INVITATION TO OFFER PROPOSAL

The City of Gatlinburg is accepting Proposals for Smoke Remediation Services at two City facilities. The two facilities are the Water Treatment Plant at 916 River Road and the Gatlinburg Convention Center at 234 Historic Nature Trail. These proposals will be received at the office of the Finance Director, Gatlinburg City Hall, 1230 East Parkway, P.O. Box 5, Gatlinburg, Tennessee 37738, **until 2:30 p.m., October 17, 2019** at which time they will be publicly opened and read aloud, and the contract awarded as soon thereafter as practicable.

Please indicate on your bid to be submitted "Bid on Smoke Remediation Services" on the outside of sealed envelope.

For questions concerning the Bid Documents, Bidders may contact City of Gatlinburg, Delea Patterson, AP/Purchasing at 865-436-1409 or Fax 865-436-6464 or deleap@gatlinburgtn.gov.

To schedule a site visit to the Convention Center, contact Scott Murphy, Interim Building Manager at 865-430-1036. Email address is ScottM@Gatlinburgtn.gov.

To schedule a site visit of the Water Treatment Plant, contact Utility Manager Dale Phelps at 865-680-5484. Email address is DPhelps@Gatlinburgtn.gov.

A site visit is required to be able to offer a proposal.

Each vendor shall be able to possess proper insurance and licensing to be able to perform necessary services. .

No bidder will be permitted to withdraw their bid for a period of thirty (30) days following the date of the bid opening.

The City of Gatlinburg reserves the right to waive any informalities in or to reject any or all bids and to accept the bid deemed favorable to the interest of the City of Gatlinburg.

GENERAL PROVISIONS

Prices quoted shall not include Federal or State taxes, if any are applicable. The successful bidder shall furnish tax exemption forms, if required, with their invoices.

The prices quoted are that for which the materials or services will be delivered F.O.B. Gatlinburg, Tennessee.

Any additions, deletions, or variations from the following specifications must be noted.

Inspection of the materials or equipment will be made by an agent of the City of Gatlinburg, and if found defective or fails in any way to meet the terms of this agreement, it will be rejected. Rejected materials or equipment will be replaced at the expense of the bidder.

All technical specifications must accompany bid.

The City of Gatlinburg reserves the right to extend this agreement for an additional twenty-four (24) months if mutually agreeable.

The City of Gatlinburg reserves the right to defer payment for thirty (30) days after delivery. The City of Gatlinburg also reserves the right to reject any and/or all bids.

The bidder agrees to indemnify the City of Gatlinburg from any and all liability, loss or damage the City may suffer as a result of claims, demands, costs, or judgments against it arising from any and all work under this agreement.

The bidder agrees to notify the City, in writing, within thirty (30) days, by registered mail, at the City's address as stated in this agreement, of any claim against the bidder on the obligations indemnified against.

SPECIFICATIONS

Locations: Gatlinburg Water Treatment Plant
916 River Road, Gatlinburg, TN

Gatlinburg Convention Center
234 Historic Nature Trail, Gatlinburg, TN

Services: Using the Smoke Damage Assessment and Remediation Protocol reports prepared by Industrial Hygienist from J.S. Held from New Orleans, LA, the vendor is requested to complete the Recommendations contained in each report. The Exhibits attached are as follows:

Exhibit A - Assessment Report for Gatlinburg Convention Center. Assessment was performed in August 2017. Exhibit is attached.

Exhibit B – Assessment Report for the Water Treatment Plant. Assessment was performed in May 2018. Exhibit is attached.

Of the Five locations tested in the months following the November 2016 Wildfires, it was recommended, based on finding of industrial hygienist, that these two locations have remediation services including cleaning of HVAC ductwork, etc.

Vendor is to use these Reports as a guide in developing plan for remediation services, etc., and offering pricing on recommended services.

Vendor must clearly state in understandable terms what services will be performed at each location.

Pricing for services should be stated by location.

Proposals will be reviewed for completeness by the City's insurance provider before project will be awarded.

Vendor should provide references of other facilities where similar services have been performed by their company. We request three (3) references with contact information and nature of service performed.

It is anticipated that Vendor may contact JS Held at phone number on Exhibit if there are questions regarding the Reports.

Vendors may use their own detailed pricing schedule if desired but must still provide total cost per location on pricing page in this document.

PRICING PAGE

Delea Patterson, AP/Purchasing
City of Gatlinburg
1230 Parkway East, P.O. Box 5
Gatlinburg, Tennessee 37738

We have reviewed the specifications and offer Smoke Remediation Services as recommended by Reports (Exhibit A and Exhibit B) as follows:

Gatlinburg Convention Center $_____

Water Treatment Plant $_____

Number of Days after award that work will begin _____

Anticipated Days to complete both locations _____

Please list References on separate page.

Please list detail services to be provided by location.

Signed/_____

_____ _____
Name (Print) Date

_____ _____
Company Name Telephone Number

_____ _____
Address Fax Number

_____ _____
City State Zip Email (if applicable)

EACH BIDDER SHALL SUBMIT THIS STATEMENT OF COMPLIANCE WITH THEIR BID.

For Title VI and IX compliance, we ask for voluntary disclosure of the following information:

Gender: Male _____

Female _____

Race: Caucasian _____

African American _____

Other _____
(Please specify)

Bidders List
(Project is open to all Qualified Vendors)

Restoration 1 of Knoxville
2309 Maryville Pike
Knoxville, TN 37920
865-213-5434
Thomas.Riordan@restoration1.com

SERVPRO of Sevier, Jefferson & Cocke Counties
P.O. Box 963
Kodak, TN 37764
Phone: (865)654-0792
Email: crewchief1@servpro8755.com
Fax Number: (865) 429-4570

ServiceMaster 24/7 Restoration
2929 Northwest Park Drive
Knoxville, TN 37912
(865) 407-2982
Don@servicemaster247restoration.com

All Pro Restoration, Inc.
P.O. Box 942
Lenoir City, Tennessee, 37771
Phone: (865) 688-1774
Fax: (865) 671-7534
allprorestorationservicesinc@gmail.com

EXHIBIT B

JS HELD ANALYSIS
WATER PLANT

CUNNINGHAM LINDSEY
NASHVILLE, TENNESSEE
(CLAIM NUMBER ATL131768)

SMOKE DAMAGE ASSESSMENT AND REMEDIATION PROTOCOL

CITY OF GATLINBURG
WATER PLANT
GATLINBURG, TENNESSEE

MAY 2018

PREPARED BY:

JS|HELD

365 CANAL STREET, SUITE 2760
NEW ORLEANS, LOUISIANA 70130
(504) 561-6563

J.S. HELD PROJECT NO: 18040955

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1.0 INTRODUCTION

J.S. Held LLC (J.S. Held) was retained by Cunningham Lindsey (Claim No.: ATL131768) to assess and collect representative smoke combustion byproduct samples from the City of Gatlinburg Water Treatment Plant, located at 916 River Road in Gatlinburg, Tennessee. The potential smoke contamination was pursuant to a wildland fire that occurred on November 28, 2016. There was a concern that there may still be smoke combustion byproducts in the building and in the Heating Ventilation Air Conditioning (HVAC) systems.

J.S. Held performed an assessment of the HVAC return air systems in the building and collected tape lift samples for combustion byproducts analysis to identify potential smoke impact. This report contains the observations from the assessment, photographs attached as **Appendix A**, sample results attached as **Appendix B**, and recommendations for the restoration of the buildings are also provided herein.

The fires originated to the South of Gatlinburg and moved into the area, destroying buildings as it moved rapidly to the North. The movement and spread of the fire was assisted by the prevailing wind direction from the South to Southeast. Gatlinburg weather data obtained from Weather Underground (www.wunderground.com) by hour for November 28, 2016 is attached in **Appendix C**, while **Figure 1** indicates the location of the Gatlinburg Water Treatment Plant, as well as some of the businesses which were destroyed in the fire. The Water Treatment Plant is located to the east of the reported fires, and the fire burned to the fence line of the property, with smoke potentially being carried by wind based on weather reports.

An Industrial Hygienist from J.S. Held was onsite May 7, 2018 to assess the HVAC systems of the building for the presence of smoke impact. The assessment included a visual inspection of the HVAC return air systems, the collection of digital photographs, and collection of surface samples from areas within the return air systems from two HVAC systems in the building. J.S. Held utilized the following guidance documents for assessing potentially smoke-impacted units and determining the scope of cleaning:

- Institute of Inspection, Cleaning and Restoration Certification (IICRC) S500 (fourth edition);
- Restoration Industry Association Guidelines for Fire and Smoke Damage Repair (second edition);
- Environmental Implications of Combustion Processes, Chapter 3 Soot, CRC Press, Boca Raton, FL, Puri, I.K. 1993; and
- Los Angeles County Department of Public Health, "How to Clean up Smoke and Soot from a Fire, June 11, 2013.

2.0 GENERAL OBSERVATIONS

The Water Treatment Plant is located at 916 River Road in Gatlinburg, Tennessee, and is a two-story building. The exterior of the building is of stone construction. The roof is of fiberglass shingle construction. The interior walls are a combination of masonry block, ceramic tile, and drywall. The building has six entry doors and twenty-two (22) windows. J.S. Held did not observe any smoke odors in the main areas of the building or in the areas of the HVAC units. The Water Treatment Plant appeared visually clean, and there were no visible signs of smoke deposition. The Plant Manager, John Leatherwood, stated that after the fire the building smelled of smoke but that it had been cleaned by internal workers and that areas of the interior had been painted over the past year.

3.0 SAMPLE COLLECTION

In order to evaluate whether particles of combustion byproducts have been deposited on any surfaces inside the HVAC systems, it is necessary to collect various samples for laboratory analysis. Combustion byproducts are defined by the analytical laboratory to be those materials that are consistent in morphology (i.e., structure) with soot, char, and/or ash. Black Carbon (Soot) is defined as a randomly formed particulate of carbon, commonly with a spherical to pseudo-spherical (aciniform) morphology. It is a byproduct of uncontrolled combustion. Char is defined as the layer of black particulate resulting from the burning of organic material which retains the morphology of the original substance, and ash is defined as the white outermost layer resulting from the burning of organic material with only slight remains of the original morphology detectable.

Although there are no regulatory guidelines as to soot, char or ash impact levels on surfaces, J.S. Held utilizes the following criteria to determine the extent of surface impact based on soot, char or ash concentrations:

Ratio (%) and Surface Concentration		
Classification (Impact)	**Total Fire Residue (Ratio %)**	**Total Fire Residue (ct/mm^2)**
Low	<1 %	<1
Upper Background	1 – 3 %	1 – 5
Moderate	3 – 10 %	5 – 50
High	>10%	>50

As the purpose of the assessment was to evaluate impact to the HVAC systems within the buildings from the fire, J.S. Held developed the following sampling strategy. Locations identified for sample collection were selected based up the following criteria:

- The area's proximity to the fire;

- Surfaces where soot, debris, and other environmental dust would typically collect; and
- Area where visible dust and debris were present (indicating the area had not been cleaned for some time; and therefore, any soot or other environmental dust that may be attributed to the fire event may still be present.)

The impact of dust loading is important in the evaluation of samples. For the interpretation of the results, the total ratio percent results column is utilized when there is heavy dust loading and/or long-term settled dust. If dust loading is not considered, the percent ratio of the result between the fire residue and the dust loading would be skewed to be falsely elevated in the total ratio percent column. With samples with light loading, the counts per millimeter square (ct/ mm^2) are to be used. In addition to the dust loading, the normal background (i.e. what is normally found inside of buildings) is also considered during the evaluation of samples results. Background concentrations of combustion byproducts are typically found inside of buildings, due to multiple sources that are utilized daily in a building of this type. For example, sources of combustion byproducts in a typical in the Water Treatment Plant could include combustion engine exhaust, among others.

J.S. Held collected samples from two of the HVAC systems return air areas from the building, including two samples collected from HVAC System #1 and one sample collected from HVAC System #2. Samples were collected by pressing the sterile surface of adhesive, in the form of a Bio-Tape® or clear cellophane tape, onto the surface to be evaluated, and securing each sample in its own enclosure with a unique identification number. The location where each sample was collected and the identification number of each sample were recorded on a chain of custody forms. The following samples were collected from the HVAC systems:

- Sample #1 – HVAC Unit #1 cooling fins of return;
- Sample #2 – HVAC Unit #1 on the return past the filter; and
- Sample #3 – HVAC Unit #2 behind the return filter.

The samples were shipped with chain of custody forms by overnight courier service to Environmental Analytical Associates (EAA), and samples were analyzed for the presence of combustion byproducts according to EAA FIRE-D01, fire/combustion residue constituents (quantitative), utilizing both reflected light and polarized light microscopy (10-300X). EAA is an American Industrial Hygiene Association (AIHA) accredited laboratory, and follows the International Organization for Standardization (ISO) guidelines for laboratory procedures. Photographs of samples collected are in **Appendix A**. The analytical results with chain of custody forms are provided in **Appendix B**.

4.0 SAMPLE RESULTS

The analytical results for the samples were reviewed by J.S. Held's Certified Industrial Hygienist (CIH). The results indicate that the two of the samples collected within the facility are above the upper background range for combustion byproducts, indicating impact from combustion byproducts in HVAC Unit #1. The following is a summary of the results of the sampling:

- The two (2) samples collected from HVAC Unit#1 are above the upper background range, large fire residue particles were identified, and no wildland fire indicators were present.
- The one (1) sample collected from HVAC System #2 is within the upper background range for the total percentage, as interference was identified by the laboratory. No large fire residue particles were present, no wildland fire indicators were present, and these results are potentially indicative of background levels.

5.0 LIMITATIONS

J.S. Held's smoke damage assessment that occurred on May 7, 2018 was limited to the HVAC systems of the Water Treatment Plant and a visual assessment for combustion byproducts. The sampling was limited to the return of the HVAC systems as representative sampling for combustion byproducts to identify potential smoke impact.

6.0 CONCLUSIONS

J.S. Held was retained by Cunningham Lindsey (Claim No.: ATL131768) to provide a smoke assessment and collect samples from the HVAC systems of the City of Gatlinburg, Water Treatment Plant located at 916 River Road in Gatlinburg, Tennessee. The assessment was to identify whether the HVAC systems had been impacted by smoke from wildland fires that occurred on November 28, 2016. J.S. Held performed an assessment in two HVAC systems in the building and collected samples for combustion byproduct analysis in the returns of the systems.

The samples collected in the HVAC systems of the Water Treatment Plant indicated impact from combustion byproducts present in HVAC System #1 and within the upper background range of combustion byproducts present in HVAC System #2. The Water Treatment Plant is located to the east of the reported fires; however, the fire burned to the fence line of the property. The analytical data of impact from combustion byproducts in the HVAC system is also supported by the weather data.

7.0 RECOMMENDATIONS

J.S. Held recommends that the two HVAC systems be cleaned in the Water Treatment Plant, due to the elevated presence of combustion byproducts within the return air systems. Although the one sample collected in HVAC #2 indicated combustion byproducts within the upper background range, J.S. Held recommends cleaning the unit due to the fact that both samples collected in HVAC #1 were impacted. A cleaning protocol for the Water Treatment Plan HVAC systems is provided in **Section 8.0** of this report.

8.0 HVAC CLEANING PROTOCOL

This protocol is based solely on the observations and data that was visible and allowed to be collected at the Water Treatment Plant. This protocol is designed to be utilized in order to address the present impact of combustion byproducts to the two Heating Ventilation Air Conditioning (HVAC) systems at the Water Treatment Plant.

The general specifications for the cleaning of the HVAC systems were developed utilizing guidance from the: National Air Duct Cleaners Association (NADCA) Assessment, Cleaning, and Restoration of HVAC Systems 2013 (ACR2013), the National Institutes of Health - Office of Research Services (ORS) - Division of Occupational Health and Safety (DOHS), and the United States Environmental Protection Agency (EPA). J.S. Held recommends that the HVAC units be cleaned by a HVAC cleaning contractor certified by the NADCA.

I. INTRODUCTION

A. Scope of Work

This protocol scope includes all work necessary to complete the cleaning associated with the impacted HVAC systems located at the City of Gatlinburg Water Treatment Plant.

1. Equipment Components

   Components of the HVAC considered to be within the scope of work shall include:

   - Air Handling Unit (AHU) Cabinet;
   - Blower/Fan Motor;
   - Filter Segments;
   - Coil Segment;
   - Insulation;
   - Mechanical Connections; and
   - Condensate drip pan and associated drain lines.

B. Work Areas

Work areas shall consist of any area where cleaning activities associated with HVAC cleaning and/or maintenance occur.

C. General Safety Requirements

1. The following safety requirements shall be followed at all times by any and all personnel associated with HVAC system cleaning activities.
   a. Always ground drop lights with ground fault circuit interrupter (GFCI), and use only rough service drop light bulbs to avoid the dangers of electrocution and exploding bulbs.
   b. Cleaning solutions can be extremely caustic and can cause chemical burns.
2. Occupant Safety – No processes or materials shall be employed in such a manner that they will introduce additional hazards into occupied spaces.
3. See **Section IV – References & Applicable Regulations** for additional safety requirements.
4. Personal Protection
   a. Any and all Personal Protective Equipment (PPE) shall be used by properly trained and knowledgeable personnel in accordance with applicable OSHA requirements.
   b. PPE shall meet or exceed the requirements outlined to the chemical agent manufacturer and/or the chemical Safety Data Sheet (SDS).
   c. PPE shall not be altered in any way unless allowed by the PPE manufacturer. If alteration is allowed by the manufacturer, the approved method of alteration must be documented and submitted prior to any alterations of the PPE.

II. PRODUCTS

A. Equipment

1. Typical Tools Required:
   a. Particulate Collectors
      i. No particulate collectors should be opened or accessed in occupied areas or conditioned buildings once debris has been collected.
      ii. All high volume particulate collection machines shall provide sufficient airflow velocity within the ventilation system to transport airborne particulate to the collection chamber.

b. Pressurized Air Supply

i. Air compressors shall be properly sized to enable pneumatic tools to achieve manufacturer recommended pressures in accordance with this Standard.

ii. Air compressors shall be configured to reduce moisture, oil, unacceptable vapors (including fuel-fired exhaust fumes), and other contaminants prior to being discharged from pneumatic cleaning tools.

2. High Efficiency Particulate Air (HEPA) Filtered Canister Vacuums

a. All canister vacuums (wet or dry) used or located within the indoor environment shall use a HEPA filter.

B. General Tool Recommendations

1. Coil Cleaning

a. Low Pressure washing equipment; and

b. Coil cleaner injection pumps.

2. General Tools

a. Drills (cordless and corded);

b. Various hand brushes;

c. Multimeter (volts, amps, ohms);

d. Hex drivers ¼", 5/16", 3/8", ½";

e. Screwdrivers; and

f. Oxygen-Fuel Gases and associated tools for cutting and soldering.

C. Chemicals and Other Cleaning Agents

1. Chemical

a. Use of sanitizers, disinfectants and other antimicrobial products.

i. A product must be registered by EPA for a specific use before it can be used for that purpose. EPA has assessed the safety of only some antimicrobial products for use specifically in HVAC systems.

ii. The product manufacturer's directions under which the product can be used, shall be followed.

iii. All hazards and precautionary statements shall be read and the product is to be used strictly according to its label.

iv. As a precaution, NO occupants will be allowed in the room during application. Occupants will only be permitted to return until after the minimum time duration specified within the product manufacturer's instructions.

2. Approval of sanitizers, disinfectants and other antimicrobial products
   a. Any and all products shall be approved prior to use.
   b. All SDS for each chemical to be used must be maintained.

III. WORK PROCEDURE

The following HVAC cleaning procedures, along with any applicable industry best practices and requirements, shall be followed during this project. Where there is a conflict or overlap of above requirements, the most stringent provisions will apply.

A. Containment and Protection of Nearby Surfaces

1. Protective Coverings
   a. 6-mil polyethylene (poly) or equivalent sheeting shall be utilized to protect each work area and its contents.
   b. A 6-mil sheet shall be placed in the following locations .
      i. On the floor immediately surrounding the HVAC and extending out three feet (3 ft.) in all directions or to the nearest wall, if within the three-foot radius, and extending up the wall at least six inches (6 inches);
      ii. The wall immediately above the HVAC; and
      iii. On other building substrates, which may be impacted by cleaning activities.
   c. All 6-mil sheets shall be sealed in such a manner that it will remain secure and prevent any impact from cleaning activities and/or cross contamination.
2. Housekeeping (Dust Control)
   a. The cleaning personnel shall:
      i. Maintain all surfaces throughout the room free of accumulation of dust and debris to prevent further dispersion.
      ii. Use approved industrial vacuum cleaners with HEPA filters to collect dust and small scrap.
      iii. The blowing down of any space with compressed air is forbidden.

iv. Workmen shall clean-up their own areas.

b. In addition to the control measures mentioned above, personnel are responsible for implementing any additional engineering controls to prevent cross contamination from occurring.

B. Energy Isolation

1. Before carrying out any cleaning activities, the electrical power to the HVAC system shall be disconnected.
2. Energy isolation shall be verified through the use of a lockout/tagout system.

C. HVAC Housing

1. The outer surface of the HVAC housing shall be cleaned prior to removal:
   a. Remove items such as paper and other general trash item from around the housing and dispose of the items in a 6-mil disposal bag.
   b. Using a HEPA vacuum, remove any accumulated dust from the top and sides of the HVAC housing, as well as, from underneath the HVAC.
   c. Wipe the housing with a mild, environmental safe detergent.
2. Using the appropriate tool, loosen the fasteners around the housing.
3. Make a record of any loose and/or missing fasteners.
4. If fasteners are able to be completely removed, do so and place to the side of the work area.
5. Remove the necessary sections of the HVAC housing in order to gain the access to the coils.
6. Once the housing has been removed, use a HEPA vacuum to vacuum the interior surface of the HVAC housing.
7. Inspect the fiberglass insulation, in addition to other HVAC system insulation.
8. If insulation is damaged, shows signs of fungal growth or is in an otherwise poor condition:
   a. Remove the insulation from the HVAC housing.
   b. Place the removed insulation in a 6-mil disposal bag.
   c. Install a new section of insulation.
      i. Insulation shall match any and all requirements and specification described by the manufacturer.

ii. Installation of a new section of insulation shall be in accordance with the manufactures specifications.

9. If insulation is good condition:
   a. Using a HEPA vacuum, clean the insulation of any dirt, dust, and/or debris.
   b. Make any required minor repairs.
10. HEPA vacuum all other areas of the HVAC housing.
11. Using a damp rag, wipe clean all areas around the insulation. **DO NOT GET THE INSULATION WET.**
12. Place housing to the side of the work area, but remaining on 6-mil poly sheeting, and allow to dry.

D. Air Filter and Filter Housing

1. Remove the filter frame, if necessary, and dispose of old filters in a 6-mil disposal bag.
2. HEPA vacuum the filter housing in order to remove all loose debris.
3. Remove the filter housing.
4. Clean the filter housing with a damp rag and applicable detergents.
5. Ensure the filter housing has no defects that may damage the filter upon its replacement.
6. Set filter housing to the side of the work area to all proper drying.
7. When replacing filters ensure airflow arrows are pointed downstream (in the direction of airflow).

E. Drain Pans and Drain Lines

1. Rusted or deteriorated drain pans shall be assessed for replacement.
2. All surfaces of the drain pan shall be wet-cleaned with proper detergent cleaners designed for this purpose, and physically scrubbed inside and out to dislodge contaminants.
3. Contaminants in the drain pan shall be removed with a HEPA-filtered, wet vacuum during this process to prevent particulate and other biological matter from entering the drain line.
4. During the cleaning process, the drain line shall be cleared as required to ensure continuous, free drainage.

5. Cleaning personnel shall inspect and ensure all drain pans are sloped to allow for proper drainage.
6. Drains pans that do not drain properly, or pans that continually hold water after the HVAC cycles off, shall be noted to the client or the client's representative.

F. Motors / Blower Assembly

1. Using a HEPA vacuum cleaner and a brush, clean the wheel and housing.
2. Utilize a damp cloth and detergent to wipe all surfaces of the motors and blowers.

G. Electric Heating Elements (if applicable)

1. If applicable, use the proper tools to remove all fasteners which hold the heating element in place.
2. When heat exchanger coils cannot be removed, surfaces surrounding the coil, such as internal insulation or electronic devices, should be temporarily isolated and protected from water/detergent overspray.
3. Once removed, electrical components must be protected before the elements are wet-washed with detergent.
4. Clean the heating element.
5. Once the heating element has been cleaned, place it to the side of the work area to be dry.

H. Coils Segment Cleaning

1. Coils should be cleaned annually or when visible accumulation of dirt and debris is observed.
2. Line or protect the interior of the HVAC housing with a moisture barrier to prevent water and cleaning solution run-off from contacting the unit's insulation or any porous surfaces.
3. Next, inspect the coil for total blockage by placing a bright incandescent or fluorescent drop light behind it.
4. The front and back of the coil should be dry-brushed several times before applying cleaning solution using a soft stainless steel, or brass bristle brush, to avoid damaging the coil's fins.
5. Use the wet vacuum (HEPA-filtered when located indoor) and a soft bristle brush attachment to remove the loose coil surface particulate.

6. Several precautions must be taken to ensure that the large amounts of water used to rinse the coils is controlled.
    a. Clear drain lines, allowing water to flow freely.
    b. Ensure the entire area is protected with a water impermeable tarp.
7. Do not begin any coil cleaning process until the drain line is clear.
8. After the debris has been removed from the coil, begin applying cleaning agents to the side of the coil which the airflow hits first.
9. Apply the cleaning solution from the top of the coil downward, allowing it to flow slowly.
10. Both sides of the coil need to be treated in this manner, allowing the coil cleaner to emulsify the internal dirt and debris.
11. Once the maximum penetration has been achieved, a thorough rinsing with fresh water must follow.
12. All chemical residues must be rinsed off the coil fins before the system is put back into operation.
13. Check constantly to be sure no water or cleaning solution leaks onto external surfaces. Leakage can cause severe damage to ceilings, walls, floors and carpeting.
14. When cleaning is complete, the coil must be meticulously inspected to ensure that it is entirely free of contaminates.

I. Ducting

1. Identify the type of ducting (flexible, semi-rigid, rigid) used in the HVAC system and proceed accordingly:
    a. Flexible and semi-rigid ducting (internal insulation) shall be removed from the impacted systems identified in this report above.
    b. Rigid (hard) ducting (no internal insulation) shall be cleaned and sanitized throughout the system.
        i. HEPA vacuum the interior surfaces and walls of the rigid ducts.
        ii. Use a damp cloth and detergent to wipe all interior surfaces and walls of the rigid ducts.

J. Post Cleaning Activities

1. Verification:
    a. Cleanliness verification shall be performed on all specified components to verify compliance with these specifications.

b. All components within the project scope of work shall achieve, at minimum, the level of visibly clean or the specified method of cleanliness verification defined in the contractual documents.

c. Cleanliness verification is done immediately after HVAC system component cleaning and prior to use in operation.

i. Surface samples for combustion byproducts should be collected and shipped under Chain of Custody (COC) to EAA located in Bay City Michigan for analysis, which includes Polarized Light Microscopy (PLM) and Reflected light microscopy.

d. Visual inspection of porous and non-porous HVAC components shall be conducted to assess that the HVAC is visibly clean.

e. An interior surface is considered visibly clean when it is free from non-adhered substances and debris.

f. If a component is visibly clean, then no further cleanliness verification methods are necessary.

g. If component is not visually clean, additional cleaning shall be required.

h. This process shall be repeated until the component in question is considered visibly clean by J.S. Held field personnel.

2. Reassembling of HVAC:

a. HVACs may not be reassembled until the following conditions have been met:

i. Verification of cleaning has been approved; and

ii. All components of the HVAC are dry.

b. All components of the HVAC shall be reassembled.

3. HVAC Equipment Check and Activation:

a. Once cleaned, verified and reassembled, the components of the HVAC shall be returned to the setting recommended by the manufacturer.

b. All system components shall be activated to verified as operation prior to attaching the HVAC housing.

4. Disposal:

a. All debris associated with the HVAC cleaning project shall be disposed of using appropriate disposal bags.

b. Disposal bags shall consist of a 6-mil thick clear disposal bag.

c. Disposal bags shall have the collar of the bags sealed with reinforced tape prior to leaving the work area.

d. Debris disposal and removal shall be in accordance with any applicable owner, local, state, and/or federal regulations.

IV. REFERENCES & APPLICABLE REGULATIONS

A. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE)

ASHRAE Handbook – HVAC Systems and Equipment

B. Air Conditioning Contractors of America / American National Standards Institute (ANSI) Publication

ANSI/ACCA Standard 4 QM – 2013: Maintenance of Residential HVAC Systems

ANSI/ACCA Standard 4 QR – 2015: Resorting the Cleanliness of HVAC Systems

C. Air Conditioning, Heating, and Refrigeration Institute / American National Standards Institute (ANSI) Publication

ANSI/AHRI Standard 440 with Addendum 1 – 2008 – Performance Rating of Room Fan-Coils

D. National Air Duct Cleaners Association (NADCA)

ACR: The NADCA Standard for Assessment, Cleaning, and Restoration of HVAC Systems – 2013

E. Code of Federal Regulations

OSHA

29 CFR 1910.22 – Walking-Working Surfaces – General Requirements

29 CFR 1910 Subpart I – Personal Protective Equipment (1910.132-1910.138)

29 CFR 1910.101 – Compressed Gases (General Requirements)

29 CFR 1910.102 – Acetylene

29 CFR 1019.104 - Oxygen

29 CFR 1910.147 – The control of hazardous energy (lockout/tagout)

29 CFR 1910.147 App. A – Typical minimal lockout procedures

29 CFR 1910 Subpart P – Hand and Portable Powered Tools and Other Hand-Held Equipment (1910.241-1910.244)

29 CFR 1910.251 – Welding, Cutting, and Brazing – Definitions

29 CFR 1910.252 – General Requirements

29 CFR 1910.253 – Oxygen-fuel Gas Welding and Cutting

29 CFR 1910.1000 – Air Contaminants

29 CFR 1910.1200 – Hazard Communications

FIGURES

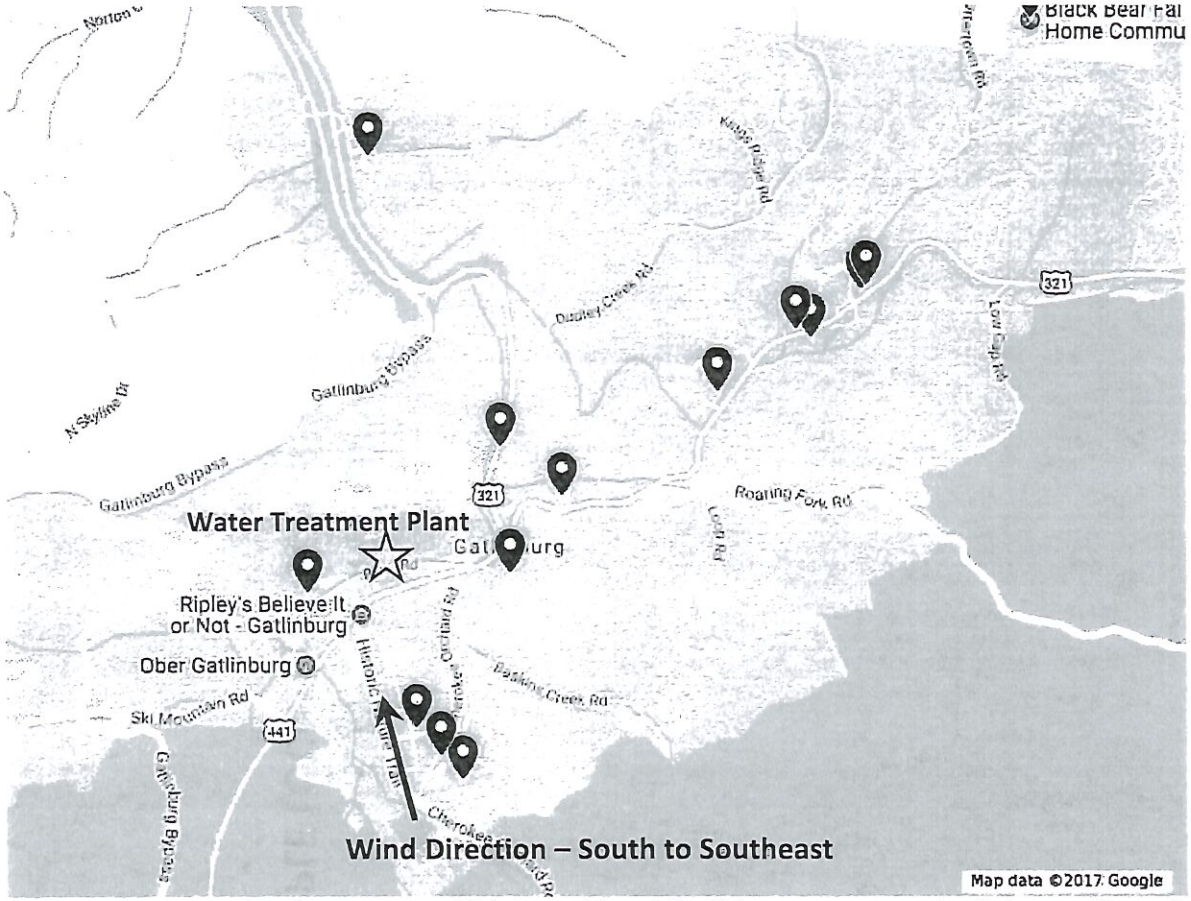
FIGURE 1

CITY OF GATLINBURG
SAMPLE LOCATIONS AND REPORTED FIRES

What's burned in Gatlinburg

Burned Businesses

- Arrowmont School of Arts and Crafts
- The Park Vista Hotel
- Driftwood Apartments
- Hillbilly Golf
- Chalet Village
- Creek Place Properties
- NAPA Auto Parts
- Southland Car & Jeep Rentals
- Black Bear Falls Log Home Community
- Alamo Steakhouse
- Cherokee Orchard Road
- Riverhouse Motor Lodge
- Starr Crest Resort
- Westgate Smoky Mountain Resort & Spa
- Troy Drive
- Cupid's Chapel Of Love
- Gatlinburg Church of Christ
- Mountain Lodge Restaurant



Reports from eyewitnesses, state officials and local firefighter crews on what's been affected by the wildfires in Gatlinburg.

Source: http://www.knoxnews.com/story/news/2016/11/29/map-bussinesses-burned-gatlinburg-fire/94586732/

Figure 1 Sample Locations and Reported Fires Cunningham Lindsey Claim No.: ATL131768 City of Gatlinburg Gatlinburg, Tennessee	N W E S	DATE: May, 2018 DESIGNER: S. Trauth PROJECT NO.: 18040955	JS|HELD

APPENDICES

APPENDIX A

PHOTOGRAPHS

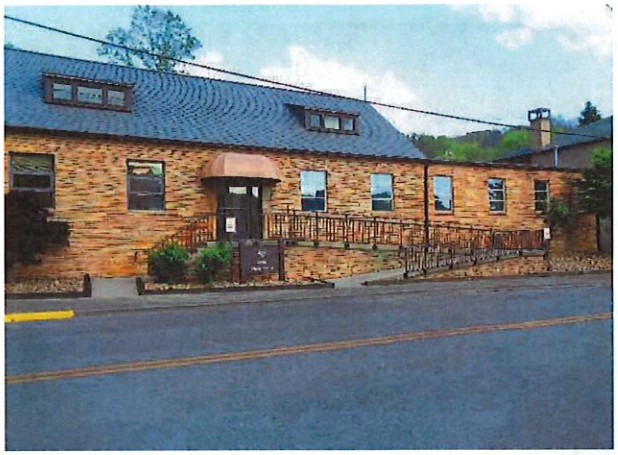


Figure (1) – Exterior front of Water Treatment Plant

Figure (2) – Exterior front of Water Treatment Plant

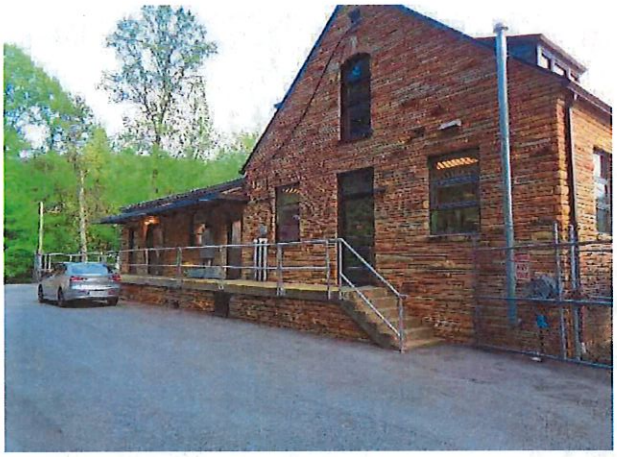


Figure (3) – West side of building

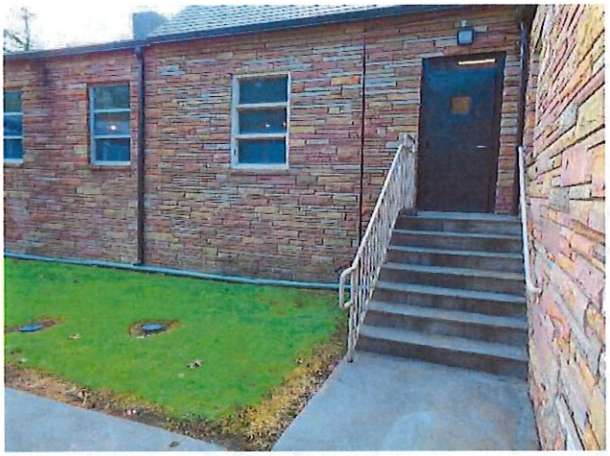


Figure (4) – Rear (North) of building

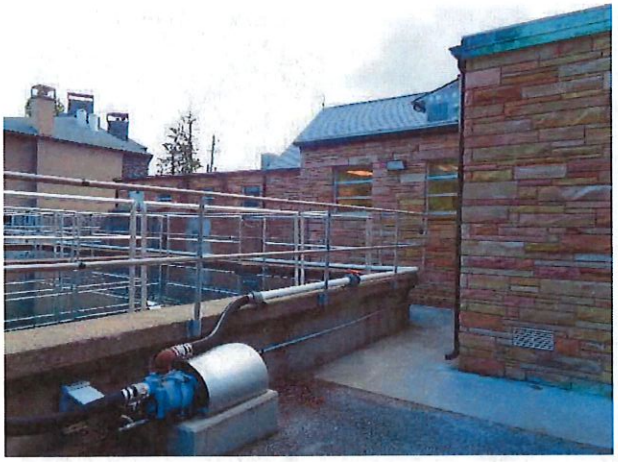


Figure (5) - Rear of building

Figure (6) – Entering from West side entry door

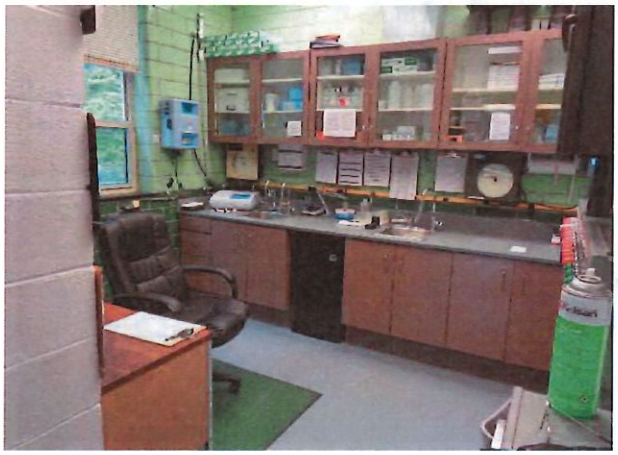


Figure (7) – Lab area

Figure (8) – HVAC grill in Lab area

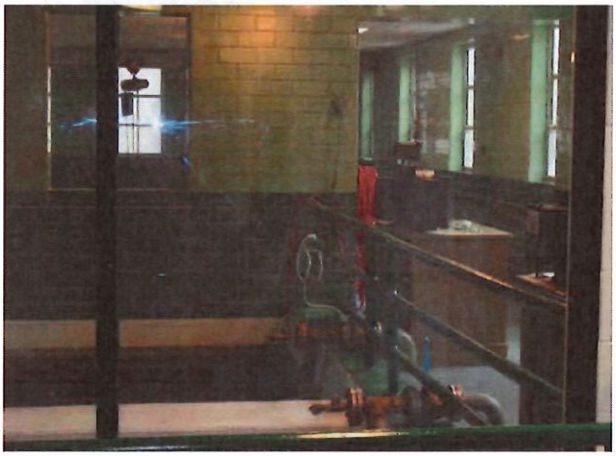


Figure (9) – Water holding bins in building

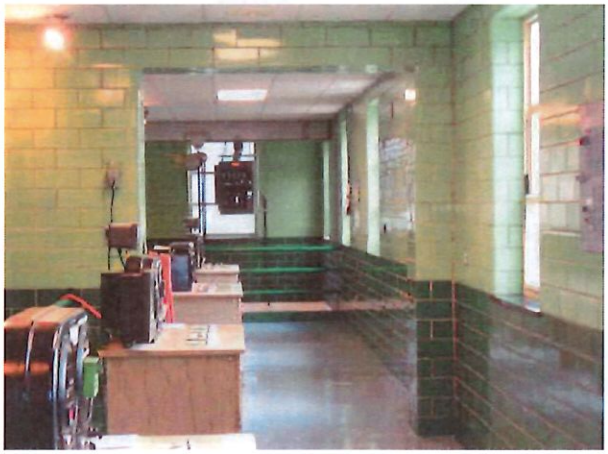


Figure (10) – Water holding bin area inside building

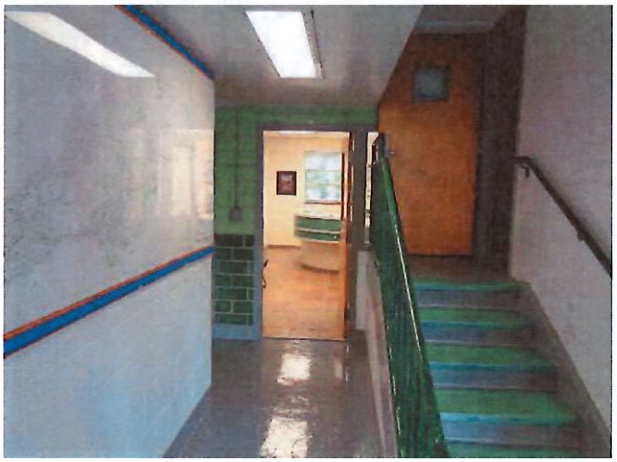


Figure (11) - Door leading to office and stairwell to 2nd floor

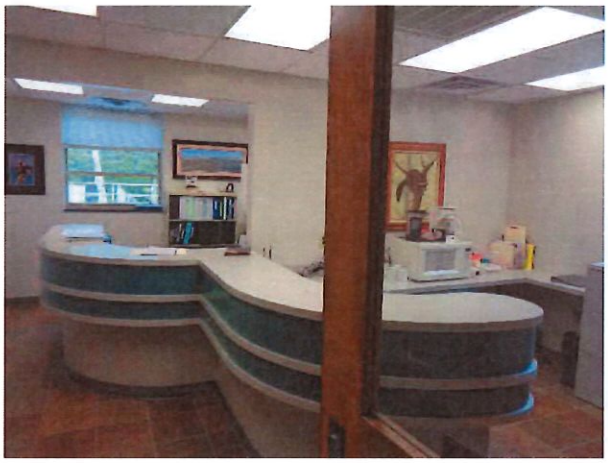


Figure (12) – Office Room

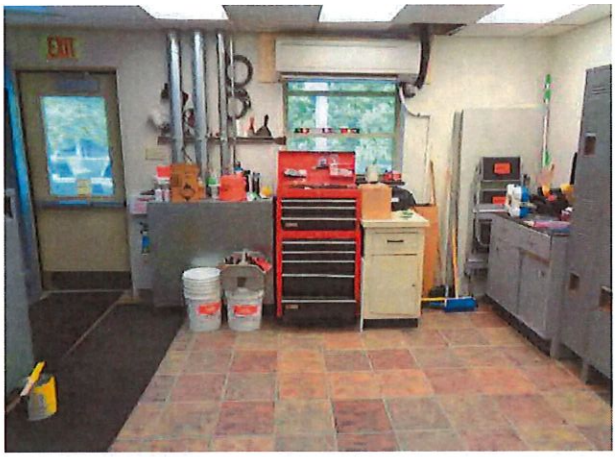


Figure (13) – Storage Room

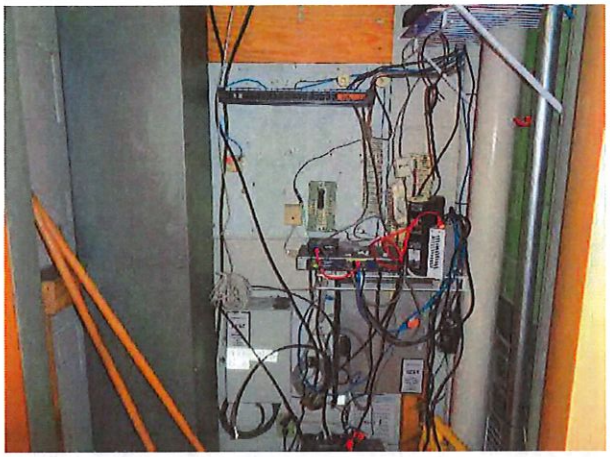


Figure (14) – Electrical/Telephone equipment room

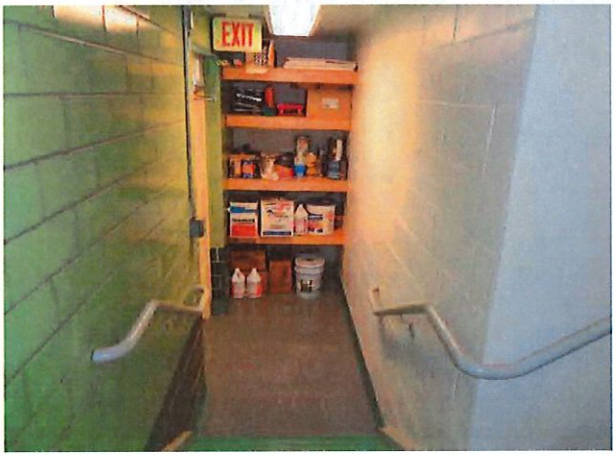


Figure (15) – Small storage area off stairwell

Figure (16) – Stairs leading to 2nd floor offices

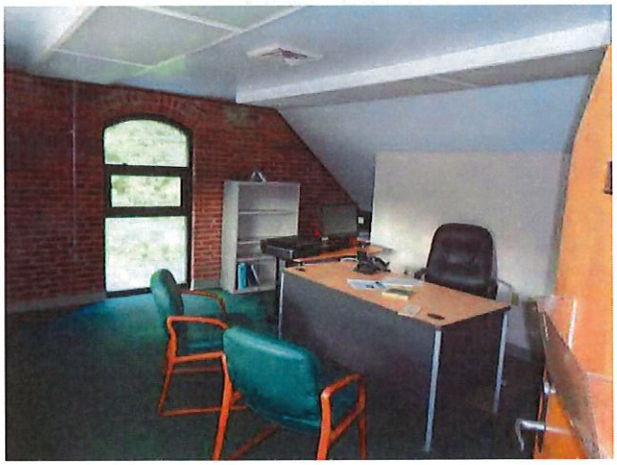


Figure (17) - Office on 2nd floor

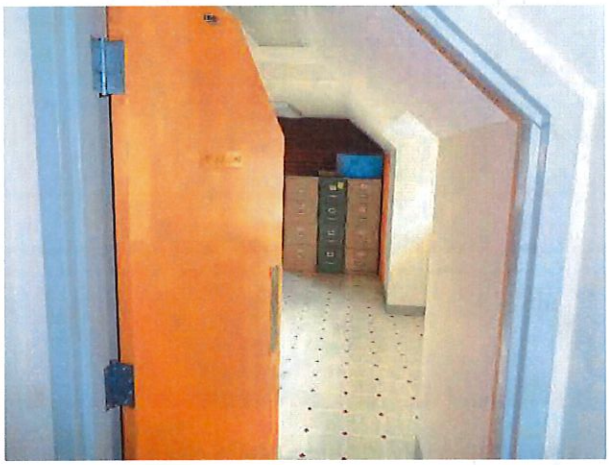


Figure (18) – 2nd office on 2nd floor

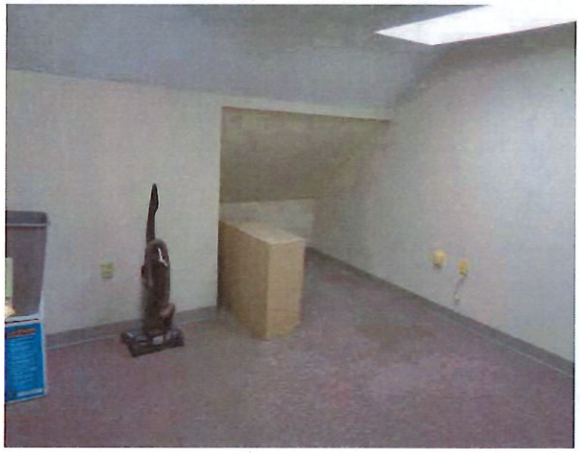


Figure (19) – 2nd office on 2nd floor

Figure (20) – Employee breakroom on 2nd floor

Figure (21) – Stairwell leading to 2nd Floor

Figure (22) – #1 HVAC System on 2nd floor

Figure (23) – #1 HVAC System Return on 2nd floor

Figure (24) – #1 Tape Lift Sample from #1 HVAC Return

Figure (25) – #1 Tape Lift Sample from #1 HVAC Return

Figure (26) – #2 Tape Lift Sample from #1 HVAC Return

Figure (27) – #2 Tape Lift Sample from #1 HVAC Return

Figure (28) – #2 HVAC System on 2nd floor

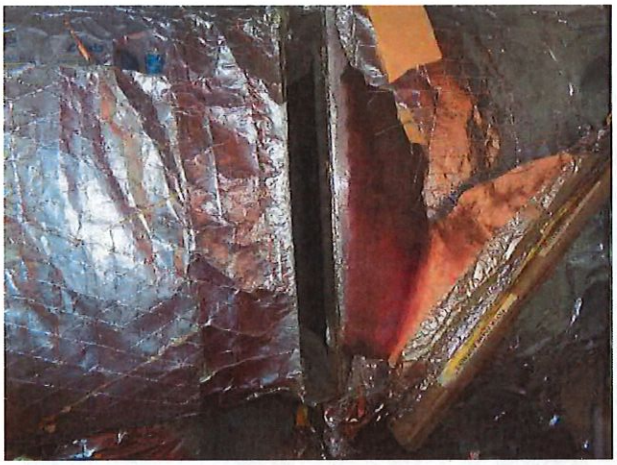


Figure (29) - #2 HVAC System Return

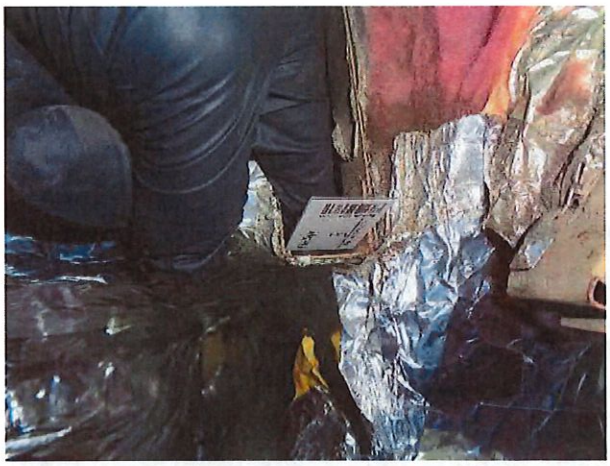


Figure (30) – #3 Tape Lift Sample from #2 HVAC System return

Figure (31) – #3 Tape Lift Sample from #2 HVAC System return

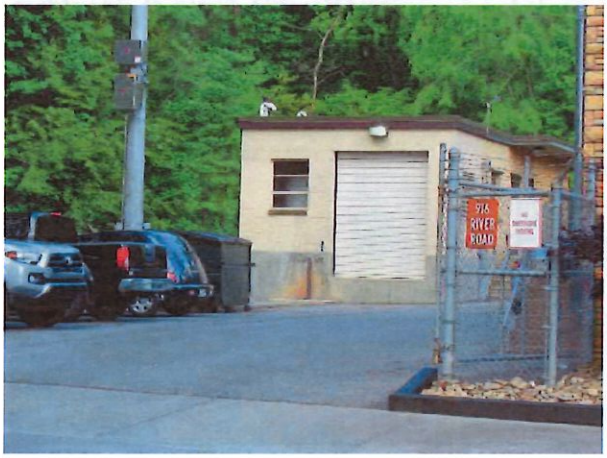


Figure (32) – Chemical and treatment building on West side of building

Figure (33) – West side fence behind chemical and treatment building where fire burned up to fence line

Figure (34) – Rear of chemical/treatment building where fire burned to fence line

Figure (35) – Back wall of chemical/treatment building

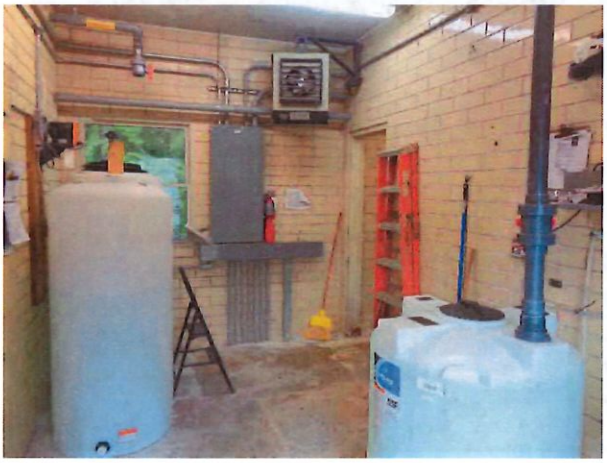


Figure (36) – Room #1 inside chemical/treatment building

Figure (37) – Room#2 inside chemical/treatment building

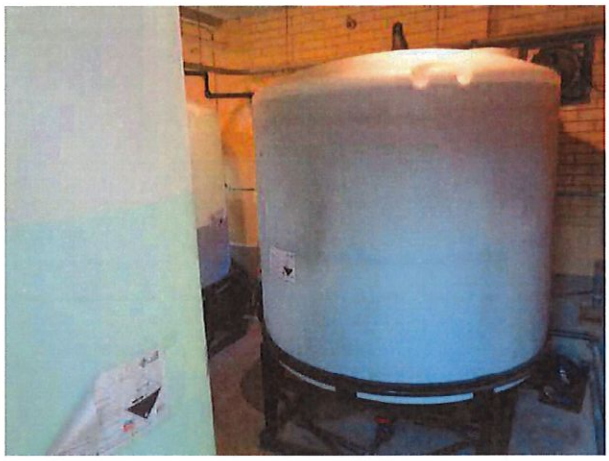


Figure (38) – Room#3 inside chemical/treatment building

APPENDIX B

COMBUSTION BYPRODUCT ANALYTICAL DATA

EAA Project # : (Lab use only) 18-0467

Environmental Analysis -SAMPLE COLLECTION / CHAIN OF CUSTODY FORM

Your Contact Information		Your Project Information	
Company name:	J.S. Held, LLC	Client Proj.# :	18040955
Address:	365 Canal Street, Suite 2760	Proj. Descrip. :	Gatlinburg water Treatment Plant
City/State/Zip :	New Orleans, LA 70130		
Phone # :	504-561-6563	Special Instructions	
Email address :	dhamm@jsheld.com		
Date collected :	5-8-18		
Contact Name :	David Hamm		
Date Submitted :	5-9-18		

Analysis requested *Check appropriate boxes, Method code, or describe the analysis if different*

Air Optical
- [ ] Airborne mold
- [ ] Airborne dust aerosols
- [ ] Airborne fire residue
- [ ] Airborne fiberglass only
- [ ] Other _____
- [ ] _____
- [ ] Photo report?

Dust
- [ ] Quantitative dust (cts/mm^2)
- [ ] Mold only tape (Qualitative)
- [X] Fire residue / dust
- [ ] Bulk mold sample (Qualitative)
- [ ] Surface mold tape (cts/mm^2)
- [ ] Bulk mold sample (Qualitative)
- [ ] Photo report?
- [ ] pH analysis (wildfire)

Electron Microscopy
- [ ] Bulk debris analysis
- [ ] Automated air or dust particle analysis
- [ ] Automated Fire chemistry analysis
- [ ] Material composition / comparison
- [ ] Particle identification
- [ ] Quantitative sample analysis (hourly)
- [ ] Other

Method code: *(if known)*

Sample Turnaround
- [X] Normal 2-5 days
- [✓] Rush 24 hr. (50% surcharge)
- [ ] Other

Sample #	Description / Location	Analysis (if different from above)	Vol. (liters)
1	From #1 HVAC System Return		
2	From #1 HVAC System Return		
3	From #2 HVAC System Return		

ENVIRONMENTAL ANALYSIS ASSOCIATES, INC.- Shipping Location Information
(All samples should be sent to Michigan unless otherwise discussed)

Michigan Lab [X] Attn: Joseph Heintskill
306 5th Street, Suite 400
Bay City, MI 48708
(989) 895-4447

San Diego - Forensic Research Lab [ ] Attn: Daniel Baxter
5290 Soledad Road
San Diego, CA 92109
(858) 272-7747

Relinquished / received	Printed Name	Company	Date	Time
David Hamm	David Hamm	JS Held, LLC	5-9-18	0900
David Heintskill	David Heintskill	EAA	5/10/18	10AM

CONTRACT TERMS

By providing signature authorization, the client acknowledges this contract is entered into, and the lab work will be performed in either San Diego, California or Bay City, Michigan. This signature binds the submitting company to provide payment for services according to EAA's fee schedule within 30 days above from receipt of the project invoice. A 1% finance charge per month will be charged on overdue invoices.

Date : 5/10/18
Client : J.S. Held, LLC
Client Project # : 18040955
Client Project Description : Gatlinburg Water Treatment Plant
EAA Project # : 18-0467

BACKGROUND

All fire/combustion residues are a complex mixture of fragile and potentially soluble combustion by-products, soil minerals, construction dust, vegetation, corrosion particles, and resins. Wildland fire residues contain not only the combustion by-products of the vegetation source, but also contain "unburned" soil and vegetation indicators generated by "firestorm" winds usually associated with the fire event. Accurate "Microscopy" analysis of combustion particles (especially wildfire ash), requires that the sample collection method will retain the original particle morphology and chemistry. This is best accomplished by using tape lift sampling, or vacuum dust samples as a secondary method. It is important to note that particle surface density concentrations can only be measured from surface tape lift or filter samples, and cannot be accurately measured from bulk dust, "wipe", or swab samples. Characterization of combustion particles cannot always be described by a straight-forward or simplistic numerical value. The particle size distribution, concentration ratio percent (%), surface particle deposition density in counts per square millimeter (cts/mm^2), and "assemblage" particle distribution all need to be considered. The Environmental Analysis Associates (EAA) method provides a combined qualitative and systematic quantitative analytical approach. This report provides both qualitative and quantitative estimates of common "fire/combustion" particles (i.e. soot, char, ash), & other contextual "assemblage" particles, including burned soil mineral grains, pollen, plant phytoliths, etc., when they are found in significant concentrations. When a specific distribution or contextual "assemblage" of indicator particles is present, it can help identify the potential source or origin of the fire.

ANALYSIS METHODOLOGY

The EAA fire / combustion residue analysis method utilizes a systematic sequential examination, first by low power Reflected Light Stereo-microscopy (10-50x); and then by a combination of both Reflected Light Dark Field Microscopy (100-200x), and Polarized Light Microscopy (100-600x). Quantification of the fire / combustion residue and other dust constituents present is performed at a magnification of ~300X and reported as both the "*Estimated Area Ratio %,* and the "*Particle Surface Density (cts/mm^2)*" whenever possible. The upgraded "*Estimated Area Ratio %*" method used by EAA provides a more systematic and precise method than Visual Area Estimation (VAE). This procedure provides the simultaneous quantification of area ratio estimates for multiple dust particle categories, and better defines the analytical counting and quantification rules to be used by laboratory analysts. The EAA method uses a direct measurement of the numerical particle concentration per area analyzed. These measurements are then multiplied times the average calculated particle size/area ratio (i.e. "K" factor) for each respective classification (i.e. soot, char, ash, cellulosic/synthetic fibers, mineral dust, etc.). These "size-adjusted" numerical concentrations for each particle classification are then used to calculate their relative ratio percentage in the sample. Because the surface deposition density and size distribution of fire residue and background dust particles can vary widely, the accuracy and precision of any ratio estimation method can also vary significantly and potentially become misleading when the background dust loading is very high, or very low. For this reason, providing both types of measurement techniques (i.e. area ratio % and surface particle density, i.e. cts/mm^2) is often required to more accurately quantify and understand the sample results.

REPORT INTERPRETATION GUIDELINES

This EAA analysis report contains a "**SUMMARY TABLE**" providing the condensed results for up to 12 samples/page. The summary table provides an overview of the quantitative results of the most common fire/combustion residue classifications only, i.e. (soot, char, ash, possible indicators). The summary page is followed by a detailed analytical report (one sample / page) that provides a narrative "**SUMMARY CONCLUSIONS**" section, **"QUALITATIVE LAB OBSERVATIONS",** and a section describing and quantifying other "**DUST CONSTITUENTS**" found in the sample.

The suggested steps for interpreting the EAA lab report are given on Guide page 2 of 2 below.

Client Project # : 18040955

REPORT INTERPRETATION GUIDELINES -Continued

Step 1: Examine the "**SUMMARY TABLE**" and determine the classification of the analytical results (Low, Upper Background, Moderate, or High). This data is based on EAA's examination of thousands of samples collected from "typical" fire impacted and non-impacted buildings (see reference Table given below). This table should be used as a general guide only (as there are no published standards). If the analytical results for both the "Estimated Area Ratio %" and "Total cts/mm^2" categories are within the "Low" or Upper background "Upper Bkg." range the results are likely consistent with normal background. If the levels are in the "Moderate", or "High" range, the detailed one page analytical report should be further examined to determine if the sample results may actually be elevated above background or are impacted by other factors. This requires taking into account the outside historical background such as recent fires, other possible combustion sources; and site specific conditions found inside the structure being evaluated (fireplaces, cooking, candle burning, etc.).

Step 2: Examine the "**SUMMARY CONCLUSIONS**" section in the detailed report for each individual sample. This section provides a narrative synopsis of the analytical results. The narrative summary integrates both the qualitative laboratory observations and quantitative concentration data. The comments will also list any observed interferences, impact of dust loading, or other mitigating factors that could affect the interpretation of the analysis results.

Step 3: Examine the "**QUALITATIVE LAB OBSERVATIONS**" section of the report to determine if there are any large "combustion / fire indicating" particles such as char, ash, or other fire "assemblage" particles. The presence of large char particles, ash, burned mineral grains, or plant phytoliths (even in the absence of significantly elevated fire/combustion particle concentrations) could still indicate the presence of current or historical wildland fire debris or other sources.

Step 4: Examine the "**FIRE RESIDUE / COMBUSTION CONSTITUENTS**" data section of the report to determine the the concentration of fire/combustion residue particles, and other indicator / assemblage particles that could help determine the source of the fire. Wildland fires are also usually accompanied by high winds & the lofting of other "non-burned"mineral and vegetation particles (pollen, plant trichomes, vegetation fragments). When these "non-burned" outdoor generated particles are found indoors, they may also be an indirect indicator of infiltrated dust generated by wildfire driven winds. Elevated levels of mineral dust, mold spores, vegetation fragments, pollen, and insect parts can also have potentially adverse health related implications. If significant non-biological interferences (such as corrosion particles, tire rubber, paint, etc.) are found in the analysis, additional Scanning Electron Microscopy (SEM) may be recommended to help qualify the analysis results.

Step 5: In order to determine if the measured fire / combustion residue concentrations for a specific site are "atypical", elevated above background, or associated with a specific fire event, the evaluation of control or background samples and other potential contributing combustion sources is required. The laboratory data needs to be combined with observational information gathered during a thorough visual inspection to arrive at any final conclusions. The microscopic laboratory data given in this report cannot be used by itself as a direct indicator of "contamination" or "damage".

Fire / Combustion Residue Concentrations For Buildings

Ratio % & Surface Concentrations		
Classification Range	Total Fire Residue (ratio%)	Total Fire Residue (cts/mm^2)
Low	<1%	<1
Upper Bkg.	1-3%	1-5
Moderate	3-10%	5-50
High	>10%	>50

Note: The "Total Fire Residue surface density concentrations (cts/mm^2)" is often a more reliable indicator of surface fire residue concentrations, especially when the background surface dust concentrations are very low.

ENVIRONMENTAL ANALYSIS ASSOCIATES, Inc. - 306 5th Street, Suite 400 - Bay City, MI 48708

Fire/Combustion Residue Data Summary Table

Client : J.S. Held, LLC
Client Project # : 18040955
Client Project Description : Gatlinburg Water Treatment Plant
EAA Project # : 18-0467

		Fire / Combustion Particle Concentrations Estimated Area Ratio %					* Surface Density (Cts/mm2)	Are large fire residue particles present ?	Are possible wildland fire Indicators present?	Is dust loading or other type of interference present?
Sample#	Sample Description	**Total**	Soot	Char	Ash-like	Oth. Indicator Particles				
1	From #1 HVAC system return	7.7	0.4	7.3	not detected		38.9	Yes		Yes
2	From #1 HVAC system return	3.2	0.1	3.1	not detected		21.6	Possible		Yes
3	From #2 HVAC system return	1.1	0.2	0.9	not detected		7.2			Yes

The "Estimated Area Ratio %" is the numerical "size/area adjusted" ratio between all particle categories based on the average estimated area of each particle category.
The "Surface density (Cts/mm2)" of fire residue particles is the numerical surface particle concentration independent of the amount or ratio of background dust

** Note: If the surface particle density of fire residue particles (cts/mm2) is not displayed, it was not analyzed due to significant sample overloading, or could not be performed on the collection media submitted for analysis. The surface density of fire combustion particles can only routinely be calculated on tape lift samples that are not "overloaded" with dust, or on filter samples collected from a known surface area and calculated serial dilution.*

** The summary guidelines for "Low", upper background "Upper Bkg.", "Moderate", and "High" concentrations are based on the variance of quantitative background levels (area ratio% and cts/mm2) measured by EAA in buildings. The local geographic background, site specific conditions, and other potential combustion sources must be taken into account in order to determine if an elevated or atypical fire/combustion residue condition is present.*

Fire / Combustion Residue Concentrations For Buildings

Ratio % & Surface Concentrations		
Classification Range	Total Fire Residue (ratio%)	Total Fire Residue (ct/mm2)
Low	<1%	<1
Upper Bkg.	1-3%	1-5
Moderate	3-10%	5-50
High	>10%	>50

FIRE/COMBUSTION RESIDUE & DUST ANALYSIS - Optical Microscopy

Method: FIRE-D02

Client Name : J.S. Held, LLC
Client Project # : 18040955
Requested by : David Hamm
Project Description : Gatlinburg Water Treatment Plant
Client Sample # : 1
Client sample description : From #1 HVAC system return
Sample collected : 5/8/18
Sample received : 5/10/18
Sample media : tape

EAA Project # : 18-0467
EAA Sample # : 0467-1

SUMMARY CONCLUSIONS : * Fire/combustion residue concentration measured above typical background concentrations
Qualitative observations indicate the potential presence of fire/combustion particles
Interferences present - Results may be higher or lower than reported

QUALITATIVE ASSEMBLAGE OBSERVATIONS -Reflected Light Microscopy (10-200x) / Polarized Light (100-600x)	
Lab sample description (color /texture)	Gray/black fibrous dust
Is a smoke or fire odor present ?	No
Are large char particles observed in reflected or polarized light ?	Yes
Are large ash-like particles observed in reflected or polarized light?	No
Are "burned" soil particles, pollen, or plant phytoliths observed?	No

FIRE / COMBUSTION RESIDUE CONSTITUENTS		Particle Concentration Cts/area (mm2)	Estimated Area Ratio %
	Totals	**38.9**	**7.7 %**
	Aciniform / soot-like fine particles	11.5	0.4
	Char (Pyrolized plant material)	27.4	7.3
	Ash-like mineral residue particles	not detected	not detected
	INORGANIC CONSTITUENTS		
Fibrous Constituents :	Cellulose/Synthetics	4.3	3.3
	Fiberglass/Mineral wool	36.0	27.4
Non-fibrous Constituents :	Inorganic mineral dust / soil	144.2	27.4
	Other opaque/corrosion/paint particles	47.6	9.4
	BIOAEROSOLS		
Mold Spores / Structures :	Unspecified	31.7	3.0
Pollen :	Unspecified	38.9	14.8
Plant fragments :	Flower parts, trichomes, etc.	4.3	2.1
Animal fragments :	Dander / skin cells	15.9	3.0
Miscellaneous :	Insect parts	1.4	0.4
	OTHER CONSTITUENTS		
Biogenic / organic debris :	Biogenic / other amorphous dust	5.8	1.6

Raw/extrapolated particle count : 256
Area adjusted factored count : 183
Detection Limit (Area ratio %) : 0.5
Detection Limit Cts/mm2 : 1.4

Authorized / data reviewed by Daniel M. Baxter 05/10/18

Note: Sample results are only applicable to the items or locations tested.

** The SUMMARY CONCLUSIONS describing fire/combustion residue concentrations are based on both the "qualitative indicators" present, and the variance of "quantitative" background levels measured by EAA in typical buildings. The local geographic background, site specific conditions, and other potential combustion sources must be taken into account in order to determine if an elevated or atypical condition is present. The estimated surface particle concentrations per unit surface area (Cts/mm^2) can only be calculated on surface tape lift samples.* doc.rev.12 - 2/8/18

FIRE/COMBUSTION RESIDUE & DUST ANALYSIS - Optical Microscopy Method: FIRE-D02

Client Name : J.S. Held, LLC
Client Project # : 18040955
Requested by : David Hamm
Project Description : Gatlinburg Water Treatment Plant
Client Sample # : 2
Client sample description : From #1 HVAC system return
Sample collected : 5/8/18
Sample received : 5/10/18
Sample media : tape

EAA Project # : 18-0467
EAA Sample # : 0467-2

SUMMARY CONCLUSIONS : * Fire/combustion residue concentration measured above typical background concentrations
Qualitative observations indicate the potential presence of fire/combustion particles
Interferences present - Results may be higher or lower than reported

QUALITATIVE ASSEMBLAGE OBSERVATIONS -Reflected Light Microscopy (10-200x) / Polarized Light (100-600x)	
Lab sample description (color /texture)	Gray dust
Is a smoke or fire odor present ?	No
Are large char particles observed in reflected or polarized light ?	Possible
Are large ash-like particles observed in reflected or polarized light?	No
Are "burned" soil particles, pollen, or plant phytoliths observed?	No

	FIRE / COMBUSTION RESIDUE CONSTITUENTS	Particle Concentration Cts/area (mm2)	Estimated Area Ratio %
	Totals	**21.6**	**3.2 %**
	Aciniform / soot-like fine particles	2.9	0.1
	Char (Pyrolized plant material)	18.7	3.1
	Ash-like mineral residue particles	not detected	not detected
	INORGANIC CONSTITUENTS		
Fibrous Constituents :	Cellulose/Synthetics	1.4	1.3
	Fiberglass/Mineral wool	1.4	0.6
Non-fibrous Constituents :	Inorganic mineral dust / soil	782.8	74.8
	Other opaque/corrosion/paint particles	160.0	11.5
	BIOAEROSOLS		
Mold Spores / Structures :	Unspecified	80.7	4.8
Pollen :	Unspecified	4.3	1.0
Plant fragments :	Flower parts, trichomes, etc.	not detected	not detected
Animal fragments :	Dander / skin cells	14.4	1.7
Miscellaneous :	Insect parts	1.4	0.2
	OTHER CONSTITUENTS		
Biogenic / organic debris :	Biogenic / other amorphous dust	4.3	0.8

Raw/extrapolated particle count : 744
Area adjusted factored count : 290
Detection Limit (Area ratio %) : 0.3
Detection Limit Cts/mm2 : 1.4

Authorized / data reviewed by Daniel M. Baxter 05/10/18

Note: Sample results are only applicable to the items or locations tested.

** The SUMMARY CONCLUSIONS describing fire/combustion residue concentrations are based on both the "qualitative indicators" present, and the variance of "quantitative" background levels measured by EAA in typical buildings. The local geographic background, site specific conditions, and other potential combustion sources must be taken into account in order to determine if an elevated or atypical condition is present. The estimated surface particle concentrations per unit surface area (Cts/mm2) can only be calculated on surface tape lift samples.* doc.rev.12 - 2/8/18

FIRE/COMBUSTION RESIDUE & DUST ANALYSIS - Optical Microscopy Method: FIRE-D02

Client Name : J.S. Held, LLC
Client Project # : 18040955
Requested by : David Hamm
Project Description : Gatlinburg Water Treatment Plant
Client Sample # : 3
Client sample description : From #2 HVAC system return
Sample collected : 5/8/18
Sample received : 5/10/18
Sample media : tape

EAA Project # : 18-0467
EAA Sample # : 0467-3

SUMMARY CONCLUSIONS : * Low fire/combustion residue present

Interferences present - Results may be higher or lower than reported

QUALITATIVE ASSEMBLAGE OBSERVATIONS -Reflected Light Microscopy (10-200x) / Polarized Light (100-600x)	
Lab sample description (color /texture)	Gray dust
Is a smoke or fire odor present ?	No
Are large char particles observed in reflected or polarized light ?	No
Are large ash-like particles observed in reflected or polarized light?	No
Are "burned" soil particles, pollen, or plant phytoliths observed?	No

	FIRE / COMBUSTION RESIDUE CONSTITUENTS	Particle Concentration Cts/area (mm2)	Estimated Area Ratio %
	Totals	**7.2**	**1.1 %**
	Aciniform / soot-like fine particles	2.9	0.2
	Char (Pyrolized plant material)	4.3	0.9
	Ash-like mineral residue particles	not detected	not detected
	INORGANIC CONSTITUENTS		
Fibrous Constituents :	Cellulose/Synthetics	2.9	1.7
	Fiberglass/Mineral wool	1.4	0.7
Non-fibrous Constituents :	Inorganic mineral dust / soil	399.3	58.4
	Other opaque/corrosion/paint particles	178.8	27.2
	BIOAEROSOLS		
Mold Spores / Structures :	Unspecified	23.1	1.7
Pollen :	Unspecified	2.9	0.8
Plant fragments :	Flower parts, trichomes, etc.	not detected	not detected
Animal fragments :	Dander / skin cells	53.3	7.8
Miscellaneous :	Insect parts	not detected	not detected
	OTHER CONSTITUENTS		
Biogenic / organic debris :	Biogenic / other amorphous dust	2.9	0.6

Raw/extrapolated particle count : 466
Area adjusted factored count : 237
Detection Limit (Area ratio %) : 0.4
Detection Limit Cts/mm2 : 1.4

Authorized / data reviewed by Daniel M. Baxter 05/10/18

Note: Sample results are only applicable to the items or locations tested.

** The SUMMARY CONCLUSIONS describing fire/combustion residue concentrations are based on both the "qualitative indicators" present, and the variance of "quantitative" background levels measured by EAA in typical buildings. The local geographic background, site specific conditions, and other potential combustion sources must be taken into account in order to determine if an elevated or atypical condition is present. The estimated surface particle concentrations per unit surface area (Cts/mm2) can only be calculated on surface tape lift samples.* doc.rev.12 - 2/8/18

APPENDIX C

NOVEMBER 28, 2016 WEATHER DATA FOR GATLINBURG

Claim No.: ATL131768
City of Gatlinburg
Gatlinburg, Tennessee
J.S. Held Project No.: 18040955

her History & Observations

Temperature	Windchill	Dew Point	Humidity	Pressure	Visibility	Wind Direction	Wind Speed	Gust Speed	Precipitation	Events	Co
39.0 °F	-	30.0 °F	70%	30.09 in	10.0 mi	Calm	Calm	-	N/A		C
37.9 °F	35.5 °F	30.0 °F	73%	30.06 in	10.0 mi	NNE	3.5 mph	-	N/A		C
39.0 °F	-	30.9 °F	73%	30.06 in	10.0 mi	Calm	Calm	-	N/A		C
39.0 °F	-	30.9 °F	73%	30.06 in	10.0 mi	Calm	Calm	-	N/A		C
41.0 °F	-	30.9 °F	67%	30.05 in	10.0 mi	Calm	Calm	-	N/A		C
39.0 °F	-	32.0 °F	76%	30.05 in	10.0 mi	Calm	Calm	-	N/A		C
39.9 °F	-	32.0 °F	73%	30.05 in	10.0 mi	Calm	Calm	-	N/A		C
39.9 °F	37.8 °F	32.0 °F	73%	30.01 in	10.0 mi	NE	3.5 mph	-	N/A		C
43.0 °F	-	32.0 °F	65%	30.00 in	9.0 mi	Calm	Calm	-	N/A		C
44.1 °F	41.5 °F	30.9 °F	60%	29.99 in	9.0 mi	NE	4.6 mph	-	N/A		C
46.0 °F	42.5 °F	30.9 °F	56%	29.98 in	8.0 mi	North	6.9 mph	-	N/A		C
52.0 °F	-	33.1 °F	49%	29.93 in	8.0 mi	NNE	5.8 mph	-	N/A		Mo
63.0 °F	-	39.0 °F	41%	29.86 in	10.0 mi	SSW	11.5 mph	-	N/A		C
64.0 °F	-	43.0 °F	46%	29.82 in	10.0 mi	South	23.0 mph	39.1 mph	N/A		Mo
66.0 °F	-	42.1 °F	42%	29.78 in	10.0 mi	South	24.2 mph	32.2 mph	N/A		Mo
64.0 °F	-	41.0 °F	43%	29.76 in	10.0 mi	South	20.7 mph	31.1 mph	N/A		Mo
64.0 °F	-	42.1 °F	45%	29.71 in	10.0 mi	SSE	23.0 mph	38.0 mph	N/A		C
63.0 °F	-	42.1 °F	46%	29.67 in	10.0 mi	SSE	6.9 mph	-	N/A		C
66.0 °F	-	44.1 °F	45%	29.65 in	10.0 mi	South	18.4 mph	35.7 mph	N/A		C
66.9 °F	-	45.0 °F	45%	29.63 in	10.0 mi	South	28.8 mph	36.8 mph	N/A		C
66.9 °F	-	46.0 °F	47%	29.61 in	10.0 mi	South	24.2 mph	43.7 mph	N/A		C
64.0 °F	-	51.1 °F	63%	29.65 in	8.0 mi	South	34.5 mph	48.3 mph	0.00 in	Rain	Li
61.0 °F	-	52.0 °F	72%	29.64 in	10.0 mi	South	20.7 mph	33.4 mph	0.06 in	Rain	Li
64.0 °F	-	50.0 °F	60%	29.59 in	10.0 mi	South	21.9 mph	38.0 mph	0.00 in		C

EXHIBIT A

JS HELD ANALYSIS

CONVENTION CENTER

CUNNINGHAM LINDSEY
NASHVILLE, TENNESSEE
(CLAIM NUMBER ATL131768)

SMOKE DAMAGE ASSESSMENT AND REMEDIATION PROTOCOL

CITY OF GATLINBURG
GOVERNMENT BUILDINGS AND
CONVENTION CENTER
GATLINBURG, TENNESSEE

AUGUST 2017

PREPARED BY:

JS|HELD

365 CANAL STREET, SUITE 2760
NEW ORLEANS, LOUISIANA 70130
(504) 561-6563

J.S. HELD PROJECT NO: 1409308

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APPENDIX

1.0 INTRODUCTION

J.S. Held LLC (J.S. Held) was retained by Cunningham Lindsey (Claim No.: ATL131768) to collect representative smoke combustion byproduct samples from the heating, ventilation, and air conditioning (HVAC) systems in four (4) City of Gatlinburg buildings located in Gatlinburg, Tennessee, including the Gatlinburg Convention Center, the Police Department, the Fire Department, and City Hall. It was reported to J.S. Held that smoke damage restoration activities had occurred in these buildings following impact from a wildland fire that occurred on November 28, 2016. However, there was a concern that the HVAC systems that had not been cleaned also sustained damage. The four (4) buildings were selected by the City of Gatlinburg as representative of "worst case" scenarios to identify whether the HVAC systems had been impacted by smoke from wildland fires.

J.S. Held performed an assessment of the HVAC return air systems within each of these buildings and collected tape lift samples for combustion byproducts analysis to identify potential smoke impact. This report contains the observations from the assessment, photographs attached as **Appendix A**, sample results attached as **Appendix B**, and recommendations for the restoration of the buildings are also provided herein.

The fires originated to the South of Gatlinburg and moved into the area, destroying buildings as it moved rapidly to the North. The movement and spread of the fire was assisted by the prevailing wind direction from the South to Southeast. Gatlinburg weather data obtained from Weather Underground (www.wunderground.com) by hour for November 28, 2016 is attached in **Appendix C**, while **Figure 1** indicates the locations of the selected tape lift sampling sites, as well as some of the businesses which were destroyed in the fire.

One (1) Industrial Hygienist from J.S. Held was onsite August 19, 2017 to assess the HVAC systems of each of the four (4) buildings for the presence of smoke impact. The assessment included a visual inspection of the HVAC return air systems, the collection of digital photographs, and collection of surface samples from areas within the return air systems from two (2) HVAC systems from each building. J.S. Held utilized the following guidance documents for assessing potentially smoke-impacted units and determining the scope of cleaning:

- Institute of Inspection, Cleaning and Restoration Certification (IICRC) S500 (fourth edition);
- Restoration Industry Association Guidelines for Fire and Smoke Damage Repair (second edition);
- Environmental Implications of Combustion Processes, Chapter 3 Soot, CRC Press, Boca Raton, FL, Puri, I.K. 1993; and

- Los Angeles County Department of Public Health, "How to Clean up Smoke and Soot from a Fire, June 11, 2013.

2.0 GENERAL OBSERVATIONS

Convention Center

The Convention Center is located at 234 Historic Nature Trail in Gatlinburg, Tennessee, and is a three-story building of 188,150 square feet. The exterior of the building is a combination fluted and split face masonry block, concrete block with DRYVIT coating and concrete column building. The roof is constructed of steel frame and flat rubber membrane roof. The interior finishes include exposed fluted masonry block, concrete, drywall and ceramic tile walls; acoustic tile, exposed insulation and metal ceilings; vinyl tile, carpet, concrete, ceramic tile and slate tile floors; fluorescent, incandescent and metal halide lighting; fixed metal windows; sprinkler system, and a fire alarm system. J.S. Held did not observe any smoke odors in the main areas of the building or in the areas of the HVAC units. The Convention Center appeared visually clean, and there were no visible signs of smoke deposition.

Fire Department

The Central Fire Department is located at 1230 Parkway East in Gatlinburg, Tennessee, and is a single-story building of 13,073 square feet with a 5,091 square feet basement included in the total square footage of the building. The exterior walls are constructed of masonry blocks, and the exterior finish is masonry/stone veneer and stucco. The interior consists of paneling, exposed concrete block and drywall walls; acoustic tile, drywall and exposed insulation ceilings; vinyl tile, wood laminate, carpet, and gravel and concrete floors. A total of three (3) HVAC systems are located in a mechanical room adjacent to the fire truck parking bays. The area appeared visually clean, and there were no visible signs of smoke deposition.

Police Department/City Hall

The City Hall and Police Department are co-located within the same building, which is a three-story building of approximately 20,386 square feet. The building is located on a hill, and contains a lower level below grade that is accessible from the back of the hill, as well as first and second floor accessible from the main entrance at the front of the building on top of the hill. The exterior is constructed of concrete block stone/veneer and stucco exterior. Interior finishes include paneling, concrete block, wood plank and drywall walls; acoustic tile and concrete ceilings; vinyl tile, carpet, hardwood, concrete and slate tile floors. The first and second floors contain numerous offices for city administration, planning and building departments. The lower level contains spaces for the Police Department, as well as mechanical rooms. The mechanical rooms contained several

HVAC units that appeared visually clean, and there were no visible signs of smoke deposition.

3.0 SAMPLE COLLECTION

In order to evaluate whether particles of combustion byproducts have been deposited on any surfaces inside the HVAC systems, it is necessary to collect various samples for laboratory analysis. Combustion byproducts are defined by the analytical laboratory to be those materials that are consistent in morphology (i.e., structure) with soot, char, and/or ash. Black Carbon (Soot) is defined as a randomly formed particulate of carbon, commonly with a spherical to pseudo-spherical (aciniform) morphology. It is a byproduct of uncontrolled combustion. Char is defined as the layer of black particulate resulting from the burning of organic material which retains the morphology of the original substance, and ash is defined as the white outermost layer resulting from the burning of organic material with only slight remains of the original morphology detectable.

Although there are no regulatory guidelines as to soot, char or ash impact levels on surfaces, J.S. Held utilizes the following criteria to determine the extent of surface impact based on soot, char or ash concentrations:

Ratio (%) and Surface Concentration		
Classification (Impact)	**Total Fire Residue (Ratio %)**	**Total Fire Residue (ct/mm^2)**
Low	<1 %	<1
Upper Background	1 – 3 %	1 – 5
Moderate	3 – 10 %	5 – 50
High	>10%	>50

As the purpose of the assessment was to evaluate impact to the HVAC systems within the buildings from the fire, J.S. Held developed the following sampling strategy. Locations identified for sample collection were selected based up the following criteria:

- The area's proximity to the fire;
- Surfaces where soot, debris, and other environmental dust would typically collect; and
- Area where visible dust and debris were present (indicating the area had not been cleaned for some time; and therefore, any soot or other environmental dust that may be attributed to the fire event may still be present.)

The impact of dust loading is important in the evaluation of samples. For the interpretation of the results, the total ratio percent results column is utilized when there is heavy dust loading and/or long-term settled dust. If dust loading is not considered, the

percent ratio of the result between the fire residue and the dust loading would be skewed to be falsely elevated in the total ratio percent column. With samples with light loading, the counts per millimeter square (ct/ mm^2) are to be used. In addition to the dust loading, the normal background (i.e. what is normally found inside of buildings) is also considered during the evaluation of samples results. Background concentrations of combustion byproducts are typically found inside of buildings, due to multiple sources that are utilized daily in a building of this type. For example, sources of combustion byproducts in a typical convention center could include catering and restaurant services from cooking and heating with sternos/candles, combustion engine exhaust, etc. Multiple sources of combustion byproducts could be found in the Fire Department, such as engine exhaust, particulates from clothing and equipment, etc.

J.S. Held collected a sample from two (2) of the HVAC systems' return air areas from each of the four (4) buildings. Two (2) samples were collected from each location for a total of eight (8) samples. Samples were collected by pressing the sterile surface of adhesive, in the form of a Bio-Tape TM or clear cellophane tape, onto the surface to be evaluated, and securing each sample in its own enclosure with a unique identification number. The location where each sample was collected and the identification number and location of each sample were recorded on a chain of custody forms. Photographs of samples collected are in **Appendix A**. The analytical results with chain of custody forms are provided in **Appendix B**. The forms and samples were shipped by overnight courier service to Environmental Analytical Associates (EAA), and samples were analyzed for the presence of combustion byproducts according to EAA FIRE-D01, fire/combustion residue constituents (quantitative), utilizing both reflected light and polarized light microscopy (10-300X). EAA is an American Industrial Hygiene Association (AIHA) accredited laboratory, and follows the International Organization for Standardization (ISO) guidelines for laboratory procedures.

4.0 SAMPLE RESULTS

The analytical results for the samples were reviewed by J.S. Held's Certified Industrial Hygienist (CIH). The results indicate that the samples collected within the four (4) facilities are in the Upper Background range, Moderate range, and in the High range for combustion byproducts. The following is a summary of the results of the sampling:

- The two (2) samples collected from the Police Department were in the lower upper background range; and indicate no smoke impact to the HVAC systems.
- The two (2) samples collected from the City Hall were in the lower upper background range, and indicate no smoke impact to the HVAC systems.
- Of the two (2) samples collected from the Fire Department, one (1) was in the Moderate range and the other was non-detectable. These results indicate no overall smoke impact to the HVAC systems, and the one sample in the Moderate range is potentially from background concentrations typically found in a fire

department. The fire truck bays are adjacent to the room where the HVAC systems are located. The exhaust from the fire trucks can also contribute to the elevated levels of combustion byproducts.

- Of the two (2) samples collected from the Convention Center, one was in the Moderate range and the other was in the High Range, indicating potential overall smoke impact in the HVAC systems.

5.0 CONCLUSIONS

J.S. Held was retained by Cunningham Lindsey (Claim No.: ATL131768) to provide a smoke assessment in the HVAC systems of the City of Gatlinburg, Convention Center, City Hall, Fire Department, and Police Department. The four (4) buildings were selected by the City of Gatlinburg as representative of "worst case" scenario to identify whether the HVAC systems had been impacted by smoke from wildland fires that occurred on November 28, 2016. J.S. Held performed an assessment in two (2) HVAC systems in each of the buildings and collected samples for combustion byproduct analysis in the returns of the systems. Results of the combustion byproduct samples indicate:

- **Convention Center -** The samples tested in the HVAC system of the Convention Center indicated a high and moderate range of combustion byproducts present, indicating potential overall smoke impact in the HVAC systems. The Convention Center is located downwind of numerous reported fires and destroyed buildings and could have been impacted based on the prevailing wind direction and location of the fires. This is supported by the analytical results.
- **City Hall and Police Department -** The samples tested in the HVAC systems of the City Hall and Police Department indicated a lower upper background range of combustion byproducts present, and indicate no smoke impact to the HVAC systems. The City Hall and Police Department are located to the east of the reported fires, and the analytical data indicating no impact is also supported by the weather data.
- **Fire Department -** The samples tested in the HVAC systems of the Fire Department indicated a Moderate range of combustion byproducts present. These results indicate no overall smoke impact to the HVAC systems, however the one sample in the Moderate range is from background concentrations typically found in a fire department. The fire truck bays are adjacent to the room where the HVAC systems are located. The exhaust from the fire trucks can also contribute to the elevated levels of combustion byproducts. The Fire Department is located adjacent to the City Hall and Police Department to the east of the reported fires, and the analytical data indicating no impact is also supported by the weather data.

J.S. Held recommends a cleaning protocol to remove byproducts of combustion in the HVAC systems of the Convention Center only, which is provided as **Section 7.0** of this report.

6.0 LIMITATIONS

J.S. Held's smoke damage assessment that occurred on August 19, 2017 was limited to the HVAC systems of four (4) buildings selected by the City of Gatlinburg as "worst case". The sampling was limited to the return of the HVAC systems as representative sampling for combustion byproducts to identify potential smoke impact.

7.0 RECOMMENDATIONS

J.S. Held recommends that the HVAC systems be cleaned in the Convention Center, due to the elevated presence of combustion byproducts within the return air systems. The sampling results for the City Hall, Fire Department and Police Department did not indicate impact from the fires, and cleaning is not recommended. A cleaning protocol for the Convention Center HVAC is provided in **Section 8.0** of this report.

8.0 HVAC CLEANING PROTOCOL

This protocol is based solely on the observations and data that was visible and allowed to be collected at the four (4) locations. This protocol is designed to be utilized in order to address the present impact of combustion byproducts to the HVAC system at the Convention Center.

The general specifications for the cleaning of the HVAC systems were developed utilizing guidance from the: National Air Duct Cleaners Association (NADCA) Assessment, Cleaning, and Restoration of HVAC Systems 2013 (ACR2013), the National Institutes of Health - Office of Research Services (ORS) - Division of Occupational Health and Safety (DOHS), and the United States Environmental Protection Agency (EPA). J.S. Held recommends that the HVAC units be cleaned by a HVAC cleaning contractor certified by the National Air Duct Cleaning Association (NADCA).

I. INTRODUCTION

A. Scope of Work

This protocol scope includes all work necessary to complete the Heating Ventilation Air Conditioning (HVAC) system cleaning project associated with the impacted HVAC systems located at the City of Gatlinburg Convention Center.

1. Equipment Components

   Components of the HVAC considered to be within the scope of work shall include:

   - Air Handling Unit (AHU) Cabinet;
   - Blower/Fan Motor;
   - Filter Segments;
   - Coil Segment;
   - Insulation;
   - Mechanical Connections; and
   - Condensate drip pan and associated drain lines.

B. Work Areas

Work areas shall consist of any area where cleaning activities associated with HVAC cleaning and/or maintenance occur.

C. General Safety Requirements

1. The following safety requirements shall be followed at all times by any and all personnel associated with HVAC system cleaning activities.
   a. Always ground drop lights with ground fault circuit interrupter (GFCI), and use only rough service drop light bulbs to avoid the dangers of electrocution and exploding bulbs.
   b. Cleaning solutions can be extremely caustic and can cause chemical burns.
2. Occupant Safety – No processes or materials shall be employed in such a manner that they will introduce additional hazards into occupied spaces.
3. See **Section IV – References & Applicable Regulations** for additional safety requirements.
4. Personal Protection
   a. Any and all Personal Protective Equipment (PPE) shall be used by properly trained and knowledgeable personnel in accordance with applicable OSHA requirements.
   b. PPE shall meet or exceed the requirements outlined to the chemical agent manufacturer and/or the chemical Safety Data Sheet (SDS).
   c. PPE shall not be altered in any way unless allowed by the PPE manufacturer. If alteration is allowed by the manufacturer, the

approved method of alteration must be documented and submitted prior to any alterations of the PPE.

II. PRODUCTS

A. Equipment

1. Typical Tools Required:
    a. Particulate Collectors
        i. No particulate collectors should be opened or accessed in occupied areas or conditioned buildings once debris has been collected.
        ii. All high volume particulate collection machines shall provide sufficient airflow velocity within the ventilation system to transport airborne particulate to the collection chamber.
    b. Pressurized Air Supply
        i. Air compressors shall be properly sized to enable pneumatic tools to achieve manufacturer recommended pressures in accordance with this Standard.
        ii. Air compressors shall be configured to reduce moisture, oil, unacceptable vapors (including fuel-fired exhaust fumes), and other contaminants prior to being discharged from pneumatic cleaning tools.
2. High Efficiency Particulate Air (HEPA) Filtered Canister Vacuums
    a. All canister vacuums (wet or dry) used or located within the indoor environment shall use a HEPA filter.

B. General Tool Recommendations

1. Coil Cleaning
    a. Low Pressure washing equipment; and
    b. Coil cleaner injection pumps.
2. General Tools
    a. Drills (cordless and corded);
    b. Various hand brushes;
    c. Multimeter (volts, amps, ohms);
    d. Hex drivers ¼", 5/16", 3/8", ½";
    e. Screwdrivers; and

f. Oxygen-Fuel Gases and associated tools for cutting and soldering.

C. Chemicals and Other Cleaning Agents

1. Chemical
   a. Use of sanitizers, disinfectants and other antimicrobial products.
      i. A product must be registered by EPA for a specific use before it can be used for that purpose. EPA has assessed the safety of only some antimicrobial products for use specifically in HVAC systems.
      ii. The product manufacturer's directions under which the product can be used, shall be followed.
      iii. All hazards and precautionary statements shall be read and the product is to be used strictly according to its label.
      iv. As a precaution, NO occupants will be allowed in the room during application. Occupants will only be permitted to return until after the minimum time duration specified within the product manufacturer's instructions.
2. Approval of sanitizers, disinfectants and other antimicrobial products
   a. Any and all products shall be approved prior to use.
   b. All SDS for each chemical to be used must be maintained.

III. WORK PROCEDURE

The following HVAC cleaning procedures, along with any applicable industry best practices and requirements, shall be followed during this project. Where there is a conflict or overlap of above requirements, the most stringent provisions will apply.

A. Containment and Protection of Nearby Surfaces

1. Protective Coverings
   a. 6-millimeter (6-mil) polyethylene (poly) or equivalent sheeting shall be utilized to protect each work area and its contents.
   b. A 6-mil sheet shall be placed in the following locations
      i. On the floor immediately surrounding the HVAC and extending out three feet (3 ft.) in all directions or to the nearest wall, if within the three-foot radius, and extending up the wall at least six inches (6 inches);
      ii. The wall immediately above the HVAC; and

iii. On other building substrates, which may be impacted by cleaning activities.

c. All 6-mil sheets shall be sealed in such a manner that it will remain secure and prevent any impact from cleaning activities and/or cross contamination.

2. Housekeeping (Dust Control)

a. The cleaning personnel shall:

i. Maintain all surfaces throughout the room free of accumulation of dust and debris to prevent further dispersion.

ii. Use approved industrial vacuum cleaners with HEPA filters to collect dust and small scrap.

iii. The blowing down of any space with compressed air is forbidden.

iv. Workmen shall clean-up their own areas.

b. In addition to the control measures mentioned above, personnel are responsible for implementing any additional engineering controls to prevent cross contamination from occurring.

B. Energy Isolation

1. Before carrying out any cleaning activities, the electrical power to the HVAC system shall be disconnected.
2. Energy isolation shall be verified through the use of a lockout/tagout system.

C. HVAC Housing

1. The outer surface of the HVAC housing shall be cleaned prior to removal:

a. Remove items such as paper and other general trash item from around the housing and dispose of the items in a 6-mil disposal bag.

b. Using a HEPA vacuum, remove any accumulated dust from the top and sides of the HVAC housing, as well as, from underneath the HVAC.

c. Wipe the housing with a mild, environmental safe detergent.

2. Using the appropriate tool, loosen the fasteners around the housing.
3. Make a record of any loose and/or missing fasteners.
4. If fasteners are able to be completely removed, do so and place to the side of the work area.

5. Remove the necessary sections of the HVAC housing in order to gain the access to the coils.
6. Once the housing has been removed, use a HEPA vacuum to vacuum the interior surface of the HVAC housing.
7. Inspect the fiberglass insulation, in addition to other HVAC system insulation.
8. If insulation is damaged, shows signs of fungal growth or is in an otherwise poor condition:
    a. Remove the insulation from the HVAC housing.
    b. Place the removed insulation in a 6-mil disposal bag.
    c. Install a new section of insulation.
        i. Insulation shall match any and all requirements and specification described by the manufacturer.
        ii. Installation of a new section of insulation shall be in accordance with the manufactures specifications.
9. If insulation is good condition:
    a. Using a HEPA vacuum, clean the insulation of any dirt, dust, and/or debris.
    b. Make any required minor repairs.
10. HEPA vacuum all other areas of the HVAC housing.
11. Using a damp rag, wipe clean all areas around the insulation. **DO NOT GET THE INSULATION WET.**
12. Place housing to the side of the work area, but remaining on 6-mil poly sheeting, and allow to dry.

D. Air Filter and Filter Housing

1. Remove the filter frame, if necessary, and dispose of old filters in a 6-mil disposal bag.
2. HEPA vacuum the filter housing in order to remove all loose debris.
3. Remove the filter housing.
4. Clean the filter housing with a damp rag and applicable detergents.
5. Ensure the filter housing has no defects that may damage the filter upon its replacement.
6. Set filter housing to the side of the work area to all proper drying.

7. When replacing filters ensure airflow arrows are pointed downstream (in the direction of airflow).

E. Drain Pans and Drain Lines

1. Rusted or deteriorated drain pans shall be assessed for replacement.
2. All surfaces of the drain pan shall be wet-cleaned with proper detergent cleaners designed for this purpose, and physically scrubbed inside and out to dislodge contaminants.
3. Contaminants in the drain pan shall be removed with a HEPA-filtered, wet vacuum during this process to prevent particulate and other biological matter from entering the drain line.
4. During the cleaning process, the drain line shall be cleared as required to ensure continuous, free drainage.
5. Cleaning personnel shall inspect and ensure all drain pans are sloped to allow for proper drainage.
6. Drains pans that do not drain properly, or pans that continually hold water after the HVAC cycles off, shall be noted to the client or the client's representative.

F. Motors / Blower Assembly

1. Using a HEPA vacuum cleaner and a brush, clean the wheel and housing.
2. Utilize a damp cloth and detergent to wipe all surfaces of the motors and blowers.

G. Electric Heating Elements (if applicable)

1. If applicable, use the proper tools to remove all fasteners which hold the heating element in place.
2. When heat exchanger coils cannot be removed, surfaces surrounding the coil, such as internal insulation or electronic devices, should be temporarily isolated and protected from water/detergent overspray.
3. Once removed, electrical components must be protected before the elements are wet-washed with detergent.
4. Clean the heating element.
5. Once the heating element has been cleaned, place it to the side of the work area to be dry.

H. Coils Segment Cleaning

1. Coils should be cleaned annually or when visible accumulation of dirt and debris is observed.
2. Line or protect the interior of the HVAC housing with a moisture barrier to prevent water and cleaning solution run-off from contacting the unit's insulation or any porous surfaces.
3. Next, inspect the coil for total blockage by placing a bright incandescent or fluorescent drop light behind it.
4. The front and back of the coil should be dry-brushed several times before applying cleaning solution using a soft stainless steel, or brass bristle brush, to avoid damaging the coil's fins.
5. Use the wet vacuum (HEPA-filtered when located indoor) and a soft bristle brush attachment to remove the loose coil surface particulate.
6. Several precautions must be taken to ensure that the large amounts of water used to rinse the coils is controlled.
    a. Clear drain lines, allowing water to flow freely.
    b. Ensure the entire area is protected with a water impermeable tarp.
7. Do not begin any coil cleaning process until the drain line is clear.
8. After the debris has been removed from the coil, begin applying cleaning agents to the side of the coil which the airflow hits first.
9. Apply the cleaning solution from the top of the coil downward, allowing it to flow slowly.
10. Both sides of the coil need to be treated in this manner, allowing the coil cleaner to emulsify the internal dirt and debris.
11. Once the maximum penetration has been achieved, a thorough rinsing with fresh water must follow.
12. All chemical residues must be rinsed off the coil fins before the system is put back into operation.
13. Check constantly to be sure no water or cleaning solution leaks onto external surfaces. Leakage can cause severe damage to ceilings, walls, floors and carpeting.
14. When cleaning is complete, the coil must be meticulously inspected to ensure that it is entirely free of contaminates.

I. Ducting

1. Identify the type of ducting (flexible, semi-rigid, rigid) used in the HVAC system and proceed accordingly:

a. Flexible and semi-rigid ducting (internal insulation) shall be removed from the impacted systems identified in this report above.

b. Rigid (hard) ducting (no internal insulation) shall be cleaned and sanitized throughout the system.

   i. HEPA vacuum the interior surfaces and walls of the rigid ducts.

   ii. Use a damp cloth and detergent to wipe all interior surfaces and walls of the rigid ducts.

J. Post Cleaning Activities

1. Verification:

   a. Cleanliness verification shall be performed on all specified components to verify compliance with these specifications.

   b. All components within the project scope of work shall achieve, at minimum, the level of visibly clean or the specified method of cleanliness verification defined in the contractual documents.

   c. Cleanliness verification is done immediately after HVAC system component cleaning and prior to use in operation.

   i. Surface samples for combustion byproducts should be collected and shipped under Chain of Custody (COC) to EAA located in Bay City Michigan for analysis, which includes Polarized Light Microscopy (PLM) and Reflected light microscopy.

   d. Visual inspection of porous and non-porous HVAC components shall be conducted to assess that the HVAC is visibly clean.

   e. An interior surface is considered visibly clean when it is free from non-adhered substances and debris.

   f. If a component is visibly clean, then no further cleanliness verification methods are necessary.

   g. If component is not visually clean, additional cleaning shall be required.

   h. This process shall be repeated until the component in question is considered visibly clean by J.S. Held field personnel.

2. Reassembling of HVAC:

   a. HVACs may not be reassembled until the following conditions have been met:

      i. Verification of cleaning has been approved; and

      ii. All components of the HVAC are dry.

   b. All components of the HVAC shall be reassembled.

3. HVAC Equipment Check and Activation:
    a. Once cleaned, verified and reassembled, the components of the HVAC shall be returned to the setting recommended by the manufacturer.
    b. All system components shall be activated to verified as operation prior to attaching the HVAC housing.
4. Disposal:
    a. All debris associated with the HVAC cleaning project shall be disposed of using appropriate disposal bags.
    b. Disposal bags shall consist of a 6-mil thick clear disposal bag.
    c. Disposal bags shall have the collar of the bags sealed with reinforced tape prior to leaving the work area.
    d. Debris disposal and removal shall be in accordance with any applicable owner, local, state, and/or federal regulations.

IV. REFERENCES & APPLICABLE REGULATIONS

A. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE)

ASHRAE Handbook – HVAC Systems and Equipment

B. Air Conditioning Contractors of America / American National Standards Institute (ANSI) Publication

ANSI/ACCA Standard 4 QM – 2013: Maintenance of Residential HVAC Systems

ANSI/ACCA Standard 4 QR – 2015: Resorting the Cleanliness of HVAC Systems

C. Air Conditioning, Heating, and Refrigeration Institute / American National Standards Institute (ANSI) Publication

ANSI/AHRI Standard 440 with Addendum 1 – 2008 – Performance Rating of Room Fan-Coils

D. National Air Duct Cleaners Association (NADCA)

ACR: The NADCA Standard for Assessment, Cleaning, and Restoration of HVAC Systems – 2013

E. Code of Federal Regulations

OSHA

29 CFR 1910.22 – Walking-Working Surfaces – General Requirements

29 CFR 1910 Subpart I – Personal Protective Equipment (1910.132-1910.138)

29 CFR 1910.101 – Compressed Gases (General Requirements)

29 CFR 1910.102 – Acetylene

29 CFR 1019.104 - Oxygen

29 CFR 1910.147 – The control of hazardous energy (lockout/tagout)

29 CFR 1910.147 App. A – Typical minimal lockout procedures

29 CFR 1910 Subpart P – Hand and Portable Powered Tools and Other Hand-Held Equipment (1910.241-1910.244)

29 CFR 1910.251 – Welding, Cutting, and Brazing – Definitions

29 CFR 1910.252 – General Requirements

29 CFR 1910.253 – Oxygen-fuel Gas Welding and Cutting

29 CFR 1910.1000 – Air Contaminants

29 CFR 1910.1200 – Hazard Communications

FIGURES

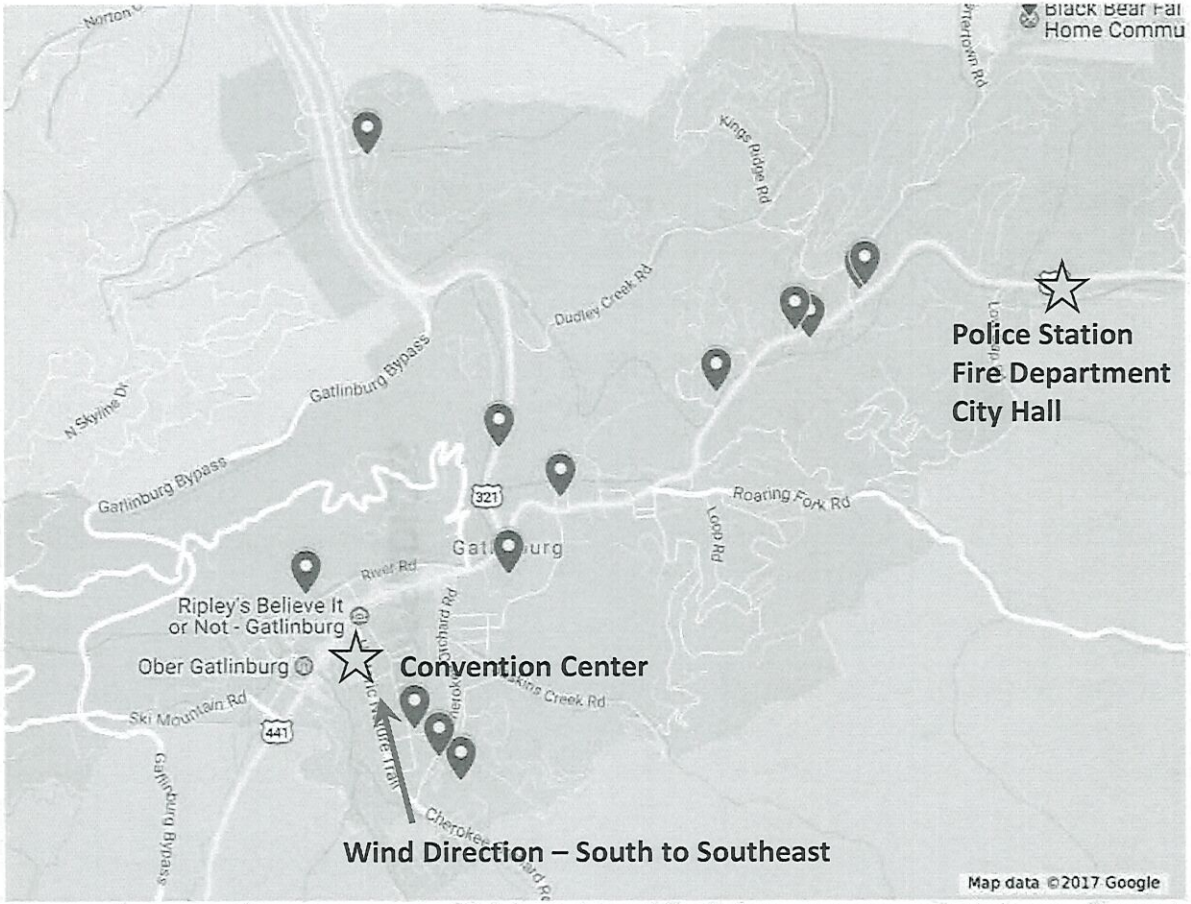
FIGURE 1

CITY OF GATLINBURG
SAMPLE LOCATIONS AND REPORTED FIRES

What's burned in Gatlinburg

Burned Businesses

- Arrowmont School of Arts and Crafts
- The Park Vista Hotel
- Driftwood Apartments
- Hillbilly Golf
- Chalet Village
- Creek Place Properties
- NAPA Auto Parts
- Southland Car & Jeep Rentals
- Black Bear Falls Log Home Community
- Alamo Steakhouse
- Cherokee Orchard Road
- Riverhouse Motor Lodge
- Starr Crest Resort
- Westgate Smoky Mountain Resort & Spa
- Troy Drive
- Cupid's Chapel Of Love
- Gatlinburg Church of Christ
- Mountain Lodge Restaurant



Reports from eyewitnesses, state officials and local firefighter crews on what's been affected by the wildfires in Gatlinburg.

Source: http://www.knoxnews.com/story/news/2016/11/29/map-bussinesses-burned-gatlinburg-fire/94586732/

Figure 1
Sample Locations and Reported Fires

Cunningham Lindsey
Claim No.: ATL131768
City of Gatlinburg
Gatlinburg, Tennessee

N W E S

DATE: August 2017

INSPECTORS: S. Trauth

PROJECT NO.: 1409308

JS|HELD

APPENDICES

APPENDIX A

PHOTOGRAPHS

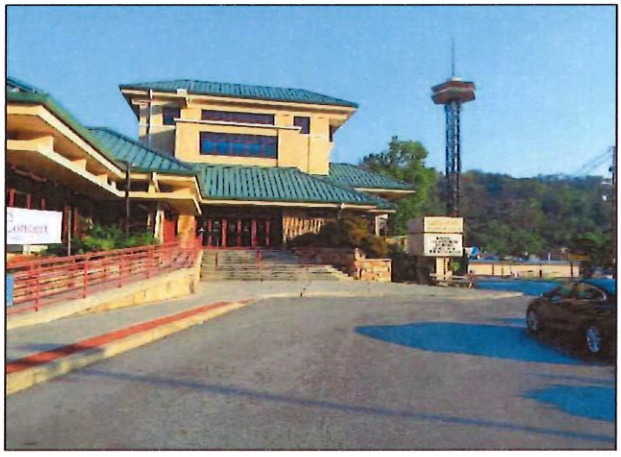


Figure (1) – Exterior of Convention Center

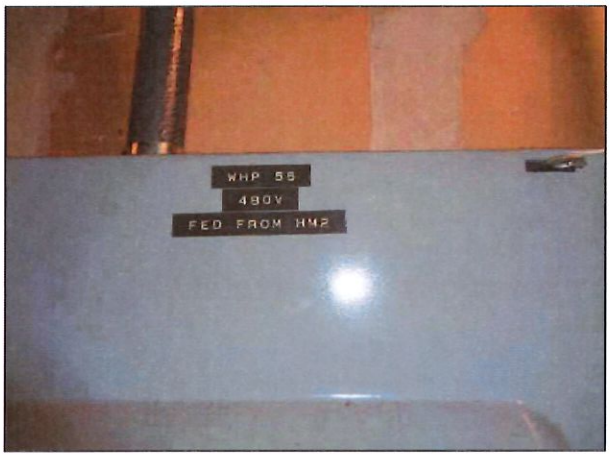


Figure (2) – Convention Center HVAC Unit #56

Figure (3) – Convention Center HVAC Unit #56 Return Air System

Figure (4) – Convention Center HVAC Unit #56 Tape Lift Sample #CC-1 in Return Air System

Figure (5) – Convention Center HVAC Unit #46

Figure (6) – Convention Center HVAC Unit #49 Return Air System

Figure (7) – Convention Center HVAC Unit #49 Tape Lift Sample #CC-2 in Return Air System.

Figure (8) – Fire Department

Figure (9) – Fire Department HVAC Unit #1

Figure (10) – Fire Department HVAC Unit #1 Tape Lift Sample #FD-1 from Return Air System

Figure (11) – Fire Department HVAC Unit #2 Return Air System

Figure (12) – Fire Department HVAC Unit #2 Tape Lift Sample #FD-2 from Return Air System

Figure (13) – City Hall Building

Figure (14) – City Hall HVAC Unit #1

Figure (15) – City Hall HVAC Unit #1 Tape Lift Sample #CH-1 from Return Air System

Figure (16) – City Hall HVAC Unit #2

Figure (17) – City Hall HVAC Unit #2 Tape Lift Sample #CH-2 from Return Air System

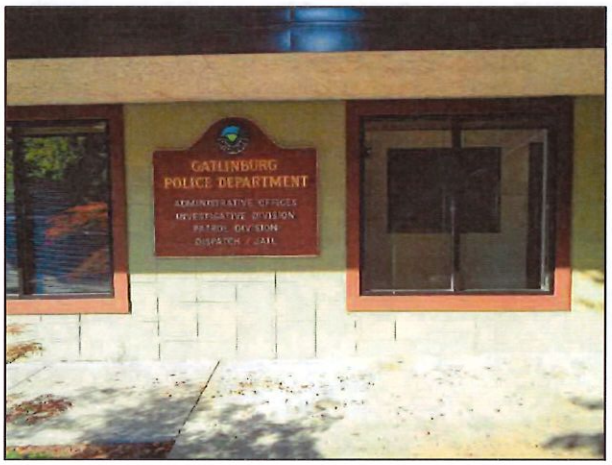


Figure (18) – Police Department

Figure (19) – Police Department HVAC Unit #1

Figure (20) – Police Department HVAC Unit #1 Tape Lift Sample #PD-1 from Return Air System

Figure (21) – Police Department HVAC Unit #2

Figure (22) – Police Department HVAC Unit #2 Tape Lift Sample #PD-2 from Return Air System

APPENDIX B

COMBUSTION BYPRODUCT ANALYTICAL DATA

FIRE/COMBUSTION RESIDUE & DUST ANALYSIS - Optical Microscopy Method: FIRE-D02

Client Name : J.S. Held, Inc.
Client Project # : 1409308
Requested by : David M. Hamm, PhD
Project Description : City of Gatlinburg
Client Sample # : CC-1
Client sample description : Conv. Cntr Air Return #56
Sample collected : 8/19/17
Sample received : 8/21/17
Sample media : tape

EAA Project # : M17-0526
EAA Sample # : M0526-1

SUMMARY CONCLUSIONS : * Fire/combustion residue concentration measured above typical background concentrations
Qualitative observations indicate the potential presence of fire/combustion particles
Sample overloaded with dust - Results may be higher or lower than reported

QUALITATIVE ASSEMBLAGE OBSERVATIONS -Reflected Light Microscopy (10-200x) / Polarized Light (100-600x)	
Lab sample description (color /texture)	Brown/black dust
Is a smoke or fire odor present ?	No
Are large char particles observed in reflected or polarized light ?	Yes
Are large ash-like particles observed in reflected or polarized light?	No
Are "burned" soil particles, pollen, or plant phytoliths observed?	No

	FIRE / COMBUSTION RESIDUE CONSTITUENTS	Particle Concentration Cts/area (mm2)	Numerical Ratio %
	Totals	**50.6**	**6.3 %**
	Aciniform / soot-like fine particles	2.2	0.3
	Char (Pyrolized plant material)	48.4	6.0
	Ash-like mineral residue particles		not detected
	INORGANIC CONSTITUENTS		
Fibrous Constituents :	Cellulose/Synthetics	68.2	8.5
	Fiberglass/Mineral wool		not detected
Non-fibrous Constituents :	Inorganic mineral dust / soil	371.8	46.2
	Other opaque/paint-like/corrosion-like debris	101.2	12.6
	BIOAEROSOLS		
Mold Spores / Structures :	Unspecified	26.4	3.3
Pollen :	Unspecified	125.4	15.6
Plant fragments :	Flower parts, trichomes, etc.		not detected
Animal fragments :	Dander / skin cells	13.2	1.6
Miscellaneous :	Insect parts	2.2	0.3
	OTHER CONSTITUENTS		
Biogenic / organic debris :	Biogenic / other amorphous dust	46.2	5.7

Total particles counted : 366
Detection Limit (Numerical %) : 0.3
Detection Limit Cts/mm2 2.2

Authorized / data reviewed by Daniel M. Baxter 08/22/17

Note: Sample results are only applicable to the items or locations tested.

** The SUMMARY CONCLUSIONS describing fire/combustion residue concentrations are based on both the "qualitative indicators" present, and "quantitative" background levels found in typical "clean" buildings. The local geographic background, site specific conditions, and other potential combustion sources must be taken into account in order to determine an elevated or atypical fire/combustion residue condition is present.*

The estimated surface particle concentration (Cts/mm^2) can only be calculated on surface tape lift samples.

FIRE/COMBUSTION RESIDUE & DUST ANALYSIS - Optical Microscopy Method: FIRE-D02

Client Name : J.S. Held, Inc.
Client Project # : 1409308
Requested by : David M. Hamm, PhD
Project Description : City of Gatlinburg
Client Sample # : CC-2
Client sample description : Conv. Cntr Air Return #49
Sample collected : 8/19/17
Sample received : 8/21/17
Sample media : tape

EAA Project # : M17-0526
EAA Sample # : M0526-2

SUMMARY CONCLUSIONS : * Fire/combustion residue concentration measured above typical background concentrations
Qualitative observations indicate the potential presence of fire/combustion particles
Sample overloaded with dust - Results may be higher or lower than reported

QUALITATIVE ASSEMBLAGE OBSERVATIONS -Reflected Light Microscopy (10-200x) / Polarized Light (100-600x)	
Lab sample description (color /texture)	Brown/black dust
Is a smoke or fire odor present ?	No
Are large char particles observed in reflected or polarized light ?	Yes
Are large ash-like particles observed in reflected or polarized light?	No
Are "burned" soil particles, pollen, or plant phytoliths observed?	No

	FIRE / COMBUSTION RESIDUE CONSTITUENTS	Particle Concentration Cts/area (mm2)	Numerical Ratio %
	Totals	**83.6**	**12.5 %**
	Aciniform / soot-like fine particles	4.4	0.7
	Char (Pyrolized plant material)	79.2	11.8
	Ash-like mineral residue particles		not detected
	INORGANIC CONSTITUENTS		
Fibrous Constituents :	Cellulose/Synthetics	28.6	4.2
	Fiberglass/Mineral wool		not detected
Non-fibrous Constituents :	Inorganic mineral dust / soil	330.0	49.0
	Other opaque/paint-like/corrosion-like debris	121.0	18.0
	BIOAEROSOLS		
Mold Spores / Structures :	Unspecified	17.6	2.6
Pollen :	Unspecified	46.2	6.9
Plant fragments :	Flower parts, trichomes, etc.		not detected
Animal fragments :	Dander / skin cells	4.4	0.7
Miscellaneous :	Insect parts		not detected
	OTHER CONSTITUENTS		
Biogenic / organic debris :	Biogenic / other amorphous dust	41.8	6.2

Total particles counted : 306
Detection Limit (Numerical %) : 0.3
Detection Limit Cts/mm2 2.2

Authorized / data reviewed by Daniel M. Baxter 08/22/17

Note: Sample results are only applicable to the items or locations tested.

** The SUMMARY CONCLUSIONS describing fire/combustion residue concentrations are based on both the "qualitative indicators" present, and "quantitative" background levels found in typical "clean" buildings. The local geographic background, site specific conditions, and other potential combustion sources must be taken into account in order to determine an elevated or atypical fire/combustion residue condition is present. The estimated surface particle concentration (Cts/mm2) can only be calculated on surface tape lift samples.*

FIRE/COMBUSTION RESIDUE & DUST ANALYSIS - Optical Microscopy Method: FIRE-D02

Client Name : J.S. Held, Inc.
Client Project # : 1409308
Requested by : David M. Hamm, PhD
Project Description : City of Gatlinburg
Client Sample # : FD-1
Client sample description : Fire Dept Air Return 1
Sample collected : 8/19/17
Sample received : 8/21/17
Sample media : tape

EAA Project # : M17-0526
EAA Sample # : M0526-3

SUMMARY CONCLUSIONS : * Fire/combustion residue concentration measured above typical background concentrations
Qualitative observations indicate the potential presence of fire/combustion particles
Interferences present - Results may be higher or lower than reported

QUALITATIVE ASSEMBLAGE OBSERVATIONS -Reflected Light Microscopy (10-200x) / Polarized Light (100-600x)	
Lab sample description (color /texture)	Mixed gray/black dust
Is a smoke or fire odor present ?	No
Are large char particles observed in reflected or polarized light ?	Possible
Are large ash-like particles observed in reflected or polarized light?	No
Are "burned" soil particles, pollen, or plant phytoliths observed?	No

	FIRE / COMBUSTION RESIDUE CONSTITUENTS	Particle Concentration Cts/area (mm2)	Numerical Ratio %
	Totals	**42.9**	**7.9 %**
	Aciniform / soot-like fine particles	2.2	0.4
	Char (Pyrolized plant material)	40.7	7.5
	Ash-like mineral residue particles		not detected
	INORGANIC CONSTITUENTS		
Fibrous Constituents :	Cellulose/Synthetics	1.1	0.2
	Fiberglass/Mineral wool	2.2	0.4
Non-fibrous Constituents :	Inorganic mineral dust / soil	195.8	36.0
	Other opaque/paint-like/corrosion-like debris	85.8	15.8
	BIOAEROSOLS		
Mold Spores / Structures :	Unspecified	154.0	28.3
Pollen :	Unspecified	5.5	1.0
Plant fragments :	Flower parts, trichomes, etc.		not detected
Animal fragments :	Dander / skin cells	35.2	6.5
Miscellaneous :	Insect parts		not detected
	OTHER CONSTITUENTS		
Biogenic / organic debris :	Biogenic / other amorphous dust	22.0	4.0

Total particles counted : 495
Detection Limit (Numerical %) : 0.2
Detection Limit Cts/mm2 1.1

Authorized / data reviewed by Daniel M. Baxter 08/22/17

Note: Sample results are only applicable to the items or locations tested.

** The SUMMARY CONCLUSIONS describing fire/combustion residue concentrations are based on both the "qualitative indicators" present, and "quantitative" background levels found in typical "clean" buildings. The local geographic background, site specific conditions, and other potential combustion sources must be taken into account in order to determine an elevated or atypical fire/combustion residue condition is present.*

The estimated surface particle concentration (Cts/mm2) can only be calculated on surface tape lift samples.

FIRE/COMBUSTION RESIDUE & DUST ANALYSIS - Optical Microscopy Method: FIRE-D02

Client Name : J.S. Held, Inc.
Client Project # : 1409308
Requested by : David M. Hamm, PhD
Project Description : City of Gatlinburg
Client Sample # : FD-2
Client sample description : Fire Dept Air Return 2
Sample collected : 8/19/17
Sample received : 8/21/17
Sample media : tape

EAA Project # : M17-0526
EAA Sample # : M0526-4

SUMMARY CONCLUSIONS : Fire/combustion residue not detected

QUALITATIVE ASSEMBLAGE OBSERVATIONS -Reflected Light Microscopy (10-200x) / Polarized Light (100-600x)	
Lab sample description (color /texture)	Very low visible dust detected
Is a smoke or fire odor present ?	No
Are large char particles observed in reflected or polarized light ?	No
Are large ash-like particles observed in reflected or polarized light?	No
Are "burned" soil particles, pollen, or plant phytoliths observed?	No

	FIRE / COMBUSTION RESIDUE CONSTITUENTS	Particle Concentration Cts/area (mm2) Totals	not detected	Numerical Ratio % not detected
	Aciniform / soot-like fine particles			not detected
	Char (Pyrolized plant material)			not detected
	Ash-like mineral residue particles			not detected
	INORGANIC CONSTITUENTS			
Fibrous Constituents :	Cellulose/Synthetics		0.3	2.3
	Fiberglass/Mineral wool		0.5	4.5
Non-fibrous Constituents :	Inorganic mineral dust / soil		4.3	36.4
	Other opaque debris		1.3	11.4
	BIOAEROSOLS			
Mold Spores / Structures :	Unspecified		3.5	29.5
Pollen :	Unspecified			not detected
Plant fragments :	Flower parts, trichomes, etc.		0.3	2.3
Animal fragments :	Dander / skin cells		1.1	9.1
Miscellaneous :	Insect parts			not detected
	OTHER CONSTITUENTS			
Biogenic / organic debris :	Biogenic / other amorphous dust		0.5	4.5

Total particles counted : 44
Detection Limit (Numerical %) : 2.3
Detection Limit Cts/mm2 0.3

Authorized / data reviewed by Daniel M. Baxter 08/22/17

Note: Sample results are only applicable to the items or locations tested.

** The SUMMARY CONCLUSIONS describing fire/combustion residue concentrations are based on both the "qualitative indicators" present, and "quantitative" background levels found in typical "clean" buildings. The local geographic background, site specific conditions, and other potential combustion sources must be taken into account in order to determine an elevated or atypical fire/combustion residue condition is present. The estimated surface particle concentration (Cts/mm2) can only be calculated on surface tape lift samples.*

FIRE/COMBUSTION RESIDUE & DUST ANALYSIS - Optical Microscopy Method: FIRE-D02

Client Name : J.S. Held, Inc.
Client Project # : 1409308
Requested by : David M. Hamm, PhD
Project Description : City of Gatlinburg
Client Sample # : CH-1
Client sample description : City Hall Air Return 1
Sample collected : 8/19/17
Sample received : 8/21/17
Sample media : tape

EAA Project # : M17-0526
EAA Sample # : M0526-5

SUMMARY CONCLUSIONS : * Low fire/combustion residue present

QUALITATIVE ASSEMBLAGE OBSERVATIONS -Reflected Light Microscopy (10-200x) / Polarized Light (100-600x)				
Lab sample description (color /texture)		Fine dust		
Is a smoke or fire odor present ?		No		
Are large char particles observed in reflected or polarized light ?		No		
Are large ash-like particles observed in reflected or polarized light?		No		
Are "burned" soil particles, pollen, or plant phytoliths observed?		No		
			Particle Concentration Cts/area (mm2)	Numerical Ratio %
	FIRE / COMBUSTION RESIDUE CONSTITUENTS	**Totals**	**2.2**	**1.5 %**
	Aciniform / soot-like fine particles		0.5	0.4
	Char (Pyrolized plant material)		1.6	1.1
	Ash-like mineral residue particles			not detected
	INORGANIC CONSTITUENTS			
Fibrous Constituents :	Cellulose/Synthetics		1.6	1.1
	Fiberglass/Mineral wool		1.1	0.7
Non-fibrous Constituents :	Inorganic mineral dust / soil		79.2	53.7
	Other opaque debris		22.0	14.9
	BIOAEROSOLS			
Mold Spores / Structures :	Unspecified		20.9	14.2
Pollen :	Unspecified			not detected
Plant fragments :	Flower parts, trichomes, etc.			not detected
Animal fragments :	Dander / skin cells		14.3	9.7
Miscellaneous :	Insect parts		0.5	0.4
	OTHER CONSTITUENTS			
Biogenic / organic debris :	Biogenic / other amorphous dust		5.5	3.7

Total particles counted : 268
Detection Limit (Numerical %) : 0.4
Detection Limit Cts/mm2 0.5

Authorized / data reviewed by : Daniel M. Baxter 08/22/17

Note: Sample results are only applicable to the items or locations tested.

** The SUMMARY CONCLUSIONS describing fire/combustion residue concentrations are based on both the "qualitative indicators" present, and "quantitative" background levels found in typical "clean" buildings. The local geographic background, site specific conditions, and other potential combustion sources must be taken into account in order to determine an elevated or atypical fire/combustion residue condition is present.*

The estimated surface particle concentration (Cts/mm2) can only be calculated on surface tape lift samples.

FIRE/COMBUSTION RESIDUE & DUST ANALYSIS - Optical Microscopy Method: FIRE-D02

Client Name : J.S. Held, Inc.
Client Project # : 1409308
Requested by : David M. Hamm, PhD
Project Description : City of Gatlinburg
Client Sample # : CH-2
Client sample description : City Hall Air Return 2
Sample collected : 8/19/17
Sample received : 8/21/17
Sample media : tape

EAA Project # : M17-0526
EAA Sample # : M0526-6

SUMMARY CONCLUSIONS : * Low fire/combustion residue present

QUALITATIVE ASSEMBLAGE OBSERVATIONS -Reflected Light Microscopy (10-200x) / Polarized Light (100-600x)			
Lab sample description (color /texture)	Fine dust		
Is a smoke or fire odor present ?	No		
Are large char particles observed in reflected or polarized light ?	No		
Are large ash-like particles observed in reflected or polarized light?	No		
Are "burned" soil particles, pollen, or plant phytoliths observed?	No		
		Particle Concentration Cts/area (mm2)	Numerical Ratio %
	FIRE / COMBUSTION RESIDUE CONSTITUENTS	**Totals 2.2**	**1.2 %**
	Aciniform / soot-like fine particles	1.1	0.6
	Char (Pyrolized plant material)	1.1	0.6
	Ash-like mineral residue particles		not detected
	INORGANIC CONSTITUENTS		
Fibrous Constituents :	Cellulose/Synthetics	2.2	1.2
	Fiberglass/Mineral wool	3.3	1.8
Non-fibrous Constituents :	Inorganic mineral dust / soil	48.4	26.5
	Other opaque debris	15.4	8.4
	BIOAEROSOLS		
Mold Spores / Structures :	Unspecified	105.6	57.8
Pollen :	Unspecified		not detected
Plant fragments :	Flower parts, trichomes, etc.		not detected
Animal fragments :	Dander / skin cells	3.3	1.8
Miscellaneous :	Insect parts		not detected
	OTHER CONSTITUENTS		
Biogenic / organic debris :	Biogenic / other amorphous dust	2.2	1.2

Total particles counted : 166
Detection Limit (Numerical %) : 0.6
Detection Limit Cts/mm2 1.1

Authorized / data reviewed by : Daniel M. Baxter 08/22/17

Note: Sample results are only applicable to the items or locations tested.

** The SUMMARY CONCLUSIONS describing fire/combustion residue concentrations are based on both the "qualitative indicators" present, and "quantitative" background levels found in typical "clean" buildings. The local geographic background, site specific conditions, and other potential combustion sources must be taken into account in order to determine an elevated or atypical fire/combustion residue condition is present. The estimated surface particle concentration (Cts/mm2) can only be calculated on surface tape lift samples.*

FIRE/COMBUSTION RESIDUE & DUST ANALYSIS - Optical Microscopy Method: FIRE-D02

Client Name : J.S. Held, Inc.
Client Project # : 1409308
Requested by : David M. Hamm, PhD
Project Description : City of Gatlinburg
Client Sample # : PD-1
Client sample description : Police Dept Air Return 1
Sample collected : 8/19/17
Sample received : 8/21/17
Sample media : tape

EAA Project # : M17-0526
EAA Sample # : M0526-7

SUMMARY CONCLUSIONS : * Low fire/combustion residue present

Interferences present - Results may be higher or lower than reported

QUALITATIVE ASSEMBLAGE OBSERVATIONS -Reflected Light Microscopy (10-200x) / Polarized Light (100-600x)	
Lab sample description (color /texture)	Brown fibrous dust
Is a smoke or fire odor present ?	No
Are large char particles observed in reflected or polarized light ?	No
Are large ash-like particles observed in reflected or polarized light?	No
Are "burned" soil particles, pollen, or plant phytoliths observed?	No

	FIRE / COMBUSTION RESIDUE CONSTITUENTS	Particle Concentration Cts/area (mm2) Totals	6.6	Numerical Ratio % 1.7 %
	Aciniform / soot-like fine particles		1.1	0.3
	Char (Pyrolized plant material)		5.5	1.4
	Ash-like mineral residue particles			not detected
	INORGANIC CONSTITUENTS			
Fibrous Constituents :	Cellulose/Synthetics		67.1	16.9
	Fiberglass/Mineral wool		11.0	2.8
Non-fibrous Constituents :	Inorganic mineral dust / soil		182.6	45.9
	Other opaque/paint-like/corrosion-like debris		35.2	8.8
	BIOAEROSOLS			
Mold Spores / Structures :	Unspecified		17.6	4.4
Pollen :	Unspecified		1.1	0.3
Plant fragments :	Flower parts, trichomes, etc.			not detected
Animal fragments :	Dander / skin cells		48.4	12.2
Miscellaneous :	Insect parts			not detected
	OTHER CONSTITUENTS			
Biogenic / organic debris :	Biogenic / other amorphous dust		28.6	7.2

Total particles counted : 362
Detection Limit (Numerical %) : 0.3
Detection Limit Cts/mm2 1.1

Authorized / data reviewed by Daniel M. Baxter 08/22/17

Note: Sample results are only applicable to the items or locations tested.

** The SUMMARY CONCLUSIONS describing fire/combustion residue concentrations are based on both the "qualitative indicators" present, and "quantitative" background levels found in typical "clean" buildings. The local geographic background, site specific conditions, and other potential combustion sources must be taken into account in order to determine an elevated or atypical fire/combustion residue condition is present. The estimated surface particle concentration (Cts/mm2) can only be calculated on surface tape lift samples.*

FIRE/COMBUSTION RESIDUE & DUST ANALYSIS - Optical Microscopy Method: FIRE-D02

Client Name : J.S. Held, Inc.
Client Project # : 1409308
Requested by : David M. Hamm, PhD
Project Description : City of Gatlinburg
Client Sample # : PD-2
Client sample description : Police Dept Air Return 2
Sample collected : 8/19/17
Sample received : 8/21/17
Sample media : tape

EAA Project # : M17-0526
EAA Sample # : M0526-8

SUMMARY CONCLUSIONS : * Low fire/combustion residue present

Interferences present - Results may be higher or lower than reported

QUALITATIVE ASSEMBLAGE OBSERVATIONS -Reflected Light Microscopy (10-200x) / Polarized Light (100-600x)			
Lab sample description (color /texture)	Gray fibrous dust		
Is a smoke or fire odor present ?	No		
Are large char particles observed in reflected or polarized light ?	No		
Are large ash-like particles observed in reflected or polarized light?	No		
Are "burned" soil particles, pollen, or plant phytoliths observed?	No		
		Particle Concentration Cts/area (mm2)	Numerical Ratio %
	FIRE / COMBUSTION RESIDUE CONSTITUENTS	**Totals** **5.5**	**1.1 %**
	Aciniform / soot-like fine particles	1.1	0.2
	Char (Pyrolized plant material)	4.4	0.9
	Ash-like mineral residue particles		not detected
	INORGANIC CONSTITUENTS		
Fibrous Constituents :	Cellulose/Synthetics	39.6	8.1
	Fiberglass/Mineral wool	34.1	7.0
Non-fibrous Constituents :	Inorganic mineral dust / soil	192.5	39.2
	Other opaque/paint-like/corrosion-like debris	66.0	13.5
	BIOAEROSOLS		
Mold Spores / Structures :	Unspecified	12.1	2.5
Pollen :	Unspecified	1.1	0.2
Plant fragments :	Flower parts, trichomes, etc.		not detected
Animal fragments :	Dander / skin cells	121.0	24.7
Miscellaneous :	Insect parts		not detected
	OTHER CONSTITUENTS		
Biogenic / organic debris :	Biogenic / other amorphous dust	18.7	3.8

Total particles counted : 446
Detection Limit (Numerical %) : 0.2
Detection Limit Cts/mm2 1.1

Authorized / data reviewed by : Daniel M. Baxter 08/22/17

Note: Sample results are only applicable to the items or locations tested.

** The SUMMARY CONCLUSIONS describing fire/combustion residue concentrations are based on both the "qualitative indicators" present, and "quantitative" background levels found in typical "clean" buildings. The local geographic background, site specific conditions, and other potential combustion sources must be taken into account in order to determine an elevated or atypical fire/combustion residue condition is present. The estimated surface particle concentration (Cts/mm2) can only be calculated on surface tape lift samples.*

Fire/Combustion Residue Data Summary Table

Client : J.S. Held, Inc.
Client Project # : 1409308
Client Project Description : City of Gatlinburg
EAA Project # : M17-0526

Sample#	Sample Description	Fire / Combustion Particle Concentrations Numerical / Area ratio % Estmates					* Surface Density (Cts/mm2)	Are large fire residue particles present ?	Are possible wildland fire Indicators present?	Is dust loading or other type of interference present?
		Total%	Soot	Char	Ash-like	Other				
CC-1	Conv. Cntr Air Return #56	6.3	0.3	6.0	not detected		50.6	Yes		Yes
CC-2	Conv. Cntr Air Return #49	12.5	0.7	11.8	not detected		83.6	Yes		Yes
FD-1	Fire Dept Air Return 1	7.9	0.4	7.5	not detected		42.9	Possible		Yes
FD-2	Fire Dept Air Return 2	not detected	not detected	not detected	not detected		not detected			
CH-1	City Hall Air Return 1	1.5	0.4	1.1	not detected		2.2			
CH-2	City Hall Air Return 2	1.2	0.6	0.6	not detected		2.2			
PD-1	Police Dept Air Return 1	1.7	0.3	1.4	not detected		6.6			Yes
PD-2	Police Dept Air Return 2	1.1	0.2	0.9	not detected		5.5			Yes

** Note: If the surface particle density of fire residue particles (cts/mm2) is not listed, it was not analyzed on this project either as a result of the client's request, or could be performed on the collection media submitted for analysis. Surface particle density can only routinely be performed on tape-lift samples, or on filter samples collected from a known surface area and calculated serial dilution.*

** The summary guidelines for "low", "Upper bkg range", "Moderate", and "High" concentrations are based on quantitative background levels (ratio% and cts/mm2) found in typical "clean" buildings. The local geographic background, site specific conditions, and other potential combustion sources must be taken into account in order to determine if an elevated or atypical fire/combustion residue condition is present.*

Fire / Combustion Residue Concentrations For Buildings

Ratio % & Surface Concentration		
Classification Range	Total Fire Residue (ratio%)	Total Fire Residue (ct/mm2)
Low	<1%	<1
Upper bkg range	1-3%	1-5
Moderate	3-10%	5-50
High	>10%	>50

Your Contact Information

Company name: J.S. Held, Inc.
Address: 365 Canal Street, Suite 2760
City/State/Zip: New Orleans, LA 70130
Phone #: 504-561-6563
Email address: dhamm@jsheld.com
vauthement@jsheld.com> (Please cc with results)
Date collected: 8-19-17
Contact Name: David M. Hamm, PhD
Date Submitted: 8-19-17

Your Project Information

Client Proj.#: 1409308
Proj. Descrip: City of Gatlinburg
Special Instructions

Analysis requested

Check appropriate boxes, Method code, or describe the analysis if different

Air

- [ ] Airborne mold
- [ ] Airborne dust aerosols
- [ ] Airborne fire residue
- [ ] Airborne fiberglass only
- [ ] Other _____
- [ ] _____
- [ ] Photo report?

Optical

- [ ] Quantitative dust (cts/mm²)
- [ ] Mold only tape (Qualitative)
- [X] Fire residue / dust
- [ ] Bulk mold sample (Qualitative)
- [ ] Surface mold tape (cts/mm²)
- [ ] Bulk mold sample (Qualitative)
- [ ] Photo report?
- [ ] pH analysis (wildfire)

Dust

Electron Microscopy

- [ ] Bulk debris analysis
- [ ] Automated air or dust particle analysis
- [ ] Automated Fire chemistry analysis
- [ ] Material composition / comparison
- [ ] Particle identification
- [ ] Quantitative sample analysis (hourly)
- [ ] Other

Method code: *(if known)*

Sample Turnaround

- [X] Normal 2-5 days
- [ ] Rush 24 hr. (50% surcharge)
- [ ] Other

Sample #	Description / Location	Analysis (if different from above)	Vol. (liters)
CC-1	Conv. Ctr. Air Return #5		
CC-2	" " Air Return #49		
FD-1	Fire Dept Air Return 1		
FD-2	" " " " 2		
CH-1	City Hall Air Return 1		
CH-2	" " " " 2		
PD-1	Police Dept Air Return 1		
PD-2	" " " " 2		

ENVIRONMENTAL ANALYSIS ASSOCIATES, INC. - Shipping Location Information

San Diego Lab [ ] Attn: Daniel Baxter
5290 Soledad Road
858-272-7747 San Diego, CA 92109

Michigan Lab [X] Attn: Joseph Heintskill
306 5th Street, Suite 400
989-895-4447 Bay City, MI 48708

Relinquished / received	Printed Name	Company	Date	Time
David Hamm	David Hamm	JSHA	8-19-17	12:20
D. Heintskill	David Heintskill	EAA	8-21-17	11:00 AM

CONTRACT TERMS

By providing signature authorization, the client acknowledges this contract is entered into, and the lab work will be performed in either San Diego, California or Bay City, Michigan. This signature binds the submitting company to provide payment for services according to EAA's fee schedule within 30 days above from receipt of the project invoice. A 1% finance charge per month will be charged on overdue invoices.

APPENDIX C

NOVEMBER 28, 2016 WEATHER DATA FOR GATLINBURG

Appendix C
November 28, 2016 Weather Data for Gatlinburg

Cunningham Lindsey
Claim No.: ATL131768
City of Gatlinburg
Gatlinburg, Tennessee
J.S. Held Project No.: 1409308

Hourly Weather History & Observations												
Time (EST)	Temperature	Windchill	Dew Point	Humidity	Pressure	Visibility	Wind Direction	Wind Speed	Gust Speed	Precipitation	Events	Conditions
12:53 AM	39.0 °F	-	30.0 °F	70%	30.09 in	10.0 mi	Calm	Calm	-	N/A		Overcast
1:53 AM	37.9 °F	35.5 °F	30.0 °F	73%	30.06 in	10.0 mi	NNE	3.5 mph	-	N/A		Overcast
2:53 AM	39.0 °F	-	30.9 °F	73%	30.06 in	10.0 mi	Calm	Calm	-	N/A		Overcast
3:53 AM	39.0 °F	-	30.9 °F	73%	30.06 in	10.0 mi	Calm	Calm	-	N/A		Overcast
4:53 AM	41.0 °F	-	30.9 °F	67%	30.05 in	10.0 mi	Calm	Calm	-	N/A		Overcast
5:53 AM	39.0 °F	-	32.0 °F	76%	30.05 in	10.0 mi	Calm	Calm	-	N/A		Overcast
6:53 AM	39.9 °F	-	32.0 °F	73%	30.05 in	10.0 mi	Calm	Calm	-	N/A		Overcast
7:53 AM	39.9 °F	37.8 °F	32.0 °F	73%	30.01 in	10.0 mi	NE	3.5 mph	-	N/A		Overcast
8:53 AM	43.0 °F	-	32.0 °F	65%	30.00 in	9.0 mi	Calm	Calm	-	N/A		Overcast
9:53 AM	44.1 °F	41.5 °F	30.9 °F	60%	29.99 in	9.0 mi	NE	4.6 mph	-	N/A		Overcast
10:53 AM	46.0 °F	42.5 °F	30.9 °F	56%	29.98 in	8.0 mi	North	6.9 mph	-	N/A		Overcast
11:53 AM	52.0 °F	-	33.1 °F	49%	29.93 in	8.0 mi	NNE	5.8 mph	-	N/A		Mostly Cloudy
12:53 PM	63.0 °F	-	39.0 °F	41%	29.86 in	10.0 mi	SSW	11.5 mph	-	N/A		Overcast
1:53 PM	64.0 °F	-	43.0 °F	46%	29.82 in	10.0 mi	South	23.0 mph	39.1 mph	N/A		Mostly Cloudy
2:53 PM	66.0 °F	-	42.1 °F	42%	29.78 in	10.0 mi	South	24.2 mph	32.2 mph	N/A		Mostly Cloudy
3:53 PM	64.0 °F	-	41.0 °F	43%	29.76 in	10.0 mi	South	20.7 mph	31.1 mph	N/A		Mostly Cloudy
4:53 PM	64.0 °F	-	42.1 °F	45%	29.71 in	10.0 mi	SSE	23.0 mph	38.0 mph	N/A		Overcast
5:53 PM	63.0 °F	-	42.1 °F	46%	29.67 in	10.0 mi	SSE	6.9 mph	-	N/A		Overcast
6:53 PM	66.0 °F	-	44.1 °F	45%	29.65 in	10.0 mi	South	18.4 mph	35.7 mph	N/A		Overcast
7:53 PM	66.9 °F	-	45.0 °F	45%	29.63 in	10.0 mi	South	28.8 mph	36.8 mph	N/A		Overcast
8:53 PM	66.9 °F	-	46.0 °F	47%	29.61 in	10.0 mi	South	24.2 mph	43.7 mph	N/A		Overcast
9:53 PM	64.0 °F	-	51.1 °F	63%	29.65 in	8.0 mi	South	34.5 mph	48.3 mph	0.00 in	Rain	Light Rain
10:53 PM	61.0 °F	-	52.0 °F	72%	29.64 in	10.0 mi	South	20.7 mph	33.4 mph	0.06 in	Rain	Light Rain
11:53 PM	64.0 °F	-	50.0 °F	60%	29.59 in	10.0 mi	South	21.9 mph	38.0 mph	0.00 in		Overcast