Home Inspectors
Environmental Testing

POCKET GUIDE

EMSL

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EMSL ANALYTICAL, INC.

TESTING LABS • PRODUCTS • TRAINING

Laboratory Services Include:

Asbestos, Mold, Bacteria, Industrial Hygiene, Metals, Environmental Chemistry, Food & Consumer Products, Allergens, PCR-Polymerase Chain Reaction (DNA), Silica, Volatiles Scan, Formaldehyde by HPLC, Indoor Air Quality, Water, Radon and Materials Testing.

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www.emsl.com

East Coast	West Coast
800.220.3675	**866.798.1089**

United States and Canada Locations

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For deeper review of any subject or sampling please consult an EMSL representative or other EMSL pocket guides.

Prior to sampling, please consult your EMSL rep or EPA state contact to determine if a license is required for sampling.

Air-O-Cell Test Code M001

- The Air-O-Cell™ cassette (Product ID 8715301B) is a single-use sampling device designed for the rapid collection and analysis of a wide range of airborne particles. These include fungal spores, pollen, insect parts, skin cell fragments, fibers, and other inorganic particulates.
- The cassette is designed to operate at a flow rate of 15 LPM. Lower flow rates may result in a collection loss of some spores and the accumulation of others in a non-uniform manner. Therefore, it is critical to run the sampling pumps at the manufacturer's recommended air flow rate.

Benefits

- Useful for initial site testing, especially if fungal growth is not visible.
- Quick and simple procedure.
- Fast turn around times available.
- Low chance of sample contamination.
- Necessary for determining allergic mold spore potential. Mold spores can cause allergies whether they are viable or non-viable.

Air-O-Cell
50 Pack, #8715301B
10 Pack, #8715302

Disadvantages

- Fungi cannot be identified to species with this method.
- Due to the similarities in spore morphology, some spores will be grouped together, i.e., *Aspergillus* sp. and *Penicillium* sp.
- Spore viability cannot be assessed.

Sampling Procedure

1. Prior to sampling, calibrate your pump to 15 liters per minute via a rotameter. It is also recommended that the rotameter or sampling pump be periodically calibrated to a NIST primary standard. If using the Zefon Bio-Pump (Product ID 8706002) use the specifically designed Air-O-Cell flow indicator. It cannot be used with any other type of pump.
2. Remove and retain tape seal covering inlet and outlet on the cassette.
3. Attach the outlet (round hole) to a standard 1/2" PVC tubing (for use with high volume pumps only).
4. Start the sampling pump and sample for an appropriate period of time (see recommendations below).
5. Remove Air-O-Cell from tubing and reseal with the original seals. Label sample.
6. Complete an EMSL Chain of Custody (COC), available at www.emsl.com, detailing client name and information, project name or number, sample #, description of sampling area, and volume of air collected.
7. To reduce shipping damage, it is recommended that the Air-O-Cell be placed in a corrugated box with padding to ensure safe arrival at the laboratory.

Sampling Duration

- The sampling time is dependent on the density of particulate in the environment. It is important not to overload the sample, otherwise it will be impossible to accurately count the types of spores, pollen or other particulates that are present. The following list represents typical sample times to attain a sharply defined trace with good dispersion of the spores:
  1. Clean "office" or outdoors (no visible dust) = 10 minutes
  2. Indoor environment, high activity & personnel = 5 minutes
  3. Indoor environment, drywall renovation or heavy industrial dust = 1 minute.

Quality Control Recommendations

- An effective interpretation is based on the comparison of indoor and outdoor samples. Outdoor samples will help determine whether spore amplification is occurring indoors.
- Obtain a control sample from a non-complaint area for comparison.
- Sending a blank cassette for analysis per project is a good practice.
- Flow rate is critical for accurate results. Remember to calibrate and recalibrate the pump prior to all sampling. (15 liters/minute)
- Never use cassettes that are damaged or expired.

Bio-Pump Plus
#8706002

Contact for Sampling Supplies and Cassettes, www.emsl.com, 1-800-220-3675
Air-O-Cell™ is a registered trademark of Zefon International.

Culturable Air Sampling (Fungi or Bacteria)

Test Code M005 - Fungi Genus ID
Test Code M006 - Fungi Species ID
Test Code M433 - Aspergillus Nosocomial Panel
Test Code M434 - Aspergillus Comprehensive Panel
Test Code M009 - Bacteria Gram Stain
Test Code M010 - Bacteria 3 MPT
Test Code M011 - Bacterial 5 MPT

Particle Impactors (Andersen-type Samplers)

- This method of air sampling involves drawing a measured volume of air over culture media in Petri dishes. The Petri dishes are incubated in the laboratory so the organisms impacted on the plate can grow. The fungi or bacteria are counted and identified. This method commonly uses an Andersen N-6 type impactor (e.g. EMSL VP-400 Microbial Sampler Product ID 8709001). Different agar plates are available from EMSL Analytical, Inc., depending on the types of fungi or bacteria to be identified.

Benefits

- Fungal cultures can determine whether the fungus is viable (alive), and allows for genus and species identification.
- Bacterial cultures provide enumeration and identification of culturable bacteria present in the air.

Disadvantages

- Cultures take 6-10 days for the microorganisms to grow and be identified.
- Since most environmental samples contain a large number of organisms, each has to compete with others to grow on the media. As a result, fungi and bacteria present in the air may not be as well represented in culture.
- Some microbes do not grow well or at all on the culture media (viable but non-culturable, VBNC).
- Some microorganisms are unable to be identified, as they fail to produce key characteristics such as spores or they may not be described in the scientific literature.

General Media Recommendations Fungi and Bacteria

- For fungal sampling, in general, we recommend Malt Extract Agar (MEA).
- If you are sampling in dry areas, the use of DG18 will help select for the growth of dry-loving fungi that may not grow on MEA agar.
- Sampling specifically for *Stachybotrys* sp. can be achieved with either Cellulose Agar (CA) or Cornmeal Agar (CMA).
- For bacterial sampling, in general, we recommend Tryptic Soy Agar (TSA) or TSA w 5% blood.
- For sampling Gram negative bacteria, we recommend MacConkey Agar (MAC).
- For all other situations, the Microbiology Department will be happy to make recommendations based on your individual sampling situation.
- Sampling supplies may be ordered at www.emsl.com or by calling Customer Service: 800-220-3675.

How to Handle Microbiological Media (Agar plates)

- Agar plates must be kept refrigerated or on freezer packs until ready to use.
- The plates must be allowed to warm up to room temperature before taking a sample (approx. 15 minutes).
- Do not remove the lid from the plate at anytime except during sampling.
- Seal the lid to the plate after sample collection with Parafilm or tape.
- The plates must be shipped back to EMSL with freezer packs by OVERNIGHT PRIORITY. Refreeze and reuse the original freezer pack (this type of freezer pack is stable for 24 hours).
- Adequate packing material must be sent to protect the plates.
- Plates must not come into direct contact with the freezer pack, as the media may freeze, invalidating the tests.
- If there is any delay in sending the agar plates to EMSL, they should be refrigerated until ready for overnight delivery.

EMSL VP-400 Single Stage Microbial Sampler #8709001

Recommendations

- Wear latex or nitrile gloves during sampling.
- Use 70% isopropyl alcohol to disinfect sampling device between each sample.
- Place Petri dish lid in a clean bag during sampling to reduce any cross contamination.
- Include outside samples and a field blank for control.

Sampling Procedure

1. Allow agar plates to reach room temperature before use.
2. Attach one end of tubing to the intake of the vacuum pump and the other end to the inlet of the sampler.
3. Calibrate the flow rate of the vacuum pump:
   A. Place an uncovered Petri dish into sampler (Do not submit this dish as a sample, discard after calibration).

EMSL VP-400 Basic Kit w/E-Lite Pump #8709003

B. Turn on pump and adjust flow until the rotameter is at 28.3 LPM (flow rate is read from the middle of bearing on the rotameter).

4. Wipe all exposed surfaces of sampler with a 70% isopropyl alcohol pad and allow to air dry.
5. Place the agar plate on the sampler base so that the Petri dish rests on the three raised metal pins.
6. Remove the cover of the Petri dish and place into a clean sample bag to minimize contamination (available upon request).
7. Assemble the jet classification stage on the sampler and secure the inlet cone with the three attached clips.
8. Set timer to appropriate time depending on environmental conditions (sampling time is usually between 2-5 minutes).
9. Turn on the pump and start the timer simultaneously.
10. When the time is up, turn off the pump and disassemble sampler and place cover back onto agar plate.
11. Secure lid onto Petri dish with masking tape or Parafilm (avoid using electrical, packing, transparent and duct tape).
12. Write the sample number on the bottom of the Petri dish.
13. Record all appropriate information on the Chain of Custody.
14. Return samples with an ice pack to EMSL Analytical for analysis.

Can Mold Cause Health Problems?

Molds are usually not a problem indoors, unless mold spores land on a wet or damp spot and begin growing. Molds have the potential to cause health problems. Molds produce allergens (substances that can cause allergic reactions), irritants, and in some cases, potentially toxic substances (mycotoxins). Inhaling or touching mold or mold spores may cause allergic reactions in sensitive individuals. Allergic responses include hay fever-type symptoms, such as sneezing, runny nose, red eyes, and skin rash (dermatitis). Allergic reactions to mold are common. They can be immediate or delayed. Molds can also cause asthma attacks in people with asthma who are allergic to mold. In addition, mold exposure can irritate the eyes, skin, nose, throat, and lungs of both mold-allergic and non-allergic people. Symptoms other than the allergic and irritant types are not commonly reported as a result of inhaling mold. Research on mold and health effects is ongoing. This brochure provides a brief overview; it does not describe all potential health effects related to mold exposure. For more detailed information consult a health professional. You may also wish to consult your state or local health department. (Source EPA Document # 402-K-02-003)

Surface Sampling Test Code M041

Bio-Tape
25 Pack, #8708325

Direct Examination (Tape Lift, Bulk, Swab)

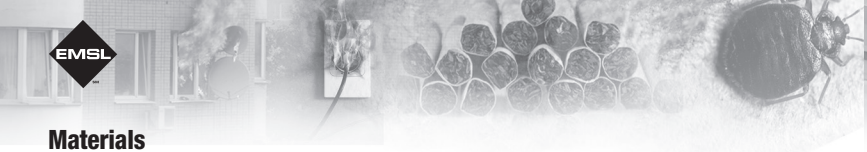
- A direct exam allows for the rapid determination of the presence of fungal spores as well as identifies the types of fungi.
- Direct examinations should only be used to sample visible mold growth in a contaminated area since most surfaces will have a deposit of fungal spores that are normally present in the environment.

Benefits

- The direct exam is inexpensive and can be performed quickly.
- A useful test for determining if there is mold amplification.
- Direct sampling may reveal indoor reservoirs of spores that have not become airborne yet.

Disadvantages

- Areas of fungal growth are often small and scattered, so they may not all be picked up. Choosing multiple sampling locations will help overcome this problem.
- Health problems related to indoor microbial growth are generally caused by the inhalation of substantial numbers of airborne spores, sometimes over a long period of time. The presence of biological materials on a particular surface may not be a direct indication of what is in the air.
- This method detects both viable and non-viable spores but cannot distinguish between them. It is advisable to combine direct exam samples with culture methods if knowing viability is important to your project.
- Tape lifts are not able to be cultured.
- If a direct examination of a swab sample is taken, a follow up by culture is possible.
- Direct examinations of dirt/soil and dust samples cannot be performed reliably because of preparation limitations.
- Fungi usually cannot be identified to species and sometimes not even to genus with this method. For example, *Aspergillus* sp. and *Penicillium* sp. are normally reported together due to the similarities in spore morphology, unless fruiting structures are present that allows for a better identification.



Materials

For Tape Lift

- We recommend using EMSL Tape kits or Bio-Tapes (Zefon Intl) otherwise clear (transparent) Scotch or other brand tape (frosted tape obscures the spores).
- New plastic bag to hold sample(s) (provided in a tape lift kit available from EMSL).
- Only use tape lifts on hard, dry, flat surfaces

For Bulk

- Sterile container or new Ziplock-type plastic bag (provided by EMSL) to hold and transport samples.

For Swab

- Sterile TransPorter swab to collect and transport samples (provided by EMSL).

For all Matrices

- Latex/nitrile gloves (also can be provided at your request).

Tape-lift Sampling Procedure

1. Take a few inches of clear tape. Avoid touching the sticky side, especially the part to be used to collect the mold.
2. Wearing gloves, apply the central inch of tape to the suspect area (choose one that is free of extraneous debris). Apply light pressure to the non-adhesive side.
3. Pull tape off surface with slow, steady pressure, holding the tape edges only.
4. Apply sticky side of tape to the inside of the plastic bag (ziplock).
5. Ensure there are no folds or creases in the tape.
6. Close bag and label appropriately. (Put only one sample in each bag.)

Bulk

1. Wearing latex gloves remove a small piece of the suspect material (1 x 1 inch piece is more than sufficient).
2. Place piece inside clean sterile container or new plastic bag (ziplock).
3. Close bag or cap container and label appropriately.

Swab

1. Wearing gloves, remove swab from packaging material.
2. Remove plug from media tube.
3. Swab the desired area thoroughly, rolling the swab lightly back and forth over sampling area.
4. Insert the swab in the tube, firmly close cap, and label appropriately.
5. Complete an EMSL Chain of Custody (COC), available on our website (www.emsl.com), detailing client name and information, project name or number, sample #, and a description of the area.

Quality Control Recommendations

For Tape Lift

- Use clear tape--not frosted, electrical, duct, or packing tape.
- Do not fold tape onto itself.
- Stick tape on the inside of the plastic bag only.
- Please do not send tape on slides or cover slips. They may arrive broken making the sample difficult to analyze.

For Bulk

- Send a representative portion of the sample, if large. This prevents over-handling of the sample and contamination. If analysis of a specific portion of sample is required, please note area(s) or take a tape lift of the area.

For Swab

- For quantitative culture reporting, the area swabbed needs to be entered on the chain of custody.

Culturable Surface Sampling (Bulk or Swab)

Test Code M007 - Fungi Genus ID
Test Code M008 - Fungi Species ID
Test Code M009 - Bacteria Gram Stain
Test Code M010 - Bacteria 3 MPT
Test Code M011 - Bacteria 5 MPT
Test Code M028 - Cryptococcus neoformans

Benefits

- The sampling method is inexpensive and surfaces can be quickly sampled.
- A useful test for initial site sampling.
- Species level identification possible.
- Viability of fungi is determined.

Disadvantages

- Areas of fungal growth are often small and scattered, so they may not all be picked up. Multiple sample locations will help overcome this problem.
- Health problems related to indoor microbial growth are generally caused by the inhalation of substantial numbers of airborne spores, sometimes over a long period of time. The presence of biological materials on a particular surface may not be a direct indication of what is in the air.
- This method detects only viable spores and hyphae but cannot detect nonviable or difficult to culture fungi. It is advisable to combine direct exam samples with culture methods if knowing the presence of non-viable fungi is important to your project.
- Cultures cannot distinguish between spores, hyphae and other fungal cells; the results are reported as colony forming units.

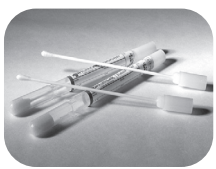
Nitrile Gloves
Small #8705400
Medium #8705401
Large #8705402
X-Large #8705403

Materials Required

- Latex/nitrile gloves

Swab Sampling Procedure

1. Obtain sterile 1 mL Butterfield's Solution swab to collect and transport samples (provided by EMSL).
2. Wearing gloves, remove swab from packaging material.
3. Remove plug from media tube.
4. Swab the desired area thoroughly, rolling the swab lightly back and forth over sampling area.
5. Insert the swab in the tube, firmly close cap, and label appropriately.
6. For quantitative culture reporting, the area swabbed needs to be entered on the chain of custody.



Sterile Swab
#8708301
FREE to EMSL Customers
Call for Details

Bulk Sampling Procedure

1. Obtain sterile sampling bags (Ziplock-type) to collect and transport samples (provided at your request by EMSL).
2. Wearing gloves and using clean tools remove a representative area of growth along with the building material (sheetrock, wood, etc). 1 inch square is sufficient.
3. Place bulk material into sampling bag and label the outside of the bag with sampling location or description.

Sample Shipment

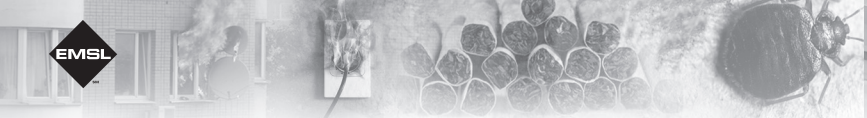
- Complete an EMSL Chain of Custody (COC), available on our website (www.emsl.com), detailing client name and information, project name or number, sample #, and a description of the area.
- Place samples in a cooler with reusable freezer packs.
- Overnight shipping recommended.

Media Recommendations For Air Sampling of Culturable Fungi and Bacteria

Fungal sampling in general, we recommend MEA. Malt Extract Agar is a general isolating media for culturing a wide-spectrum of fungi. A good media for most of your IAQ projects. Sampling for cellulose degrading microfungi in water damaged buildings (e.g. Stachybotrys sp.) either Cellulose agar or Corn Meal Agar. Bacterial sampling in general, we recommend TSA or TSA w 5% Blood Sampling for Gram negative bacteria, we recommend MacConkey Agar. All other situations, the Microbiology Department will be happy to make recommendation based on your individual sampling situation or project.

Basic Mold Cleanup

The key to mold control is moisture control. It is important to dry water damaged areas and items within 24-48 hours to prevent mold growth. If mold is a problem in your home, clean up the mold and get rid of the excess water or moisture. Fix leaky plumbing or other sources of water. Wash mold off hard surfaces with detergent and water, and dry completely. Absorbent materials (such as ceiling tiles & carpet) that become moldy may have to be replaced. (Source: EPA http://www.epa.gov/mold/moldresources.html)



ERMI Dust Sampling Test Code M180

- The ERMI© is an acronym for Environmental Relative Moldiness Index.
- It was developed by scientists at the Environmental Protection Agency (EPA) to provide a straightforward, objective, and standardized way to obtain results for indoor air quality investigations.
- The EPA has developed an ERMI ranking system based on dust samples collected from homes across the United States.
- The ERMI helps predict the moldiness of homes. Homes with high ERMI values have a greater chance of having a mold problem than homes with a low ERMI.
- 36 different fungi make up the ERMI and are designated as Group I (those found in a typical, water damaged homes) and Group II (those commonly found in all homes).

Sampling Locations

- For residential sampling, EPA recommends taking a living room and bed room sample as a composite using the same vacuum dust collector for both rooms. Other areas should be sampled separately.
- In the Common Living Area (family room or living room), select the sofa. In the absence of a sofa, select another commonly used chair.
- Using the tape measure and the roll of tape, mark the corners of a 3 foot x 6 foot rectangular sampling area on the floor immediately against the sofa. Place the long side of the rectangle against the long side of the sofa. If the area cannot accommodate the recommended sampling area, adjust the dimensions accordingly Sample a total of 18 square feet.
- For the bedroom, select the most frequently used bedroom. Using the tape measure and the roll of tape, mark the corners of a 3 foot x 6 foot rectangular sampling area on the floor immediately against the side of the bed where the resident is most likely to get in and out of the bed. If possible try to have the rectangular sampling area extend under the bed by 3 or 4 inches so that part of the sample goes under the bed. Place the long side of the rectangle against the long side of the bed. If the area cannot accommodate the recommended sampling area, adjust the dimensions accordingly. Sample a total of 18 square feet.
- Record the final sampling area you marked with tape on the lines next to the bedroom you sampled on this data sheet.
- Areas other than the Living Room, Family Rooms, or Bedrooms may be sampled. If you choose to sample other areas, a separate vacuum dust collector should be used for each area. Please call the lab if you have any questions.

Sampling Procedure

1. Make sure the hose attachment is connected to your vacuum cleaner properly. Turn on the vacuum cleaner to make sure the hose attachment is pulling air, and then turn off the vacuum cleaner. Sometimes the dust collection device will not fit correctly onto the hose attachment. If this is the case, you may use duct tape or electrical tape to tape the dust collector to the hose attachment.
2. Use the extension cord as needed to reach the marked area with the vacuum hose.
3. Remove both caps from sampling device. Place the caps in a location so you can find them after the test is completed. Attach the flat, round end of the sampler device to the end of the hose attachment of your vacuum cleaner.
4. Use the slanted end of the sampling device to collect your sample. Keep the slant end of the sampling device flush with the surface to be sampled.
5. Turn on the vacuum cleaner and start the watch or timer. Start timing the vacuuming procedure using the stopwatch. Try not to disturb the tape. Do not exceed the 5 minute sampling period.
6. Vacuum the area contained within the duct or electrical tape. Do this by passing the sampling device over slightly overlapping, imaginary parallel lines within the sampling area for about 5 minutes. If necessary, adjust your rate of movement so that a total of 5 minutes is used to vacuum the entire 18 square foot sampling area.
7. Move to the second room and repeat the vacuuming of the target area. After the sampling is completed, hold the sampling device upward toward the ceiling and turn off the vacuum cleaner. Re-cap the slant end of the sampling device so as not to lose the dust collected.
8. Avoid vacuuming up any large debris that is not dust. If you accidentally suck up the tape, point the sampling device toward the ceiling and turn off the vacuum cleaner. Pick the tape out of the sampling device. Turn the vacuum cleaner back on and return to vacuuming the sampling area. Be sure to account for lost sample time when you do this so you get a total of 5 minutes of sampling time.
9. Separate the sampling device from the hose of the vacuum cleaner and re-cap the flat end of the device.
10. After the small caps are secured on the dust sampling device, make sure there is dust in the sampling container before you send it to the lab. If no visible dust is noticed, repeat the sampling procedure in both rooms in different locations until visible dust is present in the device.
11. If you lose the small caps, seal the openings completely and securely with duct or electrical tape.

Allergens

Sampling Procedure

Dust Sampling with a Dust Collector Kit

(Kit available from EMSL, Product ID 8715600)

1. Insert the white filter tube securely into the dust collector, through the opening at the angled end.
2. Attach the dust collector to the vacuum cleaner hose or tube.
3. Turn on the vacuum cleaner and vacuum four separate areas for 30 seconds each, where each area is about 1/4 square meter. Total sampling time is 2 minutes and total area sampled is about 1 square meter.
4. A minimum of 100 mg of dust is required for allergen analysis.
5. Remove the filter tube containing the dust sample and place it in a small Ziploc-type bag or equivalent. Place entire device in the bag.
6. Label the bag with your sample name or code and ship to EMSL Analytical, Inc. for allergen analysis.

Dust Sampling with a Filter Cassette

(Cassettes available from EMSL, Product ID 8715313)

1. 25mm 0.45m MCE filter cassettes can be attached to a vacuum pump using PVC tubing.
2. A flow rate of 5-10 LPM is sufficient to collect dust into the cassette.
3. We recommend using a template to establish and standardize sampling areas (carpet, furniture, bedding, etc.).
4. Check clear window at inlet end of cassette to determine that an appreciable amount of dust has collected.
5. A minimum of 100 mg of dust is required for allergen analysis.

EMSL Carpet Sampling Kit
25mm Kit, #8715314

Allergen Sampler
#8715600

Indoor Allergen Analyses

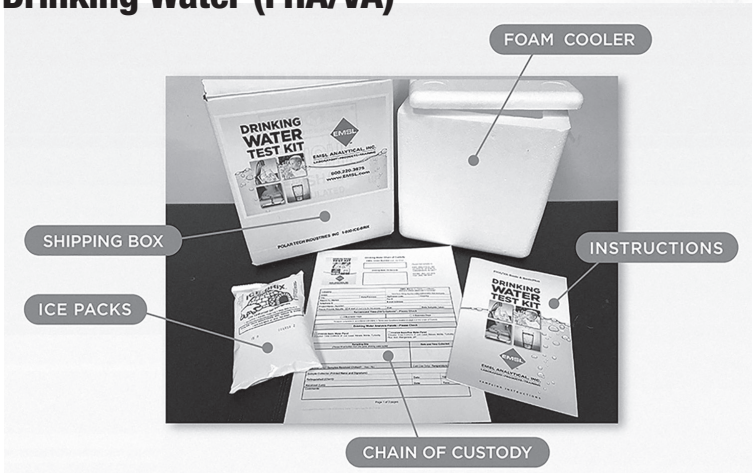
Test Code and Description

- M034 Cat Dander (Fel d 1) by MARIA
- M035 Dog Dander (Can f 1) by MARIA
- M036 Cockroach (Bla g 1) by MARIA
- M037 Dust Mites (Der p 1 & Der f 1) by MARIA
- M038 Mouse (Mus m 1) by MARIA
- M039 Rat (Rat n 1) by MARIA
- M044 Indoor Allergen Group: Cat, Dog, Cockroach, and Dust Mites by MARIA (Multiplex Array for Indoor Allergens)
- M254 Rat & Mouse Combo by MARIA

Note: Multiple allergens can be analyzed from a single dust sample.

Dust Mite

Drinking Water (FHA/VA)



Help protect the people in your home from exposure to contaminants that may be present within your drinking water and may potentially lead to serious health issues. The EMSL FHA/VA Basic Drinking Water Test Kit supplies the necessary equipment to quickly and efficiently collect a drinking water sample within a clean, complete, and professionally crafted package. EMSL has created this informational drinking water package which, in the absence of any specific local or state analytical requirements, is based upon the FHA and VA minimum panel for drinking water contaminants. This test kit package represents a single drinking water outlet and if testing multiple outlets you will need to purchase additional kits. The EMSL FHA/VA Basic Drinking Water Test Kit includes testing for Total Coliform, E. coli, Lead, Nitrate, Nitrite, and Turbidity. The EMSL FHA/VA BasicPlus Test Kit includes testing for Total Coliform, E. coli, Lead, Nitrate, Nitrite, and Turbidity plus Iron, Manganese, and pH.

What to Test

EMSL Analytical, Inc. has created these informational drinking water packages, in the absence of any specific local or state analytical requirements, which are based upon the Federal Housing Authority's (FHA) and Department of Veteran's Affairs' (VA) minimum panels for drinking water contaminants. The results for these contaminants are then compared to the EPA Maximum Contaminant Level (MCL) for drinking water. The same national MCL's are used for both publicly and privately supplied drinking water. EMSL offers a choice of 2 or 3 day sample analysis turnaround times. These report packages are intended to be a cost-effective, informative and easy to understand first step in assessing basic water quality. If contaminants are detected, a more thorough investigation may be warranted to determine the source and possible mitigation of the contamination.

When to Test

- If your drinking water does not come from a public water system, you are responsible for ensuring that it is safe to drink. Regular testing of your drinking water can establish a record of water quality, which may help you obtain compensation if another party negatively impacts your drinking water supply.
- The U.S. Environmental Protection Agency (EPA) recommends testing your drinking water every year for total coliform bacteria, nitrates, total dissolved solids and pH levels. Testing is especially recommended if you have had a new well installed or if you have made any repairs to your system.
- The EPA recommends testing your drinking water for nitrate during the early months of your pregnancy, before you bring your newborn home and during the first six months of your newborn's life.
- The EPA recommends testing your drinking water for sulfate, chloride, iron, manganese, hardness and corrosion every three years.
- Placing a call to your local health department can educate you about the specific contaminants that are related to the spill and/or leak. You can then seek drinking water testing for the specific contaminants of concern.
- Poor drinking water quality can affect the health of your loved ones especially that of infants, children, the elderly and any immune-compromised family members.

Sampling Procedure

What EMSL is Providing

- 250 mL Sampling bottle(s) (Product ID # 87LM005)
- Chain of Custody
- Original shipping box

What Will You Yeed Before Collecting Your Sample(s)

- Disposable gloves
- Eye protection

Pre-Sampling Instructions

1. Save the original shipping box from EMSL to return the sample(s) to the laboratory for analysis.
2. Each bottle(s) and cap(s) is color-coded to match the test requested.
3. On all sample(s), use a gentle stream of water to prevent overflow or splashing.
4. Always wear gloves and eye protection when handling the bottle(s).
5. To avoid contaminating your sample(s): please do not touch the inside of the bottle cap, or the inside of the bottle.
6. IMPORTANT: Collect your sample(s) in the morning Monday through Thursday. Ship everything back to the laboratory the same afternoon as collection. Please do not conduct sampling on Friday, Saturday, or Sunday.

Selecting Your Collection Location

1. Use a clean, properly functioning faucet in an area free of excessive dust or other sources of contamination. Non-swivel faucets are preferred.
2. Select a faucet without devices such as screens, aerators, hoses, or purification devices which may affect results. If present, please remove them prior to sample collection.
3. IMPORTANT: The faucet should be high enough to allow the bottle to fit underneath, with out contacting the mouth of the bottle with the faucet (example: a bath tub or kitchen sink).
4. Before collecting your sample(s), please put on your gloves and eye protection.

Collection Instructions (YELLOW CAP BOTTLE)

1. Prior to collecting your sample, allow the water to sit in the pipes undisturbed for at least six hours. Do not flush the water line before the start of the collection period.
2. Let the water run from the cold tap for at least 10 minutes before collecting your sample.
3. Remove the cap from the **YELLOW CAP** bottle. Please hold the cap by its outside edges only, and slowly fill the bottle to the neck.
4. Collect the water from the cold tap filling the bottle but not overfilling.
5. Secure the cap to the bottle for shipment.

Returning Your Samples

1. Fill out the enclosed EMSL Chain of Custody form. Be sure to provide all contact and sample information along with signatures and dates requested.
2. Place your completed Chain of Custody along with your bottle(s) inside the original box for shipment. Please do not add ice.
3. Please ship your box on the SAME DAY you collect the sample(s).

Other Options

- Bacteria only – analyze Total Coliform and *E.Coli* only. Ask about test code M017 today!
- Metals – add metals to an FHA/VA test. Metals can be testing as an add-on test or as a stand-alone, individual test.

PFAS

Background Information from The EPA (FHA/VA)

Perfluoroalkyl and polyfluoroalkyl substances (PFAS) are a group of man-made chemicals that includes PFOA, PFOS, GenX, and many other chemicals. PFAS have been manufactured and used in a variety of industries around the globe, including in the United States since the 1940s. PFOA and PFOS have been the most extensively produced and studied of these chemicals. Both chemicals are very persistent in the

environment and in the human body – meaning they don't break down and they can accumulate over time. There is evidence that exposure to PFAS can lead to adverse human health effects.

Where PFAS Can Be Found

- Food packaged in PFAS-containing materials, processed with equipment that used PFAS, or grown in PFAS-contaminated soil or water.
- Commercial household products, including stain- and water-repellent fabrics, nonstick products (e.g., Teflon), polishes, waxes, paints, cleaning products, and fire-fighting foams (a major source of groundwater contamination at airports and military bases where firefighting training occurs).
- Workplace, including production facilities or industries (e.g., chrome plating, electronics manufacturing or oil recovery) that use PFAS.
- Drinking water, typically localized and associated with a specific facility (e.g., manufacturer, landfill, wastewater treatment plant, firefighter training facility).
- Living organisms, including fish, animals and humans, where PFAS have the ability to build up and persist over time.

Certain PFAS chemicals are no longer manufactured in the United States as a result of phase outs including the PFOA Stewardship Program in which eight major chemical manufacturers agreed to eliminate the use of PFOA and PFOA-related chemicals in their products and as emissions from their facilities. Although PFOA and PFOS are no longer manufactured in the United States, they are still produced internationally and can be imported into the United States in consumer goods such as carpet, leather and apparel, textiles, paper and packaging, coatings, rubber and plastics.

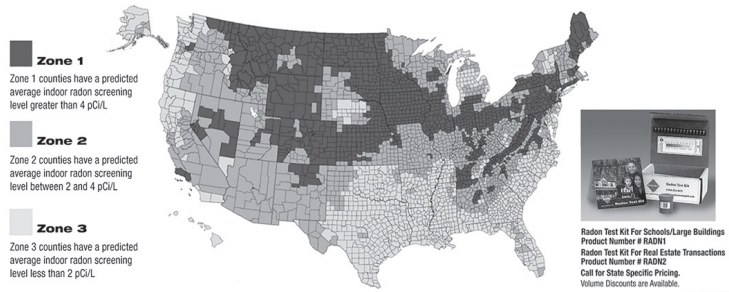
Matrix Options

At this time, EMSL is currently processing drinking water samples and other potable water sources. EMSL is in the process of setting up for wastewater, non-potable water, and soil samples.

Methods

EMSL can perform analysis for PFAS compounds by both EPA 537 and 537.1 methods for drinking water. Currently there are no accepted EPA methods for wastewater, non-potable water, or soil samples.

Radon



What is Radon?

- Radon is a Radioactive Gas
- We cannot see or smell it
- Testing is the only way to know if you have elevated levels
- Naturally occurring
- Resuts from the breakdown of Uranium in soil, rock, and water
- Colorless, odorless and tasteless
- Radon is the second leading cause of lung cancer, after smoking
  - Between 15,000 and 22,000 lung cancer deaths per year in US
  - There are no other known heal effects from inhalation of radon
  - EPA believes there is no safe level

Sampling Radon in Air

- Test every home
- Test in the lowest livable level
- Maintain closed house conditions 12 hours prior to testing & during entirety of test
- Keep all windows & doors closed, do not operate fans
- OK to operate HVAC as normal
- If radon mitigation system exists, keep operational

Radon in Drinking Water

- According to the U.S. Environmental Protection Agency (EPA) (1), radon gas can also dissolve and accumulate in water. When water containing radon is used in the home for showering, washing dishes and cooking, its gas escapes from the water and goes into the air. Breathing in radon can cause lung cancer.
- Radon in water will be tested by an EPA procedure (EPA Method 913.0) with detection limit of ~ 50 pCi/L. If your results are < 300 pCi/L, no additional actions are needed. This amount of radon in water contributes only about 0.03 pCi/L of radon to the air in your home. Analysis of radon in water should always come after air testing.
- Radon in drinking water Analysis
- Samples have a hold time of 3.8 days

Lead

Where Does Lead Come From?

Lead poisoning, especially among children, remains a major environmental health problem worldwide. Even children or people who seem healthy may have elevated lead levels in their bodies. You can get lead in your body by breathing or swallowing lead contaminated dust or by swallowing soil or paint chips contaminated with lead. Your child may also get lead by sucking on lead contaminated toys. If you work with lead, you can bring it home on your hands and clothes. Some hobbies such as refinishing furniture, working with stained glass, or making, painting, or glazing pottery may expose you or your family to lead containing materials.

Why Test For Lead?

If you are buying or renting a home, the buyer or renter must be given the opportunity to test for the presence of lead based paint if they choose. However, there is no law that requires that testing for lead based paint be conducted. It is advisable to test for lead based paint if the house or apartment was built before 1978 or if young children will be in the home. If your house was built before 1978 and you already tested for lead based paint, you are required to provide the test results to any buyer or renter when you sell or rent the home. Lead from peeling, flaking or chalking paint can get into the dust or soil in and around the home. Young children will ingest the lead contaminated dust or soil from their normal hand-to-mouth activity. In addition, an unborn child will be exposed to lead from the pregnant mother's womb as lead can readily pass through the placenta.

High lead levels in a fetus or young child (6 or younger) has been shown to cause damage to the nervous system, cause learning and behavior developmental delays, and slow growth. Testing the paint will tell you if your home contains lead based paint. Children absorb about 40% of the lead they ingest whereas adults absorb only 10%. You should be aware that the only way to determine if you or your child has lead poisoning is to get a blood test for lead. You can get this conducted through your local or state lead screening program. If you are planning to renovate, remodel or repaint a home or apartment built before 1978, you should test to see if the paint contains lead. Any disturbance of lead based paint can cause lead contaminated particles or dust to settle in the home. A major demolition may cause the soil around the home or apartment to become contaminated. It will also cause clouds of airborne contaminated particles and dust that will eventually settle out.

Areas To Test

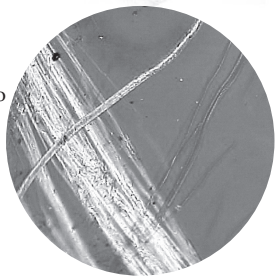
Inside - baseboards, built-in cabinets, chair rails, doors, fireplaces, floors, heating units, railings, shelves, stairs, walls, windows. Test each type of painted area that uses a different color or different type of paint. Outside – door trim, fascia, soffits, gutters, downspouts, handrails, lattice work, mailboxes, porches, roofing, painted siding, painted stairs, sheds, swing sets. Bare Soil (not grass covered) – if you suspect that lead dust was released from nearby demolition or manufacturing facilities.

Sampling Procedure

1. Put on the pair of gloves included with the test kit.
2. Label each collection vial with the location of the sample using a marker.
3. Adhere the one inch x one inch template to the surface of the sample to be collected.
4. Using a clean knife, scrape off the paint and place in the sample vial.
5. If the area you are sampling has more than one layer of paint, it is important to collect a sample that contains all the layers of paint.
6. After the sample has been placed in the collection vial, seal the lid tightly.
7. Complete the paperwork that is enclosed in the test kit. Sign and date the signatory. If you include your email address, your results will be emailed automatically. (Please be sure to re-set your spam filter to accept attachments or check your spam or junk folder.)

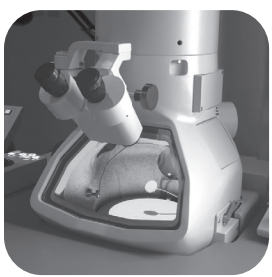
Asbestos

What is Asbestos?



Asbestos is the name of a group of highly fibrous minerals with separable, long, and thin fibers. Separated asbestos fibers are strong enough and flexible enough to be spun and woven. Asbestos fibers are heat resistant, making them useful for many industrial purposes.

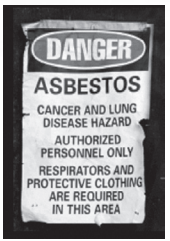
Asbestos has been used commonly in a variety of building construction materials for insulation and as a fire-retardant. Because asbestos fibers are resistant to heat and most chemicals, they have been mined for use in over 3,000 different products, including roofing materials, brake pads, and cement pipe often used in distributing water to communities. Today, asbestos is most commonly found in older homes, in pipe and furnace insulation materials, asbestos shingles, millboard, textured paints and other coating materials, and floor tiles.



Elevated concentrations of airborne asbestos can occur after asbestos-containing materials are disturbed by cutting, sanding or other remodeling activities. Improper attempts to remove these materials can release asbestos fibers into the air in homes, increasing asbestos levels and endangering people living in those homes.

Asbestos can be positively identified only by a trained analyst using a specialized microscope.

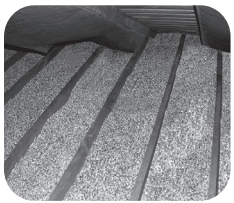
Sampling Procedure



Asbestos consultants are trained in the proper collection of samples for asbestos analysis.

- Make sure no one else is in the room when sampling is done.
- Wear disposable gloves or wash hands after sampling.
- Shut down any heating or cooling systems to minimize the spread of any released fibers.
- Do not disturb the material any more than is needed to take a small sample.
- Place a plastic sheet on the floor below the area to be sampled.
- Wet the material using a fine mist of water containing a few drops of detergent before taking the sample. The water/detergent mist will reduce the release of asbestos fibers.
- Carefully cut a piece from the entire depth of the material using, for example, a small knife, corer, or other sharp object.
- Place the small piece into a clean container (for example, a 35 mm film canister, small glass or plastic vial, or high quality resealable plastic bag).
- Tightly seal the container after the sample is in it.
- Carefully dispose of the plastic sheet. Use a damp paper towel to clean up any material on the outside of the container or around the area sampled. Dispose of asbestos materials according to state and local procedures.
- Label the container with an identification number and clearly state when and where the sample was taken.
- Patch the sampled area with the smallest possible piece of duct tape to prevent fiber release.

Vermiculite



What is Vermiculite Insulation?

Vermiculite is the mineralogical name given to hydrated laminar magnesium-aluminum-ironsilicate which resembles mica in appearance. All vermiculite ores contain a range of other minerals that were formed along with the vermiculite in the rock.Vermiculite has been shown to contain Asbestos. Exposure to asbestos increases the risk of developing lung diseases including asbestosis, lung cancer, or mesothelioma. These diseases may not occur until decades after exposure. The risk of disease increases as the level, duration, and frequency of exposure increases.

The only way to know for sure if vermiculite insulation in your home contains asbestos is to have it tested. If asbestos is found, then the proper procedures can be implemented to keep you and your family safe from exposure.

Sampling Procedure

1. Make sure no one else is in the room when sampling is done.
2. Wear disposable gloves or wash hands after sampling.
3. Shut down any heating or cooling systems to minimize the spread of any released fibers.
4. Do not disturb the material any more than is needed to take a small sample.
5. Wet the material using a fine mist of water before taking the sample. The water mist will reduce the release of asbestos fibers.
6. Carefully remove a small amount of the vermiculite insulation being sure to not aerosolize the material. The asbestos has a tendency to settle so it is important to collect the sample from the bottom if possible.
7. Place the small amount into a clean container such as a jar or ziplock bag (a half cup is a good size).
8. Tightly seal the container after the sample is in it. Double bagging is recommended.
9. Label the container with an identification number and clearly state when and where the sample was taken.

VOC/Odors

Volatile organic compounds (VOCs) include a wide range of chemicals used in many products and materials today. These VOCs are emitted as gases from certain solids or liquids and many are known to have potential adverse health effects for anyone exposed to long-term or elevated levels of these compounds.

Concentrations of many VOCs are consistently higher indoors than outdoors since they are emitted from so many products found in modern homes and buildings. Examples of common sources include: paints, paint strippers, and other solvents; wood preservatives; aerosol sprays; cleaning supplies, disinfectants and pesticides; air fresheners; stored fuels and automotive products; hobby supplies; dry-cleaned clothing; building materials and furnishings; glues and adhesives. The tighter a home is sealed, the more suffocating indoor air can be.

VOCs can cause a list of ailments and health concerns ranging in seriousness; some issues are as simples as a headache whereas others could be cause lifelong heath concerns. Performing an indoor air quality assessment is a key starting point to determining an issue.

Sampling Procedure TO-15

You will need to rent/borrow a summa canister from EMSL. Available canister sizes range, most common canister size is 1.4L.

Choose a regulator which controls the flowrate of the sample. Regulators come in 15min, 30 min, 1hr, 2hr, 4hr, 6hr, 8hr, 12hr, and 24hr.

1. Make sure you've received the ordered equipment for sampling.
2. Check the initial pressure on the canister. Note it on the Chain of custody.
3. Connect the regulator to the canister. The canister is under negative pressure so as soon as the regulator is connected to the canister the sampling has begun.
4. Allow the sample to conduct based on the requested regulator time frame. When sampling time is complete, disconnect the regulator from the canister. Note the canister pressure again on the chain of custody.
5. Return the equipment and sample of air to the lab for testing.

Formaldehyde

For more info., reference EMSL Formaldehyde Pocket Guide.

What is Formaldehyde?

Formaldehyde is a colorless, reactive, strong-smelling gas at room temperature. It is one chemical in a large family of chemical compounds called volatile organic compounds (VOCs). The term volatile means that the compounds vaporize or become a gas at room temperature. Formaldehyde can be manufactured as a liquid (formalin) or a solid (paraformaldehyde). Formaldehyde is an important industrial chemical used to make other chemicals and different types of products, such as: home furnishings, household cleaners, paints, textiles, landscape and yard products, medicinal and personal care products, and pesticides. Chemicals that are created with formaldehyde or have formaldehyde added to them include the following:

- Resins and lubricants
- Polyoxymethylene Plastics
- 1,4 - Butanediol
- Methylene Diphenyl Diisocyanate

Formaldehyde can be released into the air (off-gas) from materials and products made with it. Formaldehyde can also be released into the air by automobiles, cigarettes, and burning wood, kerosene or natural gas. It is also a naturally occurring substance.

Should You Be Concerned

Formaldehyde exposure may potentially cause a variety of symptoms and adverse health effects, such as eye, nose, throat, and skin irritation, coughing, wheezing, and allergic reactions. Long- term exposure to high levels of formaldehyde has been associated with cancer in humans and laboratory animals. Formaldehyde can affect people differently.

Some people are very sensitive to formaldehyde at a certain level while others may not have any noticeable reaction to the same level. Formaldehyde is just one of several gases present indoors that may cause adverse health effects and illnesses. Many other gases, as well as respiratory illnesses (e.g., colds and the flu), can cause similar symptoms to those caused by formaldehyde.

What Levels of Formaldehyde Are Present in Consumer Environments

Formaldehyde is normally present at low levels, usually less than 0.03 parts per million (ppm), in both outdoor and indoor air. The outdoor air in rural areas has lower concentrations while urban areas have higher concentrations (due to sources such as automobile exhaust). Residences or offices that contain products that release formaldehyde into the air can have levels greater than 0.03 ppm.

Where is Formaldehyde Found?

- Resins used in the manufacture of composite wood products (i.e., hardwood plywood, particleboard and medium-density fiberboard)
- Building materials and insulation
- Household products such as glues, permanent press fabrics, paints and coatings, lacquers and finishes, and paper products
- Preservatives used in some medicines, cosmetics and other consumer products such as dishwashing liquids and fabric softeners
- Fertilizers and pesticides

It is a Byproduct of Combustion and Certain Other Natural Processes, And so is Also Found in

- Emissions from un-vented, fuel burning appliances, like gas stoves or kerosene space heaters.
- Cigarette smoke.

What are the Major Sources of Indoor Formaldehyde Emissions in Our Homes Today?

Measuring formaldehyde emissions from individual consumer products is difficult because a variety of products in the home can release formaldehyde or trap formaldehyde emitted from other sources. Products with greater emissions and larger surface areas in the home will most likely have a greater contribution to indoor air formaldehyde levels. Keep this in mind when prioritizing the different product types below. Also, not all brands within each product type contain formaldehyde.

Wood Floor Finishes

Wet Commercial, Base and Top-Coat Floor Finishes

- May emit high levels of formaldehyde.
- Emissions decrease 24 hours after application.
- Finishes are not typically available to the consumer, but they can be (re-) applied by commercial floor contractors at residences or factories.

Pressed-Wood and Wood-Based Products

Pressed-wood (i.e., hardwood plywood, particleboard, and medium-density fiberboard (MDF)) and wood-based products, especially those containing UF resins, may be a significant formaldehyde source.

- Formaldehyde emissions from pressed-wood products have been reduced 80-90% from levels in the 1980's and earlier due to mandatory formaldehyde emission standards in California and national voluntary formaldehyde emission standards, which are described later in this booklet.
- Emissions decrease 6-10 months after initial testing.

Combustion

Cigarette smoke and the combustion of other materials, such as wood, kerosene, oil, natural gas, and gasoline, produce formaldehyde.

Wallpaper and Paints

- Moderate levels of formaldehyde initially following application.
- Levels formed during the curing process may be higher than after initial application.
- Emissions are sometimes still detectable 1-3 months following application.
- Some paints are now found with low-VOC formulations.

Other Materials

Formaldehyde can be created from the chemical reaction between ozone and other VOCs during the use of personal computers, laser printers, and photocopiers.

Re-Emitters

Because they are porous, products, such as carpets or gypsum board, do not contain significant amounts of formaldehyde when new. However, they may trap formaldehyde that is emitted into the air from other products and later release it into the indoor air.

Buck Libra (L-4) Pump w/Single Charger
#8706200

Gilian LFS-113 Standard Pump w/Single Charger
#8706211

Sampling Procedure Options

Air sampling can be done via sorbent tube/pump or via sampling badge. Sampling badges are specific to formaldehyde. Badges for sampling can be ordered through EMSL. Samples should be kept chilled except when sampling. The badge is a passive dosimeter; as air passes across the surface, formaldehyde is captured. Samples should be left for 8-24hrs.

Bulk Samples (Including Flooring)

(2 Methods options)

Small Chamber Study

(ASTMD 5582)

- Provide EMSL with a 2”x2” section of flooring in sealed plastic bag.
- Sample is placed in small glass vial and air is collected as it passes over the flooring
- Air sample is analyzed to determine PPM of formaldehyde concentration in flooring

Large Chamber Study

(ASTMD 6007)

- Provide EMSL with 2ft x 2ft section of flooring, wrapped in plastic
- Sample placed in chamber, after 24 hour period air sample is collected from chamber
- Air sample is analyzed to determine PPM of formaldehyde in flooring as well as formaldehyde emission rate from flooring (µg/m^2 – hr)

Meth Residue, Marijuana and Nicotine Smoke

Clandestine labs are used for the illicit production of illegal drugs, mostly methamphetamine, PCP, GHB, or MDA (Ecstasy). Types of hazards associated with clandestine labs Individuals usually operate these makeshift labs with little to no training in chemistry. They employ crude, homemade equipment to accomplish complex chemical reactions. Due to the nature of the chemicals involved there is significant risk of explosion, fire and exposure. The chemical agents used in the production of illegal drugs can include common household products such as methanol, ether, benzene, methylene chloride, trichloroethane, toluene, muriatic acid, sodium hydroxide, table salt, and ammonia. Some of the uncommon household items used include anhydrous ammonia, red phosphorus, iodine, and reactive metals. The poor handling, disposal, and mixing of incompatible chemicals leads to significant hazardous conditions. Once these chemicals are mixed and used in the making or "cooking" process, the production of other potentially harmful chemicals ensue. Oftentimes, abatement workers focus strictly on the chemical hazards.

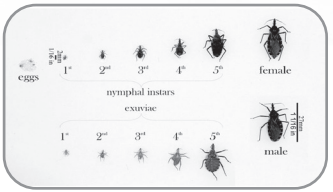
Sampling and Laboratory Analysis

Many States have specific guidelines for clearance testing associated with clandestine laboratories. For clandestine methamphetamine operations, the clearance contractor is usually required to wipe surfaces and send the samples to an accredited laboratory. NIOSH and OSHA have not published validated methods for the analysis of methamphetamine in air.

Samples can be taken from kitchen areas of the home where cooking activities are intensified. The clearance contractor should take samples from the refrigerator (inside and out), the stove/oven, and the gap between the counter and the stove where those nasty little toast crumbs build up.

Bed Bugs

Bed bugs feed exclusively on warm-blooded animals, including human, typically when they sleep. They have been detected in a variety of places such as hotels, offices, apartments, and houses. The pests only grow to a size of 4 to 5 millimeters making them difficult to detect, but EMSL's bed bug testingmakes it possible to identify them.



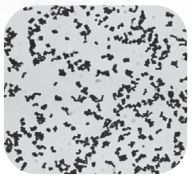
Sampling Procedure

Inspect suspected contaminated areas, usually bedding, sheets, pillows, mattresses & seams, behind headboards and picture frames, bed rails, flooring and baseboards under bed for signs of bed bugs, bed bug droppings that appear as small specks similar to ground black pepper, as well as blood drops that may be left behind after feeding.

1. Send us a bed bug specimen in a zip lock plastic bag (if you find one). Be sure to write the location on the outside of the plastic zip lock bag. (Example: Parents Bedroom)
2. If you do not find a live bug, collect your sample for bed bug DNA by swabbing or rubbing a cotton swab or Q-Tip along the areas outlined above as a collection point for your sample. Samples can also be collected using a microvac cassettes with a pump. Place sample in a zip lock plastic bag and write the location on the outside of the plastic zip lock bag.

Note: You may swab different areas in one room with the same cotton swab or Q-Tip. To see if bed bugs are present in other rooms, take a separate swab samples and be sure to write the location on the outside of the sample bag. Each sample received by EMSL will be analyzed and billed as a separate sample.

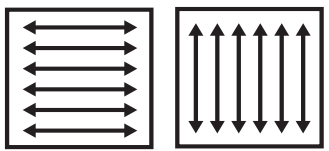
Sewage Contamination



- Methods available to test for sewage contamination in buildings include:
  M117 – a culture-based method detecting Total Coliforms, *E. coli,* and Enterocci (48 hr TAT)
  M013 – a culture-based method detecting Total Coliforms, Fecal Coliforms, *E. coli,* and Fecal Streptococcus (6-10 day TAT)
  M095 – a PCR-based method for detecting Total *Bacteroides* (24 hr TAT available)
  M199 – PCR-based method for Human *Bacteroides*
- The culture-based methods have the advantage of looking for only living bacterial contaminants which may be the only ones of interest if disease is of concern. Endotoxin testing can also be of value to measure the total amount of Gram negative bacteria in the building (see page 31).
- The *Bacteroides* test has some advantages over the traditional culture-based tests including:
  – Total *Bacteroides* is specific for fecal contamination from all sources – animals, birds, and human
  – Human *Bacteroides* is specific for human sources of fecal contamination.
  – Coliforms, *E. coli,* Fecal Streptococci, and Enterococci can grow in water, soil, sediments and on vegetation in uncontaminated environments (*E. coli* is found in pristine tropical environments).
  – Coliforms, *E. coli*, Fecal Streptococci, and Enterococci can not distinguish between animal and human sources of contamination.
  – *Bacteroides* will not multiply in the environment.
  – *Bacteroides* outnumber coliforms by 1,000:1 and outnumber *E. coli* by 10,000:1; therefore, the chance of finding *Bacteroides* is greatly enhanced.
  – Traditional culture-based tests rely on the presence of live bacteria. These bacteria often will not be viable in indoor environments. **THIS MEANS THAT A NEGATIVE COLIFORM or *E. COLI* RESULT DOES NOT MEAN THE ABSENCE OF FECAL CONTAMINATION.** The new *Bacteroides* test overcomes these culture limitations. The laboratory can detect live, nonviable, or viable but not culturable bacteria.

Sampling Procedure for all Sewage Contamination Tests

1. Obtain a sterile 1 mL Butterfield's Solution swab (EMSL Product ID 8708935) to collect and transport samples (provided at your request by EMSL).
2. With gloves on, remove swab from sterile packaging.
3. Carefully unscrew cap of sampling device – swab is attached to the lid of the cap.
4. Gently press out excess solution from sampling swab by pressing the swab against the inside wall of the tube with a rolling motion.
5. Hold swab at an approximate 30° angle from the sampling surface, taking care not to contaminate any part of the swab or the sampling site.
6. Using firm, even pressure move the swab slowly and thoroughly over an entire 4" x 4" sampling area, rewetting the swab tip with the transport solution as needed. First horizontally, then vertically:



Horizontally *Vertically*

7. After sampling is complete, carefully put swab back into vial and close cap tight.
8. Label the sample using a permanent ink marker.
9. **Background samples in non-fecally contaminated areas should be taken.**

Sample Shipping

- Samples that will be submitted for culture-based analysis must be shipped overnight cold, not frozen, within 24 hours from the sample collection. The best method of shipment for these samples is to use a cooler with freezer packs, not bags of ice or loose ice.
- There are no special shipping requirements or hold times for *Bacteroides* since they will not multiply outside of the intestine. However, we recommend sending them to the laboratory as soon as possible.

Fire & Smoke Damage Testing

Char, Ash, Black Carbon/Soot

For more info., reference EMSL Fire and Smoke Damage Pocket Guide.

The components of fire debris are complex and their nature depends on the type of materials involved in the fire, the combustion conditions, and the presence of fuels/accelerators. In general, the common by-products of fires can be classified in three categories: char, ash, and soot/black carbon.

Char is defined in ASTM D6602-13 as particulate larger than 1 µm made by incomplete combustion which may not deagglomerate or disperse by ordinary techniques, may contain material which is not black, and may contain some of the original material's cell structure, minerals, ash, cinders, and so forth. Carbon is typically the predominant component in char.

Ash is pyrolized material obtained from advanced combustion of char. Because the carbon matrix of char is almost completely combusted, ash has a minerals-based matrix, with a high amount of elements such as calcium, potassium, magnesium, aluminum, silicon, phosphorus or sulfur. The particles are very brittle and may or may not contain some of the original material's cell structure.

Soot is defined in ASTM D6602-13 as submicron black powder generally produced as an unwanted by-product of combustion or pyrolysis. It consists of various quantities of carbonaceous and inorganic solids in conjunction with adsorbed and occluded organic tars and resins. The EPA defines black carbon as the sooty black material emitted from gas and diesel engines, coal-fired power plants, and other sources that burn fossil fuel.

Carbon black is a term usually associated with soot, although they are different materials and have distinctively different origins. Carbon black is an engineered, industrially produced material, primarily composed of elemental carbon, obtained from the partial controlled combustion or thermal decomposition of hydrocarbons (most hydrocarbons are found in crude oil and other fuels).

Purpose of The Test

This test is designed for analysis of fire residues for presence of analytes of interest (char, black carbon/soot and ash). The results of this test offers the client valuable information related to the extent of damage produced by a fire at a residential, industrial or wildfire location. These results can be used for cleaning assessment and/or insurance claims.

Sampling Options

Air Sampling

- Option 1: Gravimetric analysis based on NIOSH 5000- Carbon Black
- Option 2: PCM or TEM Cassettes (based on NIOSH 7400 sampling method)
- Option 3: Air-O-Cell

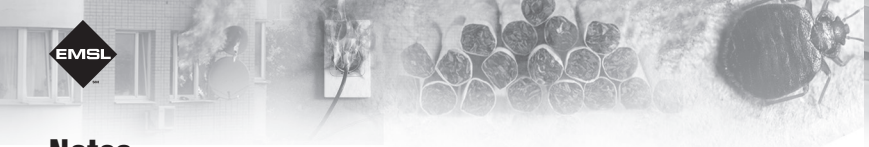
Surface Sampling

- Option 1: Micro Vacuuming
- Option 2: Tape Lifting (Forensic Adhesive Lifts, Transparent Office Tape)
- Option 3: Wet Wiping/Alcohol Prep Wipes
- Option 4: Bulk/ Grab Sample

Analytical Options

- Light Microscopy
  (Stereomicroscopy, Reflected Light Microscopy, Polarized Light Microscopy)
- Transmission Electron Microscopy with Energy Dispersive X-Ray
  (TEM/EDX)
- Scanning Electron Microscopy with Energy Dispersive X-Ray
  (SEM/EDX)

Each of these techniques provides the means to observe and characterize specific fingerprinting traits of the target analytes in fire residues.



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