

Home Air Analysis For: Smith
Home Tested: 123 W. Maple Ave.
Boston, MA 25478

Sampling Professional: Alex Carter
Air Quality Inspections
1245 Main St. Suite B
Pleasantville, MA 84847
U.S.A.

Client Sample ID: Basement
Sample Volume (L): 24
Date Sampled: 12/31/2012
Sample Type: TDT 112J

Client Sample ID: Basement
Laboratory ID: 6010 - 1

Report Number: 6010

Thank you for using IAQ Home Survey!
If you have questions about your report,
please contact your service provider who
performed this test.

Order Date: 01/02/2013
Scan Date: 01/02/2013
Report Date: 01/04/2013

IAQ Home Survey™ is one of the most advanced, trusted air testing products on the market today for identifying chemical and mold contamination in a home. Many indoor air quality (IAQ) issues identified by IAQ Home Survey can be easily remediated or eliminated. This test is an invaluable tool for homebuyers, homeowners, and renters because it provides important information on potential contamination issues in the home that cannot be detected by a visual inspection alone. Acting upon the information in this report will enable you to dramatically improve the air quality in your home, creating a healthier environment for you and your family.

What's in your Indoor Air Quality Report?

Your Indoor Air Quality Report has several sections describing different aspects of your home's air quality.

- 1. The Total Volatile Organic Compound (TVOC) level:** a general indicator of the IAQ in your home. Typically, a lower TVOC means better IAQ in your home.
- 2. The Total Mold Volatile Organic Compound (TMVOC) level:** an assessment of the actively growing mold in your home. Levels above 8 ng/L indicate that there is a source of actively growing mold in your home.
- 3. The Contamination Index™ (CI):** shows the types of air-contaminating products and materials that are present in your home. Each CI category shows the approximate contribution of that category to the TVOC level, indicates how your home compares to thousands of other homes, and provides some suggestions for where these products and materials might be found. The CI is divided into 3 main sections: Building-Related Sources, Mixed Building and Lifestyle Sources, and Lifestyle Sources. Building-Related Sources are those that are typically part of the structure of the home and may be more difficult to reduce in the short term. Mixed Building and Lifestyle Sources are those that could belong to either category and investigation on your part may be necessary to determine which source is more likely. Lifestyle Sources are those that the occupants of the home bring into the home and can usually be readily identified and remediated. Levels indicated as Elevated or Severe should be immediately addressed, and those listed as Moderate are areas that can be improved over time. Since there are potentially many sources of VOCs, homes can often be re-contaminated even after sources have been removed because new products are constantly being brought into the home. Home occupants and homebuyers should take note of this fact, and view IAQ as a continuous improvement process.
- 4. Significant VOCs:** listing of the chemical compounds measured with the IAQ Home Survey test that are large contributors to the TVOC level. Reduction of these specific chemical compounds will substantially reduce the TVOC level and greatly improve the IAQ of the home.
- 5. EPA Hazardous Air Pollutants (HAPs):** listing of the chemical compounds measured with the IAQ Home Survey test that are known or suspected to have serious health or environmental effects (also known as air toxics).

Prism Analytical Technologies, Inc., the creator of IAQ Home Survey, has been performing air quality assessments to industry and environmental consultants since 1995. Prism Analytical Technologies, Inc. (ID 166272) is accredited by the AIHA Laboratory Accreditation Programs (AIHA-LAP), LLC in the Industrial Hygiene accreditation program for GC/MS Field of Testing as documented by the Scope of Accreditation Certificate and associated Scope. Reference method NIOSH 2549 and Prism A2-IAQHS.

Sample Report

Client Sample ID: Basement
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Total Volatile Organic Compound (TVOC) Summary

Your TVOC Level is (ng/L): **1500**

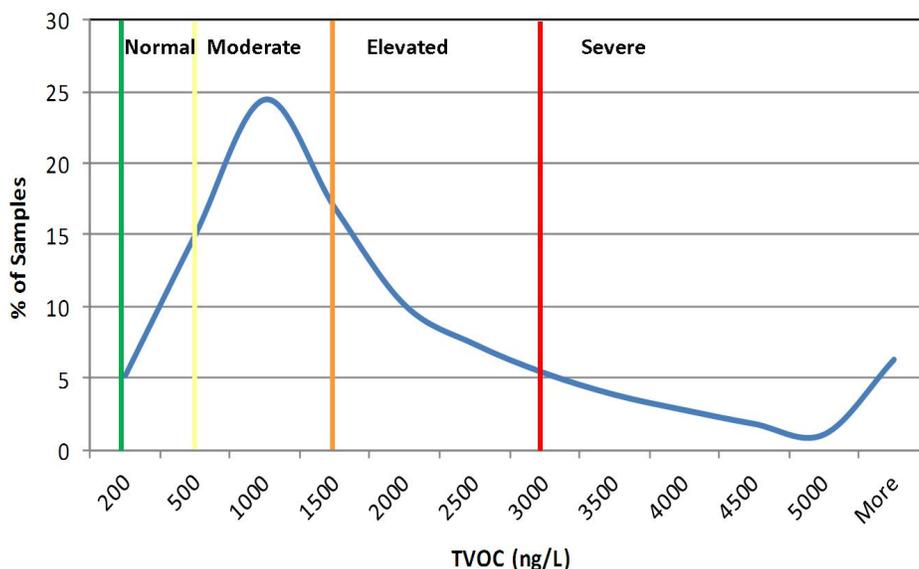
HAC Air Quality Level:

Moderate

Median TVOC (ng/L): **1,200**

The median TVOC is the midpoint TVOC value of approximately 4,500 homes.

**All IAQ Home Survey TVOC
Air Quality Indicator**



The chart above shows the TVOC levels for all homes tested using IAQ Home Survey. The blue line represents the relationship between the percentage of homes (indicated on the vertical y-axis) and the TVOC level (indicated on the horizontal x-axis). The green, yellow, orange, and red vertical bars represent divisions between Normal, Moderate, Elevated, and Severe TVOC levels. At the Normal level, non-chemically sensitive individuals should not experience issues because of VOCs. As the TVOC value increases into the Moderate, Elevated, or Severe levels, individuals may experience aggravated health problems, and therefore, the need to address VOC issues becomes more critical. However, reductions in VOCs can be made at any level.

The U.S. federal government has not specified a TVOC limit for indoor air. However, the U.S. Green Building Council (USGBC) has recommended 500 ng/L as the upper TVOC limit. TVOC levels below 500 ng/L indicate that the IAQ is acceptable for most individuals; however, chemically sensitive persons may require lower levels. TVOC levels between 500 and 1,500 ng/L indicate that the air quality is marginal and some effect on the occupants is possible. Levels above 1,500 ng/L indicate that your IAQ should definitely be improved. These levels are based on observed health effects and have been determined from a combination of published journal articles (1, 2, 3) and the statistical distribution of TVOC concentrations from the IAQ Home Survey methodology.

The presence of chemicals in your home can cause a wide range of problems, ranging from an unpleasant odor to physical symptoms (burning and irritation in the eyes, nose, and throat; headaches; nausea; nervous system effects; severe illness; etc.). In some cases, these conditions may make the home unlivable. Anyone with respiratory issues like asthma and allergies, as well as children, the elderly, and pregnant women are more susceptible to poor indoor air quality than healthy individuals. However, at elevated TVOC levels even healthy individuals are likely to experience ill effects. The following websites can offer more information:

- US EPA: <http://www.epa.gov/iaq/>
- American Lung Association: <http://www.lung.org/healthy-air/home/>
- World Health Organization: <http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/air-quality/policy/indoor-air-quality>
- Lawrence Berkeley National Laboratory: <http://www.iaqscience.lbl.gov/voc-introduction.html>

The Contamination Index (CI) in the next pages of this report will help guide you through determining what types of products or materials in the home could be problematic for your IAQ, and will provide some recommendations to help reduce or eliminate them.

1 L. Molhave, Volatile Organic Compounds, Indoor Air Quality and Health, Vol. 5, International Indoor Air Quality Conference, Toronto, Canada, 1990, p. 22 ff.
2 European Collaborative Action: Indoor Air Quality and its Impact on Man (ECA-IAQ), Report No 19 Total Volatile Organic Compounds (TVOC) in Indoor Air Quality Investigations, 1997. (from L. Molhave et al., Total Volatile Organic Compound (TVOC) in Indoor Air Quality Investigation, Indoor Air 1997; 225-240.)
3 T. Salthammer, Critical evaluation of approaches in setting indoor air quality guidelines and reference values, Chemosphere 82, 2011, 1507-1517.

Total Mold Volatile Organic Compound (TMVOC) Summary

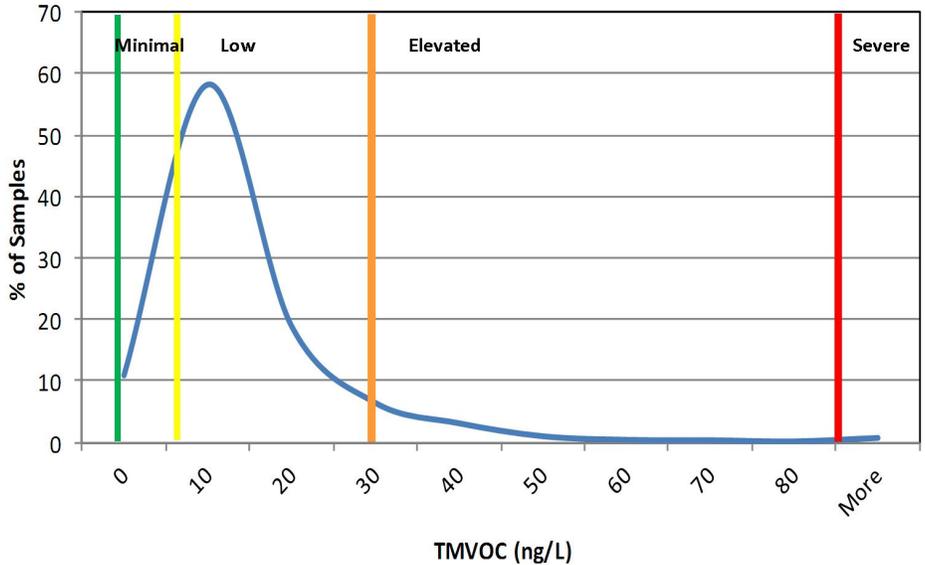
Your TMVOC Level is (ng/L): **19**

Active Mold Level: **Low**

Median TMVOC (ng/L): **< 8**

The median TMVOC is the midpoint TMVOC value of approximately 4,500 homes.

**All IAQ Home Survey TMVOC
Active Mold Indicator**



The chart above shows the TMVOC level for all homes tested using IAQ Home Survey. The line represents the relationship between the percentage of homes (indicated on the vertical y-axis) and the TMVOC level (indicated on the horizontal x-axis). The green, yellow, orange, and red vertical bars represent divisions between Minimal, Low, Elevated, and Severe TMVOC levels.

Mold VOCs are produced during the metabolic processes of molds and other micro-organisms and therefore can be used as an indicator of actively growing mold, but not as an indicator of mold in an inactive or dormant state. Molds can grow on almost any surface, especially those that provide a ready source of organic material such as wood, carpet, drywall, painted surfaces, insulation, cardboard, paper, fabrics, etc. Environmental conditions such as temperature and humidity also affect mold growth, and therefore mold VOCs. There are thousands of known species of molds, although a much smaller number of mold species are commonly found in homes. However, the mold species cannot be identified using mold VOCs because of the number of potential species as well as the changes in the metabolic processes in the presence of different growth environments (humidity, temperature, and growth surface or substrate).

The TMVOC value is an assessment of the quantity of actively growing mold in your home. Like TVOC, the U.S. federal government has not specified limits for TMVOC. Typically, if there is no plumbing leak, condensation, or water intrusion into the home, there will not be a mold problem. If active mold growth is indicated, the first step in fixing the problem is to find and repair the water leak, which is typically from the roof, plumbing, windows, or condensation.

Levels below 8 ng/L are typical for most homes and should not cause great concern for healthy individuals. Levels between 8 and 30 ng/L indicate a low level of mold which, generally, affects people who are sensitive to molds.

Levels above 150 ng/L indicate that a high level of active mold growth is present and it is likely that nearly all occupants of the home will be affected.

For sensitive individuals, these cutoff levels may need to be reduced by up to a factor of four, depending on the degree of sensitivity. Always consult a mold remediation specialist before attempting to remove mold.

These levels were determined empirically through interaction with air quality professionals regarding the reported health effects experienced by individuals exposed to actively growing mold.

Contamination Index™

The Contamination Index™ (CI) shows the types of air-contaminating products and materials that are present in your home. Each CI category shows the approximate contribution of that category to the TVOC level, indicates how your home compares to thousands of other homes, and provides some suggestions for where these products and materials might be found. The CI is divided into three main source groups: Building-Related Sources, Mixed Building and Lifestyle Sources, and Lifestyle Sources.

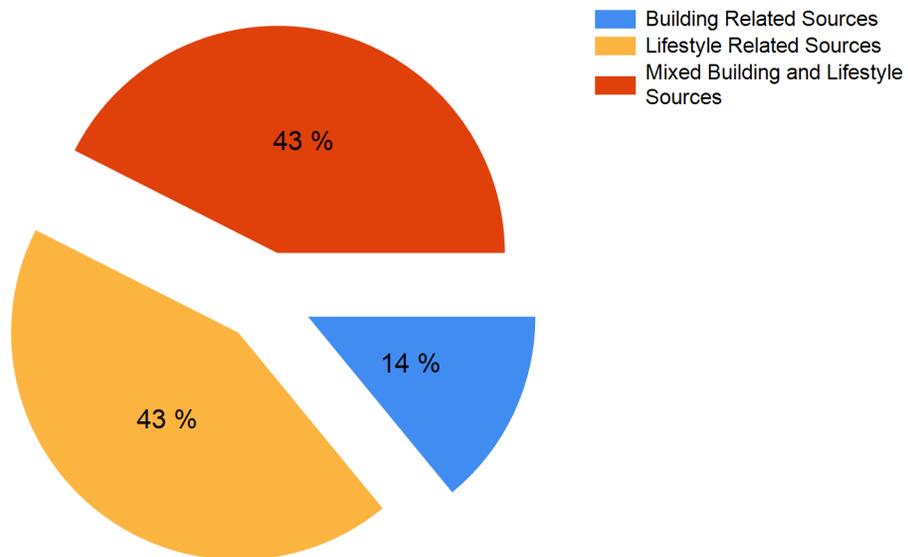
1. Building-Related Sources are those that are typically part of the structure of the home and may be more difficult to reduce in the short term.
2. Mixed Building and Lifestyle Sources are those that could belong to either category and investigation on your part may be necessary to determine which source is more likely.
3. Lifestyle Sources are those that the occupants of the home bring into the home and can usually be readily identified and remediated.

It is possible for a category listed in one source group to belong to another source group. For example, the 'Paints, Varnishes, and Coatings' category is in the Building source group because the largest contribution is typically the paint on the walls, but cans of paint stored in a basement or garage could be considered part of the Lifestyle sources group. Always consider all possible sources for a particular CI category.

Since there are potentially many sources of VOCs, homes can often be re-contaminated even after sources have been removed because new products are constantly being brought into the home. Home occupants and homebuyers should take note of this fact, and view IAQ as a continuous improvement process.

The chart below depicts the distribution of the Contamination Index source groups. These source groups are estimates and may not indicate all of the VOCs in your air sample.

Contamination Index Source Groups



Sample Report

Client Sample ID: Basement
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Contamination Index™ Building Sources

Use the Contamination Index (CI) below to help you find products in your home that may be affecting your indoor air quality. Removing or reducing these products will improve your air quality. The concentrations reported here are approximate and may not add up to the TVOC value on page 2 of this report. These categories are typically part of the structure of the home and may be more difficult to reduce in the short term. Recent construction or renovation will often cause these categories to be elevated. Levels indicated as Elevated or Severe should be immediately addressed, and those listed as Moderate are areas that can be improved over time.

Building Related Sources	Contamination Index Category	Estimated VOC Level (ng/L)	Severity	Description and Suggestions for VOC Reduction
	Paints, Varnishes, and Coatings	260	Moderate	Typically, VOCs from paints and coatings can linger for several months, sometimes longer. Ventilate as much as possible after painting and dispose of paint cans and related supplies if possible. Consider using low-VOC paints/coatings in the future.
PVC Cement	7	Moderate	PVC cement is used to join pieces of PVC pipe together, usually for plumbing. Chemical compounds in these products can cause respiratory irritation and headaches. Ventilate the area during and after use.	
HFCs and CFCs (Freons™)	4	Normal	Most often used as refrigerants for air conditioners and refrigerator/freezers and propellants for blown-in insulation, cushions, aerosol cans, etc. Many of these chemical compounds are being phased out because of the Montreal Protocol.	

Contamination Index™ Mixed Building and Lifestyle Sources

Use the Contamination Index (CI) below to help you find products in your home that may be affecting your indoor air quality. Removing or reducing these products will improve your air quality. The concentrations reported here are approximate and may not add up to the TVOC value on page 2 of this report. These categories could belong to either the Building or Lifestyle groups so additional investigation may be necessary to determine which source is more likely. Levels indicated as Elevated or Severe should be immediately addressed, and those listed as Moderate are areas that can be improved over time.

Contamination Index Category	Estimated VOC Level (ng/L)	Severity	Description and Suggestions for VOC Reduction
Adhesives-Toluene Based	0	Normal	Adhesives are used in many locations in the construction and maintenance of the home, and normally these VOCs will dissipate over time. Additionally, toluene-based adhesives can be found in arts and crafts supplies and automotive products and should be located and removed or properly stored in an closed airtight container.
Gasoline	100	Normal	VOCs from gasoline are typically a result of off-gassing from gas containers and gas-powered equipment such as lawnmowers, snow blowers, mini-bikes, etc. that are stored in attached garages or basements. These items should be stored externally to the home. Additionally, gasoline VOCs can linger on clothing after refueling an automobile at a gas station.
Fuel Oil, Diesel Fuel, Kerosene	0	Normal	Often found in garages and basements. These fuels are not very volatile so will not readily get into the air, but they can linger for a long time and produce a strong, unpleasant odor.
Moth Balls (Naphthalene Based)	0	Normal	Naphthalene based moth balls, attempt to locate these materials and remove them from the home. May be present with p-Dichlorobenzene-based moth crystals.
Moth Crystals (p-Dichlorobenzene Based)	0	Normal	p-Dichlorobenzene based moth crystals, attempt to locate these materials and remove them from the home. May be present with Naphthalene-based moth balls.
Light Hydrocarbons	160	Normal	Building materials; aerosol cans; fuel for cooking/camping/lighters; LPG; refrigerant; natural gas; propellant; blowing agent.
Light Solvents	560	Elevated	Stoddard solvent; mineral spirits; some paints, varnish, enamels; wax remover; adhesives; automotive products; penetrating oils. Many of these are present in common household products; however, recent renovation or construction will increase these levels. Increase ventilation during and after use of these products. High levels of Gasoline can contribute to the Light Solvents.
Methylene Chloride	1	Normal	Automotive products; degreasing solvent; paint stripper; adhesive remover; aerosol propellant; insecticide.

Mixed Building and Lifestyle Sources

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Contamination Index™ Lifestyle Sources

Use the Contamination Index (CI) below to help you find products in your home that may be affecting your indoor air quality. Removing or reducing these products will improve your air quality. The concentrations reported here are approximate and may not add up to the TVOC value on page 2 of this report. These categories are typically brought into the home by the occupants and can often be readily identified and removed or contained. Levels indicated as Elevated or Severe should be immediately addressed, and those listed as Moderate are areas that can be improved over time.

Lifestyle Related Sources	Contamination Index Category	Estimated VOC Level (ng/L)	Severity	Description and Suggestions for VOC Reduction
	Personal Care Products	200	Moderate	Personal care products include soap, deodorant, lotions, perfumes, hair coloring supplies, nail care supplies, oral hygiene products, etc. They contain many VOCs that will dissipate if use is discontinued or reduced. Consider storing these products in a closed container when not in use, and dispose of unused products. Also, run an exhaust fan or open a window when dispensing these products.
	Alcohol Products	490	Elevated	VOCs from alcohol can come from household cleaning products, antiseptic wipes, hand sanitizers, some solvents, reed diffusers, consumable alcohol, and some pharmaceuticals. These concentrations will be reduced by removing unnecessary products or proper storage of those materials in closed airtight containers. Consolidate cleaning products to the essentials. Consider switching to alternative methods of cleaning and sanitizing, e.g., baking soda, vinegar, borax, steam, etc., and ventilate the area during and after cleaning.
	Odorants and Fragrances	150	Normal	VOCs in this category can come from scented candles, potpourri, air fresheners, scented cleaning products, and scented personal care products. Consider reducing use of scented products and store unused products in a tight fitting container.
	Dry Cleaning Solvents	4	Normal	Typical dry-cleaning methods employ the use of carcinogenic chemicals. Dry-cleaning should be allowed to vent outside, without plastics bags, before being placed inside. Consider switching to a dry-cleaner that uses environmentally friendly methods.
	Medicinals	1	Normal	Ointments and creams, topical first aid/pain relievers.

Significant VOCs

Based upon your specific home air analysis, the chemical compounds listed below are the significant contributors to the TVOC level reported on page 2 of your IAQ Home Survey Report. These chemical compounds may come from a variety of sources as shown in the Contamination Index section of this report. Many of these chemical compounds are commonly found in homes. However, locating and removing the source of the chemical compound is the most effective way to reduce the contribution of that chemical compound to the TVOC, which ultimately leads to improved IAQ. If removing the source is not possible, try to contain it in some way (e.g., placing the source in an air-tight container when not in use). In addition, most homes have inadequate ventilation so increasing the amount of outside air or filtering or purifying re-circulated inside air will almost always reduce the TVOC. However, since VOCs continue to off-gas even when the sources are stored, ventilation and air-purification methods will need to be employed continuously in order to keep the VOC levels low. The Chemical Abstracts Service (CAS) registry number after the chemical compound name in the table below is a unique identifier for that chemical compound and is often the best means to search for additional information. The two VOC levels in the table below (ng/L and ppb) are different ways of describing the same concentration, in some cases exposure limits or other information may be described using one or both of these concentration units.

Compound	CAS	Estimated VOC Level (ng/L)	Estimated VOC Level (ppb)	Description
Ethanol	64-17-5	140	72	Cleaners, especially antiseptic wipes; personal care; consumable alcohol; some solvents; renewable gasoline component; pharmaceuticals
Butane (C 4)	106-97-8	98	41	Aerosol propellant; cooking/camping/lighters fluids; liquefied petroleum gas (LPG); refrigerant; food additive
Pentane (C 5)	109-66-0	84	28	Aerosol propellant; blowing agent; gasoline fuel component
Isobutane	75-28-5	64	27	Gasoline and fuel additive; aerosol propellant; refrigerant; cooking/camping/lighter fluids
Acetone	67-64-1	55	23	Personal care, especially nail care; cleaners; paints and coatings; strippers and thinners; PVC cleaner; caulks and adhesives; wood filler; solvent
a-Pinene	80-56-8	48	8.5	Pine lumber; fragrances and essential oils; solvents; insecticides
Cyclohexane	110-82-7	48	14	Solvent; glues and adhesives; some paints and coatings, petroleum fuel component
Limonene	138-86-3 or 5989-27-5	39	6.9	Limonene (CAS 138-86-3) or d-Limonene (CAS 5989-27-5) Fragrances; paints and coatings; cleaners; solvent; preservative
3-Methylhexane	589-34-4	13	3.2	Adhesive; paints and coatings, petroleum fuel component
Hexane (C 6)	110-54-3	13	3.6	Solvent; adhesive; grease; lubricant; paints and coatings; petroleum fuel component

The notes below indicate any additional significant compounds present in this air sample or other noteworthy information.

Aromatic Hydrocarbons: gasoline, paints and coatings, solvents, print cartridges, automotive parts cleaner, pesticides

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EPA Hazardous Air Pollutants (HAPs)

Hazardous air pollutants, also known as toxic air pollutants or air toxics, are those pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. Listed below are those HAPs that are included with the IAQ Home Survey VOC test, this list does not include all HAPs. For more information about HAPs visit the EPA [Air Toxics website](#). The exposure limits listed below can also be found in the [NIOSH Guide to Chemical Hazards](#). The HAPs in the table below may also be listed as Significant VOCs if the concentration of that chemical compound is greater than the threshold level for a Significant VOC.

Compound	CAS	Estimated VOC Level (ng/L)	Estimated VOC Level (ppb)	NIOSH Exposure Limit	Description
Methyl ethyl ketone (MEK)	78-93-3	< 1	< 0.3	590,000 ng/L (200,000 ppb)	Solvent; paints and coatings; automotive cleaner (degreaser); PVC cement/cleaner; wood filler; mold byproduct
Carbonyl sulfide	463-58-1	< 1	< 0.4	None Listed	Fumigant; contaminated drywall; fuel combustion byproduct; some foods; naturally occurring at low levels
Carbon disulfide	75-15-0	< 1	< 0.3	3,000 ng/L (1,000 ppb)	Solvent; fumigant; contaminated drywall; combustion byproduct
Methylene Chloride	75-09-2	< 1	< 0.3	Carcinogen	Automotive products; degreasing solvent; paint stripper; adhesive remover; aerosol propellant; insecticide
Hexane (C 6)	110-54-3	13	4	180,000 ng/L (50,000 ppb)	Solvent; adhesive; grease; lubricant; paints and coatings; petroleum fuel component
1,1,1-Trichloroethane	71-55-6	< 1	< 0.2	C; 1,900,000 ng/L (350,000 ppb)	Adhesives, lubricants, cleaners, solvents
Benzene	71-43-2	2	0.7	320 ng/L (100 ppb)	Gasoline. Less common sources include some discontinued solvents; printing and lithography; paints and coatings; rubber; dry cleaning; adhesives; detergents
1,2-Dichloroethane	107-06-2	< 1	< 0.2	Carcinogen; 4,000 ng/L (1,000 ppb)	PVC production; solvent for rubber, insecticides, oils, waxes, gums, resins; rug and upholstery cleaners
Trichloroethene	79-01-6	< 1	< 0.2	Carcinogen	Dry cleaning; degreasers and cleaners for home/automotive; varnish removers; anesthetic
Methyl methacrylate	80-62-6	< 1	< 0.3	410,000 ng/L (100,000 ppb)	Acrylic Polymers for paints and coatings, adhesives, fillers; solvent; pharmaceuticals; personal care
Toluene	108-88-3	12	3	375,000 ng/L (100,000 ppb)	Gasoline; adhesives (building and arts/crafts); contact cement; solvent; heavy duty cleaner
Tetrachloroethene	127-18-4	4	0.5	Carcinogen	Dry cleaning; adhesives, automotive cleaners, polishes
Ethylbenzene	100-41-4	< 1	< 0.2	435,000 ng/L (100,000 ppb)	Gasoline; paints and coatings; solvent; pesticide
m,p-Xylene	106-42-3	5	1	435,000 ng/L (100,000 ppb)	Gasoline; paints and coatings; adhesives and cements; solvent; print cartridges
o-Xylene	95-47-6	2	0.4	435,000 ng/L (100,000 ppb)	Gasoline; paints and coatings; adhesives and cements; solvent; print cartridges
Styrene	100-42-5	< 1	< 0.2	215,000 ng/L (50,000 ppb)	Polystyrene foam; synthetic rubber; flavoring agent
1,4-Dichlorobenzene	106-46-7	< 1	< 0.2	Carcinogen	Moth balls/crystals; room deodorant
Naphthalene	91-20-3	2	0.4	50,000 ng/L (10,000 ppb)	Gasoline; diesel; Moth balls/crystals; insecticide

These results are authorized by the Laboratory Director or approved representative.

This analysis was performed by Prism Analytical Technologies, Inc. (Prism). The results contained in this report are dependent upon a number of factors over which Prism has no control, which may include, but are not limited to, the sampling technique utilized, the size or source of sample, the ability of the sampler to collect a proper or suitable sample, the compounds which make up the TVOC, and/or the type of mold(s) present. Therefore, the opinions contained in this report may be invalid and cannot be considered or construed as definitive and neither Prism, nor its agents, officers, directors, employees, or successors shall be liable for any claims, actions, causes of action, costs, loss of service, medical or other expenses or any compensation whatsoever which may now or hereafter occur or accrue based upon the information or opinions contained herein.