

Client Sample ID: Main Floor
Laboratory ID: 6010-4

Client: Prism Analytical Technologies

Report Number: 6010

Sampled By: Alex Carter
Project: J Cantrell 2258
Location: 485 W. Maple Ave.
Boston, MA 25478

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

Client Sample ID: Main Floor
Sample Volume (L): 24.0
Date Sampled: 10/19/2020
Sample Type: TDT 153J
Sample Condition: Acceptable

Receive Date: 10/21/2020
Approve Date: 10/21/2020
Scan Date: 10/21/2020
Report Date: 10/23/2020

IAQ Commercial Survey™ is one of the most advanced, trusted air testing products on the market today for identifying chemical sources. Many indoor air quality (IAQ) issues identified by IAQ Commercial Survey can be easily remediated or eliminated. This test is an invaluable tool for improving air quality because it provides important information on potential contamination issues 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, creating a healthier environment.

What's in your Indoor Air Quality Report?

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

- 1. The Total Volatile Organic Compound (TVOC) level:** a general indicator of the IAQ. Typically, a lower TVOC means better IAQ in the sampled location.
- 2. The Contamination Index™ (CI):** shows the types of air-contaminating products and materials that are present in the sampled location. Each CI category shows the approximate contribution of that category to the TVOC level, indicates how your location compares to thousands of other locations, and provides some suggestions for where these products and materials might be found. The CI is divided into two main sections: Building Sources and Occupant Sources. Building Sources are those that are typically part of the structure of the building and may be more difficult to reduce in the short term. Occupant Sources are those that the occupants bring into the building and can usually be more readily identified and remediated. The values assigned to each category are approximations based on typical office and commercial spaces. Locations with additional or atypical sources may require investigation to determine the source of certain chemicals that are not accurately represented by the CI. Levels indicated as Elevated, High, or Severe should be addressed immediately, and those listed as Moderate are areas that can be improved over time. Since there are potentially many sources of VOCs, buildings can often be re-contaminated even after sources have been removed because new products are constantly being brought into the building. Occupants should take note of this fact, and view IAQ as a continuous improvement process.
- 3. Significant VOCs:** listing of up to ten chemical compounds measured with the IAQ Commercial Survey test that are large contributors to the TVOC level or are indicative of specific types of products or problems. Reduction of these specific chemical compounds will substantially reduce the TVOC level and greatly improve the IAQ of the sampled location.
- 4. EPA Hazardous Air Pollutants (HAPs):** listing of the chemical compounds measured with the IAQ Commercial Survey test that are known or suspected to have serious health or environmental effects (also known as air toxics). Note that this list does not include all HAPs, only those that are included in the IAQ Commercial Survey analysis.

Prism Analytical Technologies, the creator of IAQ Commercial 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. This analysis references methods EPA TO-17 and ISO 16000-6, which fall within the Scope of Accreditation.

Total Volatile Organic Compound (TVOC) Summary

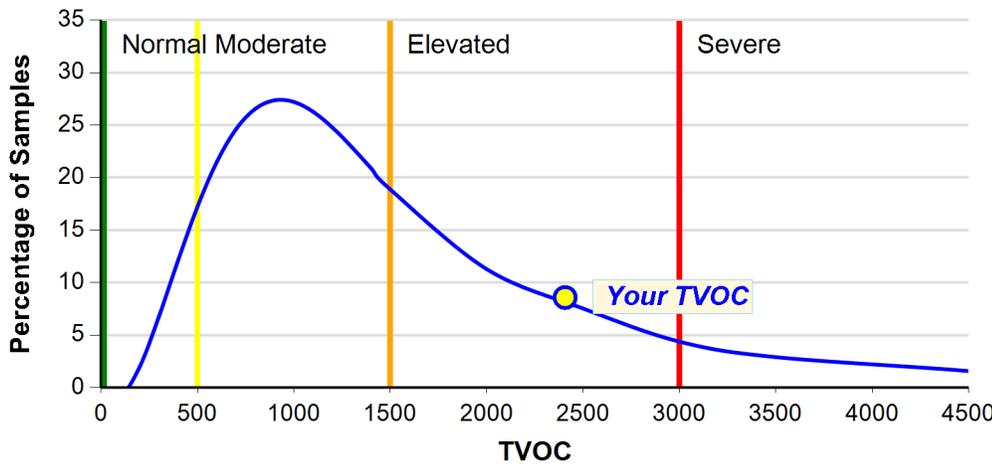
Your TVOC Level is: 2400 µg/m3

IAQ needs improvement; effect on occupants is possible; reduce potential sources and increase ventilation.

Your Indoor Air Quality Level (Highlighted)

Normal	Moderate	Elevated	Severe
< 500 µg/m3	500 - 1500 µg/m3	1500 - 3000 µg/m3	> 3000 µg/m3

All IAQ Survey TVOC Air Quality Indicator



The average TVOC is 1900 µg/m3

This chart represents the TVOC distribution of over 45,000 samples. Over 80% of these samples indicate improvements in IAQ are necessary to achieve the goal of TVOC less than 500 µg/m3.

The chart above shows the TVOC levels for all locations tested using IAQ Survey. Results for this air sample are displayed on the chart as a yellow circle. The blue curved line represents the relationship between the percentage of locations (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. As the TVOC value increases, 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 µg/m3 as the upper TVOC limit. As the TVOC increases, the probability of adverse effects increases. The 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 Survey methodology.

The presence of chemicals in your sampled location 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 location uninhabitable. 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 higher TVOC levels even healthy individuals are likely to experience ill effects. The following websites can offer more information:

- US EPA [Indoor Air Quality \(IAQ\)](#)
- American Lung Association [Healthy Air at Work](#)
- World Health Organization (WHO) [Guidelines for Indoor Air Quality](#)
- Lawrence Berkeley National Laboratory [Indoor Volatile Organic Compounds \(VOCs\) and Health](#)

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 sampled location 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.

Contamination Index™

The Contamination Index™ (CI) shows the types of air-contaminating products and materials that are present in the sampled area. Each CI category shows the approximate contribution of that category to the TVOC level, indicates how your location compares to thousands of other locations, and provides some suggestions about which products and materials might be the source for the VOCs. The CI is divided into two main source groups: Building Sources and Occupant Sources.

1. Building Sources are those that are typically part of the structure of the building and may be more difficult to reduce in the short term. Recent construction or renovation often increases the CI categories in this group to the Elevated, High, or Severe levels. VOCs from these activities often decrease substantially in the month following use or application of these products, especially if the area is flushed with air to dissipate the VOCs off gassed from the new products or materials.

2. Occupant Sources are those that the occupants of the building bring into the building and can usually be more readily identified and remediated. Recent construction or renovation can often contribute to other source categories in addition to Building Sources.

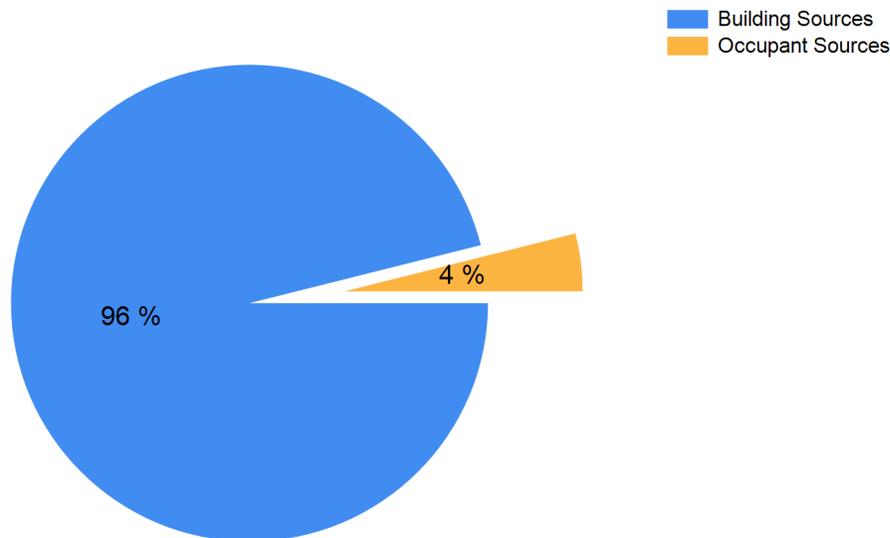
It is possible for a category listed in one source group to belong to another source group. For example, the 'Coatings' category is in the Building Sources group because the largest contribution is typically the paint on the walls, but cans of paint stored in a basement or storage area could be considered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

The CI categories comprise the most common sources but other products or activities may be present that are not included in the CI. The values assigned to each category are approximations based on typical office and commercial spaces. Locations with additional or atypical sources may require additional investigation to determine the source of certain chemicals that are not accurately represented by the CI.

Since there are potentially many sources of VOCs, buildings can often be re-contaminated even after sources have been removed because new products are constantly being brought into the building. Occupants 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



Contamination Index™ Building Sources

Use the Contamination Index (CI) below to help you find products and materials in the sampled area 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 building and may be more difficult to reduce in the short term. Recent construction or renovation will often cause these categories to be elevated. Increased ventilation will help to reduce VOCs from construction or renovation sources. Levels indicated as Elevated, High, or Severe should be addressed immediately, and those listed as Moderate are areas that can be improved over time.

			Source Prediction & Suggestions for VOC Reduction
	Contamination Index Category	Estimated VOC Level (µg/m3)	Severity
Building Sources	Coatings (Paints, Varnishes, etc.)	270	Moderate Includes interior and exterior paints (including low- or no-VOC paints), varnishes, lacquers, some sealants, and other products that can be classified as a coating over a surface. Typically, VOCs from these products are in the 10 to 14 carbon size range and can linger for several months, sometimes longer. Ventilate as much as possible during and after application of these products. Dispose of opened but unused products and related supplies if possible or store in areas that will minimize off gassing. Additional sources include fuel oil or diesel fuel.
	PVC Cement	0	Normal PVC cement is used to join pieces of PVC pipe together, usually for plumbing.
	Building Materials-Toluene Based	0	Normal Adhesives and glues used in construction and maintenance, arts and crafts; adhesive removers; contact cement; sealants; coatings (paint, polyurethane, lacquer, thinner); automotive products, including parts cleaners. Additional sources include gasoline and other fuels.
	Gasoline	17	Normal VOCs from gasoline are typically a result of off-gassing from gas containers, small spills, and gas-powered equipment used in facilities maintenance in nearby garage or storage areas. Most vehicles in good operating condition do not emit gasoline vapors due to the tightly sealed gas tank. This category does not include exhaust emissions. Gasoline VOCs can linger on clothing after refueling at a gas station. Gasoline includes chemical compounds that are also included in the Light Solvents category.
	Fuel Oil, Diesel Fuel, Kerosene	0	Normal Typically found in garages and facilities maintenance areas. These fuels are not very volatile so they will not readily get into the air, but they can linger for a long time and produce a strong, unpleasant odor. This category does not include exhaust emissions. Additional sources include coatings such as paints, varnishes, sealants, waxes, etc.
	Light Hydrocarbons	1400	High Building materials; aerosol cans; liquefied petroleum gas (LPG); refrigerant; natural gas; propellant; blowing agent. Recent renovation or construction may increase these levels. Increase ventilation during and after use of these products. Although these chemical compounds typically do not represent significant health impacts, their presence can indicate larger problems. Includes chemical compounds such as propane, butane, and isobutane.
	Light Solvents	160	Normal Stoddard solvent; mineral spirits; some coatings (paints, varnish, enamels, etc.); wax remover; adhesives; automotive products; light oils. Typically, VOCs from these products are in the 6 to 9 carbon size range.

Contamination Index™ Occupant Sources

Use the Contamination Index (CI) below to help you find products and materials in the sampled area 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 building by the occupants and can often be readily identified and removed or contained. Levels indicated as Elevated, High, or Severe should be addressed immediately, and those listed as Moderate are areas that can be improved over time.

Occupant Sources	Contamination Index Category	Estimated VOC Level (µg/m3)	Severity	Source Prediction & Suggestions for VOC Reduction
	HFCs and CFCs (Freons™)	3	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.
Personal Care and Cleaning Products	0	Normal	Personal care products such as soap, deodorant, lotions, perfumes, hair coloring supplies, nail care supplies, oral hygiene products, etc. Cleaning agents such as surface, window, and flooring products, also restroom and antibacterial products. These products contain many VOCs that will dissipate if use is discontinued or reduced.	
Odorants and Fragrances	70	Normal	Air fresheners, scented cleaning products, and scented personal care products.	
Dry Cleaning Solvents	0	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.	

Significant VOCs

Based upon your specific air analysis, the chemical compounds listed below are significant contributors to the TVOC level reported on page 2 of your IAQ Commercial Survey Report or are indicative of specific types of products or problems. Compounds from a variety of chemical classes are represented here, although only the most common or most notable are specifically listed. 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 office and commercial locations. 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, the ventilation system in some locations may not be optimized so evaluate the ventilation system and make adjustments to increase the amount of fresh air. Filter or purify re-circulated inside air to help reduce the TVOC. Since VOCs may 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 (µg/m3 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 (µg/m3)	Estimated VOC Level (ppb)	Description
Isobutane	75-28-5	1300	520	Gasoline and fuel additive; aerosol propellant; refrigerant; cooking/camping/lighter fluids
Ethanol	64-17-5	190	100	Cleaners, especially antiseptic wipes; personal care; consumable alcohol; some solvents; renewable gasoline component; pharmaceuticals
Butane (C 4)	106-97-8	75	31	Aerosol propellant; cooking/camping/lighters fluids; liquefied petroleum gas (LPG); refrigerant; food additive
a-Pinene	80-56-8	32	6	Pine lumber; fragrances and essential oils; solvents; insecticides
Acetone	67-64-1	28	11	Personal care, especially nail care; cleaners; paints and coatings; strippers and thinners; PVC cleaner; caulks and adhesives; wood filler; solvent
Propane	74-98-6	23	13	Fuel, Liquefied Petroleum Gas (LPG); aerosol and spray propellant
Limonene	138-86-3 or 5989-27-5	22	4	Limonene (CAS 138-86-3) or d-Limonene (CAS 5989-27-5)Fragrances; paints and coatings; cleaners; solvent; preservative

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

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 Commercial Survey VOC test. This list does not include all HAPs. The '<' (less than) symbol in the 'Estimated VOC Level' columns indicates the compound is below the reporting limit for this air sample and therefore can be considered absent from the air sample. 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 (µg/m3)	Estimated VOC Level (ppb)	NIOSH Exposure Limit	Description
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	4	1	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	< 1	< 0.3	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	0.3	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	2	0.6	375,000 ng/L (100,000 ppb)	Gasoline; adhesives (building and arts/crafts); contact cement; solvent; heavy duty cleaner
Tetrachloroethene	127-18-4	< 1	< 0.1	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	108-38-3; 106-42-3	< 1	< 0.2	435,000 ng/L (100,000 ppb)	Gasoline; paints and coatings; adhesives and cements; solvent; print cartridges
o-Xylene	95-47-6	< 1	< 0.2	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	< 1	< 0.2	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 (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, and the compounds which make up the TVOC. 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.