Odor Management Plan

Sanctuary Medicinals
234 Taylor Street
Littleton, Massachusetts

Updated
January 25, 2024

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1.0 INTRODUCTION

In order for there to be sufficient odor control for a cannabis grow facility, in a mixed-use area with commercial and residential properties nearby, there must be odor containment, odor ventilation, odor control, and some dispersion of residual odor. The first odor control commitment for this location was made when the type of grow facility was selected for this site.

There are essentially three types of cannabis grow facilities with respect to odor capture and odor control. The first type is a greenhouse/outdoor facility, where cannabis starts growing indoors in the winter/spring, and then transplanted outdoors during the normal summer growing season. Unfortunately, there is no capture and therefore there can be no formal "odor control" in this type of grow operations. These facilities typically require a significant amount of land buffer so the odor can dissipate to some degree prior to traveling off-site and into any nearby neighborhood. If this type of outdoor grow facility were installed here, the odor potential would be substantially higher. By not selecting an open-grow operation, the facility made a commitment to odor control containment before initial construction.

The second type is the greenhouse style. In this type of grow facility, the entire grow operations take place in one or more greenhouses. There are typically greenhouses for storing the mother plants and others for growing the product. In this type of grow facility, the grow operations are occurring "indoors" and therefore there is an ability to capture or contain odor. There is also an opportunity to control odor sometimes but not all times. While odors can be contained in the greenhouses, during the warmer months, they must be constantly ventilated with fresh air for heat relief which can emit odor that has been contained. By not selecting a greenhouse operation, the facility made a commitment to odor control capture before initial construction.

The third type of grow facility is a completely enclosed and ventilated and conditioned building with individual grow rooms to isolate their power, light, and watering needs, to each grow room. This type of facility requires a significant air recirculating system to add/remove humidity and heat from the grow rooms, which have the highest odor potential from the growing plants. And since only a small fraction of the recirculating air is actually emitted, these facilities have the best ability to capture and treat the odor. This Sanctuary Medicinal facility employes this third type of grow facility, with the highest capture and odor control options available. Of course, even with the highest potential for control it is important to optimize that potential with the proper tools for odor control, and to supplement those tools as needed. This updated OMP includes odor control procedures and tools that exist today and those that will be added once the facility completes its footprint expansion in the near future. The plan is to add another building at the rear of the property that will support the existing operations.

Please note that the facility is not proposing to add any grow capacity to the facility in the planned expansion, but instead is planning more ancillary, support areas. With no added grow capacity, the basic odor potential will not increase, and with more space to systematically process and store product and equipment and to install additional odors controls, it will be easier for the facility to manage its existing odor potential. This grow facility was one of the first proposed in the area nearly five years ago.

This Odor Management Plan provides background, regulatory requirements, the site location, and facility contacts in Section 1.0. Section 2.0 provides background on odor at marijuana facilities, a summary of training provided to Sanctuary Medicinals staff, and a discussion of on-site odor surveys and off-site odor complaint response procedures. Section 3.0 includes a discussion of the odor control system and how it should be operated and maintained to minimize offsite odor impacts. And Section 4.0 provides details on the plan to monitor odor and record keeping.

1.1 Background and Odor Potential

Sanctuary Medicinals (Sanctuary) is located on the east side of Taylor Street (also known as State Route 31), at approximately less than a half mile south of I-495, in Littleton, Massachusetts. The total property is 6 plus acres, with commercial properties to the north and residential properties to the southwest and south. The location of Sanctuary is shown in Figure 1.

If one draws a box around this facility, a majority of the odor loading, or odor potential or odor loading is created in the grow rooms. The odor loading is then removed via the HVAC system condensate recovery process, in processing, or to a much letter degree with the final product off-site. How is odor removed via the HVAC system? As air is continually recirculated in those rooms odorant dissolve in the humidity or become airborne. The odor loading within the grow rooms reaches an equilibrium when the level of production in the grow rooms is balanced by the odor removed via the condensate removal system. Condensate and other odorants is collected in the HVAC unit via impaction and pumping of the condensate out of the system and back to water reuse.

Since the primary odorants of concern are water soluble, the primary pathways for odor removal is via the two planned odor removal pathways: odor in the condensation and odor still in the moisture in the product upon harvest. The third "planned" pathway is via fugitive emissions. This emission is planned in the sense that the grow rooms are designed to be under a positive pressure and the hallways and space over the grow rooms is designed to be under a negative pressure.

This "push-pull" ventilation dynamic is planned to prevent contaminants from entering into the grow rooms from outside. Any biological grow operation, including cannabis, is susceptible to rapid spread of contamination, simply because there is a single crop being grown and harvested in a confined space and recirculating air system. A positive pressure grow room is the best way to limit the potential of a fungus or other concern spreading through a grow room.

Although the "plan" is for the rooms to leak outwards into the hallways, the potential for leakage can be minimized by rigorous Best Management Practices (BMPs), in this case by opening and closing the doors only when necessary. These BMPs will be improved when there is more room for storage and processing in the new building.

Even through minimization of door activity, there are discrete times that there will be more potential fugitive odor entering the hallways than other (think harvest time, cleaning between cycles, etc.), so it is important to treat the fugitive odors in the hallways (i.e. all areas in the building that are not the grow rooms or designated office spaces) prior to discharge.

Essentially the grow rooms act as small individually controlled air spaces, with their mechanical needs met for humidity control and temperature control, through ground mounted exterior HVAC systems. These units are fully enclosed with respect to the outdoors. The units have pressurized gaskets on all manways and access hatches, and all condensate is collected and sent back into the building's water treatment area for reuse to isolate them from the ambient environment.

Air is added to the grow rooms to create the positive pressure, and air is withdrawn from the main building processing area by ventilation through the roof. The original plans called for a carbon adsorption system on the two exhaust systems located in a crawl space above the grow rooms but beneath the main building structure that were to penetrate through the roof. The current approach is for ozone to treat these odors in an "or equal" manner. In the future, after the new axillary building and new odor control system is installed in the new building, a second ozone odor control system that will be mounted under the roof and above the second ozone can be used as a redundant or as another back-up odor control option.

The ozone generation system is being updated and a second unit is being added. Attached to this OMP are the generator cutsheets as well as some information on the residual monitoring system. The ozone generator, "or equal" if a different one is installed as part of the upgrade will provide up to 40 grams/hour, or 20 grams per hour per each of the two exhaust systems. The existing rooftop upblast fans, Greenheck CUE-131 provide approximately 1800 cubic feet per minute (cfm) of exhaust air. The duct to these fans is up to 30 feet long, 20 inches wide and 18 inches deep. It is noted that the injection location needs to be at least 25 feet prior to the exhaust point. At 25 feet, the ozone will have more than the minimum 2 second detention time needed for optimal reaction.

The residual monitoring location needs to be as close to the outlet on each stack as possible. The generation unit has a significant turndown ratio option to limit residual ozone, though most ozone will be consumed with the proper reaction or contact time since ozone is highly reactive and the reaction is not selective. The gas monitor(s) will measure and confirm that the outlet concentration, with reasonable dispersion assumptions, would not exceed the National Ambient Air Quality Standard of 70 ppb average over 8 hours beyond the fenceline. At maximum production, the zone generator could produce up to 3,000 ppb in the duct prior to reaction. At a 10 to 1 turndown this drops to 300 ppb. The ozone monitoring unit is an ATI F12 gas transmitter with calibration to ozone, or equal, with a setpoint of 100 ppb residual. This is a conservative setpoint with respect to ambient levels, since it would only require a dilution of 1.42 to get under an instantaneous reading of 70 ppb at any location and no dilution to get under that level, even with minimal wind direction changes over eight hours.

Prior to the ozone system, there are three recirculating carbon systems installed in the existing building as per Figure 2. These systems in combination with the existing three air curtains for the office and two loading dock areas will ensure that any fugitive emissions emitted from accessing the grow rooms, moving harvest material to processing, from processing areas, and from product storage areas will be reduced so that any air that escapes will have a lower average loading (again, see Figure 2).

The unit in the office space is included because it was noted that at full employee capacity, odor that can travel within the worker's clothing into the lobby, breakroom, and locker area will be reduced so that the normal odor loading is less as workers enter and exit through the front door.

Each carbon system was built to order and contains a two-speed Solar and Palau inline fan that is sized for recirculating up to 1050 cfm on high speed and 750 cfm on low speed with little to no pressure drop. The does have added pressure drop through trays of activated carbon, and the flow rate will drop based upon how thick the carbon layer is placed in each of the three trays, the trays are 4.5 inches deep and 21.5 inches by 21.5 inches wide. The facility should not fill all three of these trays up to the top as they will cause excessive pressure drop and limit the recirculation rate, and obviously be hard to handle. At 2 inches of carbon, each unit holds approximately 50 to 75 pounds of carbon, depending on the carbon density and pelletizing process.

The carbon trays should not be filled with too little carbon either. Obviously, the less the carbon thickness the more often it will need to be changed, but also if there is not a minimum thickness then any changes in thickness can create a pathway for short-circuiting. A minimum of just two inches is typically considered adequate, so long as it is evenly leveled.

With three trays and one directional flow, one could consider this potentially a "three stage" carbon system, though operating as a three-stage system is likely overkill. To operate it as a three-stage system the layer closest to the inlet flow would be the oldest and the carbon trays would rotate so that the tray that receives the newest carbon is furthest from the inlet and the trays are rotated accordingly. As simpler and likely more the optimal configuration is that the lowest level (the first exposed) is removed. The top two trays are added to it, and the other two trays have fresh carbon added. This will allow for using the highest percentage of absorptive sites on the carbon prior to change out.

1.2 Regulatory Requirements

The Massachusetts Department of Environmental Protection (MassDEP) regulates nuisance through 310 CMR 7.00"Air Pollution Control" In these regulations "air contaminant" is defined to include odor and a condition of "air pollution" includes the presence of an air contaminant in such concentration and duration as to "cause a nuisance" or "unreasonably interfere with the comfortable enjoyment of life and property".

The Town of Littleton Chapter 217 under Division 1.5: Board of Health Enactments it states, upon which there is any substance or material, or any condition, which is or may become a source of danger to the public health or a nuisance, shall, when ordered by the Board of Health, in writing, remove or abate the same within the time specified in said order."

As one can see from this very basic qualitative condition, odor is not set at a numerical regulatory limit. There is no single event that causes a violation, just as there is no threshold for multiple, milder, events. Because there is a qualitative standard, a common mistake often made is to assume that all odor evaluations can only be subjective, because the standard is subjective. That is not the case. It is very possible to use an objective approach to monitor and track odor to minimize the potential for events that could be considered a nuisance.

It is very possible, as this OMP describes, to quantitatively assess odors, and to use these assessments to track quantifiable changes in odor patterns.

1.3 Facility Contacts

As of the drafting of this OMP, observations of changes in odor shall be addressed immediately to 978-301-6600. In addition, here is a list of general contacts, as of today.

24-Hour Odor Complaint Hotline: 978-301-6600
Facilities Manager: Kevin Coyne 774-251-7017
Corporate Offices: 800-666-8621
Main Office: 234 Taylor Street Littleton, MA 01460
Emergency Numbers: Fire: 911 or (978) 540-2302 Police: 911 or (978) 540-2300 Littleton Board of Health: (978) 540-2430

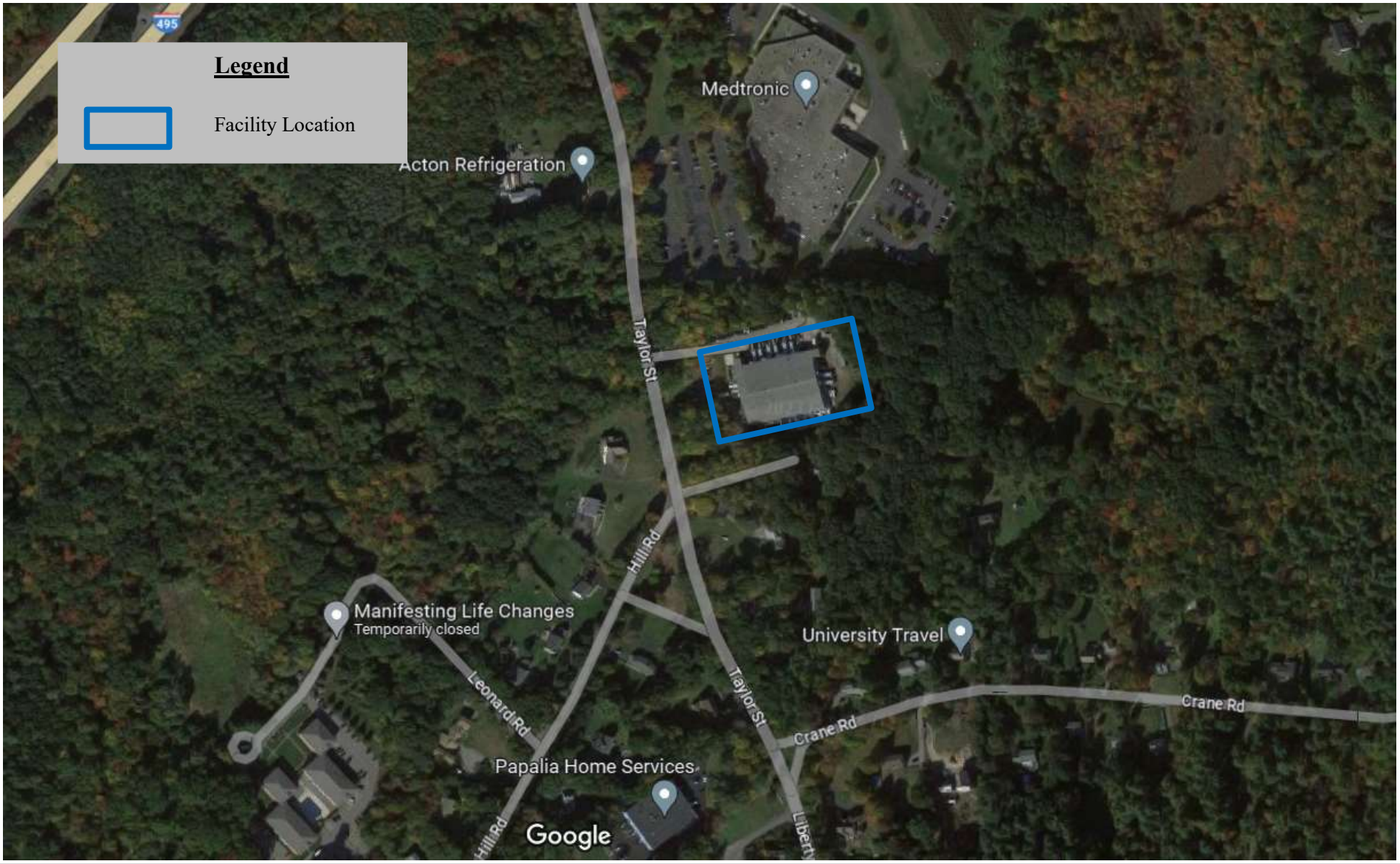

FIGURE 1.
Facility Location
Sanctuary Medicinals
Littleton, MA

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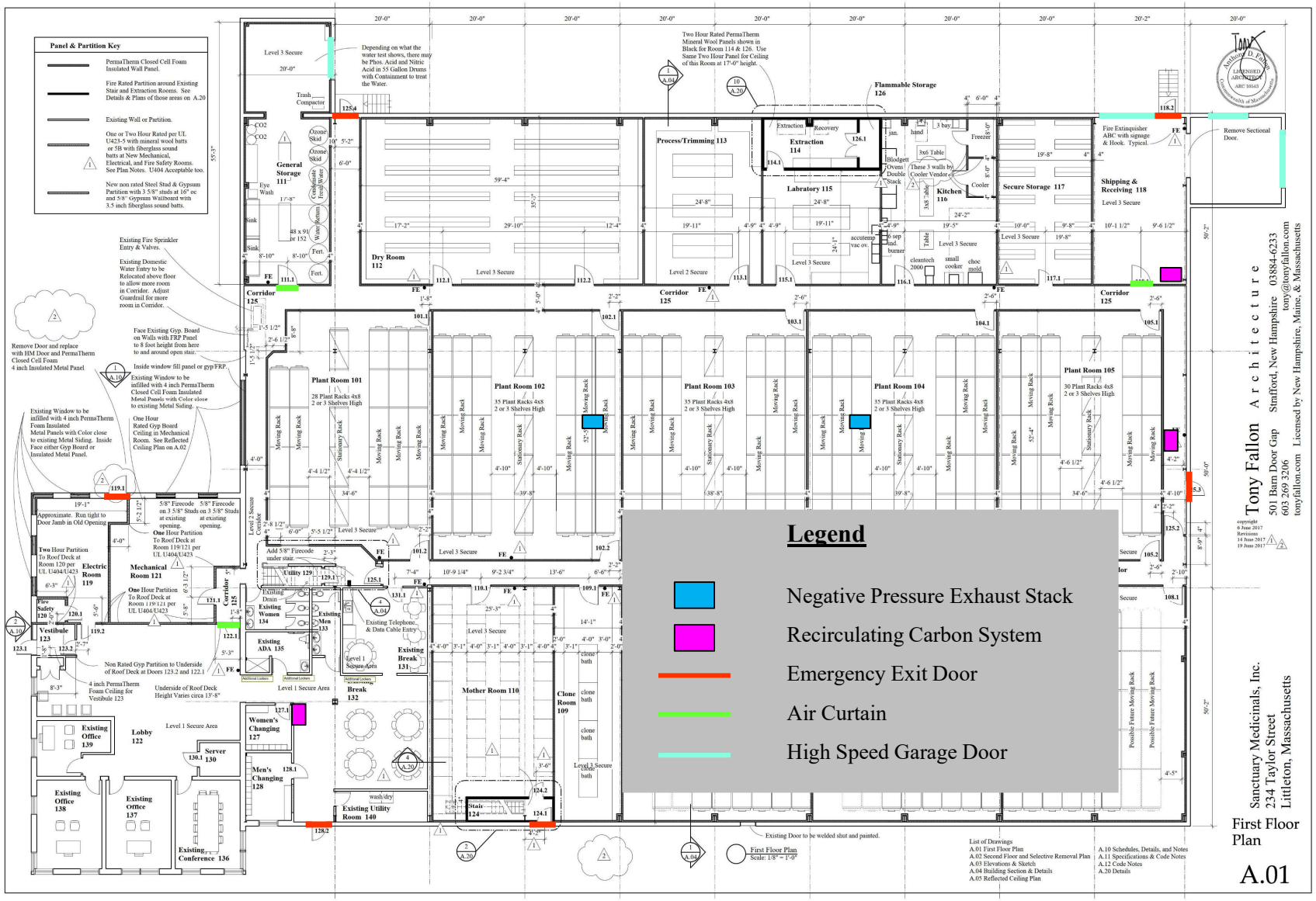

FIGURE 2.
Current: Existing Building
Sanctuary Medicinals
Littleton, MA

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2.0 ODOR BASELINE AND ODOR AWARENESS

It is human nature to react to odors that are unknown and not regularly experienced, and therefore could potentially be a health or safety problem. Typically, your average grow facility worker is not threatened by the odor directly and therefore would not be aware of changes in the odor inside or outside of the facility because they are normal, non-threatening, and expected. This section is included to be shared with employees so that odor awareness can be a part of everyone's job. It is important that all employees look for increases in odor potential and point them out to the responsible contact, so that they can be addressed before they could reach a level that could cause an increase in odor outside of the facility, or beyond the property line.

However, before someone can understand potential changes in odor at the facility, the odor baseline must be fully understood. This section is included to help employees understand the basics of odor, how to continuously assess odor as part of their daily activities, and to understand the odor baseline and how odor varies.

2.1 Odor Primer

Sensitivity to odors varies among the population. An odor that is noticed by or is offensive to one person may not be noticed by or offensive to another. It has been estimated that the olfactory sensitivity for 1 in 20 people is outside of what is considered the "normal" range and oftentimes individuals who have a poor sense of smell are never aware of their desensitized olfactory system. Conversely, some individuals have an extremely keen sense of smell. Factors that affect one's sensitivity to odors include genetics, age, gender, experience, and environmental influences.

Since odor detection and sensitivity can vary among individuals, sensitivity screening can be conducted to determine whether someone is in the "normal" (average) range. Odor threshold screening should be conducted to determine whether those individuals who are formally charged with assessing the odor baseline and tracking its changes surveys possess an adequate olfactory threshold and are capable of conducting an accurate assessment of current odors. It can also be used to assess those individuals that are ideally suited to respond to odor complaints.

Four (4) attributes of the sense of smell have been defined to classify odors:

- Concentration/Intensity - strength of the odor;
- Pervasiveness - change in intensity upon dilution;
- Character - description of the odor; and
- Hedonic Tone - relative pleasantness of the odor.

The concentration, or intensity, of an odor describes its strength; the intensity of an odor is unrelated to its character or pleasantness. In general, more reactive compounds have higher odor intensities. Odor concentration is typically highest at the source and disperses as it travels away from the source. However, odors from like sources can be additive. The pervasiveness of an odor is its rate of change in intensity upon dilution. The intensity of some odors will quickly diminish when released, while other odors will show very little decrease in concentration with dilution. The character of an odor best describes the source of that odor and typifies the human reaction to it.

The hedonic tone of an odor describes its relative pleasantness to the human nose. Two odors may both be very strong with similar odor intensities, but one may be pleasing to the human nose (i.e., flowers, chocolate, coffee) having a highly positive hedonic tone, while the other may be very offensive to the human nose (i.e., skunk, sewage, garbage) and have a highly negative hedonic tone. The character and hedonic tone of cannabis are considered negative, and their degree of unpleasantness can contribute to community nuisance issues.

2.2 Cannabis Odor

Cannabis odor is not dominated by one compound or even one type of compound, it is a bouquet of odors, similar to odor experienced from a bouquet of flowers. It is complex, it varies at different parts or the process, and it is a desired effect. A good "skunky" can be the sign of a good product. It is also the sign of an odor that can be described as undesirable from other natural or manmade processes or industries where sulfur compounds are more prevalent than in the natural environment. It is important to remember that humans have been able to detect sulfur compounds for tens of thousands of years at very low levels, as a defense mechanism. If one thinks of "cavemen concerns," number three behind being eaten by a predator, or not finding enough food and water to survive, would be exposure to naturally occurring emissions in caves that could suffocate them. As a result, the first reaction by the general public, to the skunky and desirable marijuana odor associated with a fresh cannabis product, is that it smells like something that could be harmful, or in this day and age, simply unpleasant.

The simplest reduced sulfur compound is hydrogen sulfide ("H_2S"). H_2S is often used as a surrogate for total odor. The simplest mercaptan is methyl mercaptan ("MM") which consists of a single methane where one hydrogen "H" compound is replaced by a sulfur-hydrogen "SH" compound. There are other mercaptans as well that are longer chains with more methyl groups but the same basic "SH" structure. These compounds will vary from plant to plant, but also from the operations. If plants, especially after harvest, are starved of oxygen. They will begin to decay, and reduced sulfur compounds can increase. As this occurs, sulfur compounds can also "free-up" to attach to other compounds that are regularly associated with cannabis odor.

Furthermore, other compounds regularly associated with cannabis including terpenes and ketones, can breakdown into other compounds that are often less desirable and more persistent odorants. Terpenes are by far the most recognized cannabis-based odorants. The most common are myrcenes, beta-caryophyllene, limonene, linalool, pinene, to name a few. They offer earthy, spicy, citrus, flowery, piney flavors, respectively. There are many others, but the purpose of this description is not?? for one to recognize these desirable products, but to note that these products typically are much less persistent that the sulfur compounds or some of the compounds terpenes can break down into if the drying process is not optimized. Why is persistence important? Because if fugitive odor is emitted, the more persistent ones can still be present offsite, but the less persistent ones are below the recognizable level. It is therefore possible for all the pleasant local cannabis smell to be gone and the less pleasant ones remaining. This is how a cannabis facility can be confused with a landfill odor or "sewer gas" odor. It is important to monitor overall all odors and also the different components on-site and to report any drastic change from "normal" odors.

Normal is in quotes because it will also change with different products, so one must take all variables into account.

humans can detect mercaptans to the parts per trillion ("ppt") level. Although the threshold for odor nuisance is subject to great debate, the nuisance threshold for a single short-term event is below the single ppmv range of standard electrochemical sensors. Thus, a combination of the nose and other instruments are necessary.

2.3 Odor Nuisance Threshold

The odor from the facility will vary with the different stages of the growing process. Which leads to varying odor characteristics and odor intensity. So far capturing the odor has been achieved by a combination of airlocks, positive and negative pressure balancing, isolating the areas that generate odor from those that do not, and minimal access doors to the outside that cannot be used except in emergencies. However, it is not reasonable to expect "zero odors" from a cannabis cultivation facility.

It is important that Sanctuary staff realize that they may become desensitized to certain odors during the day and over time. The staff working in the grow rooms will experience the greatest amount of temporary olfactory fatigue, while those working in the office will experience the least amount of temporary olfactory fatigue. Thus, assessing off-site odor potential may not be as effective until after some time is spent away from the facility. It is not uncommon for someone from a facility that has been exposed to on-site odor to travel off-site to investigate an odor complaint and concluded that the odor is "not that bad."

In summary, Sanctuary should always be aware of the odor baseline on-site as they complete their normal daily tasks. If this baseline changes, it should be noted. If it increases dramatically, the nuisance potential off-site should be explored by someone that is not immediately desensitized. Sanctuary should not wait for an odor complaint to assess this off-site odor potential.

2.4 Odor Training

It is possible to train someone to better understand their olfactory senses. To properly analyze an odor event, individuals need to understand the basics of odor, including how and what we smell when exposed to odorous compounds in the air. The goal of odor training is to provide individuals with the information that they need to better understand odors and how to recognize and characterize them. This, in turn, will help the trained individuals to better manage and respond to odor events and/or complaints. This type of training usually includes:

- Instruction on the role of personal perception;
- The differences between typical odors and each of their potentials; and
- The methods to recognize various odors.

Individuals responding to odor complaints, and conducting odor surveys, can more accurately determine the source of any one odor if they are well-informed about the characteristics of common odors and the way in which odors are released and transported to off-site locations. In some cases,

odors initially believed to derive from a very proximate location are from other sources that are much further away or are a culmination of smaller sources that together produce a considerable odor. Many times, multiple sources may be added to the total odor dynamic in a neighborhood, while the local community assumes that all odor is from a single source. A trained odor investigator is typically able to determine where an odor is coming from, and if not, at least correlate the odor to its rightful source.

Training has been conducted for specific Sanctuary Medicinals staff so that they can better understand odor, human perception, the differences between cannabis odors and odor potential. This training will help the staff recognize and characterize odor increases more quickly, which will lead to a faster response. The training included information on what causes odors, the role of personal perception, recognizing odors, the conduct of on-site odor surveying and gathering of data, and appropriate operational adjustments to operating conditions to address any detected off-site odors. Since odor detection and sensitivity vary a great deal among individuals, staff were also screened for their odor sensitivity to confirm that the staff is in the "normal" range. It has been estimated that the olfactory sensitivity for 1 in 20 people is outside of what is considered a "normal" range. Staff members who were in the "normal" range are considered qualified to receive the training.

2.5 Fugitive Odor Potential

The growing of cannabis is not homogeneous. It is a mixture of many different odor characteristics. Odor characteristics range from typical very complex cannabis odor character to a simpler sulfur-type odor. This odor character shift indicates that many of the odorous compounds have reached their non-detectable level and only the more persistent compounds remain. A "top-tier" cannabis facility design with respect odor, the facility functions as designed with the exception of some bleed. The resultant bleed odor can work its way towards doors and "burp" as personnel and material are transferred. The bleed odor is much lower than the process odor and the burp releases are infrequent, so the overall average odor loading from these activities is low, and therefore the nuisance potential is low, but there is still potential to detect the odor.

2.6 Formal Odor Surveys

As part of this Odor Management Plan, Sanctuary will conduct a formal odor survey at least two (2) to three (3) times per week. The odor surveys, over time, will establish an "odor baseline" for Sanctuary. This odor baseline will allow staff to more quickly recognize and respond to an incident of increased odor on-site in the future, ideally before it becomes an off-site concern. Staff conducting the surveys have been, or will be, trained in odor monitoring and odor identification.

The formal survey should be conducted in the morning before the surveyor has become desensitized to odor. Monitoring in the morning is also beneficial from a meteorological perspective since odors can experience less dispersion after a still and clear night. The survey will initially be conducted at the onsite/property line locations (See Figure 3) so that different wind directions and different areas can be examined. As the surveyor traverses the perimeter, they should record any notable odors on the Odor Survey Log. A copy of the Odor Survey Log template

is included in Appendix A. This information will help establish the areas onsite that have a higher odor potential, based on both facility activity and meteorological conditions.

Sanctuary should record the following information on days when odor surveys are completed:

- Wind speed and direction (observed and documented from a weather station).
- Weather observations (cloud cover, precipitation, haze, etc.); and
- Facility activity.

When odors are detected during the odor survey, the following information should be recorded:

- Description of odor character and intensity;
- Weather observations (cloud cover, precipitation, haze, etc.);
- Wind speed and direction (from a weather station);
- Any outdoor activity occurring; and
- Any unusual release locations

The information from these surveys should be compiled in an electronic database to generate an odor baseline and to target areas onsite with greater odor potential.

Please note that this section is designed to formally observe and document the odor baseline and changes to it. It should also include informal odor observations made by all staff during all operations and maintenance activities.

Eventually, the formal odor surveys could be reduced to a weekly or monthly basis combined with formal surveys triggered by informal observations made by staff with the use of additional effective odor control systems have been applied. The key will be to maintain sufficient odor surveys, so that any change in odor can still be readily observed and explored.

2.7 Odor Complaint Program

Sanctuary will establish a toll-free hotline which operates 24-hours a day, 7 days a week, through which all odor complaints are to be channeled. The toll-free hotline number is (978) 301-6600. The hotline calls are forwarded to Sanctuary staff to assemble a report and to respond to odor complaints made by the public and to assemble a report. Sanctuary will respond to complaints within thirty (30) minutes during the operating hours, and within eight (8) hours during all other hours. A copy of the Odor Complaint Response Report forms to be completed by Sanctuary is included in Appendix B.

The two (2) most helpful items to any odor complaint response program (in addition to the dimensional factors such as location and time) are objective in-field intensity measurements as compared to a known scale, in this case the n-butanol scale, the odor descriptors of the odors in the area. All odors present should be observed and described. Whether the responder would consider them typical daily odors for the neighborhood (skunk-like, earthy, flowers, etc.), uncommon but possible (burnt wood, fresh bark mulch, wetlands, etc.), atypical odor (septic, garbage, or sewer) is not as important as the actual descriptors such as:

- Earthy, Musty, Moldy, Musk, Grassy, Woodsy, Dust
- Floral, Fragrant, Flowery, Pine
- Fruity, Sweet, Citrus, Vegetable
- Spicy, Garlic, Cabbage, Onion, Pepper, Cinnamon, Vanilla
- Sewage, Septic, Fecal, Manure
- Putrid, Rotten Egg, Rotten Vegetable, Skunk, Vinegar
- Fishy, Urine, Ammonia, Amine
- Medicinal, Alcohol, Chlorine, Chemical, Paint, Car Exhaust

The Supplemental Odor Complaint Response Form (See Appendix B). includes the incorporation of the Odor Intensity Referencing Scale[1] (OIRS) field jar kits, and more common odor descriptors to assist the responder. The proper completion of the Supplemental Odor Complaint Response Form requires the odor responder to identify the odor character, intensity, duration, and frequency. Odor intensity should be reported using the OIRS field jar kits to provide objective quantitative comparative odor intensity. All formal responders will be trained in the use of these jars first "theoretically" during the in odor training class and later in the field as part of the final field portion as the weather gets closer to the traditional odor season. Any future responders should be trained as staff turnover requires.

Word descriptors assigned to these concentrations are no odor, trace, noticeable, moderate, strong, and very strong. All members of the odor response team will be trained in this method to ensure accurate and consistent observations of odor. The complaint and response will be logged into a database created in Excel and maintained by the odor responders. The database will include the following information: date, time, name of complainant, brief description of the nature of complaint, and weather conditions. If an odor is determined to be attributed to the facility, Sanctuary should undertake corrective actions as necessary to address the cause of the odor.

[1] From 1) "Standard Practices for Referencing Suprathreshold Odor Intensify", ASTM E554 (Reapproved 1988, 1999.) and 2) McGinley, Charles M. and McGinley, Michael A. "Odor Intensity Scales for Enforcement, Monitoring, and Testing", Air and Waste Management Association, 2000 Conference.

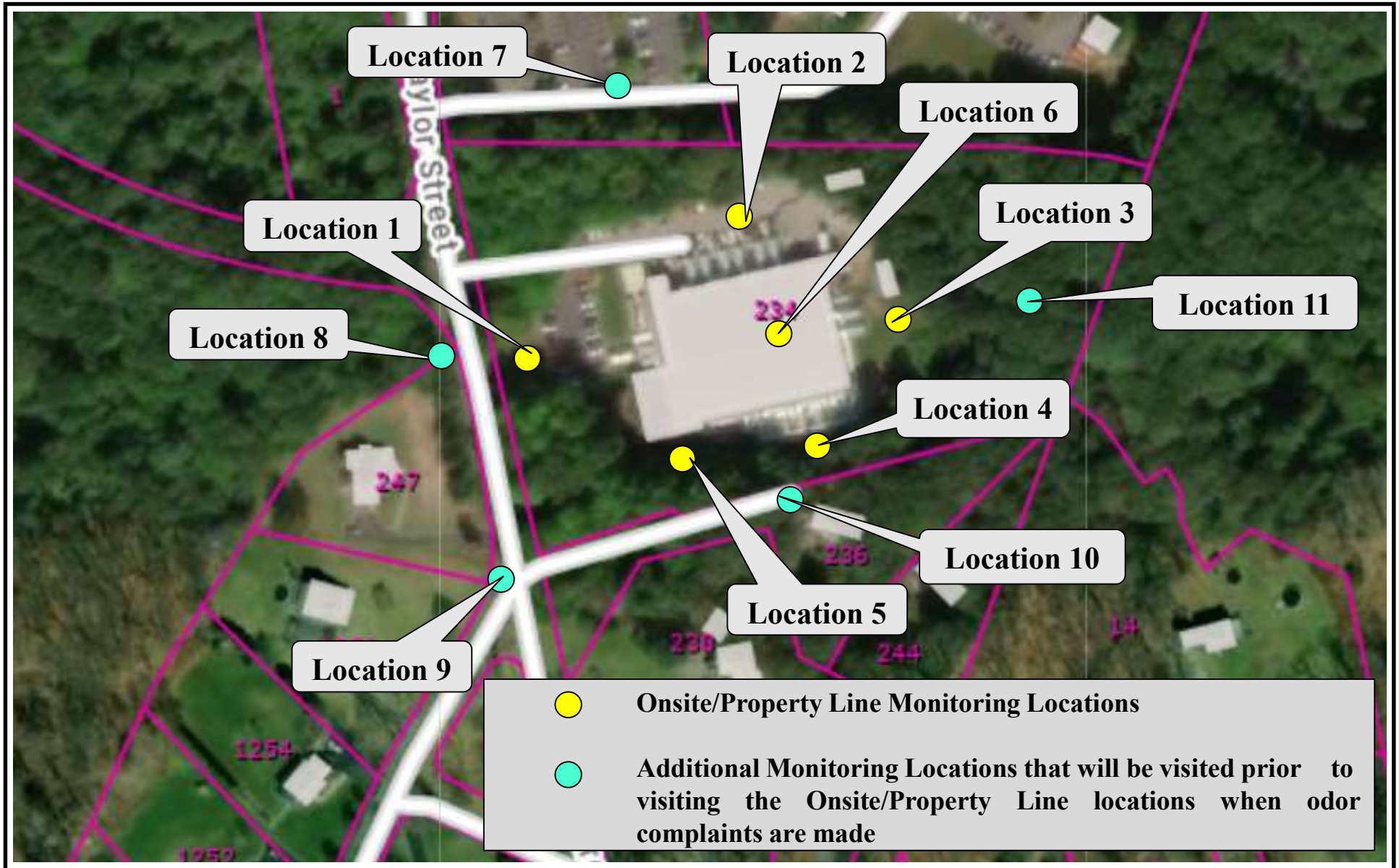

FIGURE 3.
Odor Monitoring Locations
Sanctuary Medicinals
Littleton, MA

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3.0 NEW BUILDING AND ODOR CONTROL EXHAUST SYSTEM

The new building will not create more odor. It will manage the existing odor by creating new processing, storage, and shipping areas that are currently undertaken in the existing facility structure. As a result, there will be some "fugitive" odor that currently exists in the facility areas outside of the grow room today that will be transferred to this new building.

The new building also provides a new opportunity for odor control improvements that can best serve the more spread-out odor potential of the existing and new building, and also can provide redundancy. As part of the permitting for the future facility is committing in the future a new carbon system that will keep both the existing building and the new ancillary building negative, so that any ozone system can be considered a redundant, back-up, or extreme heat relief odor control system, as needed.

The new building will be built as a stand-alone structure that will be connected to the existing structure via a hallway (See Figure 4.). The headspace in the new hallway and the headspace in one of the existing hallways will be used to provide new ductwork to and from the odor control unit as shown in Figure 4. Please note that what is known at this time is that shipping and receiving will be separated. Shipping activities will occur in the new building and receiving will occur within the existing building shipping and receiving area. It is also known that the new building will provide more processing space. This will allow some of the existing processing space in the current building to be used for grow room storage and support.

The process room headspace in the existing structures is defined as the entire existing structure minus the grow rooms, the lavatories, the mechanical and electrical rooms, and the changing rooms and the offices which each have their own dedicated HVAC systems. The volume of this headspace is approximately 320,000 cubic feet. The new building will be considered all processing for the purpose of permitting, but could have spaces isolated during design, as the design progresses. The headspace of the new building will be approximately 270,000 cubic feet.

The new building will include three 1,000 cfm dust and odor control recirculating carbon adsorption units. The systems will be sized the same so that spare parts can be interchangeable. Although they will be the same size, they are being applied strategically with higher recirculation rates, or more passes through the system per day, for the new building processing areas with the higher odor potential, and less for the lower potential areas such as those areas for labeling and storing of packaged product.

The grinding room headspace will have the highest indoor odor and dust potential in the new ancillary building, so the air within it, without considering the air exchanges of outside air to the new exhaust carbon system will pass through the recirculating system over 70 times per day on average. This continual recirculation will make sure that the baseline odor and dust in the room remains low.

The second area, the main processing and packaging area, is where ground raw material products are converted to end products and packaged. In this area the odor potential has dropped substantially after grinding, but the product is still directly exposed to the room headspace. In this

area, the air in the headspace on average within the room will pass through its recirculating odor control system over 20 times per day.

In the last two areas the odor potential is essentially lower, but the same in each room. The only real reason that the areas are separated into different rooms is for required security reasons. These two areas are the labeling areas and the final product storage areas. In these areas the product is fully sealed and has very little odor potential but given that there can be quite a bit of product in this area, minimal continual odor control will still be installed. In this area, the air within these rooms will pass through its recirculating dust and odor control system over 12 times per day on average.

These recirculating carbon units are fully self-contained and require no ductwork to operate effectively. In the last area, the unit will be installed along the common wall separating the two rooms and minimal ducting will be included to split both the intake and discharge of the common recirculating carbon system into and from the unit, and the labeling and storage rooms.

The new ancillary building will have a second layer of odor control added for redundancy as well. An exhaust carbon adsorption system will be located outdoors between the two new buildings on the commercial side of the building, or in the new odor control/HVAC room labelled on the new building plan. The ultimate exhaust odor control system location will be determined during final design, but it is shown currently outdoors at this time.

In addition to the specific recirculating carbon adsorption odor control improvements for the building expansion noted above, Sanctuary recently installed, three recirculating carbon systems in the existing building. The facility is also committing to purchasing a second ozone system to improve redundancy to the existing building regardless of the expansion plans, so the existing building will soon have three layers of odor control from a redundancy perspective (the three new recirculating carbon units located within the building in different area, the existing ozone system, and a second new ozone system).

At the permitting level it is reasonable to assume that the future building will also be a similar prefabricated steel structure building with no windows, and minimal door openings. There will be minimal personal doors and garage doors installed. Most of the personnel doors will be alarmed and marked as emergency exit only. Any access to non-alarmed doors will be restricted to only the plant managers for the required security precautions. The security precautions will ensure that these doors are not potential fugitive emission locations.

There will be one or more garage doors installed in the new loading dock area. These doors will be operated similar to the current doors in a normally closed and locked position. Each garage door opening will also be fitted with a fast-moving interior door.

4.0 ODOR Operations and Maintenance Activities

This section is organized by frequency of required events to proactively manage odor control. Also included is the survey and monitoring activities:

4.1 Daily activities

Although employees may not consider daily odor observations part of their normal routine, each employee is still responsible on a daily basis to:

1. Observe odor coming to and from the building and report anything out of the ordinary
2. Report any equipment that may not be functioning properly and may result in increases to the odor baseline inside the building or outside
3. Follow required washdown and declutter procedures to keep areas clean and tidy to limit residual odor
4. The security guard should be made aware of potential areas of concern for added odor and to report to management if those areas are compromised
5. Monitor the operating instrumentation (SCADA) system for odor control system operation

4.2 Weekly activities

1. Inspect the odor control systems for changes in flow pattern and carbon distribution
2. Perform formal proactive odor surveys, with more than one activity per week needed if either it is warmer, and the odor baseline appears to be increasing or there have been confirmed odor complaints.
3. Examine the HVAC units outdoors for potential wind or storm damage and for potential leaks in gaskets

4.3 Monthly Activities

1. Measure the pressure drop in each condensate pump line and replace or clean as required.
2. Compile the odor survey and summarize them for quarterly reports
3. Examine the odor control system performance for the month and summarize down times and maintenance performed.
4. Compile any odor complaints received, reports completed, and action items taken.
5. Check carbon for breakthrough potential and rotate carbon as per the desired process to maximize carbon efficiency.
6. Test the odor control system monitoring and shutdown components and replace those that fail.

4.4 Odor Jar Kit

Odor intensity is also a measure of the odor strength, like the D/T concentration, but it has another purpose too. While concentration (i.e., how much additional dilution is necessary to get to an undetectable level) will help one understand the potential extent of an obvious odor, intensity will help define the potential for an immediate, frequent, or long-lasting odor condition. The intensity is a measure of how strong the odor is compared to a reference odor.

The selected approach to monitoring is based upon a modified version of the laboratory method ASTM E-544 (https://www.astm.org/Standards/E544.htm) for use in the field. The primary difference between the field and laboratory method is that the field method uses the diluted end of the n-butanol scale (for off-site versus on-site odors), and it has been modified for use in the field. Five jars of increasing n-butanol concentrations are used from one (1) to five (5). N-butanol is the

reference odorant used in this test method because it has a unique odor that is not typically associated with natural odors, and also it has a neutral hedonic tone (relative pleasantness). It is not considered pleasant or unpleasant. Sanctuary has obtained an Odor Jar Kit from Tech, which will be used during each round of odor monitoring to be able to quantify the datable odor's intensity. The Odor Jar Kit last about 6 months which will then be replaced by purchasing another kit from Tech or creating one with instructions provided by Tech.

4.5 Odor Monitoring

Odor Jar Kit will be used to determine the odor intensity. Starting with the most diluted jar, the procedure for determining odor intensity is to sniff the odor in the air, sniff the odor in the jar, and then back to the air. If ambient intensity is higher than the jar intensity, then the process is repeated until the jar is stronger than the ambient odor. The intensity reading is then the highest jar equal to or below the odor. For comparison sake, most natural or typical odors are a one (1) or below on this scale, even the smell of low tide, wetlands, fresh cut grass, flowers, etc. Although these natural odors can be readily identified in nature, their intensities need not be typically overwhelming. Sanctuary will also summarize the collected data quarterly and report to the Littleton BOH as part of an evaluation of where the monitors have provided useful information.

4.6 Record Keeping & Reporting

Sanctuary will report to the Littleton BOH periodically, at a frequency agreed to with the BOH, on its efforts to address off-site odor complaints. At the request of the BOH, such reports will be provided either in writing or verbally through appearance at BOH meetings or directly to the BOH's Health Agent.

Sanctuary will meet with the Littleton BOH to review all aspects of this Odor Management Plan at a regularly scheduled meeting of the BOH, and at six (6) month intervals thereafter if requested by the BOH. If odor conditions at that time indicate that revisions are needed in the Odor Management Plan, Sanctuary and the BOH will work collaboratively to agree on modifying the odor management program, with consideration of additional best management practices for facility odor control, including adoption of alternative state of the art technology solutions in the event these are not already in use at Sanctuary.

4.7 Odor Control Supplies and Spare Parts

The facility has a number of odor control systems on-site that are intended to run continuously. In order to keep them running continuously, spare parts can be required right away. As a general rule of thumb equipment, parts, and supplies that can be ordered and delivered within a few days are not necessary to stock onsite. But for some items that have a longer delivery time, and other items that need to be replaced on a regular basis, these items should be stored onsite. Therefore, Sanctuary shall have the following list of spare parts onsite in the new ancillary building storage area:

- **"Rubber" Gaskets for the HVAC Units outdoors –** These rubberized gaskets are under compression in order to form a tight seal. The compression ability of the gaskets fades

with time as the gaskets are exposed to sunlight and heat. The facility shall have at least one complete set of gaskets for each outdoor HVAC unit.

- **Condensate Pumps** – The facility shall have at least one spare utility pump for each size/flow application to make sure that is a pump fails another one can be installed as soon as possible. In addition, spare tubing and piping shall be kept on-site

- **Existing and future recirculating carbon adsorption systems** - There are currently three SorbAire recirculating carbon systems. The systems are pretty simple and have very few moving parts. The number one replacement part needed is a spare blower. Since all three units are similar, one uninstalled spare in stock should be sufficient to maintain operations if one fails. In the future, if the new carbon adsorption recirculating systems for the ancillary building are the same as the three existing units, no additional spare fan will be needed, but if the design and specifications are altered, they a space required to meet the new specifications shall be in stock.

- **Activated Carbon** – Even more likely than the fans malfunctioning is the consumption of carbon and the need for replacement. The facility shall have sufficient spare carbon on-site to replace each unit at all times. This shall not be an issue, as the facility plans to purchase carbon in bulk, once the storage space for it in the new ancillary building is available. In the interim, simply enough carbon to replace the carbon in each unit shall be onsite.

- **Ozone System** – A second ozone system shall be installed as a spare, so that there is always one available.

- **New Exhaust Carbon System** – the new carbon system for the exhaust shall be installed in the new building. Similar to the existing carbon system, spare carbon and fan parts shall be kept for the new carbon system as well.

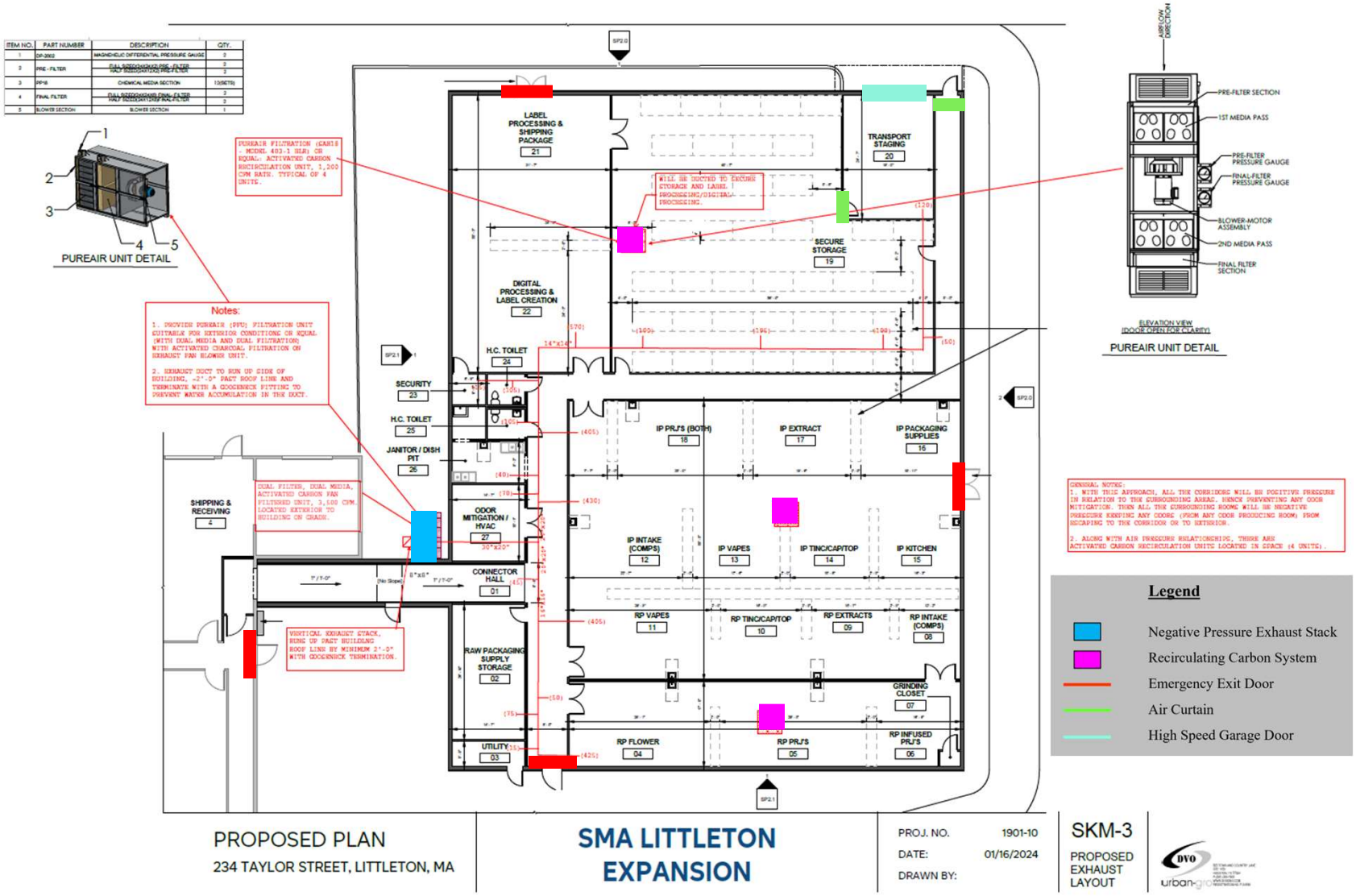

FIGURE 4.
Future: Existing and Proposed Building
Sanctuary Medicinals
Littleton, MA

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APPENDIX A

ODOR SURVEY LOG

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PRIVILEGED AND CONFIDENTIAL

MEMORANDUM

To: Files

From: Patricia Rosa

Subject: Field odor monitoring on August 31, 2023– Sanctuary Medicinals Littleton

Date: September 1, 2023 Ref 4834

This field odor monitoring memorandum was created based of field notes taken on Thursday, August 31st, where odor potential was monitored at Sanctuary Medicinals Marijuana facility located at 234 Taylor Street Littleton, Massachusetts 01460 and quantified its intensity based on the modified n-butanol scale as per ASTM E-544. I have been screened and trained to perform odor monitoring onsite and have performed similar monitoring at other facilities. As protocol requires odor monitoring was conducted prior to entering the facility starting at 12:05 PM. The weather was sunny, with temperature in the high-60s, with calm to 10 miles per hour winds directly from the north.

The monitoring locations that were investigated on this day were 1 through 11. The monitoring locations 1 through 5 that were investigated on this day were the same locations monitored in 2019.

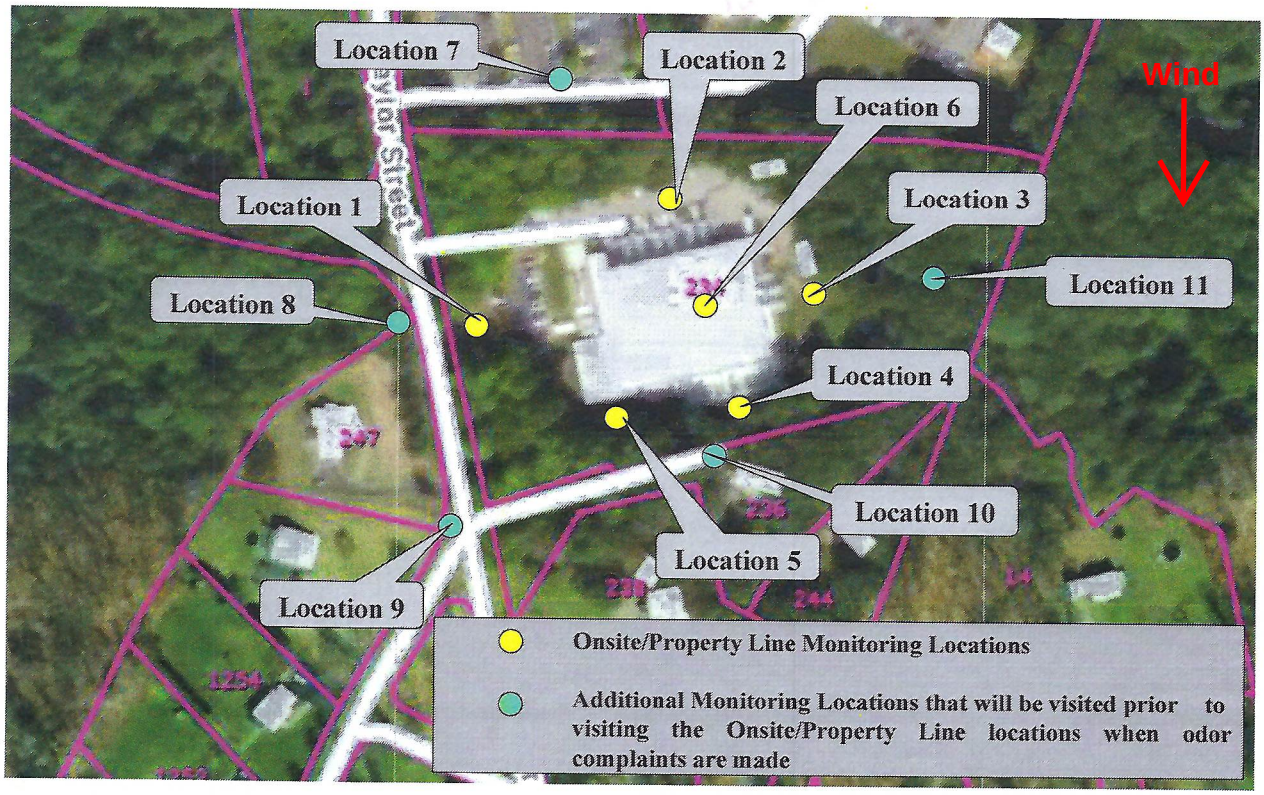
Monitoring began with location 2 and travelled counterclockwise around the facility. Odor from the facility was detected at locations 9, 5, 4, and 10. The odor intensity at these location were a 1 or less than 1. The odor intensity at locations 9, 5, 4, and 10 were less. This makes sense because the odor inside was less than it was before. The odor intensity of the grow room hallway and lobby was less than 4 and less than 2, respectively. The overall odor characteristic ranged from sour, fruity, earthy, floral, and skunky. The odor characteristic was consistent at all locations where facility odor was present but was not unpleasant compared to the existing odors of grassy, earthy and floral. See attached Odor Investigation Forms for more detail.

Sanctuary Medicinals
234 Taylor Street, Littleton, MA 01460
Odor Monitoring

Date, Time, Weather Conditions	Location	Facility Odor (Y/N)	Intensity (1 -> 5)	Odor Characteristic
12:05 PM 8/31/2023 69°F, sunny, winds: 0-10mph North	2	N	1	Grassy, earthy
	4	N	<1	earthy, plastic (med.)
	8	N	<1	earthy
	9	Y	<1	floral, skunky (last couple secs)
	1	N	<1	earthy
	5	Y	<1	floral, skunky (last couple sec)
	6	Y	<1	floral, skunky, sour, fruity
	10	Y	1	floral, skunky, sour, fruity
	3	N	<1	grassy, earthy
	11	N	<1	grassy, earthy
	Lobby	Y	<2	floral, skunky
	Hallway	Y	<4	floral, skunky

Investigator's Name: Patricia Rosa

Figure 1. Odor Monitoring Locations



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MEMORANDUM

To: Files

From: Patricia Rosa

Subject: Field odor monitoring on September 6, 2023– Sanctuary Medicinals Littleton

Date: September 6, 2023 Ref 4834

This field odor monitoring memorandum was created based of field notes taken on Wednesday, September 6th, where odor potential was monitored at Sanctuary Medicinals Marijuana facility located at 234 Taylor Street Littleton, Massachusetts 01460 and quantified its intensity based on the modified n-butanol scale as per ASTM E-544. I have been screened and trained to perform odor monitoring onsite and have performed similar monitoring at other facilities. As protocol requires odor monitoring was conducted prior to entering the facility starting at 8:45 AM. The weather was sunny, with temperature in the high-70s, with calm to 4 miles per hour winds directly from the north.

The monitoring locations that were investigated on this day were 1 through 11. The monitoring locations 1 through 5 that were investigated on this day were the same locations monitored in 2019.

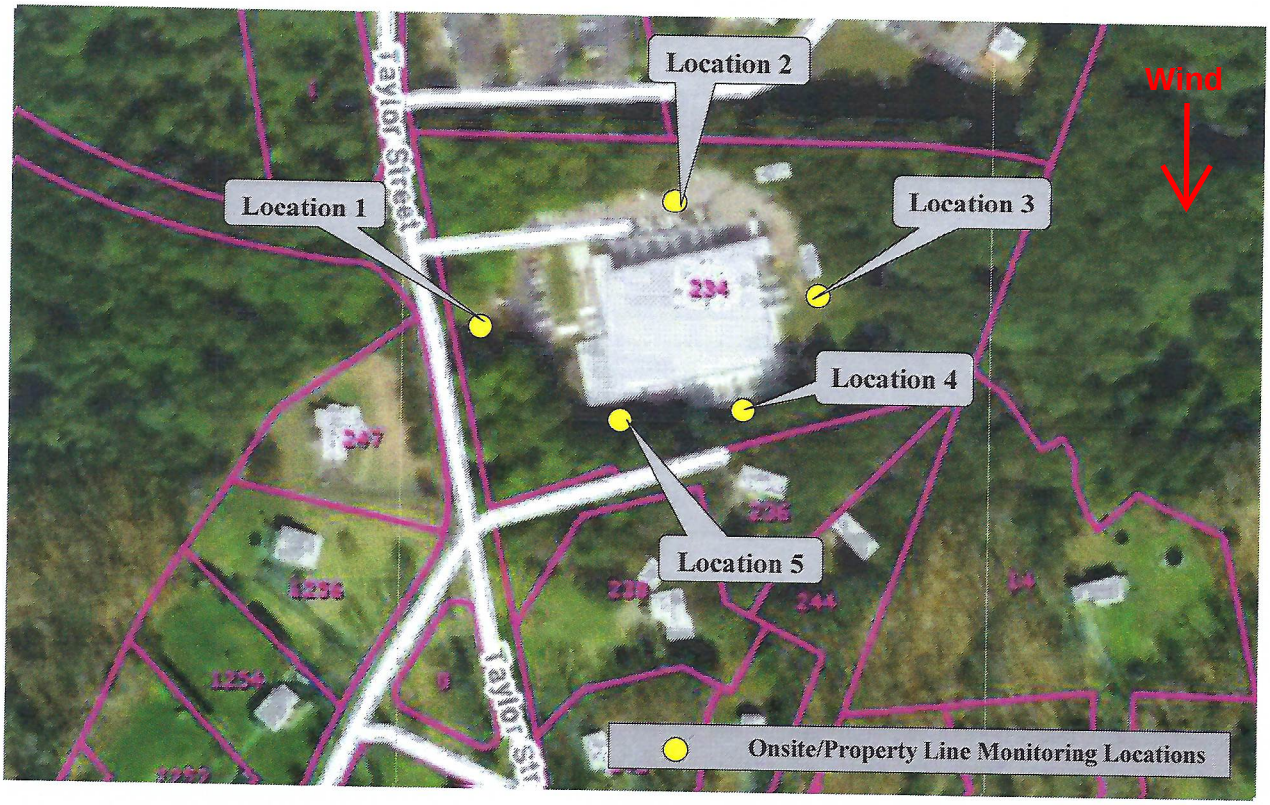
Monitoring began with location 2 and travelled counterclockwise around the facility. Odor from the facility was detected at locations 9, 1, 5, 4, 10, and 3. The odor intensity at these location were a 1 or less than 1. The odor intensity at locations 9, 1, 5, 4, 10, and 3 were less. This makes sense because the odor inside was less than it was before. The odor intensity of the grow room hallway and lobby was less than 4 and less than 2, respectively. The overall odor characteristic ranged from skunky, earthy, floral, and skunky. The odor characteristic was consistent at all locations where facility odor was present but was not unpleasant compared to the existing odors of earthy, woodsy, and floral. See attached Odor Investigation Forms for more detail.

Sanctuary Medicinals
234 Taylor Street, Littleton, MA 01460
Odor Monitoring

Date, Time, Weather Conditions	Location	Facility Odor (Y/N)	Intensity (1 -> 5)	Odor Characteristic
8:45 am 9/6/2023 76°F, sunny, Winds 0-4 mph North	2	N	<1	earthy
	7	N	<1	earthy
	8	N	<1	earthy, floral
	9	Y	<1	skunky, earthy (odor faint)
	1	Y	<1	skunky, earthy (odor faint)
	5	Y	1	skunky, earthy (odor faint)
	10	N	<1	skunky, earthy, floral
	4	Y	<1	skunky, earthy, floral
	3	Y	<1	floral, earthy
	11	N	<1	earthy, woodsy
	Lobby	Y	<2	floral, earthy, skunky
	Hallway	Y	<4	floral, earthy, skunky

Investigator's Name: Patricia Rosa

Figure 1. Odor Monitoring Locations



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MEMORANDUM

To: Files

From: Patricia Rosa

Subject: Field odor monitoring on December 5, 2023– Sanctuary Medicinals Littleton

Date: December 6, 2023 Ref 4834

This field odor monitoring memorandum was created based of field notes taken on Tuesday, December 5th, where odor potential was monitored at Sanctuary Medicinals Marijuana facility located at 234 Taylor Street Littleton, Massachusetts 01460 and quantified its intensity based on the modified n-butanol scale as per ASTM E-544. I have been screened and trained to perform odor monitoring onsite and have performed similar monitoring at other facilities. As protocol requires odor monitoring was conducted prior to entering the facility starting at 1:45 PM. The weather was mostly cloudy, with temperature in the high-30s, with calm to 5 miles per hour winds directly from the north.

The monitoring locations that were investigated on this day were 1 through 11. The monitoring locations 1 through 5 that were investigated on this day were the same locations monitored in 2019.

Monitoring began with location 1 and travelled counterclockwise around the facility. Odor from the facility was detected at locations 5, 4, and 10. The odor intensity at these location were a 1 or less than 1. This makes sense because the odor inside was less than it was before. The odor intensity of the front lobby was less than 2. The overall odor characteristic ranged from skunky, earthy, and floral. The odor characteristic was consistent at all locations where facility odor was present but was not unpleasant compared to the existing odors of earthy, woodsy, and floral. See attached Odor Investigation Forms for more detail.

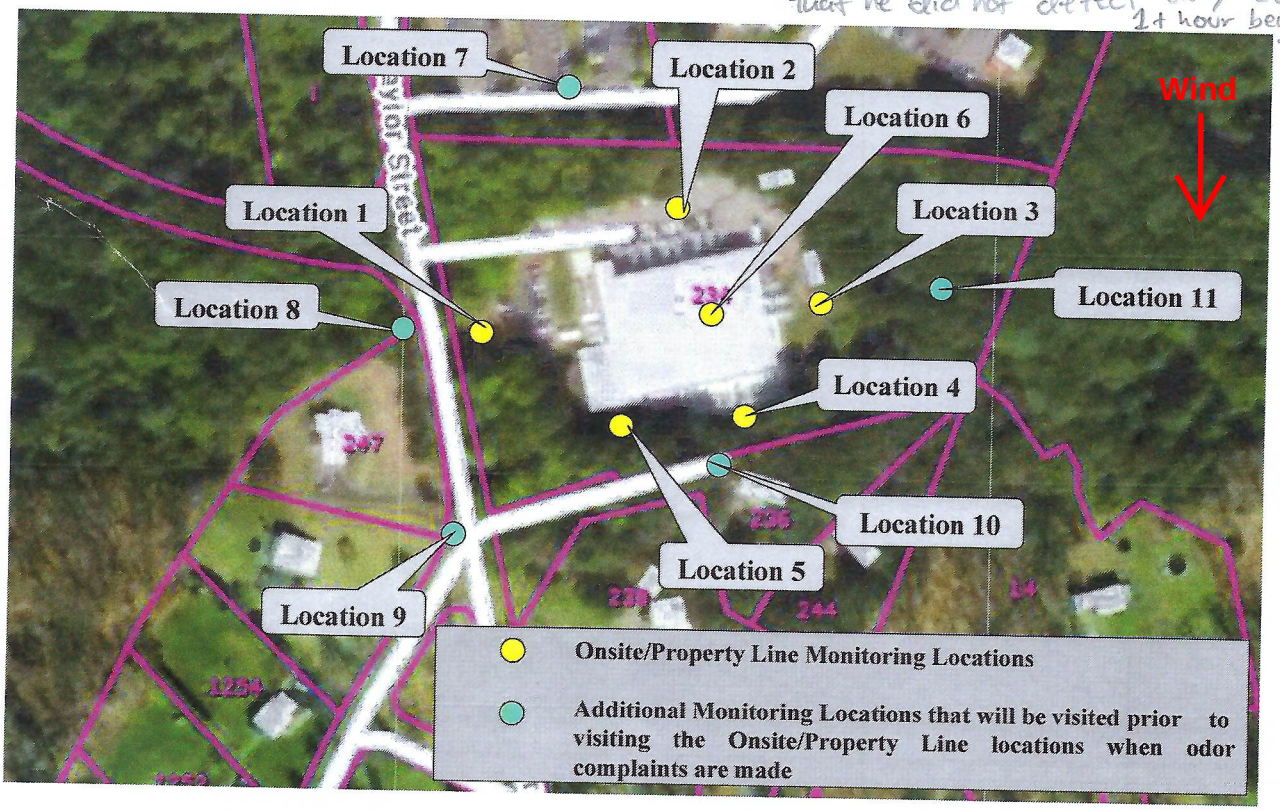
Sanctuary Medicinals
234 Taylor Street, Littleton, MA 01460
Odor Monitoring

Date, Time, Weather Conditions	Location	Facility Odor (Y/N)	Intensity (1 -> 5)	Odor Characteristic
12/5/2023 37°F mostly cloudy Winds from North 5mph 1:45pm	1	N	<1	earthy
	5	Y	<1	skunky, earthy, floral
	4	Y	<1	skunky, sweet, earthy, floral
	10	Y	<1	very faint, smell w/ breeze, skunky
	3	N	<1	earthy
	11	N	<1	earthy
	2	N	<1	earthy/
	7	N	1	earthy
	8	N	<1	earthy
	9	N	<1	earthy
	Lobby	Y	1 or <2	herbal, skunky
	Taylor St	N	<1	*

Investigator's Name: Patricia T. Rosa

*Spoke to police officer Bussiere (Badge #36) who was directing traffic infront of sanctuary while LELD was working and commented that he did not detect any odor for 1+ hour being on Taylor street.

Figure 1. Odor Monitoring Locations



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MEMORANDUM

To: Files

From: Patricia Rosa

Subject: Field odor monitoring on December 22, 2023– Sanctuary Medicinals Littleton

Date: December 22, 2023 Ref 4834

This field odor monitoring memorandum was created based of field notes taken on Friday, December 22nd, where odor potential was monitored at Sanctuary Medicinals Marijuana facility located at 234 Taylor Street Littleton, Massachusetts 01460 and quantified its intensity based on the modified n-butanol scale as per ASTM E-544. I have been screened and trained to perform odor monitoring onsite and have performed similar monitoring at other facilities. As protocol requires odor monitoring was conducted prior to entering the facility starting at 9:40 AM. The weather was mostly cloudy, with temperature in the low-20s, with calm to 3 miles per hour winds directly from the north.

The monitoring locations that were investigated on this day were 1 through 11. The monitoring locations 1 through 5 that were investigated on this day were the same locations monitored in 2019.

Monitoring began with location 1 and travelled counterclockwise around the facility. Odor from the facility was detected at locations 1, 5, 4, and 10. The odor intensity at these location were a 1 or less than 1. This makes sense because the odor inside was less than it was before. The odor intensity of the front lobby was less than 3. The overall odor characteristic ranged from skunky, earthy, smoky, coffee, and floral. The odor characteristic was consistent at all locations where facility odor which was noticeable but was not unpleasant compared to the existing odors of earthy, woodsy, and floral. Tech would like to note that the HVAC units were leaking condensate on the south side of the building. See attached Odor Investigation Forms for more detail.

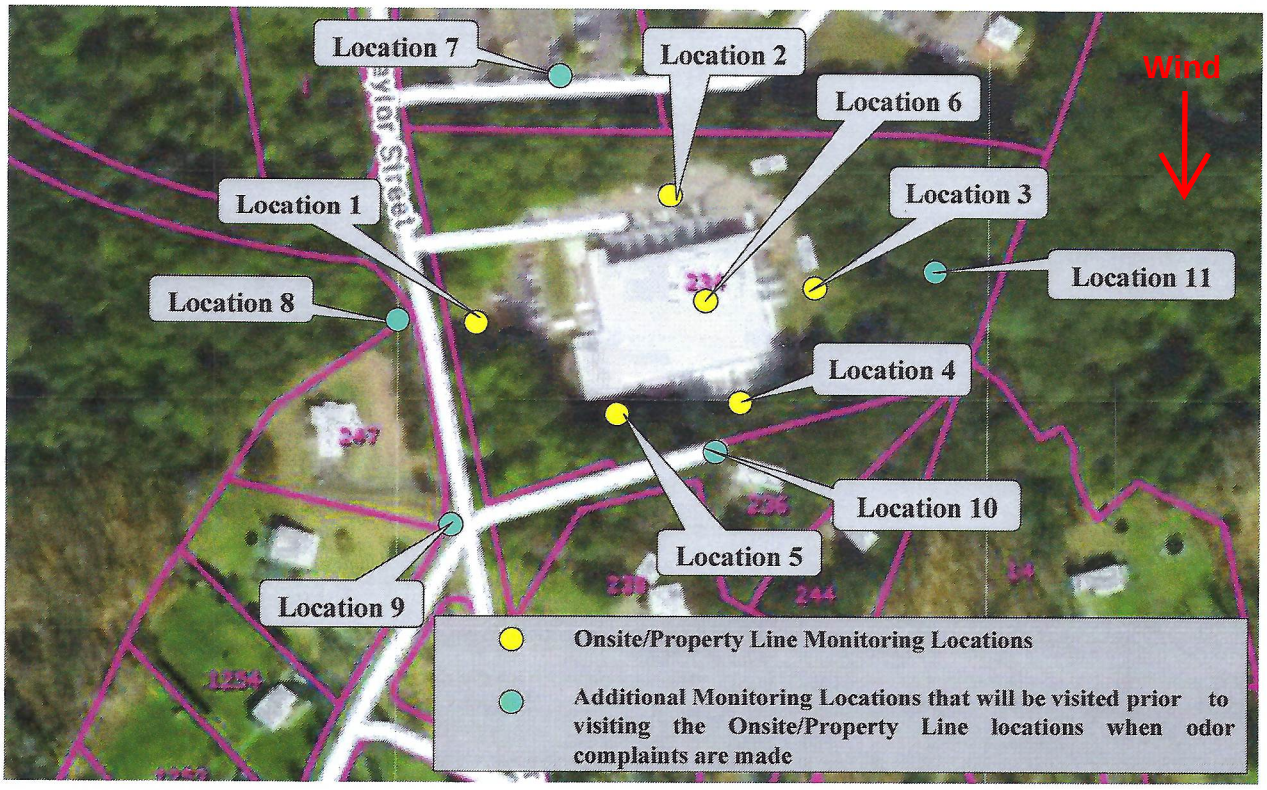
Sanctuary Medicinals
234 Taylor Street, Littleton, MA 01460
Odor Monitoring

Date, Time, Weather Conditions	Location	Facility Odor (Y/N)	Intensity (1 -> 5)	Odor Characteristic
12/22/2023 9:40 am 23 °F partly cloudy 3mph North	1	Y	<1	faint skunky odor last couple days
	7	N	<1	earthy very faint
	8	N	<1	earthy
	9	N	<1	truck exhaust
	5	Y	1	skunky, smoky
	4	Y	1	earthy, coffee, skunky
	10	Y	1	earthy, coffee, skunky
	3	N	<1	earthy
	11	N	<1	earthy
	2	N	<1	earthy
	Lobby	Y	<3	skunky, floral

Investigator's Name: Patricia T. Rosa

* HVAC units on south and east side near locations 3 to 5 were leaking condensate

Figure 1. Odor Monitoring Locations



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MEMORANDUM

To: Files

From: Patricia Rosa

Subject: Field odor monitoring on December 27, 2023– Sanctuary Medicinals Littleton

Date: December 28, 2023 Ref 4834

This field odor monitoring memorandum was created based of field notes taken on Wednesday, December 27th, where odor potential was monitored at Sanctuary Medicinals Marijuana facility located at 234 Taylor Street Littleton, Massachusetts 01460 and quantified its intensity based on the modified n-butanol scale as per ASTM E-544. I have been screened and trained to perform odor monitoring onsite and have performed similar monitoring at other facilities. As protocol requires odor monitoring was conducted prior to entering the facility starting at 1:00 PM. The weather was mostly cloudy, with temperature in the low-50s, with calm to 2 miles per hour winds directly from the south southeast.

The monitoring locations that were investigated on this day were 1 through 11. The monitoring locations 1 through 5 that were investigated on this day were the same locations monitored in 2019.

Monitoring began with location 1 and travelled counterclockwise around the facility. Odor from the facility was detected at locations 5, 4, 10, 3. The odor intensity at these location were less than 1. Tech also detected odor on the driveway onto the facility between locations 1 and 7, the odor would only last a couple of seconds and was very faint, the odor intensity was also less than a 1. The odor intensity of the front lobby was less than 2, and in the grow room hallways was less than 3. The overall odor characteristic ranged from skunky, earthy, coffee, fragrant and floral. The odor characteristic were similar at all locations where facility odor was present but was not unpleasant compared to the existing odors of earthy, woodsy, and floral. Tech would like to note that the HVAC units from the last odor monitoring performed on December 22nd, were still leaking condensate. See attached Odor Investigation Forms for more detail.

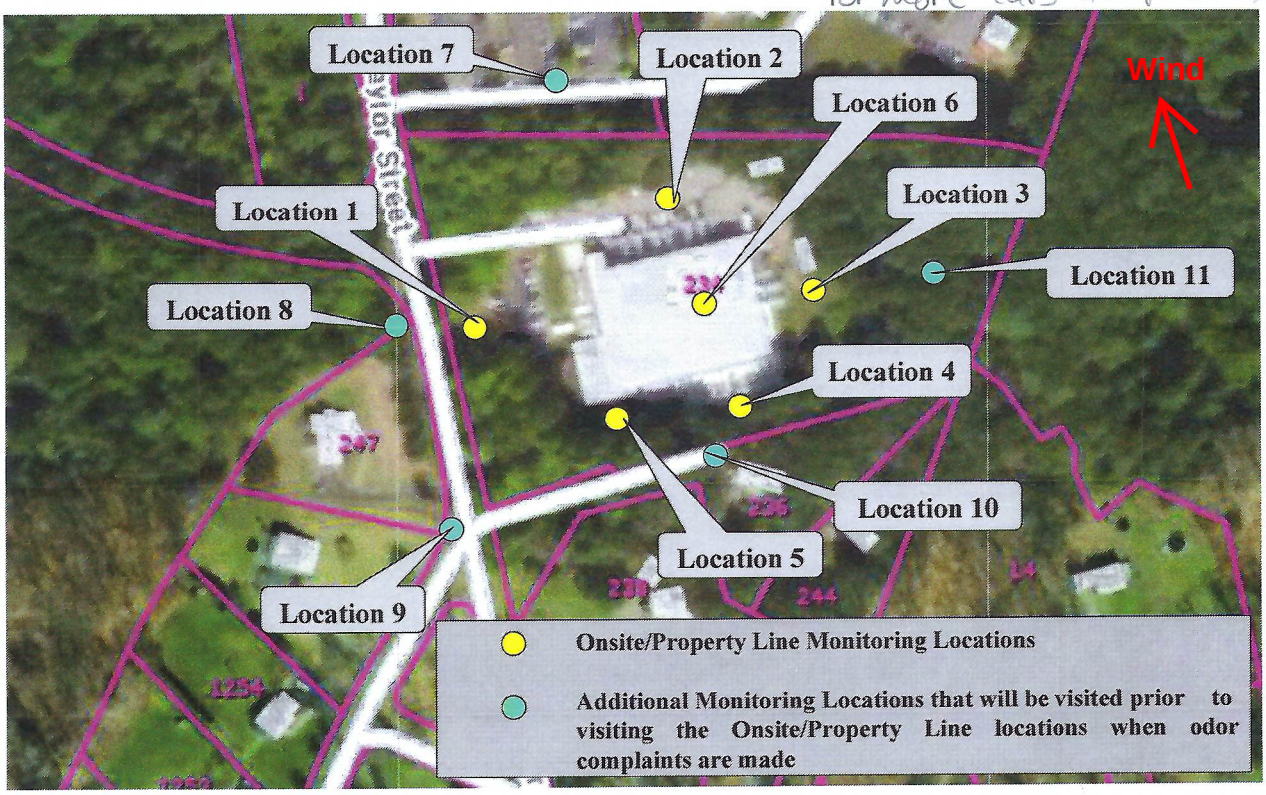
Sanctuary Medicinals
234 Taylor Street, Littleton, MA 01460
Odor Monitoring

Date, Time, Weather Conditions	Location	Facility Odor (Y/N)	Intensity (1 -> 5)	Odor Characteristic
1:00 PM 12/27/2023 50°F Cloudy 2 Mph SSE	1	N	<1	earthy
	7	N	<1	earthy
	8*	N	<1	earthy
	9	N	<1	earthy
	1-7	Y	<1	floral, earthy, skunky, faint
	5	Y	<1	coffee, floral, earthy
	4	Y	<1	coffee, floral, earthy
	10	Y	<1	coffee, floral, earthy
	3	Y	<1	coffee, floral, earthy, faint
	11	N	<1	earthy
	2	Y	<1	floral
	Lobby	Y	<2	floral, earthy
	Hallway	Y	<3	floral, earthy, fragrant

Investigator's Name: Patricia T. Rosa

* smelled facility for only a couple seconds after cars passed by but did not occur again after waiting for more cars to pass by

Figure 1. Odor Monitoring Locations



APPENDIX B

ODOR COMPLAINT RESPONSE FORM

The following form is FOR INTERNAL USE ONLY.
Only trained investigators should fill out this form.

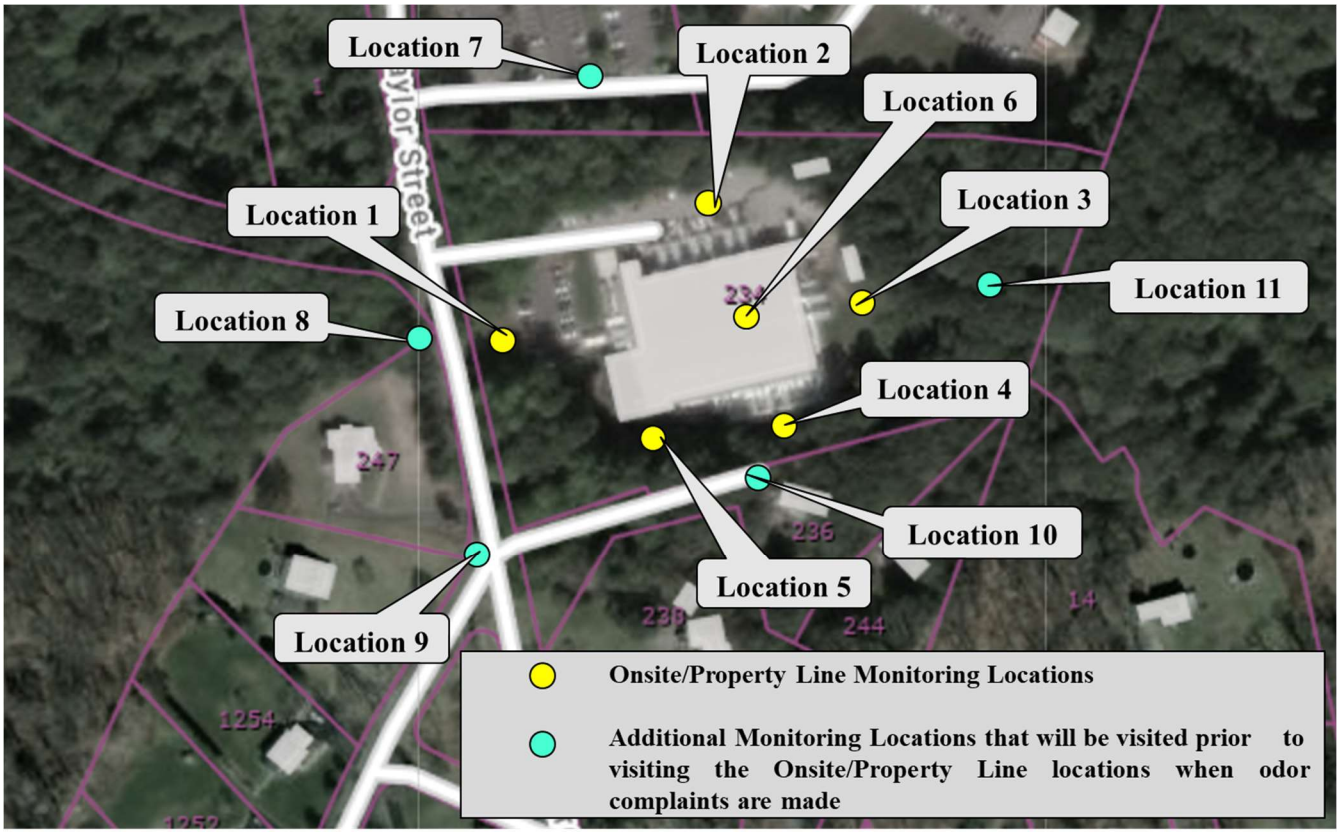
SANCTUARY MEDICINALS ODOR SURVEY LOG

Date: _____

Investigator's Name: _____ **Starting Time:** _____

Your best estimate of current weather conditions in field:	**Weather.com/ local met-station data:**
Wind Direction (wind coming from the): N NE E SE S SW W NW	Condition: _____
Average Wind Speed: None/Still Calm Low (5-10 mph) High (10+ mph)	Temp (ºF): _____ Pressure (in.): _____
Weather: Clear Skies Partly Cloudy Cloudy Light Rain Heavy Rain Snow	Wind from the: _____ Wind speed (mph): _____

Odor Monitoring Locations:



Notes:

_____

_____

_____

The following form is FOR INTERNAL USE ONLY.
Only trained investigators should fill out this form.

Fill out the table below:

MONITORING LOCATIONS	*WAS THERE ANY NOTICEABLE ODOR?*	*WHAT DID IT SMELL LIKE?[1]*	*HOW STRONG WAS THE ODOR?[2]*	*WHAT IS THE ODOR INTENSITY?[3]*	*FACILITY ACTIVITIES AT THE TIME OF MONITORING*
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					

[1] *Common Odor Descriptors:*

- *Earthy, Musty, Moldy, Musk, Grassy, Woodsy, Dust*
- *Floral, Fragrant, Flowery, Pine*
- *Fruity, Sweet, Citrus, Vegetable*
- *Spicy, Garlic, Cabbage, Onion, Pepper, Cinnamon, Vanilla*
- *Sewage, Septic, Fecal, Manure*
- *Putrid, Rotten Egg, Rotten Vegetable, Skunk, Vinegar*
- *Fishy, Urine, Ammonia, Amine*
- *Medicinal, Alcohol, Chlorine, Chemical, Paint, Car Exhaust*

[2] *(1) Trace (2) Noticeable (3) Moderate (4) Strong (5) Very strong*

[3] *Based on Odor Jar Kit ranking of 1 through 5*

DOCUMENT ALL READINGS FROM THE ODOR PATROL IN THE ELECTRONIC DATABASE

APPENDIX C

OZONE SYSTEM CUTSHEETS

OXG-Series Ozone Generators

The OXG Series are built with an Ozone Generation Cell and Oxygen Concentrator in one system. They can produce ozone from 10 to 150 g/hr from 4 to 30 LPM. These Ozone Generators are compact, efficient, and easy to use with a wide variety of options and features.

APPLICATIONS

- Water Treatment
- Bottled water
- Laundry applications
- Odor control
- Agricultural applications

OXG TECHNOLOGY

The OXG Ozone Generator line is a turnkey unit that houses both an ozone generation cell and oxygen concentrator. Simply plug into electrical power and produce both oxygen and ozone from one unit. The OXG units are easy to use and work for a variety of industrial applications.

SYSTEM FEATURES

- Turnkey Ozone Generator
- Integrated Oxygen Concentrator
- Efficient ozone generation – high concentration ozone
- Air cooled Ozone Generator – no cooling water necessary
- Visual Flow-meter (standard)
- Adjustable ozone output (standard)
- Easy to install and operate

Oxidation Technologies, LLC.
214 US Highway 18
Inwood, IA 51240

(515) 635-5854
Sales@oxidationtech.com
www.oxidationtech.com

Model	O3 Production	Oxygen Flow	O3 %	Dimensions (inches WxDxH)	Power Requirement	Compressed Air Requirement (compressor standard)
OXG-10	10 g/hr	4 LPM	3.5%	24” x 12” x 36”	120 VAC	4 CFM
OXG-20	20 g/hr	7 LPM	4%	26” x 12” x 36”	120 VAC	4 CFM
OXG-30	30 g/hr	10LPM	4%	26” x 12” x 38”	120 VAC	4 CFM
OXG-40	40 g/hr	10 LPM	4.7%	26” x 12” x 38”	120 VAC	4 CFM
OXG-60	60 g/hr	10 LPM	6%	26” x 12” x 38”	220 VAC	8 CFM
OXG-80	80 g/hr	20 LPM	4.7%	30” x 12” x 38”	220 VAC	8 CFM
OXG-100	100 g/hr	20 LPM	6%	30” x 12” x 38”	220 VAC	8 CFM
OXG-120	120 g/hr	30 LPM	4.7%	30” x 12” x 38”	220 VAC	12 CFM
OXG-150	150 g/hr	30 LPM	6 %	30” x 12” x 42”	220 VAC	12 CFM

OPTIONS

- **External Compressed Air** – the OXG-10 to OXG-40 units incorporate an oil-less compressor to provide compressed air for the Ozone Generator. If plant air is available, or in very humid/poor air quality environments the internal air compressor can be removed at a cost savings. We will remove the compressor and replace with air solenoid valve, pressure regulator, and 2-stage air filtration.
- **Internal Compressed Air** - the standard OXG-60 to OXG-100 require plant compressed air for operation. An optional internal air compressor is available. The OXG-120 & OXG-150 are not available with an internal compressed air option.
- **Stainless Steel Enclosure** – upgrade the enclosure to be stainless steel if required for your application, durability or look.
- **Ozone Analyzer** – this additional piece of equipment will provide readout of the output of the ozone generator

Oxidation Technologies, LLC.
214 US Highway 18
Inwood, IA 51240

(515) 635-5854
Sales@oxidationtech.com
www.oxidationtech.com

Centrifugal Upblast & Sidewall Exhaust

Models CUE, CUBE and USGF

- General Clean Air
- Restaurant Grease
- High Wind
- Seismic
- Smoke Control
- Contaminants

VARI-GREEN. *performance data included*

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Building Value in Air.

BUILDING VALUE IN AIR.

August 2023

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Table of Contents

c UL US LISTED

- UL/cUL705 Listed Power Ventilators
  File E40001 (CUE and CUBE)
- UL/cUL 705 Supplement SC Power Ventilators for Restaurant Exhaust Appliances
  File MH11745 (CUE, CUBE and USGF sizes 099 and larger)
- UL/cUL Power Ventilators for Smoke Control Systems
  File MH17511 (CUBE and USGF models 500°F (260°C) for 4 hours and 1,000°F (538°C) for 15 minutes)

Note: UL/cUL is optional and must be specified

Model sizes CUBE-099, 160XP, 240XP, 300HP & 300XP are excluded from Power Ventilators for Smoke Control Systems

CE

Modes CUE, CUBE, and USGF meet CE (Conformité Européenne).

Greenheck Fan Corporation certifies that the Model CUE, CUBE, and USGF shown herein are licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and Publication 311 and comply with the requirements of the AMCA Certified Ratings Program. The certified ratings for Model CUBE, CUE and USGF, are shown on pages 19-50.

Enjoy Greenheck's extraordinary service, before, during and after the sale.

Greenheck offers added value to our wide selection of top performing, energy-efficient products by providing several unique Greenheck service programs.

- Our Quick Delivery program ensures shipment of our in-stock products within 24 hours of placing your order. Our Quick Build made-to-order products can be produced in 1-3-5-10-15-20 or 25-day production cycles, depending upon their complexity.
- eCAPS® online selection guides you to choose the best value products for your building projects. eCAPS® includes fan, louver, make-up air, energy recovery preconditioner, and dedicated outdoor air system (DOAS) selections, as well as a damper guide and toolbox.
- Greenheck's free Computer Aided Product Selection (CAPS®) program, rated by many as the best in the industry, helps you conveniently and efficiently select the right products for the challenge at hand.
- Our 3D service allows you to download, at no charge, easy-to-use AutoDesk® Revit® 3D drawings for many of our ventilation products.

Find out more about these special Greenheck services at greenheck.com

Model Comparison

Model	Location		Mounting					Airflow				Application								Drive Type		Impeller Type			Performance	
	Outdoor	Indoor	Roof Curb	Base/Floor	Hanging	Wall	Ceiling Mounted	Exhaust	Supply	Reversible	Recirculate	General/Clean Air	Contaminated Air	Spark Resistant	Grease (UL 705 Supplement SC)	Smoke Control (UL 705 Supplement SD)	High Wind (150 mph)	High Temp (above 200°F)	Seismic Certification	Belt	Direct	Centrifugal	Propeller/Axial	Mixed Flow	Maximum Volume (cfm)	Maximum Static Pressure (in. wg)
CUE	✓		✓			✓		✓				✓	✓	✓	✓		✓	✓	✓		✓	✓			14,700	3
CUBE	✓		✓			✓		✓				✓	✓	✓	✓	✓	✓	✓	✓	✓		✓			30,000	5
USGF	✓		✓					✓				✓	✓		✓	✓	✓	✓		✓		✓			6,800	3.25

When you buy a Greenheck roof upblast or sidewall exhaust fan, you'll receive a fan with the industry's best performance and durability for general clean air, restaurant grease, smoke control, light contaminants, seismic, high wind, and hurricane applications. Both roof upblast and sidewall configurations are specifically designed to discharge air directly away from the mounting surface.

- Performance as cataloged is assured. All fan sizes are tested in our AMCA accredited laboratory and all models are licensed to bear the AMCA Sound, Air and FEI Performance seal.
- UL/cUL Listed for Power Ventilators, Restaurant Exhaust Appliances and Smoke Control Systems.
- Greenheck subjects these products to extensive life testing, ensuring the fans will provide many years of reliable performance.

LEED information

Greenheck became one of the first manufacturers in the air movement and control industry to join the LEED/green movement when they joined the United States Green Building Council (USGBC) in 2005. Greenheck has been actively researching qualification requirements for our products to meet LEED credits and prerequisites.

The Vari-Green® motor significantly helps qualification efforts for the Energy and Atmosphere credits and prerequisites, specifically credit one, Optimize Energy Performance and prerequisite two, Minimum Energy Performance.

Standard Construction Features

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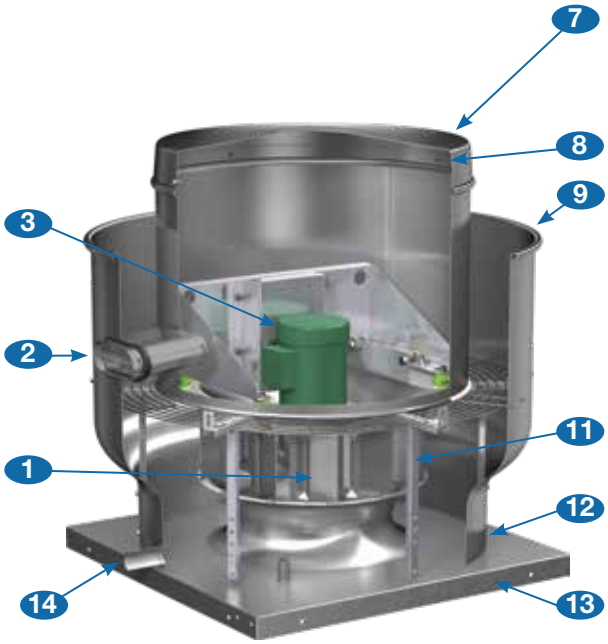
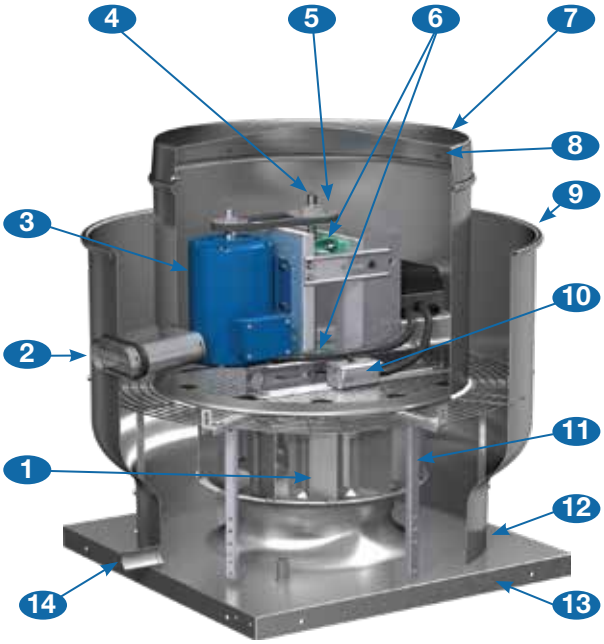
	Standard Construction Features	CUE CUBE	USGF
1	**Wheel** — A backward-inclined, non-overloading centrifugal wheel is utilized to generate high efficiency and minimal sound. Wheel cones are carefully matched to the venturi for maximum efficiency. Each wheel is statically and dynamically balanced for long life and quiet operation.	✓	✓ *Non-Stick, Steel
2	**Motor Cooling Tube** — Cooling fins located on top of the fan wheel draw outside air through a large breather tube directly into the motor compartment. Positive motor cooling with fresh air results in maximum motor life.	✓	✓
3	**Motor** — Carefully matched to the fan load and mounted out of the airstream.	✓	✓
4	**Fan Shaft** — Precisely sized, ground and polished so the first critical speed is at least 25% over the maximum operating speed. Where the shaft makes contact with bearings, close tolerances result in longer bearing life.	✓	✓
5	**Drive Assembly** — Belts, pulleys and keys are oversized 150% of driven horsepower. Machined-cast pulleys are adjustable for final system balancing. Belts are static-free and oil-resistant.	✓	✓
6	**Bearings** — 100% factory tested and designed specifically for air handling applications with a minimum L_{10} life in excess of 100,000 hours (L_{50} life in excess of 500,000 hours).	✓	✓
7	**Motor Cover** — Constructed of aluminum. Attached with stainless steel fasteners for easy removal and access to the motor compartment and drive assembly.	✓	✓ *Steel
8	**Stainless Steel Fasteners** — Allow easy removal and access to the motor compartment and drive assembly.	✓	✓
9	**Windband** — One-piece, heavy-gauge aluminum with a rolled bead for extra strength directs exhaust air away from the mounting surface.	✓	✓ *Steel
10	**Disconnect Switch** — NEMA-1 switch is factory-mounted and wiring is provided from the motor as standard (other switches are available). All wiring and electrical components comply with the National Electric Code (NEC) and are either UL/cUL Listed or Recognized.	✓	
	NEMA-3R switch is factory-mounted and wired as standard. All wiring and electrical components comply with the National Electric Code (NEC) and are either UL/cUL Listed or Recognized.		✓
11	**Internal Supports** — Heavy-gauge supports provide additional strength to withstand wind loads of 150 PSF and support motor and drives.	✓	✓
12	**Leakproof Construction** — One-piece windband is continuously welded to the curb cap for leakproof protection on models CUE, CUBE, and USGF through size 240 and all sizes with UL/cUL 705 Supplement SC (restaurant exhaust).	✓	✓
13	**Curb Cap with Mounting Holes** — One-piece for a weathertight fit. Constructed of aluminum with an integral deep spun venturi. Aluminum curb cap has prepunched mounting holes to ensure correct attachment to the roof.	✓	✓ *Steel
14	**Drain/Grease Trough** — Allows for one-point drainage of water, grease and other residues.	✓	✓
Not Shown	**Nameplate** — Permanent embossed aluminum nameplate for exact model and serial number identification.	✓	✓
Not Shown	**Internal Conduit Chase** — For easy internal electrical wiring in applications. Not available on UL 705 Supplement SC (restaurant exhaust) rated fans per NFPA 96.	✓	
15	**Dual Drives** — Oversized 150%, adjustable, static-free and oil-resistant.		✓
16	**Permatector™ Coating** — Typically used for applications that require corrosion resistance in indoor and outdoor environments.		✓
17	**Clean-Out Port** — Allows for easy cleaning of the entire centrifugal wheel through a 4-inch diameter hole on the outside of the fan windband. Meets NFPA 96 standard.		✓
18	**Hinged Curb Base with Cables** — Allows maintenance personnel to gain access to wheel and ductwork for regular inspection and cleaning by utilizing the factory assembled hinge.		✓
19	**Vibration Isolation** — True vibration isolators consist of two independent studs separated by a neoprene (rubber) center. Reduces vibration and noise transfer between the drive system and fan housing. (No metal-to-metal contact. Factory-mounted ground wire used to ground system).	✓	✓
20	**Lifting Points** — Various lifting points located on the drive frame and bearing plate.	✓	✓

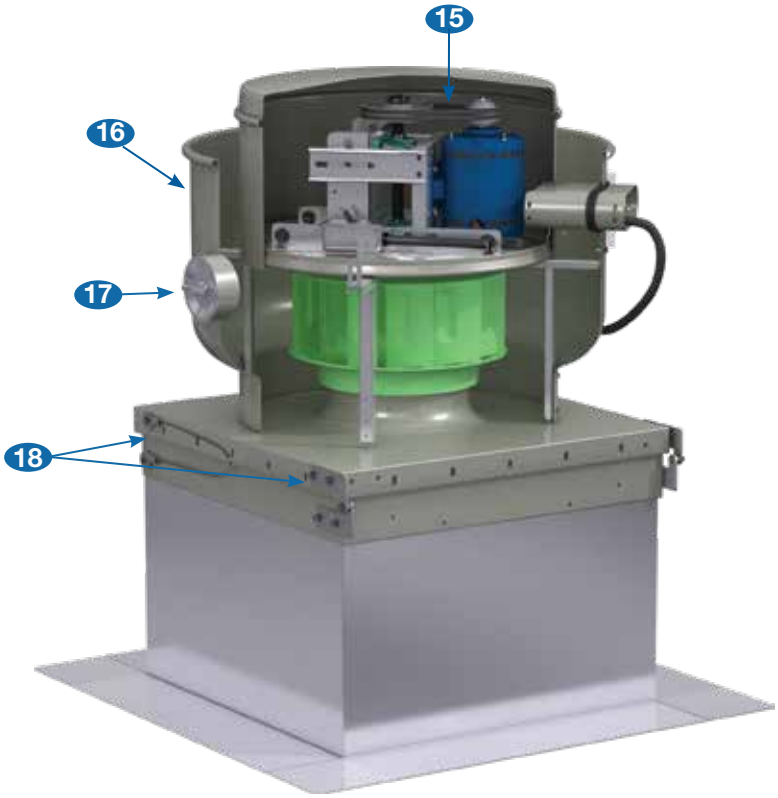
*Differences from the standard construction feature.



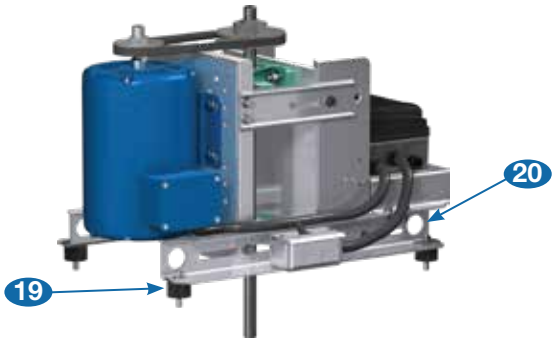
Model CUE



Model CUBE



Model USGF



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Performance & Dimensions Quick Reference

Page Index					Material Thickness		
Model Size	CUBE	CUE	CUBE Smoke Option	USGF	Windband	Motor Cover	Curb Caps
060		19 •			0.051 *(1.3)*	0.051 *(1.3)*	0.051 *(1.3)*
070		20 •					
080		21 •			0.051 *(1.3)*	0.051 *(1.3)*	0.064 *(1.6)*
090		22 •					
095		23 •					
099	24 •				0.051 (1.3)	0.040 *(1.0)*	0.064 *(1.6)*
100	25 •		x				
100HP	26 •		x				
120	27 •		x				
130	28 •		x				
140	29 •		x	x			
140HP	30 •		x	x			
160	31 •		x	x			
160HP	32 •		x	x			
160XP	33 •			x			
180	34 •		x	x	0.064 *(1.6)*	0.040 *(1.0)*	0.064 *(1.6)*
180HP	35 •		x	x			
200	36 •		x	x			
200HP	37 •		x	x			
220	38 •		x		USGF 0.051 *(1.3)*		
220HP	39 •		x				
240	40 •		x				
240HP	41 •		x		0.064 *(1.6)*	0.051 *(1.3)*	0.064 *(1.6)*
240XP	42 •						
300	43 •		x		0.080 *(2.0)*	0.051 *(1.3)*	0.064 *(1.6)*
300HP	44 •						
300XP	45 •						
360	46 •		x		0.080 *(2.0)*	0.064 *(1.6)*	0.080 *(2.0)*
360HP	47 •		x				
360XP	48 •						
420	49 •		x		0.080 *(2.0)*	0.064 *(1.6)*	0.100 *(2.5)*
480	50 •		x				

• Vari-Green option available

The Model number system is designed to completely identify the fan. The correct code letters must be specified to designate belt or direct drive. The remainder of the model number is determined by the size and performance.

CUBE-240HP-A-5-VG/VGD-1-34-X

Configuration
CUE - Direct Drive Roof or Wall Mounted
CUBE - Belt Drive Roof or Wall Mounted
USGF - Belt Drive Roof Mounted

Fan Size
060 thru 480

Wheel Pressure Level
HP - High-Pressure
XP - Extended High-Pressure

60 Hz Motor RPM *(Direct Drive Only)*
A = 1725
B = 1140
C = 860
D = 1550
E = 1050
G = 1300

50 Hz Motor RPM *(Direct Drive Only)*
International *(See CAPS for performance)*
K = 950 RPM
L = 1290 RPM
J = 1425 RPM

Motor HP
4 = 1/4
3 = 1/3
5 = 1/2
7 = 3/4
10 = 1
15 = 1½
20 = 2
30 = 3
50 = 5
75 = 7½

VG = Vari-Green® Motor
VGD = Vari-Green® Drive

Performance Revision

Curb Cap Size (inches)

X = UL 705
F = UL 705 Supplement SD (Smoke)
G = UL 705 Supplement SC (Restaurant)

Roof Upblast/Sidewall Exhaust
Size-130: CUBE • CUE
Previously Size-131

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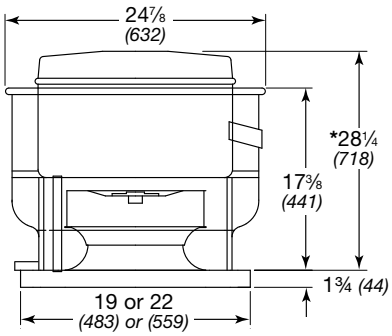
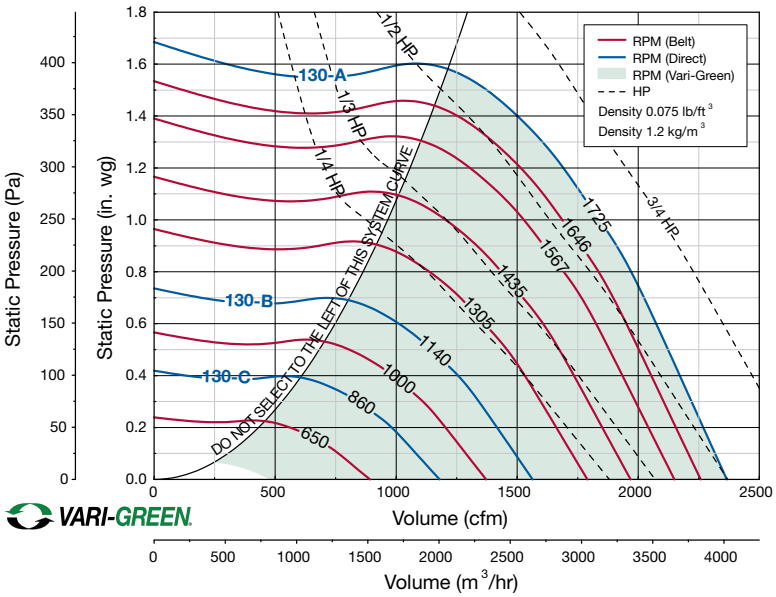


Direct Drive RPM

C-860 RPM
B-1140 RPM
A-1725 RPM
VG-1725 RPM

All dimensions in inches *(millimeters)*, weight in pounds *(kilograms)*.
* May be greater depending on motor.
^Weight shown is largest cataloged open drip-proof motor.

	CUBE	CUE
^Approximate Weight	66 *(30)*	64 *(29)*
Damper Size	12 x 12 *(305 x 305)*	
	16 x 16 *(406 x 406)*	
Roof/Wall (without wall bracket) Opening	15½ x 15½ *(394 x 394)*	
	18½ x 18½ *(470 x 470)*	
Wall Opening with Wall Bracket	15 x 15 *(381 x 381)*	
	18 x 18 *(457 x 457)*	
Wall Opening with a Curb Through Wall	19 x 19 *(483 x 483)*	
	22 x 22 *(559 x 559)*	



Motor HP			Fan		Static Pressure in Inches wg									
Belt	Direct		RPM		0	0.125	0.25	0.375	0.5	0.625	0.75	1	1.25	1.5
130														
1/4	VG-1/4		650	CFM	892	724								
				BHP	0.03	0.03								
				Sones	6.2	6.0								
			755	CFM	1036	895	697							
				BHP	0.04	0.05	0.05							
				Sones	7.2	7.0	6.3							
	VARI-GREEN.	C-1/8	860	CFM	1180	1057	914	675						
				BHP	0.06	0.07	0.07	0.07						
				Sones	8.5	8.3	7.7	6.9						
			1000	CFM	1372	1267	1158	1016	801					
				BHP	0.10	0.11	0.11	0.12	0.11					
				Sones	10.7	10.5	10.0	9.2	8.3					
		B-1/6	1140	CFM	1564	1471	1379	1280	1144	964				
				BHP	0.14	0.15	0.16	0.17	0.17	0.17				
				Sones	12.5	12.2	11.8	11.2	10.3	9.7				
	VG-1/2		1305	CFM	1790	1709	1629	1547	1458	1340	1201			
				BHP	0.22	0.23	0.24	0.25	0.26	0.26	0.26			
				Sones	14.6	14.3	13.9	13.5	13.0	12.0	11.5			
1/3			1435	CFM	1968	1895	1822	1749	1671	1586	1479	1198		
				BHP	0.29	0.30	0.31	0.32	0.33	0.34	0.35	0.33		
				Sones	15.7	15.5	15.1	14.8	14.3	13.8	13.1	11.9		
1/2	VG-3/4		1488	CFM	2041	1970	1900	1829	1756	1679	1580	1342		
				BHP	0.32	0.33	0.35	0.36	0.37	0.38	0.39	0.38		
				Sones	16.2	15.9	15.7	15.4	15.0	14.5	13.9	12.7		
			1567	CFM	2149	2082	2015	1948	1881	1808	1728	1527	1222	
				BHP	0.37	0.39	0.40	0.41	0.43	0.44	0.45	0.45	0.42	
				Sones	17.0	16.8	16.5	16.3	15.9	15.5	15.0	13.8	12.6	
			1646	CFM	2258	2194	2130	2066	2002	1935	1865	1686	1458	
				BHP	0.43	0.45	0.46	0.47	0.49	0.50	0.51	0.52	0.51	
				Sones	17.9	17.6	17.4	17.2	16.9	16.5	16.1	15.1	14.0	
		A-1/2	1725	CFM	2366	2305	2244	2183	2122	2061	1994	1838	1646	1365
				BHP	0.50	0.51	0.53	0.54	0.56	0.57	0.58	0.60	0.60	0.57
				Sones	18.8	18.6	18.4	18.2	18.0	17.6	17.2	16.4	15.3	14.1

MAXIMUM BHP AT A
GIVEN RPM = (RPM/2041)³
MAXIMUM RPM = 1725
TIP SPEED (ft/min) = RPM x 3.420
MAXIMUM MOTOR FRAME SIZE = 56
AVERAGE DISCHARGE VELOCITY
(FPM) = CFM/1.28

Performance certified is for installation type A: Free inlet, Free outlet. Power rating (Bhp) does not include transmission losses. Performance ratings do not include the effects of appurtenances (accessories). The sound ratings shown are loudness values in fan sones at 5 ft. (1.5 m) in a hemispherical free field calculated per AMCA Standard 301. Values shown are for installation type A: Free inlet hemispherical sone levels.

ATi
ANALYTICAL TECHNOLOGY, INC.

F12iS

INTRINSICALLY SAFE TOXIC GAS DETECTION

ATI's Series F12iS Toxic Gas Transmitter is the perfect choice for detection of gas leaks in explosion-hazard environments. While operating at intrinsically-safe power levels, the F12iS is still available with our Auto-Test system that verifies sensor function daily, virtually eliminating the need for manual "bump tests".

c UL us

Ex

IECEx

MODEL F12iS TOXIC GAS DETECTOR

- **Power:** Loop-powered 12-28 VDC
- **Interchangeable Sensors:** The F12iS accommodates 60 different sensor modules
- **Sensor Verification:** Auto-Test generator option provides a true gas response test. Test history is stored in sensor memory for user review at any time
- **LCD Graphic Display:** Allows clear gas concentration display plus complete menu-driven operator interface
- **Heated Sensor Option:** A heated sensor holder allows operation in high humidity to avoid condensation problems
- **Remote Sensor:** A junction box with digital output allows sensor location up to 500 ft. from the F12iS display unit
- **Internal Data Logger:** Gas values are stored at user defined intervals from 1 to 60 minutes. Stored data may be reviewed or graphed on the LCD display
- **Calibration History:** Sensor calibration adjustments of zero and span are stored in sensor memory and may be viewed on the F12iS display
- **Communication:** F12iS is available with optional Hart® output
- **Approvals:** CE and RoHS Compliant

INSTALLATION OPTIONS

The sensor holder in the F12iS is normally mounted to the transmitter enclosure. For applications where this configuration is not ideal, there are a number of different configurations for meeting specific requirements. These include a 6 ft. (1.9 m) cable extension, a remote junction box for longer sensor separation distances, and a duct mount sensor.

F12iS with integral sensor holder

F12iS with integral sensor holder & Auto-Test generator

6 ft. extended sensor holder

Insertion sensor assembly

Remote sensor holder & digital interface

FLOWCELL AND CALIBRATION ADAPTERS

Calibration adapters slide into the sensor holder for easy connection of calibration gas. A flowcell assembly is also available where pumped sampling systems are used.

An accessory device called a "sensor keeper" is available for storing standby spares. The keeper provides sensor bias circuitry that maintains spare sensors in a ready-to-use state without the need for stabilization time.

SMART SENSORS

The F12iS uses ATI **smart sensors** that allow easy interchangeability. Each sensor contains signal conditioning electronics and data memory. Sensors can be calibrated using a spare unit in the shop to avoid using calibration gases in the plant. Sensors may also be returned to ATI for factory calibration, which is useful for gases that are costly or difficult to obtain. Each sensor adjustment (zero or span) is stored in sensor memory and can be reviewed on the F12iS display. This data is very useful in assessing the sensor's condition and estimating remaining sensor life.

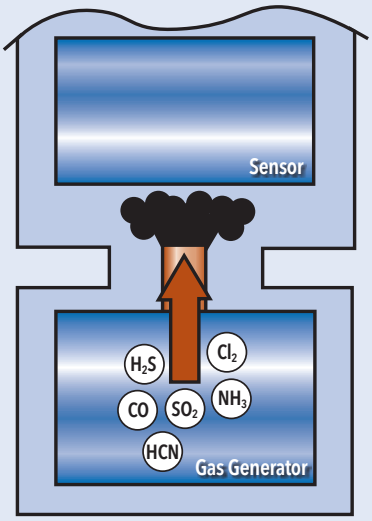
AVAILABLE SENSORS

00-1000*	Br_2, 0-1/5 ppm (00-1538)
00-1001*	Br_2, 0-5/200 ppm (00-1538, 20 max.)
00-1002*	Cl_2, 0-1/5 ppm (00-1538)
00-1003*	Cl_2, 0-5/200 ppm (00-1538, 20 max.)
00-1004*	ClO_2, 0-1/5 ppm (00-1538)
00-1005*	ClO_2, 0-5/200 ppm (00-1538, 20 max.)
00-1359	ClO_2, 200/1000 ppm
00-1425*	ClO_2, 0-1/5 ppm (low Cl_2) (00-1538)
00-1006*	F_2, 0-1/5 ppm (00-1538)
00-1007*	F_2, 0-5/200 (00-1538, 20 max.)
00-1008*	O_3, 0-1/5 ppm (00-1538)
00-1009*	O_3, 0-5/200 ppm (00-1538, 20 max.)
00-1358	O_3, 200/1000 ppm
00-1163	O_3, 500/2000 ppb (00-1538)
00-1010*	NH_3, 0-50/500 ppm (00-1539, 100 max.)
00-1011	NH_3, 0-500/2000 ppm
00-1012*	CO, 0-50/1000 ppm (00-1540, 100 max.)
00-1013	H_2, 0-1/10%
00-1041	H_2, 0-500/2000 ppm
00-1014	O_2, 0-5/25%
00-1015	$COCl_2$, 0-1/5 ppm
00-1016	$COCl_2$, 0-5/100 ppm
00-1017*	HCl, 0-10/200 ppm (00-1541, 20 max.)
00-1018*	HCN, 0-10/200 ppm (00-1611, 20 max.)
00-1019*	HF, 0-10/200 ppm (00-1538, 20 max.)
00-1020*	H_2S, 0-10/200 ppm (00-1541, 100 max.)
00-1469	H_2S, 200/1000 ppm
00-1021	NO, 0-50/500 ppm
00-1022*	NO_2, 0-10/200 ppm (00-1538, 20 max.)
00-1023*	SO_2, 0-10/500 ppm (00-1542, 20 max.)
00-1024	AsH_3, 0-500/2000 ppb
00-1025	AsH_3, 0-10/200 ppm
00-1026	B_2H_6, 0-500/2000 ppb
00-1027	B_2H_6, 0-10/200 ppm
00-1028	GeH_4, 0-500/2000 ppb
00-1029	GeH_4, 0-10/200 ppm
00-1030	H_2Se, 0-500/2000 ppb
00-1031	H_2Se, 0-10/200 ppm
00-1032	PH_3, 0-500/2000 ppb
00-1033	PH_3, 0-10/200 ppm
00-1034	PH_3, 0-200/2000 ppm
00-1035	SiH_4, 0-10/200 ppm
00-1036*	I_2, 0-1/5 ppm (00-1538)
00-1037*	I_2, 0-5/200 ppm (00-1538, 20 max.)
00-1038*	Acid Gas, 0-10/200 ppm (00-1538,20 max)
00-1039*	ETO, 0-20/200 ppm (00-1540, 20 max.)
00-1040	HCOH, 0-20/200 ppm (00-1540, 20 max.)
00-1349	HCOH, 500/2000 ppm
00-1042	H_2O_2, 0-10/100 ppm (00-1542)
00-1169	H_2O_2, 200/2000 ppm
00-1043	Alcohol, 0-50/500 ppm
00-1044	Alcohol, 0-500/2000 ppm
00-1057	C_2H_2, 0-200/2000 ppm
00-1181	NO_x, 0-50/500 ppm
00-1450*	DMA, 100/200 ppm (00-1539, 100 max.)
00-1455*	HBr, 10/200 ppm (00-1538, 20 max.)
00-1516	HC Sensor – Consult Factory)
00-1045	CH_3COOH, 100/500 ppm
00-1704	PAA Vapor, 1/5 ppm
00-1705	PAA Vapor, 10/100 ppm

Notes: X/XX for each sensor indicates minimum and maximum ranges for that sensor.
* indicates availability of Auto-Test. Generator part number shown in ( ).
Auto-Test not available for ranges above indicated maximum.

AUTOMATIC SENSOR VERIFICATION

With the F12iS, users can take advantage of ATI's unique Auto-Test sensor verification system. While other gas transmitters rely on less reliable electronic sensor tests, the Auto-Test system consists of an actual gas test. A test gas is generated right at the sensor and the response of the sensor is verified. Manual bump testing to verify response is eliminated, greatly reducing maintenance requirements.



AUTO-TEST GENERATORS

00-1538	E18-11 Chlorine gas generator
00-1539	E18-15 Ammonia gas generator
00-1540	E18-16 Carbon Monoxide gas generator
00-1541	E18-24 Hydrogen Sulfide gas generator
00-1542	E18-27 Sulfur Dioxide gas generator
00-1611	E18-22 HCN gas generator

ORDERING INFORMATION
MODEL F12IS - A-B-C-D

F12iS transmitters are designed to use electrochemical sensors only. Specify transmitter and then select sensors from page 3. Add the Auto-Test generator if that feature is desired.

SUFFIX A – POWER

1 - 24 VDC, loop-powered

SUFFIX B – SENSOR HOLDER STYLE

1 - Integral sensor holder

2 - Remote sensor holder with junction box (order 31-0185 interconnect cable below)

3 - Integral heated sensor holder

4 - Remote heated sensor holder with junction box (order 31-0068 interconnect cable below)

5 - Duct mount sensor holder with 25 ft. extension cable (requires 00-1388 Adapter)

6 - Sensor holder with 6 ft. cable

7 - Remote junction box plus 6 ft. cable with holder

8 - Remote junction box with close-coupled duct mount sensor (requires 00-1388 Adapter)

SUFFIX C – SENSOR AUTO-TEST

1 - No Auto-Test Generator Holder

2 - With Auto-Test Generator Holder

SUFFIX D – DIGITAL OUTPUT

1 - None

2 - HART® interface

ACCESSORIES

00-1056 Calibration adapter
00-1251 Flowcell assembly
03-0118 Flowcell with 03-0460 sensor cap
00-0981 Sensing module keeper for 4 sensors
00-1388 Duct sensor adapter, 1½" MNPT
31-0185 4-Conductor Interconnect Cable, specify length, max. 500 ft.
31-0068 6-Conductor Interconnect Cable, specify length, max. 500 ft.

Note: When ordering an F12iS unit with a flowcell, the 03-0460 sensor cap will be supplied in place of the standard sensor cap and does not need to be ordered separately. If a flowcell is being added to an existing F12iS, order the 03-0118 assembly which includes both the flowcell and sensor cap.

SPECIFICATIONS

Sensor Type	Electrochemical cell
Gas Type	Select sensor from listing on page 3
Range	User adjustable within limits of selected sensor
Response Time	Sensor dependent
Accuracy	Generally ±5-10% of value, limited by available calibration gas accuracy.
Repeatability	±1% (Electronic)
Linearity	±0.5% (Electronic)
Zero Drift	Less than 2% full scale per month, non-cumulative
Span Drift	Dependent on sensor environment but generally less than 3% per month
Analog Output	4-20 mA, 600 ohms max. at 24 VDC
Serial Interface	(Optional) HART® digital signaling over the 4-20mA current loop
Power Requirements	12-28 VDC, 25 mA Maximum 75 mA Maximum with heated sensor
Enclosure	IP 65, polycarbonate with stainless steel hardware. Weatherproof and corrosion resistant. Refer to F12iS Support Drawings for Dimensions
CE Mark	2014/35/EU – Low voltage directive 2014/30/EU – Electromagnetic compatibility
Certifications:	UL/CSA: I.S. for Class I, II, and III, Division 1 Locations ATEX: EX II 1 G Ex ia IIC T4 Ga, -30°C ≤ Ta ≤ 60°C; IP65 IEC: Ex ia IIC T4 Ga, -30°C ≤ Ta ≤ 60°C
Mounting	(Standard) Wall or pipe mount bracket. U-Bolts suitable for 1.5" or 2" I.D. (Optional) Panel mount kit available.
Auto-Test Option	Dependent on sensor gas type and full scale range
Display	96x32 Dot-matrix Graphic LCD, Backlit, Transflective
Controls	Four, dome-type push buttons; Remote alarm reset input (w/optional alarm relays only)
Temperature	-30°C to +60°C (Min. temp. for O_2 Sensor is –20°C)
Environment	10 to 95% RH (non-condensing)
Weight	1.5 lb (0.68 kg)

Visit Us on the Web: www.analyticaltechnology.com

Analytical Technology, Inc.
6 Iron Bridge Drive
Collegeville, PA 19426
Phone 610.917.0991
Toll-Free 800.959.0299
Fax 610.917.0992
Email sales@analyticaltechnology.com

Analytical Technology
Unit 1 & 2 - Gatehead Business Park
Delph New Road, Delph
Saddleworth OL3 5DE
Phone 01457 873 318
Fax 01457 874 468
Email sales@atiuk.com

Represented by:

APPENDIX D

RECIRCULATING CARBON SYSTEM

SORBAIRE

Is your neighbor's nose all up in your business? Or is your business all up in your neighbor's nose?

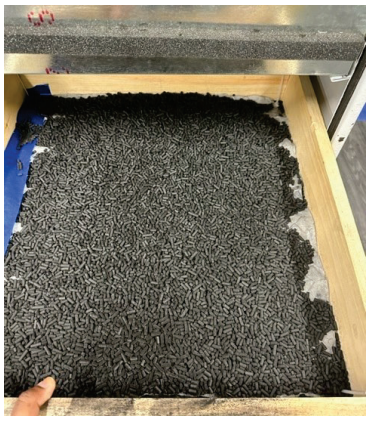
However you look at it, meet SorbAire. SorbAire is our own odor mitigation system that was designed and built by our team in Auburn, Maine.

SorbAire can be wall-mounted into a room, or you can take advantage of our mobile CIP (short for "Clean-In-Place") Cart.

Want to try SorbAire out for free to make sure it's a good fit for your organization? Send us an email at info@lifespringmc.com for more information.

Lifespring Microclimates
1400 Hotel Road
Auburn, ME 04210

info@lifespringmc.com
Tel : 1.877.351.9875
https://www.lifespringmc.com/



Inline Fans Options

Featuring TD-MIXVENT/TD-SILENT

The World's Leading Producer of Air Movement Products

TD_0116
January 2016

Soler&Palau Ventilation Group

Table of Contents

Overview TD-MIXVENT & TD-SILENT Series

Compact Size-TD Fans require minimum space

The S&P TD-MIXVENT & TD-SILENT series of in-line duct fans have been specially designed to maximize the airflow performance with minimal noise levels within the smallest and most compact of housing sizes. This makes the TD-MIXVENT & TD-SILENT series the ultimate solution for small to medium sized ventilation installations which require a high airflow to pressure ratio and occupy only the minimum space possible. Example: false ceiling voids, cabinets and many other limited space environments.

Easy to Install...fit and forget!

All the models in the TD-MIXVENT & TD-SILENT range have been designed with the professional contractor/ engineer in mind. All models include a “removable body” feature that enables the motor-impeller assembly to be completely removed or replaced without the need to interfere with the attached ducting.

Internal parts can be easily removed for mounting & servicing

Multitude of features-high specification

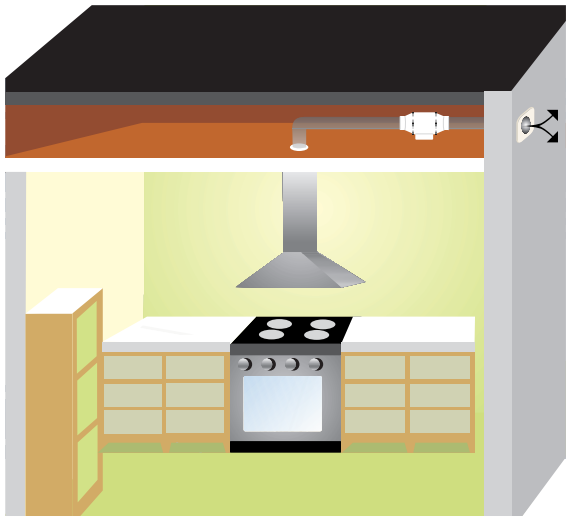
All models within the TD-MIXVENT & TD-SILENT range incorporate a powerful mixed flow impeller and internal air vanes located at the discharge end of the fan housing. This impeller and guide vane combination provides a smooth laminar air flow which in turn minimizes turbulence and noise, and generates an **excellent air flow to pressure performance ratio.**

Description

All of the TD-fans include the combination of a powerful motor, factory installed, to a mixed flow impeller. This motor and impeller combination enables the TD-fans to deliver high airflow performances with minimum noise generation against high static pressures typically found in ducted ventilation systems. The unique design of the support brackets, allows the motor and impeller assembly to be fitted or removed without dismantling the adjacent ducting and therefore, facilitating any installation or maintenance. The internal aerodynamic design of the TD-MIXVENT & TD-SILENT fans enable the units to generate large air volumes and pressures with the minimum of in-duct or radiated noise. The TD-fans offer the ideal in-line duct fan solution for a wide range of HVAC ventilation applications.

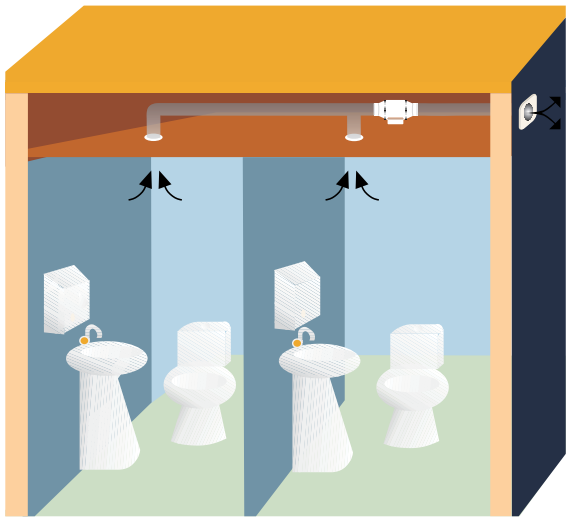
TD-MIXVENT & TD-SILENT Practical Installations

The TD-MIXVENT & TD-SILENT system offers the most versatile installation range on the market, as a result of its multiple combinations; it can be used in a large number of small and mid-range ventilation installations.

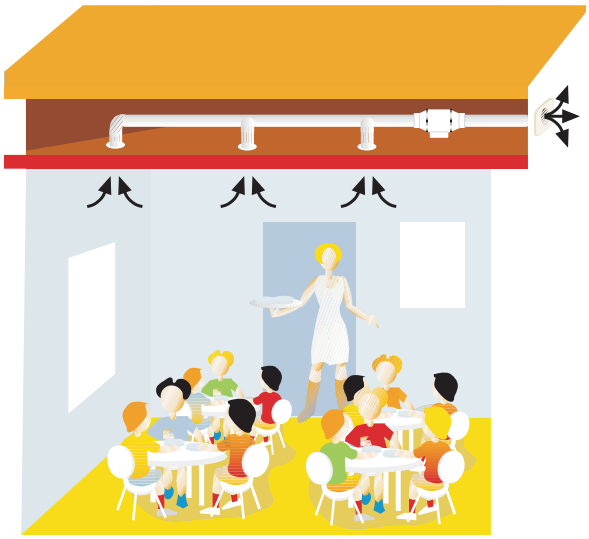


Domestic - Range Hood Exhaust

Commercial - Office

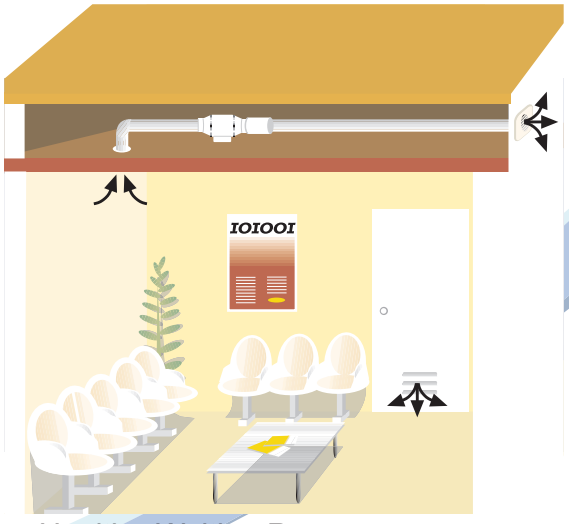


Industrial - Public Restroom



School - Dining Hall

Industrial - Locker Room



Health - Waiting Room

General Details of the TD-MIXVENT Range

S&P Exclusive Product

Low profile mixed flow fans, manufactured in plastic material (up to model 200) or in **galvanized steel** sheet protected with Epoxy paint (models 250, 315, 355, and 400), with external terminal box, removable motor-impeller assembly and adjustable single-phase motor, Class B, IP44.

Construction characteristics

	100	100x	125	150	200	250	315	355	400
Polypropylene housing	•	•	•	•	•				
Steel housing with epoxy coating						•	•	•	•
ABS fan blades	•	•	•	•	•				
Aluminum fan blades						•	•	•	•
Thermal link via fuse	•								
Thermal link with automatic reset		•	•	•	•	•	•	•	•
Permanently lubricated ball bearings	•	•	•	•	•	•	•	•	•

The extensive range of the TD-MIXVENT series makes it an effective solution for a wide range of residential and light commercial ventilation installations.

TD-MIXVENT Installation & Maintenance

Low Profile

The low profile of the fans in the TD-MIXVENT range makes them the ideal product for installations with low height limits, such as the case of suspended ceilings.

Easy to Install

1

Secure the support.

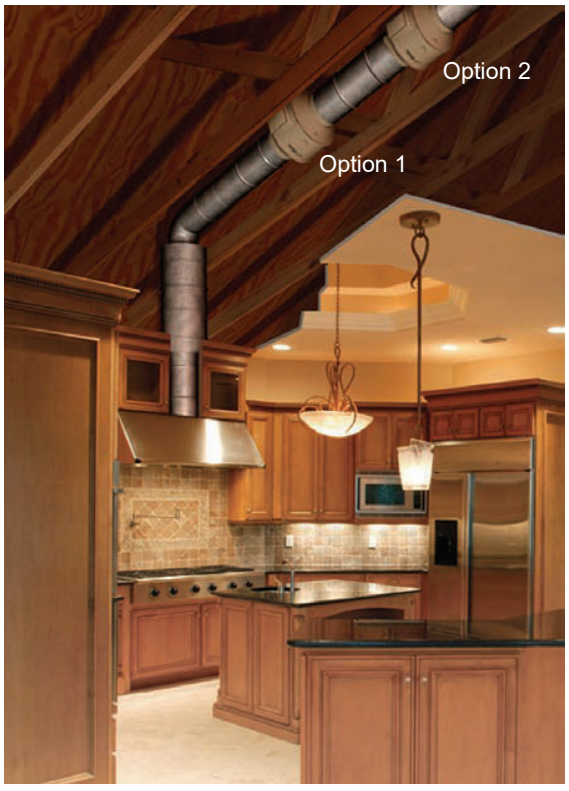
2

Make the connections.

3

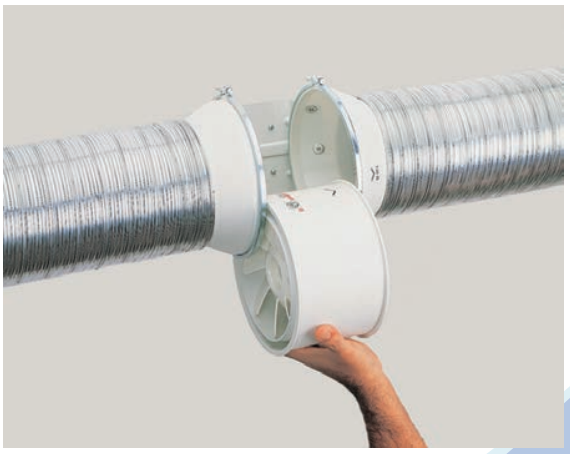
Connect the ducts.

Flexibility in Location



The fans can be connected at any point along the ventilation duct: along the duct or at the end.

Easy Maintenance



Removable body, for repair or cleaning, **without the need to touch the ducts.**

TD-MIXVENT Technical Specifications

Warranty
Five (5) year limited warranty.

Range
The TD-MIXVENT series consists of nine (9) nominal sized in-line fans. All models are specifically designed for direct connection in-line with industry standard diameter round ducting.

Construction
The TD-MIXVENT models 100, 100x, 125,150, and 200 are manufactured in tough reinforced plastic, models 250, 315, 355, and 400 have a metal casing and are finished in a tough epoxy-polyester paint coating. The TD fan duct connection flanges are manufactured from reinforced plastic, except for models 200, 250, 315, 355, and 400 which are constructed from epoxy-polyester coated metal.

Impellers
The impeller blades for models 100, 100x, 125, 150 and 200 are molded in tough ABS plastic. Models 250, 315, 355, and 400 are metal.

Motors
Models 100, 100x and 125 :

- Single-phase, 120V 60Hz, shaded pole induction asynchronous motor in die cast aluminum. All motors include direct single speed connection and are also suitable for voltage speed control.
- Class II electrical insulation (model 100) & Class I (models 100x and 125)
- IP 44 Protection
- Class B Motor Insulation
- Safety auto reset Thermal Overload Protection (fuse type)
- Self-lubricating sleeve bearings.
- Suitable for working airstreams up to 104° F (40°C).

Models 150, 200, 250, 315, 355, and 400:

- Single-phase induction asynchronous motor, with permanent capacitor and external rotor constructed of die cast aluminum. Models 150, 200, 355 and 400 feature single speed, fully speed controllable motors. Models 250 and 315 include direct two speed connection motors and are also suitable for voltage speed control.
- Class I electrical insulation
- IP 44 Protection
- Thermal Overload Protection
- Class B Motor Insulation
- Sealed For Life, ball bearings
- Suitable for working airstreams up to 140° F (60°C).

Performance characteristics

Models 250 and 315 include a direct two speed motor connection.

Model	Nom. RPM	Volts	Max. Watts	Speed	CFM v Static Pressure (SP) Ins. WG							Max. SP	Max operating temp. (ºF)	Wgt. (lbs)	Duct Dia. Ins.
					0"	0.125"	0.25"	0.375"	0.5"	0.75"	1.0"				
TD-100	2516	120	26	-	101	85	57	-	-	-	-	.4	104	2	4"
TD-100x	2096	120	33	-	135	113	90	53	-	-	-	.55	104	4.4	4"
TD-125	2146	120	38	-	197	168	133	86	22	-	-	.55	104	4.4	5"
TD-150	2289	120	65	-	293	273	250	227	206	131	35	1.15	140	4.4	6"
TD-200	2781	120	184	-	538	495	458	418	367	190	10	1.625	140	8.8	8"
TD-250	2400	115	162	LS	541	475	418	355	295	218	170	2.03	140	19.8	10"
	3200	115	241	HS	754	715	666	610	550	520	495	2.53	140	19.8	10"
TD-315	2000	115	208	LS	751	670	545	420	285	190	130	1.62	140	30.9	12.4"
	2500	115	335	HS	1050	990	932	850	770	600	420	2.95	140	30.9	12.4"
TD-355	1536	115	522	-	2000	2018	1995	1950	1777	1510	1320	1.1	140	43	14"
TD-400	1559	115	916	-	3127	3034	2938	2836	2735	2542	2303	1.2	140	78	16"

Performance certified is for installation Type D: Ducted Inlet, Ducted Outlet. Performance ratings do not include the effects of appurtenances.

LS= Low Speed
HS = High Speed

S&P USA certifies that all TD fan sizes shown herein are licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and comply with the requirements of the AMCA Certified Ratings Program.

TD-100x, 125, 150, and 200 are ENERGY STAR® qualified.

The TD-MIXVENT Models 100, 100x and 150 are California Title 24 compliant and meet ASHRAE 62.2 when installed with a CVC and other TD models are compliant when installed with a 3 way switch and remotely mounted speed control.

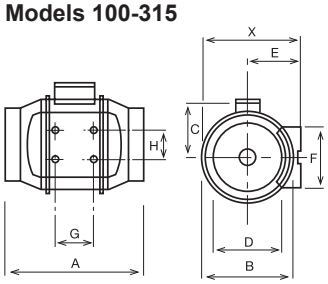
TD 250 & 315 are UL listed for outdoor use.

Sound characteristics

Fan sound levels are measured in sones. At this time there are no sone level test standards available through HVI due to the fact that remote mounted fan noise levels are in proportion to the following: type of duct, length of duct, fan distance from the intake source and other miscellaneous factors. However, it is generally accepted that remote mounted venting is usually quieter than standard (in room) venting.

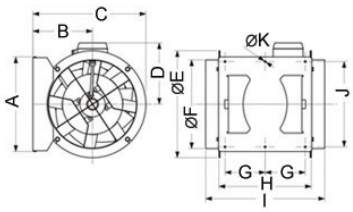
Dimensions (inches/mm)

Models 100-315



Model	X	A	B	C	D	E	F	G	H
TD-100	5 15/16 / 151	9 1/8 / 232	5 7/16 / 138	3 3/4 / 96	3 7/8 / 98	3 1/4 / 82	3 3/4 / 95	1 7/8 / 48	2 1/16 / 52
TD-100x	7 3/8 / 188	11 15/16 / 303	6 15/16 / 176	4 1/2 / 115	3 13/16 / 97	3 15/16 / 100	3 9/16 / 90	3 1/8 / 80	2 3/8 / 60
TD-125	7 3/8 / 188	10 3/16 / 258	6 15/16 / 176	4 1/2 / 115	4 13/16 / 123	3 15/16 / 100	3 9/16 / 90	3 1/8 / 80	2 3/8 / 60
TD-150	8 3/8 / 212	11 5/8 / 295	7 7/8 / 200	5 / 127	5 13/16 / 147	4 7/16 / 112	5 1/8 / 130	3 1/8 / 80	2 3/8 / 60
TD-200	9 3/16 / 233	11 7/8 / 302	8 9/16 / 217	5 9/16 / 141	7 13/16 / 198	4 7/8 / 124	5 1/2 / 140	3 15/16 / 100	3 11/16 / 94
TD-250	11 7/16 / 291	15 3/16 / 386	10 11/16 / 272	7 9/16 / 192	9 3/4 / 248	6 1/8 / 155	6 5/8 / 168	5 11/16 / 145	5 1/2 / 140
TD-315	14 / 356	17 11/16 / 450	13 1/4 / 336	8 13/16 / 224	12 5/16 / 312	7 3/8 / 188	8 1/4 / 210	7 3/16 / 182	7 / 178

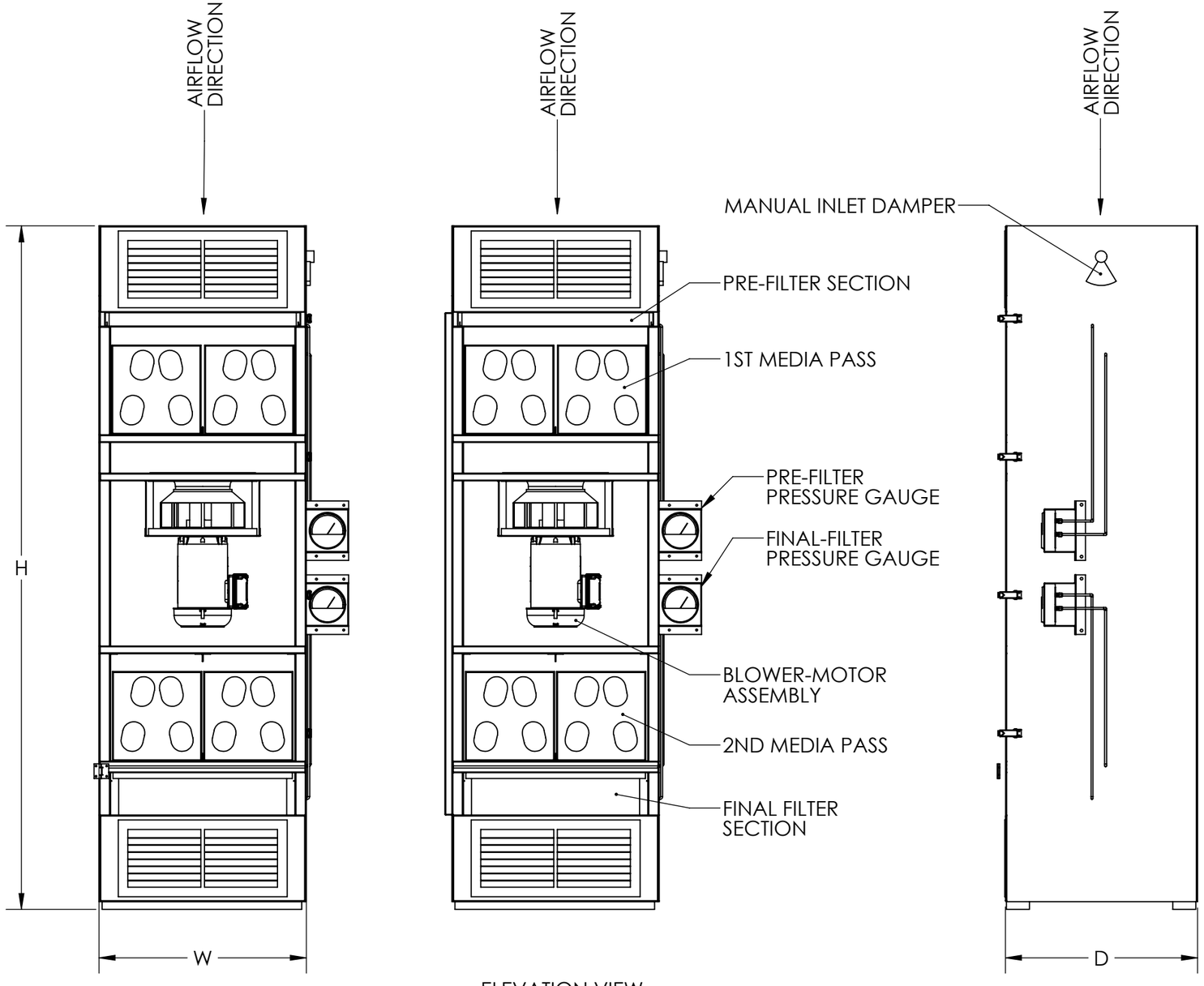
Models 355 - 400



Model	A	B	C	D	E	F	G	H	I	J	K
TD-355	14 5/6 / 377	9 3/8 / 238	17 11/16 / 451	8 5/6 / 224	16 7/9 / 426	13 15/16 / 354	5 8/9 / 150	14 1/2 / 368	18 2/3 / 474	13 3/8 / 340	1/3 / 8.5
TD-400	16 / 407	9 4/5 / 249	19 3/8 / 492	10 1/2 / 267	19 1/6 / 487	15 5/7 / 399	6 2/7 / 160	16 3/4 / 425	21 5/9 / 547	14 4/7 / 370	1/3 / 8.5

APPENDIX E

PROPOSED NEW CARBON SYSTEM CUTSHEETS



ELEVATION VIEW

ELEVATION VIEW
(DOOR OPEN FOR CLARITY)

SIDE VIEW

PFU MODEL	H	W	D
1,000	88''	31''	25''
2,000	98''	60''	27''
3,000	119''	60''	36''

NOTES:

- PFU UNITS AVAILABLE IN DOWNFLOW OR UPFLOW CONFIGURATION
SEE CATALOG PAGE FOR ADDITIONAL OPTIONS AND FEATURES
UNIT STANDARD PUREAIR FILTRATION MODELS AND DIMENSIONS ARE LISTED: HOWEVER, DIMENSIONS CAN BE CUSTOMIZED TO MEET SPACE AND OTHER REQUIREMENTS. DISCUSS WITH SALES OR ENGINEERING TEAM.

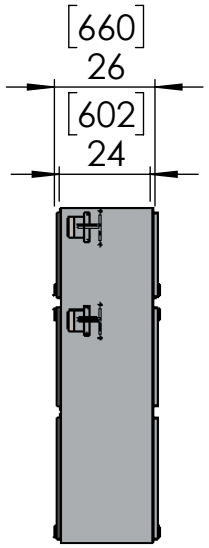
PureAIR FILTRATION
6050 Peachtree Parkway
Suite 240-187
Norcross, GA 30092
Phone: (678) 935-1431

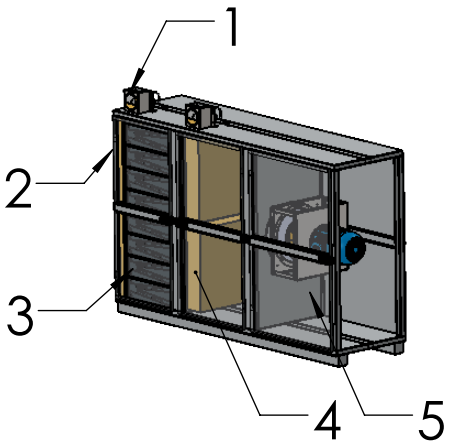
DRAWN BY:	COMPANY: PUREAIR FILTRATION
CHECKED BY:	CLIENT:
DATE: Monday, October 3, 2022	DESCRIPTION: PFU SYSTEM ASSEMBLY
S.O. #:	
PROJECT NAME:	

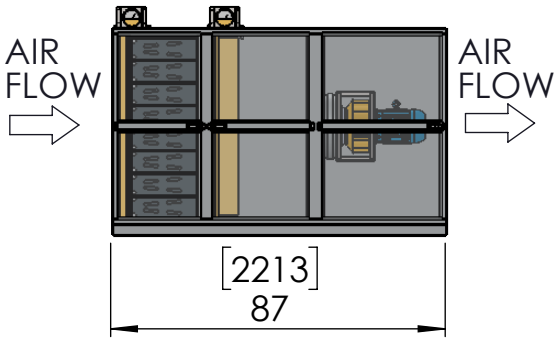
DWG. NO: PFU-XXX

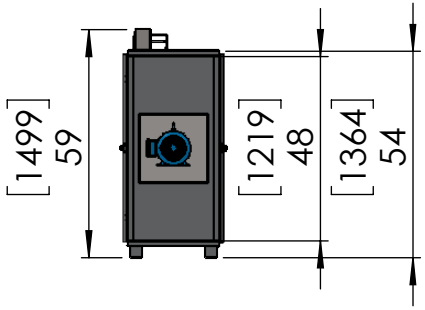
REV: 1 | DO NOT SCALE DRAWING | SHEET 1 OF 1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	DP-2002	MAGNEHELIC DIFFERENTIAL PRESSURE GAUGE	2
2	PRE - FILTER	FULL SIZED(24X24X2) PRE - FILTER	2
3	PP18	CHEMICAL MEDIA SECTION	8(SETS)
4	FINAL FILTER	FULL SIZED(24X24X6) FINAL- FILTER	2
5	BLOWER SECTION	BLOWER SECTION	1









MODEL DIMENSIONS (INCHES)			
SAH18 MODEL	W	L	H
402 - 1 BLR	26	87	59

CONSTRUCTION OPTIONS

- ☐ -16 GA MILD STEEL CABINET
- ☐ -16 GA 304 STAINLESS STEEL CABINET
- ☐ -.125 THK ALUMINUM CABINET
- ☐ - SINGLE WALL
- ☐ - DOUBLE WALL
- ☐ - ANCHOR BOLTS
- ☐ - LIFTING LUGS
- ☐ - POWDER COATED
- ☐ - PAINT SYSTEM: _____

MISCELLANEOUS

- DIMENSIONS ARE APPROXIMATE
- DOOR CONFIGURATION MAY VARY DEPENDING ON SYSTEM SIZE AND OPTIONS

PureAir Filtration
6050 Peachtree Pkwy
Suite 240-187
Atlanta, GA 30092
(678) 935-1431
www.pureairfiltration.com
info@pureairfiltration.com

CLIENT:

PROJECT:

MODEL: SAH18-402-1 BLR

SCALE: 1:50	DRAWN BY:	REVISION: -	DATE:

PureAIR FILTRATION

EXPERTS IN ODOR ELIMINATION

CANNABIS ODOR CAN BE A NUISANCE
WE CAN HELP ELIMINATE IT...
AND THE COMPLAINTS

Side Access Housing (SAH)

- Horizontal airflow system
- Quick access, low maintenance

Packaged Filter Unit (PFU)

- Vertical airflow system
- Powerful & compact

+1 678.935.1431
Toll Free: 866.543.7479
www.PureAirFiltration.com
6050 Peachtree Pkwy Suite 240-187. Atlanta, GA, USA 30092

Packaged Filter Unit (PFU)

The Packaged Filter Units (PFU) are used in controlled environments for commercial and light industrial applications to protect mission critical electronics from corrosion and equipment failure. A PFU improves indoor air quality, while also providing odor control. The standard PFU is available in three stationary models PFU-1000, PFU-2000, and PFU-3000.

The self contained, free standing, vertical airflow configuration of the PFU provides continuous high efficiency purification. The PFU models can be used in **pressurization only**, **recirculation only** or **pressurization and recirculation** configurations.

Combined with high-quality adsorbent media, a PFU can remove more than 99% of gases that can damage electronic equipment resulting in costly repairs, replacement of equipment prematurely, plant interruptions, and unscheduled downtime; thus reducing operational and capital expenses.

MODEL	MEDIA CAPACITY	ELECTRICAL REQUIREMENTS	MOTOR SIZE HP (KW)	PRESSURIZATION OR RECIRCULATION MAX AIRFLOW (TOTAL) CMH (CFM)	PRESSURIZATION AND RECIRCULATION MAX AIRFLOW (EACH) CMH (CFM)
PFU-1000 (Stationary, Hardwired, 4 - PP12 Modules)	.11 m^3 (4 ft^3)	230/380/460 1ph, 3ph/50, 60 Hz	2 (1.5)	1,700 (1,000)	850 (500)
PFU-2000 (Stationary, Hardwired, 8 - PP12 Modules)	.22 m^3 (8 ft^3)	230/380/460 1ph, 3ph/50, 60 Hz	3 (2.2)	3,400 (2,000)	1,700 (1,000)
PFU-3000 (Stationary, Hardwired, 12 - PP12 Modules)	.34 m^3 (12 ft^3)	230/380/460 1ph, 3ph/50, 60 Hz	5 (3.7)	5,100 (3,000)	2,550 (1,500)

Pressurization or Recirculation Only

MODEL	ROOM SIZING BY MODEL AND AIR QUALITY LEVEL*		
	G2	G3	GX
PFU-1000	1,200 m^3 (40,000 ft^3)	600 m^3 (20,000 ft^3)	300 m^3 (10,000 ft^3)
PFU-2000	2,400 m^3 (85,000 ft^3)	1,200 m^3 (40,000 ft^3)	600 m^3 (20,000 ft^3)
PFU-3000	3,600 m^3 (127,000 ft^3)	1,800 m^3 (64,000 ft^3)	900 m^3 (32,000 ft^3)

*Based upon ISA S71.4 or ASHRAE TC9.9 recommendations that state the need to maintain G1 air quality to protect valuable electronics

BENEFITS	FEATURES
Powerful and Compact	• Vertical, stand-alone airflow system • 1,000 to 3,000 total CFM for **recirculation** • 500 to 1,500 each CFM for **pressurization and recirculation**
Highest Filtration Efficiency	• Positive air seal to prevent air bypass and ensure removal of unwanted contaminant gases • Low EMF brushless AC blower motor • Integral particulate filters • Variable frequency drive
Quick Access, Low Maintenance	• Front door opens giving access to internal parts for easy maintenance and media changeout • Low energy consumption • Optional magnehelic or photohelic differential pressure gauges to indicate particulate filter change
Customizable	• Multiple sizes, power configurations, and optional filters • Up to two media stages available • Can be designed for pressurization, recirculation, or both
Multiple Applications	• Protect Electronics in Motor Control Centers, Drive Rooms, Rack Rooms, and Operator Control Rooms in Pulp and Paper Mills, Steel Manufacturers, and Oil and Gas Refineries

PFU Units are available in this standard configuration:

Protecting Critical Electronics
MERV 8 (G4) Particulate 2" Prefilter
PureAir chemisorbant media filled in low pressure drop disposable module
MERV 14 (F8) Particulate 6" Final Filter

Notable Customers:

- Barclays Bank
- Brooklyn Museum
- Christie's Auction House
- Data Clean Asia
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- Google
- HSCB Bank
- Harvard University
- Hewlett-Packard
- Innodata
- Intel
- Turner Broadcasting Systems

+1 678.935.1431
Toll Free: 866.543.7479
www.PureAirFiltration.com
6050 Peachtree Pkwy, Suite 240-187, Atlanta, GA, 30092 USA

VOCsorb Blend Adsorbent Media

Basic Information:

VOCsorb Blend adsorbent media is a 25/75 percent blend of PureAir 8 potassium permanganate-based media and PureAir AC-X virgin bituminous activated carbon designed for the broadest range removal of corrosive, odorous, or toxic gases.

Note: VOCsorb Blend media meets the requirements for UL certification.

General Description

VOCsorb Blend has the combined properties and benefits of PureAir 8 and Activated Carbon.

PureAir 8:
Spherical porous pellets formed from a combination of powdered activated alumina and other binders, suitably impregnated with potassium permanganate to provide optimum adsorption, absorption, and oxidation of a wide variety of gaseous contaminants.

PureAir AC-X:
Porous, cylindrical pellets of high grade bituminous activated carbon.

Product Specifications

- Particle Size: See base products
- Density: 560 kg/m^3 (35 lbs/ft^3)
- Surface Area: See base products
- Typical Moisture Content %: See base products
- Crush Test: See base products
- Abrasion Loss %: See base products
- Relative Pressure Drop: See Curve B
- Permanganate Content: See base products
- CTC Value: See base products
- Iodine #: See base products

Removal Capability

- VOCs: 20% by weight
- Hydrogen Sulfide: 5.0% by weight
- Sulfur Dioxide: 3% by weight
- Nitrogen Dioxide: 8% by weight
- Formaldehyde: 1% by weight

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