

LVJCo. Design for Odor Mitigation

The point of concern regarding Odor on this project centers around the oven exhaust discharge. This falls into the same category as commercial kitchen hood exhaust discharge, as the byproducts of food preparation in a commercial kitchen are odors and grease that can create a public nuisance if the ventilation system is not properly designed.

Kentucky has adopted the 2015 version of the International Mechanical Code (IMC 2015), which lays out the requirements for proper mechanical design of various building systems. [Section 501.3](#) contains the requirement for exhaust systems to discharge

“outdoors at a point where it will not cause a **public nuisance** and not less than the distances specified in Section 501.3.1.”

The relevant portion of [Section 501.3.1](#) reads,

“For other [non-explosive, non-flammable vapors, fumes or dusts] product-conveying outlets: **10 feet from the property lines**; 3 feet from exterior walls and roofs; 10 feet from operable openings into buildings; 10 feet above adjoining grade.”

In [Section 506.3.13.2](#), which pertains to exhaust outlets from grease rated commercial hood systems, we again find the public nuisance language:

“Exhaust outlets shall be permitted to terminate through exterior walls where the smoke, grease, gases, vapors and odors in the discharge from such terminations do not create a **public nuisance** or a fire hazard.”

It is worth noting that the public nuisance language is not present when referring to non-grease kitchen exhaust systems. ***Cooking foods that do not include animal proteins will not produce the grease, gases, vapors and odors that are likely to create a public nuisance.***

We designed the oven exhaust system for LVJCo.’s Shelby St. location not just to meet Code requirements, but to ensure that odors from this facility will not be a nuisance to the neighborhood community.

Note first that ***by definition, none of Louisville Vegan Jerky Company’s products will contain animal products, and thus the dehydrating/cooking process will not produce grease or odors common to commercial kitchen or food preparation operations.*** There are also no flammable or volatile byproducts of the process, so ***it is exclusively odors from the plant-based protein and flavorings that we are mitigating.***

The oven manufacturer advised that the amount of air discharged during the dehydrating/cooking process varies but will typically be less than 2000 cubic feet per minute (CFM). The oven is capable of discharging up to 4000 CFM but will rarely if ever do so. We have added a high velocity discharge fan to the oven outlet that will constantly output 4000 CFM at a velocity of 2865 feet per minute (FPM), throwing the air more than 18' above the fan outlet, or more than 45' above ground level. As the oven operates at around 220°F, the exhaust air will be substantially warmer than the ambient air it is discharging into, adding a buoyancy effect that will further increase the plume height.

The result of this design approach is that the air conveying whatever odors might be a byproduct of the dehydration/cooking process will be diluted many times over by the time it reaches any nearby properties.

2000 CFM of oven exhaust is mixed with 2000 CFM of ambient air into the exhaust fan discharge plume that is more than 18' above the fan discharge. Average windspeed in Louisville is 6.9 MPH, so by the time the oven exhaust air is 300' away, it will likely make up less than half a percentage of the air volume it has been diluted into.

Further research into odor mitigation efforts revealed a proposed addition to IMC 2015 Section 506.3.13.3, Termination Location of Exhaust Outlets Serving Type I (Grease) Hoods that ultimately was not adopted. The proposal suggested that **exhaust discharge locations within 250 feet horizontally of a dwelling unit** should be required to

“comply with one or more of the following:

1. **The point of discharge for such an outlet shall be located 25 feet or greater above the highest opening into the dwelling unit.**
2. The exhaust system shall be served by a pollution control unit that is listed for that application and designed to effectively capture and control effluent particulates, contaminants and odors.
3. **The exhaust system shall be an engineered system utilizing a utility set fan and discharge nozzle designed to eject the effluent vertically to a height not less than 25 feet above the dwelling unit.”**

While this proposal was not adopted into the IMC 2015 because it was viewed as too stringent and requiring substantial increases in the cost of construction, it is worthwhile noting the following points concerning the LVJCo. project:

1. The oven exhaust outlet is more than 250 feet horizontally from dwelling units.
2. The oven exhaust outlet is more than 25 feet above ground level.
3. The oven exhaust system is an engineered system utilizing a utility set style fan and discharge nozzle designed to eject the effluent vertically more than 45 feet above ground level.

Thus, while the oven discharge is outside of the limits outlined in a Code proposal that was rejected as too stringent, the system still complies with the requirements of that same rejected Code proposal.

Aside from Code requirements and recommendations, the Environmental Protection Agency (EPA) has done research and provides recommendations on odor control issues. Understandably, most of the applications they discuss are those in which there is chemical or biological waste emitted into the environment that has detrimental effects beyond just nuisance odors. In a paper on "[Odor Control in Biosolids Management](#)," several possible design changes to wastewater treatment plants are suggested as good options for mitigating odor issues. These include,

"increasing stack height, increasing stack velocity, providing reheat to increase thermal buoyancy, or dilution with ambient air."

While any odors from the production of vegan jerky are considerably less powerful and unpleasant than the odors from a sewage plant, ***the system we have designed for LVJCo. implements each of the design features suggested by the EPA for odor control in a wastewater treatment plant.***

Finally, as with every facility within Louisville Metro, LVJCo.'s Shelby Street location will be required to comply with Louisville Air Pollution Control District [Regulation 1.13, Control of Objectionable Odors in the Ambient Air, Section 2.1](#):

"No person shall emit or cause to be emitted into the ambient air any substance that creates an objectionable odor beyond the person's property line. An odor will be deemed objectionable when documented investigation by the District includes, as a minimum: observations on the odor's nature, intensity, duration, and location, and evidence that the odor causes injury, detriment, nuisance, or annoyance to persons or to the public."

Louisville already has a process in place for monitoring and investigating complaints of objectionable odors within the city, outlined in the above cited Odor Investigation Procedure. There is even an [app available from Smell My City](#) that allows residents to document and submit odor complaints and view anonymous complaint history. Every report submitted is automatically emailed to **Louisville Air Pollution Control District**, [as reported by WFPL on March 30, 2019](#).

In conclusion, LVJCo. is committed to being good neighbors and ensuring that they are not causing a nuisance to anybody who lives nearby. Though the food and process used to produce it is already unlikely to cause nuisance odors, their ventilation system has been designed to exceed even proposed code requirements that were deemed too stringent, and includes multiple features recommended by the EPA for odor mitigation in wastewater treatment plants.

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