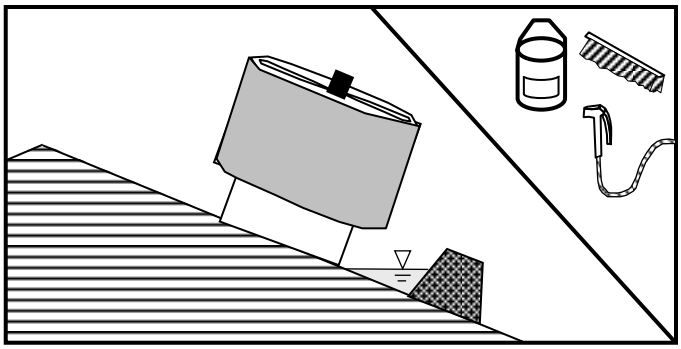
ACTIVITY: Kitchen Exhaust Cleaning

IC – 11



CITY OF KNOXVILLE

Targeted Constituents

● Significant Benefit	◗ Partial Benefit	○ Low or Unknown Benefit

○ Sediment	○ Heavy Metals	○ Floatable Materials	● Oxygen Demanding Substances	
● Nutrients	◗ Toxic Materials	● Oil & Grease	● Bacteria & Viruses	○ Construction Wastes

Description

Cleaning kitchen exhaust systems is required by law in order to avoid fire hazards from excessive grease buildup for restaurants and commercial kitchens. Methods of cleaning are generally proscribed by NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations. Requirements for inspection and cleaning include grease removal devices, exhaust systems, hoods, fans and cooking equipment. Eliminate non-stormwater discharges by controlling all water, grease, solvents, cleaners and other fluids generated in the cleaning process. Do not allow grease or solvents to contact roof surfaces, gutters, parking lots or other areas that receive rainfall.

Approach

Exhaust systems generally consist of an exhaust hood, plenum, filters or baffles, exhaust stack, and a roof fan. Each exhaust system tends to be unique due to

- different combinations of possible equipment
- restaurant layout and design
- building architecture and constraints

Hoods and filters are usually made of stainless steel, galvanized steel or aluminum in order to facilitate regular cleaning. Stacks are usually made of fabricated black iron, and are required to be leakproof so that cleaning with pressure washing equipment can take place. Common types of roof fans are upblast, squirrel cage, and supreme.

Disposal of any cleaning or wastewater discharges onto the ground, or any surface that washes off into the storm drainage system or natural streams, is a direct violation of the City of Knoxville Stormwater and Street Ordinance. Refer to IC-01, Non-Stormwater Discharges to Storm Drains. Report illegal dumping to the storm drains or local waterways to the Water Quality Hotline at 215-4147.

Many restaurants and other smaller businesses may not know whether a particular drain leads to the storm drain system or the sanitary sewer system. Contact the property owner for plans indicating which pipes are connected to storm drains or to sanitary sewer. If plans are not available, then contact the City of Knoxville Engineering Department or the Knoxville Utilities Board (KUB) for assistance. A plumbing contractor can verify which pipes are connected to the sanitary sewer system. Procedures using smoke, dye tests or air monitoring equipment can also be used to identify sanitary sewer lines.

All drains inside of a building or within a covered structure must be connected to the sanitary sewer. All drains outside of a building and exposed to rainfall should be

connected to the storm drain system. This common-sense approach was not generally in effect for older buildings and neighborhoods, so it is important to verify that each pipe connects to the proper drain. Even newer buildings, which have replaced old buildings, may not be configured in the correct way, due to shortcuts or assumptions on the behalf of a building contractor.

Methods ***Typical Kitchen Exhaust Cleaning Procedures***

Kitchen exhaust cleaning is a multi-step operation designed to clean all of the system components to bare metal. This operation must be planned in order to clean each component thoroughly while protecting surrounding areas, by working from the top down. Protect workers by disconnecting electricity to the exhaust cleaning system. A variety of cleaning equipment and supplies (degreasers, brushes, sponges, etc) should be on hand. The following is a typical list of exhaust cleaning procedures for each hood:

- Erect a waterproof tarp underneath the hood in order to collect wastewater and grease coming down the stack. The tarp must be securely fastened along all edges, in order to protect cooking equipment and surrounding areas. The tarp must be structurally supported or braced to handle the expected amounts of wastewater.
- Remove filters and drain cups from the hood. Clean these components down to bare metal by soaking with chemical degreasers and then rinsing with high-pressure water. Try to remove any thick grease first, and dispose of grease properly.
- Clean the roof exhaust fan inside and out, down to bare metal, using chemical degreasers and then rinsing with high-pressure water. The exhaust fan may need to be partially disassembled in order to clean fully.
- The exhaust stack is sprayed with chemical degreaser and then rinsed with high-pressure water. Remove exhaust duct access doors as necessary to clean and inspect the interior of the exhaust stack.
- The plenum and interior of the exhaust hood are sprayed with chemical degreaser and then rinsed with high-pressure water.
- Allow the hood/stack/fan system to fully drain and then dry by air. Remove tarp and dispose as solid waste. It is very difficult to clean and reuse the tarp, so disposal is recommended.
- Dry the exhaust hood, and polish stainless steel surfaces as necessary. Replace filters and drain cups. Clean and polish wall surfaces in the immediate vicinity. Mop floors as needed.

There are several local companies that provide kitchen exhaust cleaning services; these companies must be familiar with NFPA 96 in order to properly inspect, clean and reinstall kitchen exhaust systems. These companies have specialized equipment and the proper supplies to perform the work quickly and efficiently. In general, kitchen exhaust cleaning is performed late at night or during weekends to allow the maximum amount of time for cleaning and drying. Restaurant operators are responsible to hire only qualified contractors for kitchen exhaust cleaning.

Grease and Wastewater Recovery

Most kitchens and restaurants are required to have a grease trap as part of the sanitary drain systems in the cooking area. In addition, most kitchens and restaurants typically have an outdoor grease receptacle for the disposal and recycling of thick grease. Whenever thick grease is encountered, it should be scraped from the surface and then

placed into the outdoor grease receptacle. This will increase the maintenance interval of a grease trap, and helps to ensure the sanitary sewer systems will function adequately without adverse results.

During the entire process of kitchen exhaust cleaning, there is a substantial amount of wastewater generated. It is illegal to discharge this wastewater outdoors onto the ground or parking lot, into a ditch or storm drainage system, or into a natural stream. Refer to IC-01, Non-Stormwater Discharges to Storm Drains. Illegal discharges can be reported anonymously to the Water Quality Hotline at 215-4147.

Wastewater may either be disposed into the indoor sanitary sewer system, or removed for legal disposal by a wastewater disposal company. Any wastewater that contains grease is typically poured into a sink or floor drain that leads to a grease trap. The property owner should verify that all indoor floor drains lead into the sanitary sewer system. Otherwise, further modifications to the floor drains will be necessary.

Cleaning Methods for Exhaust Roof Fans

Exhaust fans typically are the hardest elements to clean. There are more surfaces for grease to accumulate on (fan blades, motor casings). Heavy accumulations of grease can put undue stress on fan motors, bearings and drive belts (due to the excess weight). Exhaust fans must be cleaned thoroughly, both inside and outside, down to the bare metals surfaces.

Do not clean near catch basins, ditches, pipes or any part of the stormwater drainage system. Collect wastewater and rinsewater by appropriate means for disposal into the interior sanitary drains. Exterior portions of the fan casing should be cleaned and rinsed by hand when necessary to avoid discharging wastewater onto the roof. However, a tarp or a child-sized swimming pool is also commonly used to contain wastewater and high-pressure water while cleaning the exterior surfaces.

Squirrel Cage Fan:

> Squirrel cage fans usually have an integral water collection drain on the bottom, which simplifies the process of cleaning the interior surfaces. Collect wastewater into a watertight container, which can then be emptied into an interior sanitary drain leading into the grease trap. The exterior surfaces of squirrel cage fans may be cleaned by hand; there is generally a miniscule amount of grease on these surfaces.

Supreme Fan:

> Supreme fans have an integral grease collection tray with a ball valve spout. This allows the interior cleaning wastewater to be collected into a watertight container, which can then be emptied into an interior sanitary drain leading into the grease trap. Wastewater from cleaning the underside of the fans will run down the stack. Supreme fans have the fan motor and blades mounted on a pivoting assembly that pops out of the fan housing. Ensure that all wastewater is collected when washing the fan blades and housing assembly.

Upblast Fan:

> Upblast fans have an integral water collection spout on the bottom, which simplifies the process of cleaning the interior surfaces. Collect wastewater into a watertight container, which can then be emptied into an interior sanitary drain leading into the grease trap. Wastewater from cleaning the underside will run directly down the stack. The fan assembly is usually cleaned in the normal

position, and then tilted up for additional cleaning. Ensure that all wastewater is collected when washing the fan blades and housing assembly.

Roof Wastewater Collection Methods

Do not allow any roof wastewater or cleaning water into the municipal stormwater drainage system, ditches, catch basins, natural creeks and streams, etc. Preferable methods for cleaning exhaust roof vents will not generate uncontrolled wastewater or rinsewater on roofs. A watertight tarp can be securely fastened along all edges around an exhaust fan, with some sort of structural support or bracing to handle the expected water amounts. A child-sized swimming pool can be easily altered to perform as structural support for a watertight tarp.

As an alternate method, the roof itself can be used to store or contain wastewater. Flat roofs have drains that can be temporarily stopped up. Then the low point of the roof can be used as a collection point for grease and wastewater, which is then vacuumed and safely disposed. If needed, gutters or downspouts can be temporarily stopped and then used as a collection point. Wastewater must be collected into a suitable vacuum truck. The contaminated roof areas must be cleaned and rinsed a few times.

Maintenance

- Inspection of kitchen exhaust systems should occur weekly or as recommended by the equipment manufacturer. Cleaning and maintenance of kitchen exhaust systems should occur as soon as possible after a deficiency is noted.
- Keep adequate records of inspections and maintenance work at the restaurant or kitchen location. Records must be made available to City of Knoxville inspectors and Knox County inspectors upon request.

Limitations

- Some restaurants or kitchens may have space or access limitations that hamper efforts to inspect and clean kitchen exhaust systems. This may necessitate the removal of ovens, exhausts, or other types of kitchen equipment on a regular basis to adequately inspect kitchen exhaust systems.

Additional BMPs

These BMPs contain additional information related to kitchen exhaust cleaning:

IC-01	Non-Stormwater Discharges to Storm Drains	IC-10	Dumpsters
IC-07	Food Service and Handling	AM-01	Employee Training
IC-08	Power or Pressure Washing		

Summary

Due to the toxic nature of the cleaning chemicals involved, and the heavy amounts of grease and oil generated, kitchen exhaust cleaning has frequently caused severe pollution and degradation of natural creeks and streams, including noticeable fishkills. Many restaurants have been caught and fined heavily for this type of pollution.

References

31, 33, 34, 35, 99, 103, 138, 193 (see BMP Manual Chapter 10 for list)

National Fire Protection Association (NFPA), #96: Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations
http://www.nfpa.org/