

WIGHT INSPIRED
EST. 2011



PORTLAND MAINE
U.S.A.

26 EVERGREEN DRIVE, Unit B PORTLAND, ME 04103 Tel: (207) 878-9759

Web: newenglanddistilling.com Email: info@newenglanddistilling.com

May 31, 2016

City of Portland
389 Congress St.
Portland, ME 04101

To whom it may concern,

The purpose of this letter is to address the Fire Department requirements as listed on the Department of Permitting and Inspections form for Change of Use.

The applicant, New England Distilling, located at 26 Evergreen Drive, Unit B in Portland is seeking to reclassify a portion of our office space as a tasting room and retail space. In 2011 we were granted a Certificate of Occupancy by the city of Portland and have been producing spirits at the distillery since that time. We would like to simply designate a portion of office space as tasting room space under that Certificate. The entire space at Evergreen Drive is 3000 sqft, and the tasting room would be part of the existing space, representing 136 sqft. The tasting space is separated from the production space by an existing 2x4 wall and door. The wall is sheathed on each side with 5/8" sheetrock and filled with fiberglass insulation, the door is a solid core wooden door, 1 3/4" thick, there are no plans to remove these. The tasting room space has three standard size doors, one leading to the production space, one to a bathroom, and one marked as an emergency exit leading to the outside. The marked emergency exit door is a double paned glass door with metal frame. In the tasting room, the travel distance from the most remote location to the marked exit door is 21 feet. In the production space the travel distance from the most remote location to the nearest marked exit door is 65 feet, or roughly 50 feet to the nearest egress (marked or overhead door). The building does not have sprinklers, however, as recommended in our fire safety plan we have installed a fire detection system as well as fire extinguisher, which is located in the production space right outside the tasting room door. The tasting room space has one set of emergency lights near the exit leading to the outside, the production space has two sets of emergency lights located near the entrance to the tasting room and the marked exit on the back wall. We have consulted with Mark Cummings of Fire Risk Management on the allowable occupancy of the tasting room, given the square footage and fixed furniture, and he has returned an allowable occupancy of 18.



FIRE RISK MANAGEMENT, INC

1 Front St., Bath, ME 04530
207/442-7200 [-7272 (fax)]
FRM@fireriskmgmt.com

Date: 16 September, 2011

Memo Report

From: W. Mark Cummings, P.E.
To: Mr. Ned Wight; New England Distilling, LLC
CC: Capt. Keith Perone; Fire Prevention Division, Portland Fire Department
Subject: **Fire Hazards Assessment of the New England Distilling Site at 26 Evergreen Dr., Unit B, Portland, ME.**

A review of the proposed installation/construction of a new distilling operation to be located within Unit B of the industrial building located at 26 Evergreen Drive in Portland, ME was conducted on 3 August, 2011. The purpose of this review was to evaluate the proposed operations and materials associated with the distillation process to ascertain potential fire/explosion and life safety hazards that may be present. The end result for this assessment is to develop recommendations to mitigate any potential fire and life safety hazards identified.

Background

The proposed distillery is intended to occupy the middle portion (Unit B; ≤ 3000 sf) of an existing industrial building; which is currently divided into three separate tenant spaces, separated by fire barriers that reportedly have a 2-hour fire rating. The stated plan for this distillery is to produce quantities of a number of alcoholic beverages (spirits); including whiskey, gin, and rum. To produce these various beverages, a small still is to be installed in the space, which will be used to distill the various liquids; producing a range of alcoholic beverages with alcoholic contents ranging from 40% to 60% by volume. Resulting from discussions with the owner (Mr. Ned Wight), it was ascertained that a portion of the space will be used to store some of the finished products, including the whiskey and rum that will be stored in wooden (oak) barrels as part of the overall aging process for these beverages. An exact quantity that is likely to be stored in this facility at any one time is not specifically known at this time. It is intended that the gin product, which will be stored in glass (750 ml) containers within cardboard cases, is to be stored on site for only a relatively short period of time prior to being shipped to clients. As such, this product will likely represent a small(er) percentage of the total product being stored on site. It is estimated that the quantity of this product would not exceed that which would be contained on more than four (4) shipping pallets; 1080 liters (285 gal) at any one point in time. Due to the aging process associated with the rum and whiskey products, these will be initially stored within wooden barrels. Based on the planned production schedule for these beverages, it is estimated that the maximum quantity of rum that might be stored on site at any given time would be less than 1500 gallons; with an expected maximum quantity of whiskey that will be stored on site being upwards of 5000 gallons. However, it is anticipated that these maximum quantities would not be achieved until after several years of operation. Prior to leaving the distillery, both the rum and whiskey products will be transferred from the wood barrels to glass containers that will be placed in cardboard cases and installed on pallets in preparation for shipment.

Based on the parameters outlined in the International Building Code (IBC), the occupancy classification that best "fits" this distillery operation would be that of a "Factory Industrial, F-1, Moderate-hazard" occupancy. The building in which the distilling operations are to take place is constructed of (reinforced) masonry (CMU) exterior walls that support (exposed) steel roof trusses. The roof of the facility is flat, consisting of corrugated metal attached to the steel trusses. As such, this building would be classified as having Type IIB construction,

as defined by the IBC. The space that will be used to house the distilling operations consists of approximately 3000 ft² of high bay area; with a ceiling height of approximately 18 ft, from the concrete floor to the underside of the metal roof. Within this space, installed along the north wall, a small office area has been constructed, which occupies approximately 500 ft². The office area has a ceiling height of approximately 8 ft and appears to be of wood frame and drywall construction. Also installed along the north exterior wall, between the office area and the West wall of the space, is a wood framed and sheathed room that is slightly more than 100 ft² in floor area. This space was previously used as a storage area having a controlled environment. It was stated that this area may continue to be used in this capacity in conjunction with the aging process for some of the beverages. It was stated that the planned location for the still was to be in the southeast corner of the space, adjacent to one of the large overhead doors.

The high bay area has no mechanical ventilation; other than a single unit heater that is installed near the ceiling in the northeast corner of the space and a single overhead (ceiling) fan that is centrally located within this area. The heating/ventilation equipment for the office area is installed above/on the ceiling of this area. Access and egress to the overall space is through two personnel doors, one in the north exterior wall, via the office area, and one in the south exterior wall within the high bay area. Additionally, two overhead doors are installed in the south exterior wall that also provide direct access to the high bay portion of space. It was stated during the site visit that the Federal Government has a requirement that all access doors to the space where the beverages are being produced/stored must have a padlock installed. This configuration would result in a conflict with the egress requirements of the Life Safety Code[®], NFPA 101, which is adopted in the State of Maine. However, the owner has indicated that at any time when the facility is occupied the padlocks will be removed from the doors that are needed to maintain adequate egress from the facility. Currently, the space (and building) is not provided with either an installed fire suppression or fire detection/notification system. A hand-held fire extinguisher is installed in the high bay area, adjacent to the door that connects this area to the office space.

Fire / Explosion Hazards

In general, all the individual, constituent materials used to support the distillation and packaging processes do not represent significant fire hazards. The primary fire fuel loading that will be present in this space will be the empty wood barrels and the cardboard cases that will ultimately be used in storing the finished products. Additionally, the building is supplied with natural gas, which is currently used as the fuel for both the office area heating system and the unit heater in the high bay area. It is planned that this source of fuel will also be used to supply the still's heating element (burner). A steel natural gas pipe line currently transits through the overhead of the high bay area and this line will be modified to also supply the fuel for the still's heating element. The heating element for the still will not be enclosed and as such, an open flame will be exposed to the surrounding environment.

The final stages of the distillation process are that which represent the greatest potential for a fire/explosion hazard; when the liquid has been distilled to the point that the alcohol content is increased to the point that the beverage becomes a "flammable liquid" and the ethanol (vapor) that is being produced by the distillation (boiling) process could result in the development of an ethanol/air mixture that is within its lower flammability limit (LFL). The still design being used by New England Distilling, LLC is very basic and is not one that is designed to operate under any significant pressure. The top of the still is a "friction fit" and only its weight will allow for any level of pressure increase; above ambient. At ambient atmospheric pressure, ethanol will boil at just over 78°C (172°F). Should the boiling rate within the still increase beyond that which is desired, the top of the still would lift, thereby releasing excessive pressure; albeit also releasing the ethanol vapor as well. With an auto-ignition temperature of approximately 426°C (800°F), it is unlikely that the surface temperatures of the still will ever approach the point that it might be expected that contact by an ethanol/air mixture with the still's hot surfaces could result in fire initiation. However, it is still this potential scenario, coupled with the open flame below the still, which represents the greatest risk for a fire/explosion hazard associated with the actual distillation process being used by New England Distilling.

Due to the alcoholic content, 40% to 60% by volume, of final products (liquids) being produced by the distillation process, these will primarily be classified as being Class IC flammable liquids, as defined by NFPA 30, the *Flammable and Combustible Liquids Code*. This classification stems from the fact that beverages with alcoholic contents in the range specified above will have flash points between 22.8°C and 37.8°C (73°F and 100°F). Another potential fire hazard that will be associated with the distillery's operation is that of a potential spill of these flammable liquids, such that they, and any vapor that might then be produced, could then be exposed to a potential ignition source. It is reported¹ that the evaporation rate for ethanol at "standard" ambient temperatures of approximately 25°C (77°F) is relatively low, such that even the presence of natural ventilation should be sufficient to prevent the development of an ethanol vapor cloud that would be exceed its lower flammability limit. However, if a spill was of significant volume (quantity) or if the area where a spill occurred was subject to "stagnant" air, the potential still exists that the LFL could be achieved. It is beyond the scope of this evaluation to attempt to determine a specific spill volume(s) that could result in such an occurrence.

The presence of other stored materials, such as the cardboard for the shipping cases and the empty wood barrels, will also cause an increase in the overall fire fuel loading (fire potential) within this space. Given that the wood (oak) has a relatively high ignition energy requirement, this represents a very low potential as being an "initial" fire source. The cardboard is much more readily "ignitable", but must still have another ignition source to result in fire initiation. Although not directly involved in the distillation process, the operations and materials associated with the office area also represent a potential source of fire initiation, including the heating equipment installed on the ceiling of the office. However, this risk is no greater than any other typical office location.

The overall evaluation of the New England Distilling facility included research of any available historical data involving fires and explosions associated with distilleries in general. Based on this initial research, it is apparent that, in general, fires resulting from the distillation processes themselves are extremely rare. Most of the historical data indicates that the greatest risk of fires involving distilled beverages is primarily that resulting when these beverages are exposed to the effects of fires that originated from other sources not directly involving the distillation process. When these (flammable) liquids are exposed to the thermal insult from an adjacent fire, they will begin to rapidly evaporate, potentially producing significant volumes of a flammable vapor. Equally, an adjacent fire can result in the failure of the packaging of the stored liquids, thus resulting in spillage and a significant increase in fire intensity and if sufficient flammable vapors are produced; an explosion.

Review and Assessment of Code & Standards Requirements

At the outset of this evaluation, it became apparent that the existing national building (IBC) and fire (NFPA) codes did not readily apply to the type and scope of distillery operations that are being proposed by New England Distilling. Since the use of the space by New England Distilling continues to fall within the "industrial" category of the existing building and no significant modifications are being made to this facility, the requirements of the International Building and Fire Codes (IBC & IFC) or the Maine Uniform Building & Energy Code (MUBEC) don't specifically apply to this situation; albeit the IBC & IFC (2009 ed.) were used as references in developing recommendations for this project, based on the requirements that would typically apply for new construction. Other codes that the State of Maine has adopted that are applicable to this project and that were used in the code evaluation for fire and life safety include the latest editions of the National Fire Protection Association's codes; NFPA 30 – *Flammable and Combustible Liquids Code*, NFPA 54 – the *National Fuel Gas Code*, and NFPA 101 – *The Life Safety Code*[®]. Additionally, the applicable Factory Mutual (FM) Global Property Loss Prevention Data Sheet, 7-74 – Distilleries, was reviewed and used as a source of information and reference, since much of the fire protection information provided in these sheets is based on historical data specific to that industry.

¹ *Potential Explosion Hazards due to Evaporating Ethanol in Whiskey Distilleries*, HSL/2003/08, H.S. Ledin, Health & Safety Laboratory, Buxton, England.

A primary focus for the review of both the IBC/IFC and NFPA 30 was to ascertain if there would be any limits on the amounts of flammable liquids (Class IC) that could be present/stored within the New England Distilling space. However, the published limits on the amounts of flammable liquids that can be stored, listed in both of these codes, were specifically exempted for alcoholic beverages that are contained in wood barrels and/or individual containers that do not exceed 1.3 gallons (5 liters); refer to para. 9.1.4 of NFPA 30 and para. 3401.2 of the IFC. Since New England Distilling has indicated the beverages produced by the still will be stored in either wooden barrels or individual 750 ml (0.2 gal) bottles, no specific code limitations exist for the amounts to be stored on site, such that no code restrictions exist that would further limit the expected maximum quantities of the various products outlined above. Also resulting from the exemptions provided for these products, no specific fire protection code requirements exist with regards to the "storage" of these liquids. NFPA 30 does, however, have specific requirements for "processing facilities" and those that "dispense, handle, transfer, or use" these liquids. The requirements that do apply to the New England Distilling operations are primarily to provide a fire detection/notification system and a ventilation system that is designed to prevent the accumulation of flammable vapors; refer to chapters 17 and 18 of NFPA 30. Without specifically performing calculations to ascertain a specific ventilation rate that will prevent the accumulation of flammable vapors, within 25% of the LFL, the code requires that a minimum ventilation rate of 1 cfm/ft² be provided. Given the approximate "foot print" of the high bay area where the distilling operations are to be performed, this would require that a ventilation system that can provide approximately 2400 cfm be installed. Furthermore, the inlet and exhausts for this system must be located within 12 inches of the floor and should be installed on opposite sides/ends of the room, such that the air movement will "sweep" vapors from all areas of the space. Chapter 17 of NFPA 30 also has separation requirements between a "processing" facility and any other facilities that could represent exposure hazards. Unfortunately, the requirements of this chapter do not adequately accommodate the New England Distilling situation; whereby these operations occupy only a portion of a multi-tenant building. However, given the specifics associated with the New England Distilling operation, coupled with the separation requirements outlined in Table 17.4.3 for the "process vessel", it would be necessary to keep the still at least 5 ft from any adjacent property line or building. If the 2-hour walls are to be considered the "property line", an argument can be made that the still should be located at least 5 ft from either of the two walls separating the New England Distillery from its two adjacent tenants. However, based on the specifics of the still configuration and the amounts of liquid involved, providing the 5-foot separation is not considered essential. The maintenance of this minimal separation distance between the still and fire wall is unlikely to provide any notable benefits, either to property protection or life safety, that would warrant this being a mandated code requirement for this operation.

As outlined above, many of the requirements in NFPA 30 do not apply to distilled spirits. Although in finished form these liquids are classified as flammable, they would not be considered a "hazardous" material. NFPA 30 does include some requirements with regards to containing and/or controlling spillage from storage containers. The plan for the New England Distilling facility includes some storage of the finished products, both in small containers and in the larger wooden barrels. The code specifically exempts any need for containment systems for the products stored in the small containers (≤ 5 liters). However, the need to provide containment where the barrels are to be stored is less clear. Currently, the facility is provided with two (2) floor drains within the high-bay area; one of which is located in the vicinity of the planned storage areas for the barrels. It is unknown if the municipal authorities have any restrictions that would require this drain to be isolated from these alcohol-containing products; albeit it is not believed that they represent any toxic risk to the municipal sewer system. Should a spill occur that results in some of the products entering the municipal sewer system, it is likely that these products would quickly be diluted below their flammable range, including the alcohol evaporating. Equally, there are no potential ignition sources within the immediate vicinity of the location where the products are to be stored; such that should a spill occur, there is no immediate danger of the product being ignited. With the possible exception of the filling process, which is being done manually and represents a very low risk of any significant spillage, the wood barrels do not present a high risk of spillage or being accidentally ruptured. Once filled, the barrels are not involved in any other process until such time has passed that the contents are ready to

be transferred into the smaller containers for distribution/sale, which will also be a manual process. Any time the products are being transferred to/from the different containers, which represents the highest risk for leakage/spillage, personnel will be present and can quickly take actions to mitigate any spill that might occur. For these reasons, along with the lack of any specific code applicability regarding distilled spirits, it is not considered necessary that any "containment" system be included for the storage area within this facility.

In general, all pertinent requirements associated with the Life Safety Code[®] (NFPA 101) are currently being met at the New England Distilling space, with only one exception that was noted during the site visit; the lack of an exit sign for the door connecting the office and high bay areas. This door represents the requisite second means of egress from the high bay area. It is unknown if correction of this item is a responsibility for the tenant or landlord. It was stated that due to Federal regulations, it will be necessary to install padlocks on all doors that access the (high bay) area where the distilled liquids are to be stored. In general, NFPA 101 does not allow locks involving the need for keys to be installed on doors required for egress, but para. 7.2.1.5.4.1 does provide an allowance for this, along with other specific measures that must also be implemented, including the installation of a sign that indicates the door shall not be locked when the building is occupied.

The FM Data Sheet (7-74) that addresses distilleries does include recommendations to provide a fire sprinkler system. The primary function of this system would be for property (asset) protection and not for life safety. The installation of fire suppression systems is always encouraged, albeit not a code requirement in this instance. Although not specifically stated in this data sheet, it is likely that the requirements outlined in this data sheet are intended for much larger operations; those that are located in dedicated buildings/facilities and likely involving much more complex distillation systems and greater quantities of flammable liquids.

Summary and Recommendations:

The research associated with this fire hazard assessment indicates that, in general, fires resulting directly from distillery operations are rare. However, should a fire occur that ultimately exposes/involves the distilled products (flammable liquids), the results could be catastrophic. Based on this assessment and the historical data reviewed, it is likely that the office area or the other building systems within the New England Distilling facility likely represent a greater risk of fire than does the actual distilling operations. This is based on the fact that the distilling operations will only occur while the facility is manned, such that any problem that might occur during these operations should be immediately identified and corrective measures implemented. However, this is not meant to imply that the operation of this distillery is not without inherent fire risks. Equally, it is recommended that specific measures be implemented to further mitigate the potential for damage to the building and the operation of the adjacent tenants, along with complying with all pertinent code requirements.

Based on the results of this assessment, including the site inspection, the following recommendations are provided:

1. Provide an approved exit sign for the door connecting the office and high bay areas. [code requirement]
2. Install a sign that is readily visible and meets the requirements of NFPA 101 (para. 7.2.1.5.4.1), along with all other code requirements, in the vicinity of the egress doors from the high bay area. [code requirement]
3. Provide an installed fire detection/notification system. Based on the requirements within NFPA 30 for "processing facilities", this system is needed to provide early warning to occupants of the building, not just New England Distilling employees. Equally, given that no fire suppression is installed within this building, this system will provide early notification to the responding Fire Department; either directly or via a central monitoring station. Since a security system is already scheduled to be installed and monitored by a third party, the fire detection/notification could also be monitored by the same entity. Given that the greatest risk to both the building and responding firefighters will be a fire occurring when the facility is not occupied, coupled with the storage of flammable liquids on site, early notification will significantly improve the fire safety of this facility. [code requirement]
4. Provide a means for emergency disconnect (closure) of the natural gas fuel supply system. It is recommended that the ability to remotely shut off the fuel supply to the still's heating element be provided to ensure that if a problem occurs with the still's operation, access to shut off the fuel supply will be readily accessible. A remote

manual shutoff (pull station) located by the exit from the high bay area is recommended. Although the code (NFPA 54) does include a requirement [*code requirement*] for such a shut off device, it does not specifically mandate the type or location.

5. Provide a mechanical ventilation system within the high bay area. [*code requirement*] This system is needed to ensure no accumulation of potentially flammable vapors can occur, which could then present a fire risk; especially in the vicinity of electrical systems/components. Since the vapors will be heavier than air and would accumulate near the floor, the inlet and exhaust for the ventilation system must be within 12 inches of the floor. Absent of any specific calculations to determine the minimum ventilation rate required for the specific configuration used at the New England Distilling facility, it is recommended that a ventilation rate of at least 2400 cfm be provided. Based on the stated proposed layout for the facility (see attached sketch), it would be recommended that the location for the exhaust inlet air (vent) be located at the northeast corner of the high bay area, with the exhaust fan being in the opposite corner. This would facilitate movement of air “away” from the proposed location for the still (open flame).
6. Given the configuration of the still’s heating element that involves an open flame, it is recommended that no combustible materials be located/stored any closer than 10 feet from the still.

Should there be any questions regarding this assessment and the recommendations contained herein, please do not hesitate to contact me.



W. Mark Cummings, P.E.