MBAA Safety Toolbox Talk

Radiation Safety

Overview

Radiation safety may not come to mind when thinking of brewery safety but it may be a real concern in your brewery. Package inspection devices use gamma or X-ray radiation to detect low fills, missing bottles, and foreign objects. Due to the radiation produced by these devices, a license or registration must be obtained for their use. The responsibility for licensing, registering, and regulating the use and handling of these devices is shared by several governmental organizations including; *The Environmental Protection Agency (EPA), Food and Drug Administration (FDA), Nuclear Regulatory Commission (NRC), Department of Transportation (DOT) and State Governments.*

Background

The gamma inspectors consist of two components: a radiation source and a detector. The radioactive source (usually Americium 241) is fixed onto ceramic beads and sealed in a stainless steel capsule (considered a radioactive Sealed Source). As objects pass through the gauge they absorb a portion of the radiated energy. Changes in the radiation absorbed may indicate a lowfill or missing a bottle. The devices continually produce radiation, although when turned off, a shutter may close, blocking the majority of the radiation. Gamma radiation, a form of ionizing radiation, in large enough doses can cause radiation sickness and can penetrate all but the densest materials, including human tissue. Ionizing radiation has the power to disrupt molecules including DNA, thereby posing a cancer risk. X-ray systems (sometimes called radiation machines) also emit ionizing radiation, but rather than coming from disintegrating radioactive material, they use high-voltage electronic vacuum tubes to generate the radiation. Unlike gamma units, when the power is turned off, no radiation is generated. They do not require leak tests, as there is no radioactive material to leak out. Also, for gamma units, there is a fee for disposal of the material (which continues to radiate for millions of years), but not for x-ray units.

Licensing and Registration

All but two States (New York and Oregon) require only a General License to operate these devices (States Administrative Code or 10CFR31.5). Oregon and New York require a Specific License, which requires employee training and a written radiation protection program in addition to General License requirements. Both license types require devices to be registered with the State or NRC.

Safeguards

With common sense safety precautions, these devices can be operated safely. Due to the small radiation source and the fact that it is sealed in a protective housing, the emitted radiation is limited to a small area, particularly with the unit off and the shutter closed.

In brewery applications, the level of gamma or x-ray radiation produced should not necessitate any protective clothing or exposure monitoring. The radiation does not significantly irradiate the product as it passes through the device. In fact, a bottle would need to be left in the inspector for more than a year to reach FDA food irradiation limits. Any brewery using a gamma radiation source or x-rays must appoint a Radiation Safety Officer (RSO).

Radiation Safety Officer

The RSO duties include;

1. Assure all radioactive materials possessed are authorized by a radioactive materials license.
2. Assure only individuals authorized by the license use the radioactive devices.
3. Assure authorized users are fitted with radiation dosimeters, if required.
4. Review all personnel radiation monitoring and make any required notifications in the event of high exposures, investigate causes and take corrective action.
5. Assure all radiation sources are secured against unauthorized removal when not in use.
6. Act as a point of contact and give assistance in case of emergency.
7. Notify the proper authorities in case of an accident, or damage to or theft of the devices.
8. Assure the terms of the license are met, (leak testing, shutter testing, device storage inventory, staff training, yearly compliance reviews, and record keeping).
9. Ensure every radioactive device bears a legible, durable tag identifying the radioactive contents, quantity, manufacturer, serial number, model number, and date of the source manufacture.
10. Ensure only third parties licensed to transport or perform repairs have access to the devices.
11. Safely dispose of unwanted devices.

Emergency Response

If the unit is structurally damaged:

1. Gather details about the accident and damage.
2. Determine if anyone was injured, call emergency services, (Local ph. 911, National Regulatory Commission ph. 301-816-5100, and any applicable state contacts), your RSO and the device manufacturer's RSO.
3. If possible, power down the unit and close the shutter.
4. Control access to the site. If a vehicle was involved, leave it at the site; it may be contaminated.
5. Inform emergency responders of the radiation risk.
6. Do not touch the source housing with any part of the body or clothing.
7. Do not touch any material that has come into contact with the source housing.
8. Stay 15' back from the gauge until a radiation survey and leak tests are conducted, or until directed by the RSO.

Links

- OSHA Standards Radiation Safety
- US NRC Radiation Protection

FOR MORE INFORMATION ON BREWERY SAFETY, PLEASE VISIT THE MBAA BREWERY SAFETY WEBSITE AT:
http://www.mbaa.com/brewresources/brewsafety