

Grain Elevators — Best Management Practices



Introduction

Activities at Kansas grain elevators prompt many elevator neighbors to call the Kansas Department of Health and Environment (KDHE) with concerns about excessive dust in the air. That “dust” is regulated by KDHE as particulate matter (PM) emissions and is the main air pollutant in grain storage, handling, and processing facilities. Beyond the explosion danger, exposure to grain dust can cause numerous lung-related health effects such as coughing, shortness of breath, and chronic bronchitis. Non-lung-related effects includes inflammation and irritation of the eyes, nose, and skin.

Grain elevators fall into three categories: country grain elevators, grain terminal elevators, and grain storage elevators. KDHE has guidance for elevators which define these terms and can be found at www.kdheks.gov/air-permit/forms/country-grain-elevator-guidance.pdf. Emission calculations should be performed for any new grain elevator or changes to a grain elevator that increase the throughput and storage capacity. KDHE has Country and Terminal Grain Elevator PTE calculators that can be found at www.kdheks.gov/air-permit/indexPrmt.html.

Some grain elevators constructed, modified, or reconstructed after August 3, 1978 have performance standards they must follow. The regulations are found in the code of federal regulations at 40 CFR Part 60 Subpart DD. A KDHE guidance document, *Grain Elevator Guidance Doc-NSPS Subpart DD*, explains requirements for elevators built since 1978 and is available at www.kdheks.gov/air-permit/tech_guidance.html. Elevators built before 1978 are not subject to these regulations. PTE emission calculator for terminal grain elevators can be found at www.kdheks.gov/air-permit/indexPrmt.html.

Process modification

To meet regulatory requirements, reduce the dust emissions, and reduce community complaints, changing the process is often a cheaper, but seemingly harder approach to improving the situation. It means changing the “way it’s always been done.”

Improved communication with neighboring businesses and residences, prior to loading or unloading grain, can go along way to avoiding problems. Consider wind speed and direction when handling grain. Avoid handling grain during times when the wind will cause neighbors to receive excessive amounts of dust.

A substantial reduction in emissions from receiving, shipping, handling, and transfer areas can be achieved by reducing grain free fall distances and grain velocities. Construction and sealing practices that minimize emissions include –

- enclosing the receiving area to the degree practicable, preferably with doors at both ends of a receiving shed
- specifying dust-tight cleaning and processing equipment
- using lip-type shaft seals at bearings on conveyors and other equipment housings
- using flanged inlets and outlets on all spouting, transitions, and miscellaneous hoppers
- fully enclosing and sealing all areas in contact with products handled
- for grain loadouts, using socks and drop-down spouts or sleeves, which extends at least 6 inches below the sides of the receiving container to minimize grain free-fall distance, except for topping off.

Air Emissions

Capture/collection systems

Capture/collection systems control emissions after they are generated. Control devices typically used in the grain handling and processing industry are cyclones (mechanical collectors) and fabric filters. Fabric filters are highly efficient, while cyclones do an acceptable job of reducing emissions. However, both devices must be properly operated and maintained to do their jobs. Equipment malfunctions can actually cause increased emissions until repairs are made.

Oil-suppression systems

The main reason for developing oil-suppression systems has been to prevent elevator explosions as well as control emissions. White mineral oil, soybean oil, or some other vegetable oil is typically used. To ensure the oil is dispersed well, it may be applied –

- as a top dressing before grain enters the bucket elevator or at other grain transfer points
- from below the grain stream at a grain transfer point, using one or more spray nozzles
- in the boot of the bucket elevator leg
- at the discharge point from a receiving pit onto a belt or other type conveyor
- in a screw conveyor

Equipment maintenance

Once preventative processes are in place, maintaining equipment may be the best way to control emissions.

- Operate equipment according to manufacturer's instructions.
- Perform regular inspections on equipment.
- Make needed repairs immediately.
- Maintain equipment logs with information such as dates of inspections, maintenance procedures, and replacement of equipment.

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Contact the Small Business Environmental Assistance Program (SBEAP) at 800-578-8898 or sbeap@ksu.edu with questions on environmental compliance and pollution prevention opportunities.

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