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Title: Letter from Thomas C. O'Connor, National Grain And Feed Association, To Dallas Safriet, USEPA, RTP, NC June 30, 1997

National Grain and Feed Association

6/30/97

Mr. Dallas Safriet
Environmental Engineer
Emission Factor and Inventory Branch
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711

Dear Mr. Safriet:

As per your request on April 30, 1997, the National Grain and Feed Association (NGFA) is pleased to submit the following descriptions of "Traditional" and "Modern" grain elevators and guidelines for applying oil to grain for effective dust control.

I. Traditional vs. Modern Grain Elevators

Traditional Elevator

Traditional grain elevators - both country and terminal - are typically designed so that most grain handling equipment (such as cleaners, conveyors, and legs) is located inside a building or structure which prevents all but minute amounts of visible dust from reaching the ambient atmosphere. This structure is normally referred to as the headhouse. This type of facility often employs belt conveyors, equipped with a mobile tripper, to transfer grain to storage in concrete silos. The belt and tripper arrangement is located in an enclosed structure above the silos called the gallery or bin deck. Grain is often moved from storage using open belt conveyors located in an enclosed tunnel underneath the concrete silos. Further, legs and cleaners are totally enclosed with little to no dust emissions.

Dust emissions from equipment inside the elevator structure are commonly controlled using one or more of the following equipment: cyclones; fabric filters; oil-based dust suppression; dust covers with skirting and belt wipers on belt conveyors; and enclosure. These dust control measures are used to reduce dust accumulations and the potential for catastrophic dust explosions and protect employee health.

Dust control equipment is also commonly used at unloading and loading areas to reduce product loss and emissions to the atmosphere. This control equipment may include: cyclones; fabric filters; oil-based dust suppression; enclosure; specially designed spouts which concentrate the grain stream to reduce dust turbulence; baffles

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in unloading pits; the use of tarpaulins; socks at the end of spouts; choke unloading; and dead-boxes at the end of spouts to reduce the velocity of the grain stream and minimize the quantity of air that can travel with the grain during loading.

Traditional elevator design is associated with facilities built before 1980. Industry sponsored research in the late 1970's and new technology resulted in improved design techniques for grain elevators.

Modern Grain Elevators

Facilities built in recent years - both country and terminal - have moved away from the traditional design discussed above. Most of these facilities do not have the traditional enclosed headhouse or bin deck. Modern grain facilities employ an open structural design, including locating equipment -- such as legs, conveyors, cleaners, and scales -- outside of any enclosed structure. This design technique reduces the potential for a catastrophic dust explosion and eliminates dust emissions by using equipment that is enclosed by design. In some cases, equipment - such as cleaners and screening equipment - may be located in separate buildings.

In the modern facility, grain is normally moved using enclosed belt or drag conveyors. The movable tripper has been replaced with enclosed distributors or turn-heads and direct spouting to storage bins and tanks, where feasible. These facilities are generally more automated.

Some traditional grain facilities have been partially retrofitted or reconstructed to employ these modern techniques of outside legs and other equipment. This outside equipment is also fully enclosed and not normally a source of emissions. Another technique to reduce emissions from open belt conveyors is to deepen the trough of the belt and slow the conveyor's speed. Leg belts can also be modified by increasing the size of the buckets on the leg and slowing the leg velocity, which reduces grain breakage and potential emissions when the grain is subsequently handled.

Although modern grain facilities use enclosed equipment to eliminate dust emissions, dust control techniques may also be employed, where needed. For example, mechanical aspiration can be used at unloading and loading areas, baffled unloading pits are commonly employed, oil-based dust suppression can be used, and specially designed spouts and dead-boxes to control dust emissions during load-out can also be found. Depending on the commodity, aspiration may be found at transfer points.

II. Proper Oil Application

The following are our suggested guidelines for applying oil for effective dust control:

"The effectiveness of an oil additive system depends largely on how well the oil mixes and disperses with the grain once it is applied. Several basic approaches can be used to apply oil additives to the grain stream to reduce airborne dust concentrations:

- 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 nozzle(s), if inadequate grain turbulence is available between conveyor and leg. This provides for better dispersion of the oil.
- In the boot of the bucket elevator leg.
- At the discharge point from a receiving pit onto a belt or into other type conveyor. Oil can also be applied to grain in a screw conveyor.

When choosing the type of nozzle to use:

- Evaluate the pump pressure and flow rate
- Make certain it will apply the necessary quantity and coverage of oil for the grain being handled. Research tests have demonstrated that spray nozzles give coverage equivalent to mist and atomizer nozzles, provided they are properly maintained with consistent oil viscosity and system pressure.

Generally, the amount of oil applied should vary with the dustiness of the grain being handled. Research tests and actual experience in operating elevators have shown that usually oil additives applied at a rate of 60 to 200 parts per million by weight of grain or 0.5 to 1.7 gallons per thousand bushels will provide effective dust control. The U.S. Food and Drug Administration has approved food grade mineral oil and vegetable oil for use on grains."

Thank you for allowing us the opportunity to provide this input. If you have any questions on the information in the letter, please feel free to call me at 202/289-0873.

Sincerely,

Thomas C. O'Connor
Director of Technical Services

cc: Dr. Tom Lapp, MRI