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STATE OF ILLINOIS  
Pollution Control Board

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF: )

AMENDMENTS TO LIVESTOCK )  
WASTE REGULATIONS )  
(35 IL Adm. Code 506) )

R01-28

*P.C. #8*

COMMENTS OF TERRY FELDMANN, P.E.

I am a licensed professional engineer (Agricultural Engineer) in the state of Illinois. I own Feldmann & Associates, an Agricultural Engineering and Environmental Consulting firm in East Peoria, IL. I am a graduate of the University of Illinois College of Engineering with a degree in Agricultural Engineering. I have been a full time consultant to Livestock and Poultry producers full time since 1992. I was raised on a small farm in Madison county Illinois where we raised hogs and beef cattle. This upbringing enables me to understand the practical side (the real world) of livestock production and associated tasks such as construction, maintenance, etc.

I testified at the 1997 part 506 rule making hearing in Champaign and actively worked with livestock producers in the design of their facilities to follow that rule. I consult with more livestock facilities about their designs than any other consulting engineer in Illinois. I am an active member of the American Society of Agricultural Engineers and serve on both the Swine and Dairy Housing committees.

Overall the new rules submitted by the Department are a major step toward protecting the environment and the livestock industry. I am sorry that I could not make it to one of the hearings for this rule making and I commend the participants and the board for their effort.

I do not own a livestock business and will not be directly impacted by increased construction costs. However, I do rely on the livestock industry in Illinois for practically all of my income and therefore directly value its viability. I am concerned that certain proposed provisions are without merit and will only increase costs unnecessarily. As a result, livestock producers will decide to build in other states or countries rather than in Illinois.

I have the following major concerns about the proposed rule:

1. There is no provision for determining the seasonal high water table in the site investigation nor methods. Perhaps "seasonal high water table" should be defined as the expected equilibrium elevation of water in an open pit or bore hole. This requires professional judgement which should be left up to the person responsible for certifying the site investigation. Since it is practically impossible to do a soils

investigation at the time of the seasonal high water table, I suggest reference to the USDA definition found in the Soil Survey. Seasonal High Water Table is the highest level of a saturated zone in the soil in most years. The survey estimates are based on the evidence of a saturated zone, namely grayish color and mottles in the soil.

2. Section 506.210 requires the use of secondary containment. The Act says that a lagoon shall include a secondary berm, filter strip, grass waterway, or terrace, or combination of those if an engineer retained by the registrant with the concurrence of the Department, determines that such feature(s) is necessary to ensure against a release to non-owned land or waters of this state. I contend that not all sites and lagoon designs should be required to have one of these features. The Act certainly does not require the use of certain combinations of features as specified. The rule should allow for use of an engineer's judgement. If an engineer determines that particular site and lagoon does not need one of these features, such feature(s) should not be required.
3. Section 506.303 proposes an additional 6" rainfall covering the storage structure and other drainage areas beyond the 2' freeboard. I contend that the rainfall event on the storage structure itself is already accounted for within the 2' freeboard. However, a volume for the 25 year-24 hour storm event (which may be more or less than 6") should be added for drainage areas other than that of the structures surface. This is consistent with the guidance documents such as MWPS-18 and ASAE EP 393.3. I propose that the board adopt the ASAE EP393.3 standard as it includes all volumes including bedding, wash down volumes, etc. with the 2' freeboard provision as explained above.
4. Section 506.307 (b) requires that deep bedded systems with an earthen base achieve a conductivity equal or less than  $1 \times 10^{-7}$  centimeters/sec. Since these housing systems use bedding to absorb liquids and are generally roofed and protected from precipitation, this permeability requirement is not necessary. Solid handling/storage system not exposed to precipitation should be exempt from these requirements unless a site investigation indicates a vulnerable site due to a karst area or shallow ground water or aquifer material.
5. Section 506.310 outlines additional requirements if aquifer material is located within 5' of the proposed bottom. The proposed rule requires the installation of perimeter drainage tubing. Perimeter drainage tubing is to be used as outlined in MWPS-36 where the water table could rise above the floor (MWPS-36, Fig. 27). In my experience with soils investigations half of the sites with aquifer material do not have a seasonal high water table within close proximity to the floor. Many of these sites are sand hills or other well, drained soils with relatively deep (10' to 20') water tables. If the seasonal high water table is not expected to be higher than the tank floor elevation, drainage tubing is useless. However, the location or elevation of the water table, if it is present within 5' of the planned bottom, should be determined

and design provisions for adequate protection should be provided by an engineer with concurrence of the Department.

6. Inspection/monitoring of perimeter drain tubing is a good idea, but quarterly sampling is not. Most water tables are seasonally high causing flow from the drainage tubing for brief periods in the spring. Furthermore, it gives no opportunity for determining the quality of up gradient water which may flow below a manure storage structure. Producers can however, monitor the flow from the tubing during the season that it flows. They can simply collect a sample in a jar and inspect it visually for turbidity and odor.
7. The proposed rule calls for drainage tubing to be installed 1' below the bottom of the footings. This is excessive and costly. In most cases installing the tube so that the bottom of the tube is at the same elevation as the bottom of the footing is sufficient. This always makes the top of the tube below the top of the manure storage floor to prevent the water table from being higher than the floor as shown in MWPS-36. Tubes should however, either drain to a free outlet (daylight) or provide sufficient slope when connected to other subsurface conduits.
8. Section 13 (b) of the Livestock Management Facilities Act specifically requires designs to follow ASAE 393.3 or future updates. In the proposed rules section 506.310(b) specifies minimum thicknesses of floors and walls. As listed in EP393.3 section 6.1.1.3.1, if no wheel loads are expected, 4" floors are adequate. The 5" thickness is required for tanks with wheel loads. Requiring a minimum 8" thick walls should not be specified as EP393.3 specifies the loading and that the design be based on ACI-318 (Building Code Requirements for Structural Concrete). These minimums may actually hinder the design process with engineers. For example, a producer reads this minimum and thinks that is what is needed. If a wall is taller or soil load is greater, the wall may need to be thicker. Now the engineer has a harder job to convince the producer that a thicker wall is needed because he believes that 8" is adequate. On the other hand, a shorter wall (<4') that is only a few feet tall need not be 8" thick and provides negligible additional protection.

Designs should take into account site specific data including the soil type, depth to ground water, etc. Design professionals should use their judgement with concurrence of the Department to determine what is necessary to prevent seepage of stored liquid. For example, in the case of a concrete structure, a designer might choose a more limiting Z-check of <115 kips/in rather than <145 kips/in to control flexure crack widths. Site specific data (rather than assuming 3000 psf) for soil bearing strength should be required for footing design in areas of shallow aquifer material or karst areas. This is very important to prevent seepage.

In fact, even more important than the design itself might be a good Quality Assurance/Quality Control (QA/QC) plan. I suggest that these plans be developed as part of the overall design and submitted to the Department for their review for

facilities located in a karst area. The degree of detail should be left to the design engineer with concurrence of the Department. Regular inspection and maintenance should also be considered.

With regard to testimony of Dan Heacock of IEPA, I have the following concerns:

1. The number of soil borings in a karst area should be determined by the engineer or geologist based on judgement and existing geologic information. A specific number of boring should not be specified. Although, if they deem it necessary to protect the environment, the Department may require additional borings, sampling, or tests. Minimum depth of at least one boring is important to specify as stated in the proposed rule.
2. Requiring a storage facility for perimeter drain tiles is not feasible. Storage facilities constructed according to the proposed rules are meant to be liquid tight and therefore are not likely to contaminate perimeter drain tiles. However, if it is determined that a facility does have seepage to a tile, the liquid must be captured, properly treated and/or disposed as required by the Environmental Protection Act.

An important provision of the proposed rule is section 506.106 which provides for design alternative, modifications, and waivers. This allows for engineering judgement to be used.

More explanation of these comments and details can be found in a paper that Mark Armstrong, P.E. and I wrote for the proceeding of the 1999 Livestock Waste Management Conference held at the University of Illinois.

Thank you for considering these comments.

Sincerely,



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