

July 1, 2014

Mr. Doug Szenher
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, Arkansas 72118

Re: Public Comment—Regulation 5 and Regulation 6 Rulemaking

Subject: Response to Remarks Made by Mr. Evan Teague of the Arkansas Farm Bureau at the Harrison Public Meeting

Dear Mr. Szenher,

At the Harrison meeting on June 17, apparently in response to my opening comments that the clay liners of the C & H Hog Farms waste holding ponds would leak at an initial high rate and would probably be a continuing source of contamination over time, Mr. Teague stated that a 1995-2000 study sponsored by ADEQ of hog farms in the Buffalo River watershed showed that the pond clay liners did not leak and that the “modern” clay liners at C&H Hog Farms were better than those used in the 90’s.

I take issue with his statement. We requested the records from ADEQ of the 1995-2000 study and they supplied a technical article about the ADEQ study (Ref. 1). The study was initiated because in the 90’s e-coli concentrations were increasing in the Buffalo River and its tributaries and it was thought that this was due to cattle and swine farms in the area. At that time there were 11 permitted small swine farms with waste treatment facilities in the watershed and six agreed to participate in the study. A number of problems were identified including surface water overrunning the facilities, breaking down of vehicles on the rough roads on the way to spray fields (and thus putting too much waste on nearby fields), insufficient capacity of the manure storage facilities, too much solid manure in ponds reducing capacity, and waste spreading equipment of too low a capacity to handle the waste load. BPM’s (Best Management Practices) were also deficient. They worked on improvements for all six

farms and performed in-depth monitoring of the surface water leaving one of the farms. They found a substantial decrease in the concentrations of phosphorus and nitrogen in the surface water after making a number of improvements both in the physical parameters and the BMP's.

Whether or not there was leakage through the pond liners is another matter. The referenced technical article states that they "reconditioned" the pond liners and that probably meant that they re-compacted the soil. That is how pond liners are constructed initially (Ref. 2). Various EPA publications (Ref. 3, Ref. 4) describe the difficulties of measuring pond liner leakage. One method involves not adding waste to the pond for one to two weeks, having a gauge to accurately measure the water level change, using a rain gauge to measure rainfall, and using an evaporation pan to measure the rate of evaporation. All of this data can be used to determine a leakage rate. There is no mention that they used this method. The other method that could be used without a lot of special equipment is an indirect one in which groundwater concentrations are monitored. This is done by determining the direction of the groundwater flow and drilling two wells up-gradient and two wells down-gradient and measuring the concentration of phosphorus and nitrogen in the wells. The amount of leakage can be inferred by the difference in concentration. They may have tried to use a modified version of this method. There is no indication in the reference that they determined the direction of the groundwater flow but they did drill "wells", "upstream and downstream". The statement in the presentation is that "(1) the swine farms in the Buffalo River watershed were primarily impacting surface water and (2) the local geologic setting plays an important role in the integrity of the earthen manure storage structure and, in this case, helped limit the impacts to groundwater quality."

Since there was not data presented in the article we cannot judge the degree of impact of pond leakage on groundwater contamination. There must have been some contamination since they mention that the geologic setting "helped limit the impact". However, we can rely on several EPA publications, Ref. 2, Ref. 3, and Ref. 4. to help determine leakage characteristics of pond liners. It is stated that with a compacted soil liner, one cannot rely on a liner permeability of less than $1 \times 10^{-7} \text{ cm}^2/\text{sec}$. We

can use this permeability and Darcy's Law to calculate the leakage rate for ponds with 12-inch liners and a liquid depth of 12 feet (as an example) and find that the leakage rate would be 1,200 gal/acre/day. For a one acre pond this would be 440,000 gal/year. This is certainly not insignificant and thus when Mr. Teague said that there was not leakage of the liners tested in the late 90's, it would seem that he was mistaken. Also since the references we used (Ref. 2, Ref. 3, and Ref. 4) describe the current state of compacted soil liner technology as practiced at C & H Hog Farms, we believe Mr. Teague's statement about his not expecting the liners there to leak is not realistic either

There are liner types that the USDA's Agricultural Waste Management Field Handbook (Ref. 2) describes, i.e. ecomembranes, that do not leak but Regulation 6 does not require that type and while Regulation 5 could be interpreted to require ecomembrane liners in karst terrane, that is not enough of a change to prevent contamination of the Buffalo River. As mentioned in my letter about water quality, there are a number of other routes for contamination.

The amendments should be approved to ban medium and large CAFOs in the watershed.

Sincerely,

Robert Cross
President, Ozark Society
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Fayetteville, AR 72702

References

1. Formica, S. J. et al., 2001, Using data, communication & education to improve swine waste management in the Buffalo River Watershed, Proceedings of 2nd National Conference: Nonpoint Source Pollution Information & Education Programs, May 14-17, 2001 (Chicago, Illinois)

2. U. S. Department of Agriculture, Natural Resource Conservation Service, *Part 651 Agricultural Waste Management Field Handbook*, Chapter 10, Agricultural Waste Management System Component Design, August 2009
3. EPA's Region 6 Office, *CAFO Liner Requirements*, July 20, 2011
4. State of Oregon, Department of Environmental Quality Guidelines, Guidelines for estimating leakage from existing sewage lagoons, DSM: LAGOON2.TST, Orig. V.93, Rev.1, VIII94