



**A HYDROGEOLOGICAL ASSESSMENT OF THE PROPOSAL FOR
SYNTHETIC LINERS IN MANURE PONDS AT THE C&H HOG FARM,
NEWTON COUNTY, ARKANSAS.**

**TESTIMONY FOR PRESENTATION AT A PUBLIC HEARING
SEPTEMBER 29, 2015 AT JASPER, ARKANSAS.**

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Ozark Underground Laboratory, Inc.

An assessment prepared at the request of the Buffalo River Watershed Alliance.

My name is Tom Aley. I am President and Senior Hydrogeologist at the Ozark Underground Laboratory, Inc., 1572 Aley Lane, Protem, MO. 65733.

I have been continuously licensed as a Professional Geologist in Arkansas (License #1646) since 1991 and I have similar current licenses in Missouri, Kentucky, and Alabama. Since 1983 I have continuously held national certification as a Professional Hydrogeologist from the American Institute of Hydrology (PHG #179). I hold university degrees from the University of California (Berkeley) awarded in 1960 and 1962. A copy of my resume is available on-line at www.ozarkundergroundlab.com. I am submitting my testimony as a Professional Hydrogeologist and a Professional Geologist licensed to practice in the State of Arkansas. This assessment of the proposal for synthetic liners in the manure ponds at the C&H Hog Farm was requested by the Buffalo River Watershed Alliance.

In my profession I specialize in the hydrology of karst areas and in the subsurface migration of pollutants. On August 27, 2015 in a public hearing at Jasper, Arkansas I testified about the inadequacy of the Environmental Assessment for federally guaranteed loans for this hog farm. In that testimony I commented at length on the risk of catastrophic sinkhole collapses beneath these manure ponds and resulting risks to water quality from the manure ponds and other features associated with the C&H Hog Farm operation. Rather than repeat that testimony I am attaching a copy of my earlier testimony and request that it be made a part of tonight's public record. Comments 6 and 7 in my previous testimony specifically relate to the manure ponds.

In my professional work in karst areas I have had substantial personal experience with stormwater detention basins, manure ponds, sewage lagoons, and industrial waste lagoons in karst areas that have experienced severe leakage and/or catastrophic collapse into sinkholes. Unfortunately, it is a very common problem even in states (such as Texas) with stringent regulatory controls designed to protect groundwater quality. Arkansas lacks effective groundwater protection controls as is demonstrated by the existence of this hog farm and its manure ponds. Most of the wastewater impoundments that have experienced severe leakage and/or catastrophic collapse have had compacted clay liners, but some have had synthetic liners that have been ruptured by land subsidence or catastrophic collapse. This has been the case even when the liners were installed during the initial construction of the impoundments. Retrofitting liners in the C&H manure ponds so that they will not leak or rupture will, at best, be a very challenging operation.

If there is to be a reasonable chance that the liners will be beneficial then ADEQ, in their oversight of this modification, needs to ensure the following:

- That all manure and any ponded water or super-saturated sediment is removed from the ponds before any liner installation is begun. The liners must not be installed over "boggy" areas, ponded water, or depressions filled with manure.
- The empty and effectively cleaned ponds must be searched by a qualified person (preferably an experienced geologist licensed in Arkansas) for evidence of

subsidence or small collapses expressed in the sediments on the floors or sides of the ponds. Such features are likely to be filled with manure and this is why all manure must be removed before examination.

- That sediments on the floors and sides of the basins are compacted with appropriate compaction equipment prior to installation of the liners and any underlying cushion materials.
- That all tears or other damage to the liners are repaired before the liners are placed in service.
- That, after installation of the liners, the manure ponds are refilled with water and/or manure to prevent any portions of the liners from floating on any water that builds up between the top of the compacted sediments and the liners. Segments of liners that float are subject to being unequally stressed and torn when liquids are subsequently added to the ponds.

Examining the empty and effectively cleaned ponds for evidence of subsidence or small collapses expressed in the sediments on the floors or sides of the ponds is critically important. Areas that have experienced subsidence or small collapses are critically important evidence of underlying instability. In this karst setting such underlying instability extends into the underlying limestone bedrock, which is of substantial but unknown depth at this site due to the absence of an appropriate and adequate subsurface investigations. Since the manure ponds have already been constructed, effective remediation of the underlying instability will almost certainly require pressure grouting that would extend from underlying cavities in the limestone up through the residuum to the base of the ponds. I recommend the following publication as the best available current reference on sinkhole and subsidence remediation: Waltham, Tony; Fred Bell; and Martin Culshaw. 2005. "Sinkholes and subsidence; karst and cavernous rocks in engineering and construction." Springer/Praxis Publishing. 382p.

The proposal to install the liners suggests that one or both of the manure ponds may already be experiencing major leakage to groundwater. If so, given the hydrogeologic nature of the site and the underlying Boone Formation Aquifer, that leakage is likely to be concentrated in a few points that quickly convey contaminants into the underlying groundwater system. Such discrete recharge zones are subject to subsidence and/or collapse. A thin synthetic liner lacks the strength to span even relatively small subsidence or sinkhole features. As demonstrated a couple of years ago, a six or eight inch thick concrete floor at the Corvette Museum in Bowling Green, Kentucky was unable to span an underlying sinkhole collapse. A 60 mil synthetic liner will not do nearly as well as the concrete. The manure ponds and the Corvette Museum have important factors in common; both are in karst areas and neither received adequate subsurface investigations before construction.

In summary, while the proposed liners in the ponds may be beneficial, they do not negate the serious pollution risks associated with the manure ponds or with the entire operation of the C&H Hog Farm. Adequately preparing the ponds for installation of the liners will be difficult and, especially if evidence of subsidence or collapse is found, expensive. It is not likely to occur. Inadequate preparation of the ponds for the liners

will compromise the leakage integrity of the synthetic liners even if they are well installed. What we have here is little more than a public relations effort to conceal the major pollution threat posed to the Buffalo River by C&H Hog Farms.

Thank you for your attention.

A handwritten signature in black ink that reads "Tom Aley". The signature is written in a cursive style with a large, looping initial "T".

Tom Aley, Arkansas PG 1646
President and Senior Hydrogeologist
Ozark Underground Laboratory, Inc.

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