

## Marti Olesen Comments on Regulation 5 Draft Denial of Permit

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Director Keogh, Caleb Osborne,

VIA U.S. MAIL AND EMAIL

I agree with and support the ADEQ's STATEMENT OF BASIS and its decision to deny the C&H swine CAFO Permit No. 5264-W AFIN 51-00164:

"This Statement of Basis is for information and justification of the draft permitting decision only.

The Arkansas Department of Environmental Quality (ADEQ) hereby issues a draft denial of the application for Arkansas Pollution Control and Ecology Commission (APC&EC or

"Commission") Regulation 5 Permit 5264-W, AFIN 51-00164."

I begin my comments by including the passionate words of Dr. Kenneth Smith, author of the book, *Buffalo River Country*, a timeless narrative of the Buffalo National River and its hinterlands, reflecting on its scenery, geology, flora, fauna, history, and archaeology. He served for many years as the park's master trail planner and trail builder with a long term vision for the Buffalo National River. Listen to his speech at the Arkansas State Tourism convention where he was honored and inducted into the Tourism Hall of Fame in 2017.

<https://vimeo.com/208539794>

I include by reference the comments of the Buffalo River Watershed Alliance and the ADEQ draft denial of the permit. Since the Buffalo National River is designated as an Outstanding National Resource Water and Extraordinary Resource Water, it is subject to more stringent water quality standards than many other streams. Because most essential bases have been evaluated extensively by both ADEQ and BRWA, I will focus here on the frequently neglected aspect of the least considered, the threatened, endangered, and rare species that are essential to the integrity and future of the Buffalo National River and the sustainable fabric of its watershed. Having been labeled an "extreme elitist economic environmentalist" by some, I can only say in defense that the river cannot speak for itself, its lifeforms and the creatures that depend upon it can't speak for themselves, and so I volunteer to speak for them. Although given a nod in the Environmental Assessments (EA) that have been submitted for loan guarantees for the C&H operation, they have not been examined thoroughly as to the parts they play in maintaining the quality of the water or the watershed.

A federal court district judge ordered a "harder look" than was taken in the cursory "checklist" EA submitted for C&H's CAFO loan. ( [https://buffaloriveralliance.org/Resources/Documents/C\\_H\\_Hog\\_Farms\\_Inc\\_EA\\_FONSI\\_26\\_Sept\\_2012.pdf](https://buffaloriveralliance.org/Resources/Documents/C_H_Hog_Farms_Inc_EA_FONSI_26_Sept_2012.pdf) ) The second EA contracted by the Farm Services Agency (FSA) and the Small Business Administration (SBA) with an Australian firm, Cardno-GS and Ecosphere Environmental Services, a New Mexico firm specializing in the western United States to draft a new EA, also turned out to be flawed for many reasons. The "deeper look" Cardno took was incomplete and shallow as we now know. Subsequent information has come to light that negates its determinations about C&H's location in karst terrain and its role in affecting the watershed's critical habitat for these rare and important species.

(Cardno EA, 3-30-3-32: [https://buffaloriveralliance.org/Resources/Documents/Aug\\_2015\\_Draft\\_EA\\_on\\_remand.pdf](https://buffaloriveralliance.org/Resources/Documents/Aug_2015_Draft_EA_on_remand.pdf) )

Exhaustive studies show that the wilderness habitat that these species depend upon for their lives is dwindling and being segmented, divided into pieces due to disruptive factors we all recognize, agriculture, logging, construction of homes and cabins, etc. However, the added impairments attributable to runoff from a single liquid waste swine CAFO from the excessive manure applied to fields and from leakage through underground karst channels as recharge into the Buffalo National River (BNR) and Big Creek may well be the critical factors in these species' continued existence in this watershed. The degradation of the waters affected by the waste, the extensive algal cover, increased pathogens, heavy metals, and low dissolved oxygen content may be the environmental "straw that breaks the camel's back", so to speak. People often negate the importance of the loss of some little-known fish, or bat, or mussel. They see plenty of wildlife but don't recognize that entire chains of predator/prey relationships rely upon a balance that has emerged in the present design we see in a particular forest or waterway. We need reminders that we have been charged as stewards to care for living creatures. When the least of these has its very existence threatened, our nation has established laws and practices that help us to protect and sustain them again.

Here in the BNR watershed, because of its many caves, clear streams and hardwood forests, several threatened and endangered species of bats find refuge. At night they forage up to 10 miles over the creeks and in the woods to feed on insects. White Nose Syndrome (WNS), a fungus that has decimated bats across America, found its way in 2014 to the BNR watershed as a new threat. The combination of the spread of WNS, along with reductions of their highly sensitive macroinvertebrate insect prey, may wipe out these beneficial mammals. The Gray, Long Nose, and Indiana bats feed primarily on Mayflies and other key macroinvertebrate insect species that thrive only in pristine watersheds along streams such as Big Creek and the Buffalo River. There are at least thirteen known caves and innumerable pockets and crevices in the Boone formation along the Big Creek and its Left Fork that serve as ideal roosts and hibernarium for these bats. In the Buffalo River watershed more than 440 caves and over 500 springs draw them here. (See Caves map NPS below.) The smaller colonies, because of their relative isolation away from the bigger caves where WNS infects large populations and has been so deadly, may be the rare survivors. The threat of added endangerment from microcystins contained in abundant algal growth in the Buffalo National River is another factor of concern for bat survival. The bats dine on the arthropods that are affected and declining because of this exponential increase in algal cover. In studies of bats in algae infested waters, as bats dip down to drink the water and forage for insects above a waterway, researchers have found them coated with green algal slime which appears to have suffocated them. If that was not the cause of death, then the accumulation of mycrocystin toxins from the insects they ate poisoned them from within. (See "Mortality of Little Brown Bats (*Myotis lucifugus carissima*) Naturally Exposed to Microcystin-LR" *Journal of Wildlife Diseases*, 55(1), 2019, pp. 000–000 Ó Wildlife Disease Association 2019.) (See also, "Survey of Threatened and Endangered Bat Species on Big Creek" by James W. Gore" Link: <https://buffaloriveralliance.org/Resources/Documents/Ex 3 - Gore FINAL - truncated version, reduced size.pdf>"Survey of Threatened and Endangered Bat Species on Left Fork of Big Creek by James W. Gore" Link: <https://buffaloriveralliance.org/Resources/Documents/Bat Survey Left Fork Final-2.pdf> (Comments F3 and F4 pp. 98-104, BRWA comments.)

The following excerpts and tables from the FSA/SBA Cardno Environmental Assessment ([https://www.fsa.usda.gov/Assets/USDA-FSA-Public/usdfiles/Environ-Cultural/fonsi\\_hog\\_farms\\_final\\_assesment.pdf](https://www.fsa.usda.gov/Assets/USDA-FSA-Public/usdfiles/Environ-Cultural/fonsi_hog_farms_final_assesment.pdf)) show the dismissive and inaccurate evaluations made about Ozark endangered and threatened species, especially as relates to the complicated BNR karst terrain and its unique fit to enable the survival of these species. (pp. 32-47). In addition, the analyses in this EA document must now be reappraised since subsequent findings and information brought forth during the past few years have proved its conclusions and predictions false. Please take the time to review the assessments in that report. It is time to reconsider the effects impaired water quality has on these endangered species.

From the Cardno EA: “The presence of foraging bats on the C&H Hog Farms or the application fields does not mean that they would be adversely impacted by the farm operation. The C&H Hog Farms operation is not expected to inhibit or modify the movement of foraging bat species that may forage in the area.” After several years of scientific water quality monitoring since then, we now know that when fields are smothered in excessive waste applications of phosphorus and nitrates, pathogens and nutrient runoff negatively affect the water quality of tributary Big and Left Fork creeks as well as the Buffalo.

**“Significant changes in water quality could adversely affect macroinvertebrate populations occurring in Big Creek, which indirectly could affect bat species through a reduction in prey base. However, no measureable adverse impacts to surface water quality in Big Creek have been identified based on the BCRET and NPS water quality monitoring data. Therefore, no effects to Indian bat, gray bat, or northern long-eared bat are expected to result from the proposed action.** The four bat species are included in Table 3-3, but are not analyzed further” in this Cardno document.

In addition, consider the blanket statement in the report, *“There are no caves within the C&H Hog Farms facilities including the application fields in the table below.”* We know that no adequate geotechnical investigations have been made to determine that conclusion. We do know that there is a doline feature beneath at least one of the fields from ERI test results and that the Harbor borehole drilling has revealed the convoluted nature of underground geology beneath the waste ponds and spreading fields, showing voids and epikarst channels. Note that Cardno states in the table below that the Gray, Indiana, Ozark big-eared, and Northern long-eared bats were recorded in the Big Creek and Left Fork areas. These bats forage for miles in the woods and they winter in local caves, John Eddings Cave being one example. (See attachment #1 for extent of caves in the BNR watershed.)

Mammals				
Gray bat ( <i>Myotis grisescens</i> )	Endangered	Inhabits caves year-round. Occupies cold hibernating caves or mines in winter and warmer caves during summer (USFWS 2009).	There are no caves within the C&H Hog Farms facilities including the application fields. The nearest recorded location used for summer roosting by transient gray bats is approximately 2.75 miles from the farm (NPS 2015a, 2015b; USFWS 2015c). This species was recorded in summer 2015 as occurring in the action area on Big Creek and the Left Fork of Big Creek (Gore 2015a, 2015b).	Yes
Indiana bat ( <i>Myotis sodalis</i> )	Endangered	Hibernate during winter in caves or, occasionally, in abandoned mines. During summer roosts under the peeling bark of dead and dying trees (Federal Register 2007).	There are no caves or contiguous old-growth forests within the within the C&H Hog Farms facilities including the application fields. This species was recorded in summer 2015 as occurring in the action area on Big Creek and the Left Fork of Big Creek (Gore 2015a, 2015b).	Yes

Species	Status	Habitat Associations	Potential to Occur in the Action Area	Eliminated from Detailed Consideration
Northern long-eared bat ( <i>Myotis septentrionalis</i> )	Threatened	Summer roost habitat is generally correlated with old growth forests composed of trees 100 years old or older with low edge-to-interior ratios. Hibernates in caves or inactive mines (Federal Register 2011).	There is no suitable roosting or hibernacula habitat within the C&H Hog Farms facilities. The nearest hibernaculum location used is approximately 4 miles from the farm (NPS 2015a; 2015b, USFWS 2015c). This species was recorded in summer 2015 as occurring in the action area on Big Creek and the Left Fork of Big Creek (Gore 2015a, 2015b).	Yes
Ozark big-eared bat ( <i>Corynorhinus [Plecotus] townsendii ingens</i> )	Endangered	Associated with caves, cliffs, and rock ledges in well-drained, oak-hickory Ozark forests (USFWS 1995).	There is no suitable roosting or hibernacula habitat within C&H Hog Farms facilities. This species recorded approximately 3.8 miles from the farm in December 2014 (NPS 2015a; 2015b, USFWS 2015c).	Yes

Besides the demise of bats serving as the “straw that broke the camel’s back” in this ecosystem, we have the lowly mussels as a precarious “canary in the coal mine” for the integrity of the Buffalo National River which has been designated “critical habitat” by the Department of Interior for the Rabbitsfoot mussel *Theleiderma cylindrical* and the Snufflebox mussel. (Federal Register/Vol. 80, No. 83/Thursday, April 30, 2015/Rules and Regulations.) These mussels are threatened throughout their rapidly shrinking range in the Buffalo National River. With the exponential growth of algal blooms stretching for 70 miles along the river sections, including those where they live, these vulnerable species are at severe risk. The continued presence and vitality of filter feeding mollusks plays its role in the sustainability and health of this prime outstanding resource water habitat. See the table below from the Cardno FSA/SBA EA.

Species	Status	Habitat Associations	Potential to Occur in the Action Area	Eliminated from Detailed Consideration
<b>Clams</b>				
Rabbitsfoot mussel ( <i>Quadrula cylindrica cylindrica</i> )	Threatened with Designated Critical Habitat	Found in small- to medium-sized streams and some larger rivers. It usually occurs in shallow water areas along the bank and adjacent runs and shoals with reduced water velocity. May occupy deep water runs, 9 to 12 feet of water. Bottom substrates generally include gravel and sand (Federal Register 2012c).	From the confluence with Big Creek, the nearest rabbitsfoot mussel recorded occurrence is approximately 26.6 river miles downstream on the Buffalo River (USFWS 2015b).	No
Snuffbox mussel ( <i>Epioblasma triquetra</i> )	Endangered	Found in small- to medium-sized creeks to larger rivers, and in lakes. Occurs in swift currents of riffles and shoals and wave-washed shores of lakes over gravel and sand with occasional cobble and boulders (Federal Register 2012a).	From the confluence with Big Creek, the nearest snuffbox mussel recorded occurrence is approximately 81 river miles downstream on the Buffalo River (USFWS 2015b).	No

One species that draws visitors and serious fishermen to the river is the Smallmouth Bass. This sport fish requires the clean, high quality waters that the mussels serve to filter. Although Smallmouth Bass transition their diets toward eating more fish as they grow, all rely almost exclusively on insects for their diet as juveniles. See table 5 and descriptors pp. 29-32 of the [Assessment Methodology](#). Sensitive arthropods are accounted for in the Hilsenhoff Biotic Index and Mayflies make up the E in EPT (Ephemeroptera, Plecoptera, Trichoptera; aka mayflies, stoneflies, caddisflies) metrics. They rank in the highest, least tolerant species category on the Aquatic Life Designation, and are very important for many species of fish, including the coveted Smallmouth Bass. In this article from the UK, Mayflies are a tipping point for pollution. Arkansas' assessment tool measures them, and bats depend on these highly sensitive macroinvertebrates for their survival. The ripple effects of deleting entire species from the BNR food chain affects other species dependent on the makeup of this long established pristine habitat. It is reasonable to predict that they will also suffer detrimental consequences from the same distressed water quality that threatens the continued survival of these target species. "At levels very close to existing guideline limits - 25mg per litre of fine sediment and 0.07 mg/l of phosphate - the researchers found 80% of the (Mayfly) eggs died."

<https://www.theguardian.com/environment/2018/jan/11/insect-declines-new-alarm-over-mayfly-is-tip-of-iceberg-warn-experts>

This serves to remind us that the Buffalo River must be protected from excess nitrogen and phosphorous running off from agricultural over application, and recharge into the Buffalo mainstream through subsurface karst channels and springs. The resultant algal growth changes the make-up of the water and its oxygen supply, clouding the light with its mats and covering the bottoms with residual degradation and excretions. Sewage algae and long strands of bright green algal slime stretch unrelenting through the once sweet water. Low dissolved oxygen interferes with breathing for blue ribbon Smallmouth Bass and other key species that live in the streams. "Dissolved oxygen deficiency is the most common and overarching measure of water quality because dissolved oxygen is critical for many forms of aquatic life that use oxygen in respiration, including fish, invertebrates, bacteria and plants." (Read more at: <https://phys.org/news/2018-10-watershed-groups-positive-impact-local.html#jCp>).

When considering impairment of the river:

“Under Reg. 2.509 Nutrients

(A) Materials stimulating algal growth shall not be present in concentrations sufficient to cause objectionable algal densities or other nuisance aquatic vegetation or otherwise impair any designated use of the waterbody. Impairment of a waterbody from excess nutrients is dependent on the natural waterbody characteristics such as stream flow, residence time, stream slope, substrate type, canopy, riparian vegetation, primary use of waterbody, season of the year and ecoregion water chemistry.”

During the past three years, the Buffalo National River has experienced significant algal blooms primarily downstream of the confluence of the Big Creek at Carver on the Buffalo. A University of Arkansas extension publication on soil phosphorus, (with authors including Dr. Andrew Sharpley leader of the BCRET water monitoring team) describe the problem of continued applications of waste as fertilizer on increased algal growth:

**The repeated application of manure at rates meeting plant N needs will increase soil test P levels.**

A large amount of research between 1985 and 2000, showed that as STP increased, especially in the top 2 to 4 inches of soil, so did the concentration of soluble P in runoff (Figure 1). While conservation programs and improved pasture management and productivity were decreasing total P losses, research found that more of the P that was moving was in a soluble form, which was immediately available for algal uptake. This exacerbated the frequency and occurrence of nuisance algae blooms in freshwater lakes and reservoirs. In most cases, biological productivity (or eutrophication) is accelerated by P inputs because N and carbon can freely exchange between air and water and some blue-green algae can fix atmospheric N.

**Research shows as soil test P increases, so does the concentration of P in runoff.**

### *Soil Phosphorus: Management*

Sharpley, Daniels, Vandevender, Slaton

U of A Extension Service UAEX Publication #9528. #1029

FSA1029-PD-9-10RV

“The repeated application of manure at rates meeting plant N needs will increase soil test P levels.

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“Growers with confined livestock and poultry operations import feed onto the farm. This feed contains P at nationally recommended dietary levels for healthy animals to maintain bone structure

strength, reproduction, etc. However, as only about 30 percent of that P is absorbed by the animal, most of the dietary P passes through the animal and is excreted in manure.”

Dr. Sharpley also discusses phosphorus in this video. [The Role of Phosphorus Management](#) - January 30, 2015 Youtube presentation from Maryland Phosphorus Symposium. Quote from approximately 32:00: "**We can't expect cheap food and clean water at the same time.**" He points out that phosphorus causes acceleration of algal growth and the eutrophication of water zones.

<https://www.youtube.com/watch?v=0lvkRwXpZYY&feature=youtu.be>

Everyone has heard of the butterfly effect. In the river the choice of a single threatened “butterfly” species is impossible to make. It is now apparent that the lack of dissolved oxygen, the surplus of nutrients (nitrates and phosphorus), the resultant slimy strings and mats of algae, and excess pathogens, change the life stream of each of its most sensitive inhabitants. The river’s designation as an Outstanding Natural Resource water, and “primary contact” EPA category should provide protections for the health and lives of all creatures great and small that need, enjoy and rely on its clean water, from Mayfly to human child.

The human end of this habitat chain feels the effects when small towns and businesses lose their appeal for customers and residents. When no one visits the watershed, where will the residents find work? Not everyone wants to work in a confined animal feeding operation. Restaurants, cabins, and gift shops can’t provide jobs if no one comes to view or play or fish on the River. Too many other communities have already experienced this downward spiral. When the waters cloud and stink, people turn to other venues for their work and recreation. Children move away to the cities and communities begin to die.

Although Farm Bureau, Pork Producers, JBS and C&H itself posit its operation as a state of the art poster child family farm, C&H has not submitted adequate information to the ADEQ or the people of Arkansas that demonstrate that it is not impairing the Buffalo National River. Information in the form of a groundwater flow direction dye tracing studies is missing. (See photograph below from the Harbor Drilling Report showing calcite crystals formed in an underground void discovered between 18.5-28 feet below ground surface from a single borehole.) There simply are not sufficient geotechnical investigation results that portray the inherent karst geology as an acceptable operation location. Storm water monitoring data is needed of run-off from the site and the waste application fields currently in use, including EC Farms liquid waste application fields (which are also in the BNR watershed and along its key tributaries). Since most runoff occurs during flash flooding and storm events this kind of monitoring is essential to accurately assess accurate nutrient management plan application practices. If there is insufficient information submitted by the C&H operation showing that its facility, storage ponds and application fields will function as projected in its application, then this new Reg 5 permit must be denied, the site closed, and removed from the BNR watershed’s karst hydrogeology.

Besides the references I include below, I would like to comment on the argument that C&H makes that no other facilities have received the scrutiny it has received, that it is being singled out for unfair and unprecedented treatment, and held to higher standards than any other swine CAFO in the state. The Arkansas regulations are written and publicly available for anyone to read. C&H is applying for a new permit under this regulation, and it must be treated as a new permit. It is clear that the permit application does not meet its criteria. It is irrelevant whether they ask to be compared to other permits that exist under Reg 5. This is an individual, site specific, no discharge permit. With this crucial permitting decision, ADEQ is using the state’s regulations to protect the waters and health of the people of Arkansas at this specific site. That C&H sits in a karst hydrogeologic setting and that its proximity and operations affect the Buffalo National River require it to be examined thoroughly. C&H may not have realized that this location is unique and extremely valuable to the integrity of the designation of the outstanding resource water quality of the Buffalo National River, but the reality remains that it is. It isn’t comparable to the other locations of swine CAFOs in the state. The combination of problems that its location creates is unprecedented for Arkansas. It’s application for a permit is for a site that ADEQ has

indicated the agency cannot defend because of the huge quantities of unknown factors it involves. The watershed of the Buffalo serves as a top tier assessment category against which water quality degradation for the rest of state is compared. The lives of its inhabitants, even the lowliest and least tolerant of insects, truly contribute to its stability and sustainability. C&H is certainly not the only factor in the increased problems affecting the river, but it is the single largest factor contributing to the degradation, and it has been documented during the river's rapid decline over the past five years. Much needs to be addressed and remedied to improve the water quality of the Buffalo National River. However, this is a single application for an individual permit must be held to the requirements of the regulation and denied.

So, the lowly mussel, the intolerant Mayfly, and the quirky bats have a tale to tell us about what happens when we live as if we were wearing blinders, seeing only the scenes we prefer. We must pay attention to the least of these creatures, and examine how they relate to our own state's future, and that of its natural resources. If we keep our eye on the sparrow, (or in this case the bat, the mussel and the Mayfly), if Arkansas focuses on the narrow turquoise sliver in the middle of its portion of America, then our most unique and vulnerable ecosystem will prosper. It is a last refuge for its most susceptible inhabitants. If we are good stewards, we will have fresh water in our wells, fresh air to breathe, abundant wildlife, and the indescribable beauty that draws almost a million people to visit every year, where they, too, can take in that rarer and rarer vision of a watershed intact, creation preserved and flourishing. By no stretch of the imagination or objective scientific review can swine Confined Animal Feeding Operations be a fit for the spectacular and singular karst environment of the Buffalo National River.

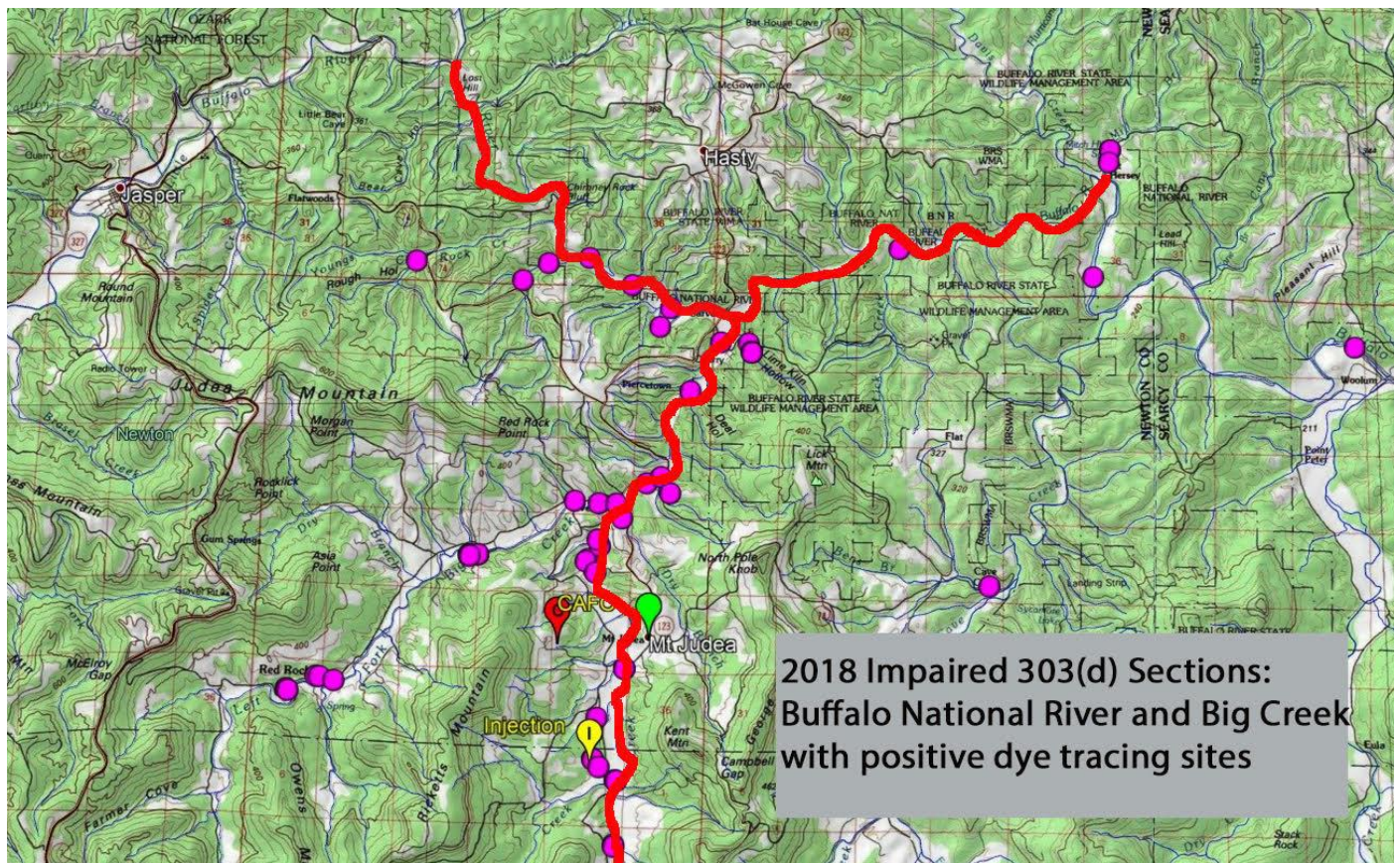
Sincerely,

Marti Olesen  
P.O. 104  
Ponca, AR 72670

**I include the following references to support my comments:**



- Overlay of two maps showing the 303d impaired waters (red) in the watershed and the dye trace results (pink) of Dr. Van Brahana's investigation of dye receptor sites from a well close to the C&H operation. One site was 12 miles from the injection and others showed a lateral movement under a mountain to the Left Fork of Big Creek. This is included to show the utter unpredictability of karst hydrogeological connections in the C&H vicinity.



**Harbor Drilling Report**, subsurface investigations show calcite crystals formed inside a void formation demonstrating inadequacy of thorough geotechnical investigations into the hydrogeology of the operation's karst terrain: photos #11 and 12:

<b>Photo #:</b>	12	<b>Date:</b>	9/21/16	<b>Time:</b>	1415	<b>Photographer:</b>	C. Yeatman
<b>Description:</b>	Core recovery from 18.5 to 28.5'						



<b>Photo #:</b>	11	<b>Date:</b>	9/21/16	<b>Time:</b>	1415	<b>Photographer:</b>	C. Yeatman
<b>Description:</b>	Core recovery from 18.5 to 28.5'						



- **Dr. Bert Fisher Expert report** concludes: “C&H Hog Farms’ failure to conduct an appropriate field assessment of all land application sites contemplated in C&H Hog Farms Regulation 5 permit application, including, but not limited to, soil thickness and water capacity alone would have been sufficient grounds to deny issuance of a Regulation 5 permit to C&H Hog Farms. As a consequence of C&H Hog Farms’ failure to conduct appropriate and required geological investigations the record developed by C&H Farms in support of their Regulation 5 permit application lacked necessary and critical information to support granting C& H Farms a Regulation 5 permit. The requirements to obtain a permit under Regulation 5 are minimum 105 of 132 standards. The permit application submitted by C&H Hog Farms did not meet the minimum standards required by Regulation 5. ADEQ properly denied issuance of a Regulation 5 permit to C&H Hog Farms.”

- **National Park Service, USGS analysis:**

**Tourism to Buffalo National River** Creates \$71.1 Million in Economic Benefits Harrison, Arkansas – A new National Park Service (NPS) report shows that 1.5 million visitors to Buffalo National River in 2017 spent \$62.6 million in communities near the park. That spending supported 911 jobs in the local area and had a cumulative benefit to the local economy of \$71.1 million. "Buffalo National River is pleased to welcome a diverse group of visitors from across the state and around the country," said Acting Superintendent Laura Miller. "In addition to the recreational opportunities available at Buffalo National River we are happy to share the park's natural and cultural resources with our visitors. It is our hope that local communities continue to benefit economically from the tourism that is generated by the park." (The peer-reviewed visitor spending analysis was conducted by economists Catherine Cullinane Thomas of the U.S. Geological Survey and Lynne Koontz of the National Park Service.)

- **Buffalo River Watershed Alliance Comments:**

- pp.40-41, BRWA comments: Regulation 5.404 Subsurface Investigation Requirements states: “The subsurface investigation for earthen holding ponds and treatment lagoons suitability and liner requirements may consist of auger holes, dozer pits, or backhoe pits that should extend to at least two (2) feet below the planned bottom of the excavation.”

The AWMFH 651.0704(4) Guide to detailed geologic investigation page 7-21 goes further suggesting the following for sampling the subsurface where ponds are planned. This is noted as to be particularly applicable for complex and inconsistent environments such as karst.

“For structures with a pool area, use at least five test holes or pits or one per 10,000 square feet of pool area, whichever is greater. These holes or pits should be as evenly distributed as possible across the pool area. Use additional borings or pits, if needed, for complex sites where correlation is uncertain. The borings or pits should be dug no less than 2 feet below proposed grade in the pool area or to refusal (limiting layer).”

The original NPDES Reg 6 NOI specifies pond area in section C2 “design calculations” as follows:

- Top of Waste Storage Pond 1 20,857 Square feet
- Top of Waste Storage Pond 2 35,262 Square feet

It should be noted that the Reg 5 permit application specifies different square footage areas for the two ponds than the original NOI. Likewise the application also specifies square footage for a total drainage area. None of these figures agree, but for the purposes of this comment they do not vary enough to make a

difference.

The original NPDES Reg 6 NOI shows records for three borings in the Geologic Investigation document. These are numbered B-1, B-2, B-3. Only B-2 and B-3 were in the area of the ponds (see Comment C3). Using the guide from AWMFH page 7-21(4), there should have been at least 6 distributed borings if “pool area” is interpreted as encompassing both pools. More borings if “pool area” is interpreted as per pool. It is unclear how much latitude Chapter 7 provides the engineer regarding the detailed investigation. Certainly the risk factors were present to justify the AWMFH recommendations. The fact that the engineer recognized that drilling two holes was important but chose not to follow AWMFH guidance for the recommended number in the pond area suggests that the geologic investigation in this permit application is not proportional to the risk factors as discussed in Part A. The sensitivity of the watershed calls for the detailed geologic investigation to be revisited.

- pp. 50-52, BRWA comments:

The indication of epikarst at 13.8 to 28 ft below ground level confirms porous weathered rock at a depth that is above the floor of the ponds with the pond #2 invert at 20 ft below the surface of where the bore hole was drilled (See Appendix C12 for elevations). The AWMFH table 10-D in Appendix 10D (Appendix C-10 of this document) notes the following regarding karst in the Vulnerability to Risk matrix when siting a facility: “large voids e.g. karst, lava tubes, mine shafts) as a very high vulnerability suggesting that the engineer “Evaluate other storage alternatives”. No such alternatives were considered. As a result, this permit does not comply with AWMFH guidance.

What we know for certain is that there is at the very least 23.6 cubic ft area of subsurface open space at a depth of 20 to 28.5 ft where drilling water was lost and where the grout would not rise. The elevation of where the bore hole was drilled was about 914.3 ft (see Appendix C12 page 2) which means the subterranean opening occurred at an elevation between 894.3 and 885.8 ft (where water was lost) or 889.3 (where grout would not rise). The elevation of the floor of Pond #2 is 894.3 ft which places a clearly identified opening of some sort roughly even with the floor of pond 2 or a few feet below.

AWMFH table 10-4 (Appendix C10) that identifies vulnerability to risk, lists “Large voids (e.g. karst, lava tubes, mine shafts) OR highest anticipated ground water elevation within 5 ft of invert” as a “Very high” vulnerability and suggests Evaluate other storage alternatives.

In AWMFH Appendix 10-D under When a liner should be considered the following is stated:

“Some bedrock may contain large openings caused by solutioning and dissolving of the bedrock by ground water. Common types of solutionized bedrock are limestone and gypsum. When sinks or openings are known or identified during the site investigation, these areas should be avoided and the proposed facility located elsewhere.”

- p. 54 BRWA comments:

AWMFH 651.0701 Overview of geologic material and groundwater under Aquifers page 7-7 says this about perched aquifers:

“A perched aquifer (fig. 7–8) is a local zone of unconfined groundwater occurring at some level above the regional water table, with unsaturated conditions existing above and below it. They form where downward-percolating groundwater is

blocked by a zone of lesser permeability and accumulates above it. This lower confining unit is called a perching bed, and they commonly occur where clay lenses are present, particularly in glacial outwash and till. These perched aquifers are generally of limited lateral extent and may not provide a long-lasting source of water. Perched aquifers can also cause problems in construction dewatering and need to be identified during the site investigation.”

- p. 70 BRWA Comments:

The approved pond liner retrofit is of notable concern as it is possible that ADEQ will view this as a solution to the comments in Part C regarding geological issues, and also Part D regarding degradation. Unfortunately, not only does a synthetic liner at this stage present unique risks, it would not satisfy the very serious vulnerabilities identified by comments: C10, C11, C12, and C13. It has been subsequent to the pond liner modification approval that indications of subsurface karst, epikarst, voids, fractures, and perched groundwater have been revealed by Dr. Halihan’s ERI transects and validated by the Harbor Environmental drilling exercise. These risks were unknown at the time ADEQ approved the synthetic liner permit modification in June of 2014. When the circumstances of each of these four comments (C10 thru 13) are applied to the AWMFH Appendix 10D vulnerability to risk matrix (Appendix C10 of this document) the vulnerability is identified as “very high” and the recommendation is: -“Evaluate other storage alternatives”. The 10D vulnerability to risk matrix is not suggesting mitigation of the impoundment, but that it never should have been constructed at that location based on the risk factors present.

The take-away is that ADEQ’s approved synthetic liner modification is now outdated because of what has come to light in recent studies. The approval of the pond liner modification should be rescinded.

- The AWMFH devotes the entirety of Chapter 7 to guidance around “Geologic and Groundwater Considerations”. AWMFH 651.0702 Engineering Geology Considerations in Planning states the following under Part (I) Topography: “Karst topography is formed on limestone, gypsum, or similar rocks by dissolution and is characterized by sinkholes, caves, and underground drainage. Common problems associated with karst terrain include highly permeable foundations and the associated potential for groundwater contamination, and sinkholes can open up with collapsing ground. As such, its recognition is important in determining potential siting problems.”

- Regulation 5.404 Subsurface Investigation Requirements reads as follows: “The subsurface investigation for earthen holding ponds and treatment lagoons suitability and liner requirements may consist of auger holes, dozer pits, or backhoe pits that should extend to at least (2) feet below the planned bottom of the excavation.”

- p. 97 BRWA comments

ADEQ describes the proposed impairment of Big Creek and the Buffalo in the following response to comments on the Regulation 5 permit from January: “ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of

a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen. Based on data for submitted by USGS for the 2018 303(d) list, ADEQ proposes listing Big Creek (AR\_11010005\_022) as impaired for dissolved oxygen.”

- pp.108-109, BRWA comments

BRWA concurs with Professional Geologist Tom Aley’s analyses, and especially that: “Given the abundance of karst features beneath the land application fields, it is my opinion that, if waters of the state are to be protected from manure contamination, then the fields associated with the C&H Hog Farms are not suited to land application of liquid hog manure”.... We concur with Professional Geologist Tom Aley that the AWMFH (p. 2-8) requires that investigations into groundwater must be made to map and determine direction of flow and receiving stream locations, as well as hydraulic gradient. (Appendix 7A)

- **Tom Aley Expert report:**

- pp. 41-42 BRWA agrees with Professional Geologist Tom Aley’s assessment that discrepancies in the depth to bedrock borings reported by the DeHaan engineer and the boring log recorder show that such a hasty and unchecked process does not meet the AWMFH requirements for a site investigation beneath the waste storage ponds. Aley suggests that instead of a site investigation into the karst suitability for siting a facility, this was merely a probe to find suitable clay soils to be used in constructing the liners. He also states that the borings did nothing to confirm they had delved 10 feet into bedrock, that instead of ascertaining bedrock, the auger could very well have encountered a large rock or pinnacle, as is common in epikarst.

- pp. 45-48 BRWA comments

We agree with Professional Geologist Tom Aley’s response to the DeHaan analysis of the clay liner composition. Instead of the fatty clay the firm describes, the results from the boreholes used to determine the suitability of the clay for liner material reports clayey gravel with sand and chert fragments. There were no sieve size measurements so the chert and gravel amounts are unknown in the clays used from this source.

- p.115 BRWA comments:

-The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

- **ADEQ’s assessment, pp.111-116**

p. 111 ADEQ's assessment:

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

p.112

The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

-A groundwater flow study has not been submitted to the Department for review. The Department has no knowledge of any groundwater studies that may have informed the placement of the interceptor trenches. The information on the interceptor trenches provided in the BCRET Quarterly Report for July 1 to September 30, 2014 is not sufficient to determine the appropriateness of the placement of the interceptor trenches for the purpose of monitoring leakage from the waste storage ponds. At this time, the Department does not have sufficient information to comment on the appropriateness of placement of the trenches or on the sufficiency of those trenches as a monitoring system for the waste storage ponds.

- **Director Keogh's deposition:**

p 117 When asked about consideration of alternatives to a denial of the C&H Reg 5 permit application, Director Keogh recalls team discussion about the possibility of using a conditional permit with a "Schedule of Compliance" that listed detailed information that could be submitted by the applicant. ADEQ made the decision not to utilize this alternative because the record of information was too incomplete to demonstrate compliance with Reg 5. (pp. 21-24)

In a meeting with Governor Hutchinson about the C&H Reg 5 denial decision prior to issuing it, Director Keogh relates that her administrative superior, the Governor, was aware and supported the decision to deny the permit. (pp. 27-28)

BRWA supports the ADEQ decision to deny this permit that was reviewed by the Governor before it was issued, including the explanation of the reasons the permit application record was incomplete. (p. 32)

Director Keogh was questioned about when the so called "Blanz memo" was made available to C&H. BRWA agrees with the ADEQ that the decision to deny the permit was based on the terms of Regulation 5 and that applicants have the responsibility to adhere to the regulation and the AWFH and the Technical Guide that Reg 5 includes, and to submit the information required for the ADEQ to consider when evaluating an application. (pp. 58-59)

- **Katherine McWilliams deposition**

pp.117-118 BRWA points out that many concerned individuals took the time and effort to read the entire Regulation 5, and the AWMFH and technical guide it relies upon in order to see if the C&H permit application satisfied the Reg 5 liquid swine waste conditions. The C&H owners and/or the engineers and experts they relied upon for making sure their permit would be in compliance with the regulation could certainly have done the same. As Katherine McWilliams confirmed in her deposition, the AWMFH and technical guide are comprehensive.

- p. 15: BRWA agrees with McWilliams statement that the Reg 5 permit is an individual permit in the state of Arkansas and that Reg 5 permits rely upon the site specific conditions in the AWMFH and the technical guide. When asked about Dr. Blanz's added conditions, she responded: "So it's an individual permit (Reg 5) there were some individual conditions, specific conditions added... for the facility."

pp. 41-43: McWilliams confirms that based on comments ADEQ received, they (questions about the technical completeness of the permit) could not be adequately answered without additional information, which had not been provided by C&H. She explains that additional information would have been from the geologic investigation from the handbook.

pp. 46-48: When asked about a groundwater flow direction study and waste storage pond, McWilliams says it referred to the AWMFH, Chapter 7, and would have been included as part of the geologic investigation information for the site which was requested by ADEQ.

pp. 53-54: When asked about the compaction test and permeability analysis of the pond liner, McWilliams says it was part of the "as built" supplemental information requested by ADEQ.

- p.126 Dr.Blanz deposition

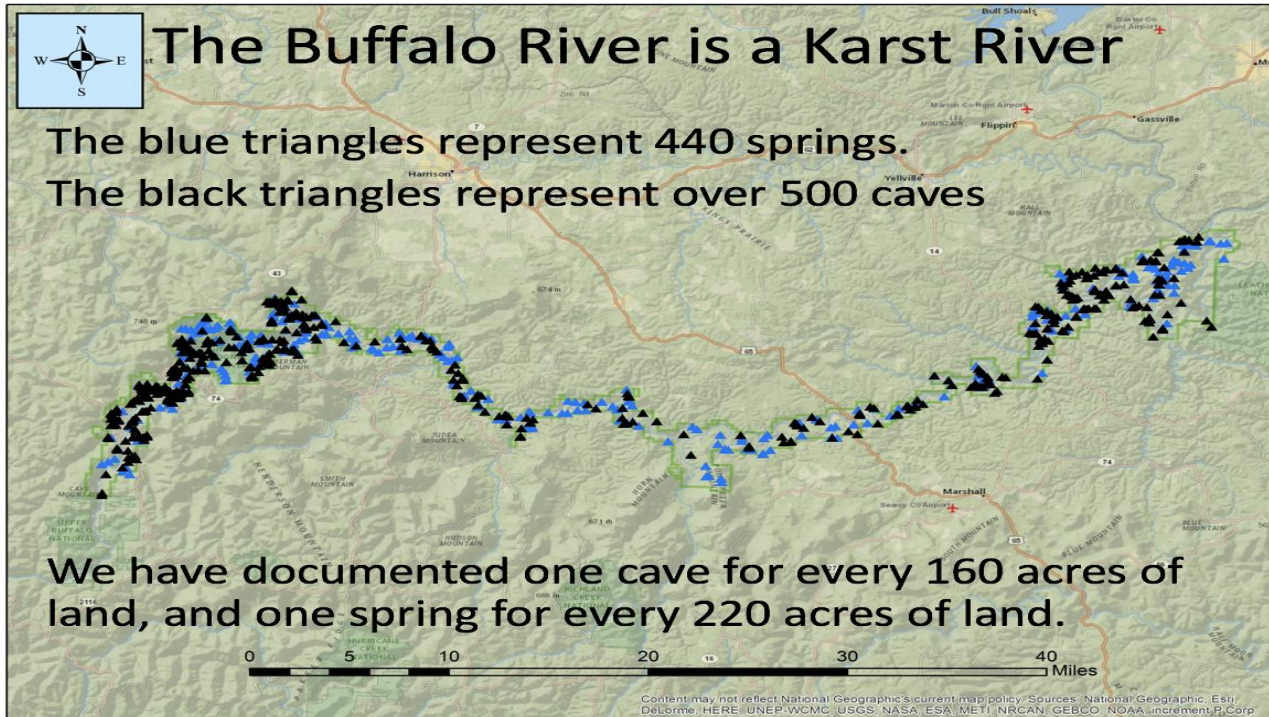
The seepage calculations are in the C&H application and the manual calls for seepage.

Dr. Blanz:

**"The seepage, of course, is the same as a leak,** but a leak could be also from when the pond is pumped down periodically to remove the waste and get the solids. There was not enough information provided in the application to know if the ponds were built properly". (p. 165)



- Caves map, National Park Service:



- **Buffalo National Park 40 point letter, 2013, to the Farm Services Agency written in response to FSA/SBA Environmental Assessment.**

This includes information about the threatened and Endangered Species that must be protected and their threatened habitat, as well as many other warnings of environmental impairment that have since occurred after the erroneous original permitting of this CAFO in 2012. [NPS Letter, See pp. 10-11](#)