**From:** Ellen Mitchell [mailto:ellen@ellenmmitchell.com]
**Sent:** Monday, June 16, 2014 3:16 PM
**To:** Reg-Comment
**Subject:** No CAFO's on The Buffalo River

# To ADEQ

**I implore you to take a moment and consider the devastating effects that allowing Confined Animal Feeding Operations (CAFO) into our state will mean to our economy and environment.**

**As I am sure you are aware, a large CAFO has been permitted to operate only 100' from Big Creek, within 1/16$^{th}$ of a mile from the Mt. Judea school, in Newton County. Only 4 miles downstream flows the Buffalo National River. Big Creek contributes about 10% of the water into the Buffalo at this point, a very large contribution. This hog factory will hold 6500 hogs, the equivalent of a town of 60,000, without benefit of a sewage system, holding the waste in a lagoon and periodically spraying that waste over the thin, rocky, karst landscape of this region. And into Big Creek and the Buffalo and the White…**

**Please take a few minutes and read the article below about the devastating facts of CAFO's on North Carolina and please ask yourself why we think this will not happen here too?**

**Arkansas is called the Natural State for obvious reasons…we have some of the most pristine and beautiful land and waters in the country, but it will not stay that way, if CAFO's are allowed in our state. And they are coming here because other states have put moratoriums on them, for VERY obvious reasons!**

**Can't we take a page from the book of other states that learned their lesson the hard way, instead of jumping off the cliff after them?**

**I beg you, please read the following article and bring some common sense into this picture and save our state from this fate, just to benefit big agri that just want to rape our state' s environment and the small farmers economy, for their profits.**

**Thank you,**

**Ellen Mitchell**

**1996— Public Service**

THE NEWS&OBSERVER

**New studies show that lagoons are leaking**

Groundwater, rivers affected by waste

By:

Joby Warrick and Pat Stith
N&O Staff Writers

February 19, 1995

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Hog waste pours into a lagoon at a Carroll's farm. *N&O (photo by Scott Sharpe*)

Imagine a city as big as New York suddenly grafted onto North Carolina's Coastal Plain. Double it.

Now imagine that this city has no sewage treatment plants. All the wastes from 15 million inhabitants are simply flushed into open pits and sprayed onto fields.

Turn those humans into hogs, and you don't have to imagine at all. It's already here.

A vast city of swine has risen practically overnight in the counties east of Interstate 95. It's a megalopolis of 7 million animals that live in metal confinement barns and produce two to four times as much waste, per hog, as the average human.

All that manure -- about 9.5 million tons a year -- is stored in thousands of earthen pits called lagoons, where it is decomposed and sprayed or spread on crop lands. The lagoon system is the source of most hog farm odor, but industry officials say it's a proven and effective way to keep harmful chemicals and bacteria out of water supplies.

**With this story:**

- State pollution police rarely enforce rules for hog farms.
- One state agency withholds hog information from another.
- Information sources for these stories.

New evidence says otherwise:

- The News & Observer has obtained new scientific studies showing that contaminants from hog lagoons are getting into groundwater. One N.C. State University report estimates that as many as half of existing lagoons -- perhaps hundreds -- are leaking badly enough to contaminate groundwater.
- The industry also is running out of places to spread or spray the waste from lagoons. On

paper, the state's biggest swine counties already are producing more phosphorous-rich manure than available land can absorb, state Agriculture Department records show.

- Scientists are discovering that hog farms emit large amounts of ammonia gas, which returns to earth in rain. The ammonia is believed to be contributing to an explosion of algae growth that's choking many of the state's rivers and estuaries.

Hogs aren't the only the agricultural commodity that poses a threat to water quality. Fertilizer from crop land and golf courses has been cited for years among pollution sources in Eastern North Carolina.

Pork industry officials say they are supporting research into hog waste and odor problems. They say no one works harder than they do to prevent the contamination of water supplies -- a resource that they also must use.

But there's also no precedent for the expansion of high-density hog farming in North Carolina. Nowhere else has this waste-intensive industry grown so much so fast, with so little known about long-term consequences.

What is known is that Eastern North Carolina, with its sandy soils and a shallow water table, is especially vulnerable to groundwater pollution. Yet the state has weaker environmental regulations for hog farms than any major hog-producing state.

Compared to Missouri, Iowa and even neighboring Virginia, North Carolina has lenient requirements for lagoon construction, minimum buffer zones between hog farms and neighbors, and seepage from lagoons into the ground. It minimally enforces the rules that are in place.

The newest state regulations call for increased reporting from farmers, but even those rules won't be fully implemented until 1997. By then, North Carolina hog farms are projected to produce up to 16 million swine a year -- and as much raw waste as a country of 32 million people.

Can the swine industry handle that much manure without seriously degrading the environment? It's a worrisome question for water quality experts like Lawrence B. Cahoon, professor of biological science at the University of North Carolina at Wilmington.

"You have to put it in perspective," said Cahoon, who is studying nutrient pollution in the Cape Fear River. "There are now 2 million hogs in the Cape Fear River basin alone. Is hog waste treatment up to the same standard as human sewage treatment? Certainly not.

"And if it's nowhere close, then you've got a mammoth potential problem on your hands."

## Lagoons leak

Carroll's Foods of Virginia was hoping to quell neighbors' fears about groundwater contamination when it agreed to install monitoring wells at three of its Northampton County hog farms early in 1993.

The results took everyone by surprise.

The first few months of testing yielded nothing unusual. But then, last winter, contamination started showing up in a well outside a waste lagoon on Farm No. 32.

Levels of ammonia nitrogen -- a byproduct of urine -- suddenly jumped from a normal background level of 2 parts per million to 18. Three months later it had jumped to 27, then to 57. By last autumn it had soared to 178 parts per million -- many times the norm.

Those numbers shocked Northampton County officials who were receiving test results regularly. They asked Carroll's to allow an independent investigator to perform more tests at the site, but the company refused.

Until now, the findings have received almost no notice outside the immediate area. In a letter to Northampton County manager W.E. Daniels, Carroll's downplayed the results as a "nonmaterial variation."

But to Richard Maas, a UNC-Asheville scientist who studied the test results at the county's request, they could mean only one thing.

"If you're seeing ammonia," said Maas, director of the university's Environmental Quality Institute, "it means water is leaching out through the lagoon."

The conventional wisdom about hog lagoons -- where bacteria breaks down animal waste -- is that they are virtually leak-proof. The heavier sludge is supposed to settle to the bottom and form a seal that prevents the escape of harmful bacteria as well as chemicals such as nitrate, a groundwater contaminant that can be lethal to infants.

As recently as two years ago, the Division of Environmental Management told lawmakers in a briefing that lagoons effectively self-seal within months with "little or no groundwater contamination" -- even in sandy, highly permeable soils.

Wendell H. Murphy, a former state senator who is now the nation's largest producer of hogs, said in an interview this month that "lagoons will seal themselves," and that there is "not one shred, not one piece of evidence anywhere in this nation that any groundwater is being contaminated by a hog lagoon."

But what Murphy didn't know was that a series of brand-new studies, conducted on Eastern North Carolina hog farms, was showing that large numbers of lagoons are leaking -- some of them severely.

The studies, described in papers prepared for academic publication, concluded that lagoons were causing local pollution around hog farms. One of the researchers, Rodney L. Huffman, acknowledged the explosiveness of the findings as he discussed them.

"I'm not trying to be an alarmist," said Huffman, an assistant professor of biological and agricultural engineering at N.C. State University. "The simple fact is that some lagoons work well, but others, especially the older ones, apparently do not."

Huffman was a principal researcher in three of major four research projects that sought to explore what happens to hog waste in lagoons and in the ground. The results were strikingly similar.

- **Old lagoons**: The scientists selected 11 lagoons that were at least 7 years old and dug a series of test wells to see if wastes were seeping out of them. Their findings: More than half of the lagoons were leaking moderately to severely. Even the lagoons that were described as having little seepage still produced groundwater nitrate levels up three times the allowable limit.

"Assuming these findings to be typical," the researchers said in a paper awaiting publication, "leads to the conclusion that about half of the swine operations in the lower coastal plain of North Carolina are inadvertently contributing to local contamination of the surficial aquifer."

The report concludes: "If this level of contamination cannot be tolerated, remedial measures should be taken."

- **New lagoons**: Test wells were installed at three new lagoons and monitored over a period of five years. Two of the lagoons, were constructed in coarse sandy soil, began leaking immediately and never stopped. Huffman concluded that sand-based lagoons may never seal adequately unless liners are installed.
- **Extent of contamination**: Researchers at a Duplin County hog farm discovered that nitrates seeping from lagoons can be quite mobile. Their test wells tracked a "plume" of nitrates from a leaking lagoon that caused water contamination at distances beyond 250 feet.
- **Irrigation fields**: Lagoons may not be the only source of groundwater contamination. Another Huffman research project looked at groundwater quality in test wells in fields where hog waste had been sprayed as fertilizer. The result: "Evidence of contamination was found almost everywhere" in the sandy soils beneath the spray fields, the June report said.

In some cases, nitrate was observed to be moving very deeply into the ground, presenting a "possible contamination hazard to the confined aquifer system," it said.

The findings are particularly worrisome for Eastern North Carolina, where large numbers of rural residents draw their water from shallow wells. The contaminants seeping out of these lagoons are known to include numerous strains of harmful bacteria and chemicals.

Among the contaminants is nitrate-nitrogen, which causes methemoglobinemia, a disease that can be fatal to infants. Methemoglobinemia, or "blue-baby syndrome," interferes with the blood's ability to absorb oxygen.

Kris C. Matson, a hydrogeologist for the state Division of Environmental Management, said the findings challenge many of the industry's basic assumptions about how waste should be handled. Even spray irrigation -- considered the most environmentally benign way to recycle nutrients from manure -- may have to be re-examined, he said.

"This is a wake-up call," he said.

## Wells at risk?

What does it all mean for the state's drinking water?

Huffman, for one, isn't urging rural residents to rush out to buy bottled water. In most of the cases he studied, the contaminants appeared to be migrating laterally toward the nearest ditch or stream rather than causing wholesale contamination of groundwater.

Pork industry officials, likewise, are convinced that any pollutants from leaking lagoons are filtered out harmlessly by the soil. They note that there's no direct evidence that a private well has been contaminated by a leaking lagoon.

But the truth is, no one really knows what is happening to the wastes once they enter the soil. The NCSU research did not attempt to answer the question. A two-year, $157,000 study funded by federal and state grants is just getting under way to see if lagoon wastes are reaching drinking water supplies.

But whatever is taking place, it is likely happening on a huge scale:

- There are 8,000 farms with hogs in the state, including 1,800 farms with 100 or more animals. Most of the larger farms have one or more lagoons. The exact number of lagoons is unknown because the state has never required permits for them.

In some of the biggest hog-producing counties, as many as two-thirds of the waste-management

systems fall short of recommended guidelines, according to a 1993 survey by the federal Natural Resources Conservation Service. A failing grade could mean anything from an undersized lagoon to the lack of a liner in an area with coarse soils.

Those findings are significant because that federal agency, formerly called the Soil Conservation Service, sets the standards for lagoon construction, and in many cases actually designs the lagoons.

- Compacted clay or synthetic liners can make lagoons almost leak-proof. But at least until recently, very few hog producers were putting any kind of liner on their lagoons, industry sources say. A 1993 court affidavit prepared by the NRSC said that in Johnston County, home to 128,500 hogs in 1993, only one farm was known to have a clay-lined lagoon.

Wendell Murphy said his company now spends the extra money to put clay liners in lagoons.

"I would tell you that there were some that were done without clay, but I would also tell you that they are perfectly sealed. I'll guarantee you they're sealed. And I challenge anybody to prove me wrong on that."

This aerial view of a Carroll's Foods farm shows wastewater from a lagoon being sprayed on

fields near rows of barracks-like hog confinement barns. *(photo by Robert Willett)*

Even now, under the state's tougher water-quality standards imposed last year, hog farms aren't required to install liners unless a "technical specialist" -- in some cases, a hog company employee -- recommends it. By contrast, Virginia, which has similar soils, requires a one-foot compacted clay liner or an equivalent synthetic liner on all new lagoons.

Eastern North Carolina's situation is complicated by a crazy-quilt of soil types where layers of sand, loam and clay begin and end abruptly. It's impossible to judge from a few soil samples whether a piece of land is suitable for a lagoon, said Doug Rader, a former special projects group leader in DEM's water quality branch.

Hog company executives such as Murphy consider the Coastal Plain's sandy soil to be an advantage. "You're much less likely to get the runoff because the sand will absorb the moisture," Murphy said recently.

But Rader, now senior scientist for the N.C. Environmental Defense Fund, says sand is hardly an asset when it comes to protecting groundwater. Sand allows nitrates and bacteria to pass quickly to water supplies below. And in lagoons, even a small patch of sand in the wall of lagoon can prevent it from ever sealing properly, he said.

"It can't help but leak," Rader said, "like a bucket with a hole in it."

## Toxic spills

If a leaking lagoon is like a slow, steady drip from a faucet, a spill is the equivalent of a water-main burst.

Some are accidents; others are intentional releases of lagoon waste. Either way, a spill violates state law prohibiting the discharge of any waste whatsoever.

Occasionally major spills are cleaned up quietly so the public never hears about them. That's what happened in May 1991 when a 10-acre lagoon ruptured on Murphy Farm's Magnolia No. 1 facility in western Duplin County.

A limestone layer beneath the lagoon collapsed May 8, sending tons of water cascading into the nearby Millers Creek in an incident that was never reported to state water-quality officials.

An employee of the town's water department discovered the problem when he saw corn kernels and hog waste floating by in the creek. He alerted the company, and within hours a task force had been assembled to plug the leak. Wendell Murphy himself traveled to the site to inspect the

damage.

It took four days to find and patch the leak. But neither Magnolia town officials nor Murphy Farms ever notified the state about the spill.

"In retrospect, maybe we should have," Murphy said. "But I would also say that to my knowledge, no harm has come of it."

Former employees of hog companies told The N&O that spills are a common occurrence. Marvin Angel, a former farm manager for Carroll's of Virginia in Northampton County, said hardly a week passed that there wasn't some kind leak or overflow.

One of the worst occurred a year ago when some pipes froze and burst overnight, Angel said. Workers arrived to find hundreds of thousands of gallons of waste water puddled around the buildings.

"There are so many ways to have a spill that it's impossible NOT to have one," Angel said. "Pipes fill up with leaves. Drains get stopped up."

When accidents occur, workers do the best they can to clean it up. After that's it's just "pray and keep your mouth shut," he said.

In other, documented cases, farmers have deliberately discharged lagoon waste into ditches, streams and swamps. State officials usually learn of these incidents only when someone complains.

By then substantial damage already may have been done.

# A river runs through it

Even if there were no more spills and all lagoons magically sealed, the pork industry could still have a major impact on the state's water quality. The effects would just show up many miles downstream.

A growing body of scientific data shows that Eastern North Carolina's rivers and streams are carrying ever-larger volumes of what researchers call "nutrient pollution" -- nitrogen, phosphorous and other substances that are used in fertilizers and are contained in all animal waste. An overabundance of these nutrients can trigger an explosion of algae growth that kills fish.

In recent years, the state DEM has classified the Neuse, Chowan and Tar-Pamlico rivers as

"nutrient-sensitive waters" because of problems resulting from high levels of nutrients. A major source of this pollution, the DEM says, is runoff from crop lands and intensive livestock operations.

This is indirect, or "non-point," pollution, and no one knows exactly how big of a role hogs are playing. New research on the issue, though, has helped illuminate problems for the industry that could have serious ramifications for the future.

First, the hog industry is running out of places to put its wastes. Most swine farms spray the contents of their waste lagoons on crop lands and pastures as a substitute for commercial fertilizer. The problem is, you need lots of land to accommodate all that waste -- and some counties are rapidly reaching the saturation point.

In fact, Duplin and Sampson counties -- the nation's top two swine-producing counties with nearly 1,300 hogs per square mile -- are already reporting a nutrient surplus: They are producing more phosphorous in animal waste than they have crop acres to put it on, according to a survey by NCSU and the state Agriculture Department. Nitrogen wasn't very far behind.

The prospect of being buried under all that manure has sent state officials scurrying to find new uses for the stuff. One idea being discussed calls for spreading composted waste on the sides of highways as fertilizer for beautification projects.

Meanwhile, if farmers apply too much manure on crops, the excess nutrients will eventually turn up in rivers through storm runoff and groundwater discharge. Determining how much manure to apply is a complicated procedure that requires a chemical analysis of the soil, the waste and the crops being grown.

A second source of nutrient pollution is ammonia gas, which research shows is escaping through the air in large quantities and returning to earth with rainfall. According to Dr. Leon Chesnin, professor emeritus of waste management and utilization at the University of Nebraska-Lincoln, a farm with 1,400 mature hogs will produce a ton of airborne ammonia a year.

Much of this ammonia is apparently coming from lagoons. As the pork industry often points out, lagoons are designed not just to hold waste but to treat it through bacterial digestion. One result is that 70 percent to 80 percent of the nitrogen content is eliminated -- much of it as airborne ammonia gas.

Hans Paerl, a Kenan professor of Marine and Environmental Sciences at UNC-Chapel Hill, is studying the affect of this ammonia on rivers. As the ammonia falls to the earth as rain, he says, it creates a whole new source of nutrients that can trigger algae blooms.

In Northern Europe, where the swine population is even more dense, ammonia gas has become the No. 1 environmental concern for the agricultural community. Because most regulations are aimed at curbing ammonia, open-air lagoons have been banned completely, and farmers must directly inject waste into cropland rather than spraying it.

No one has yet proposed such measures for North Carolina, but some of Paerl's preliminary data shows that all this vanishing nitrogen may not be so invisible after all.

"They were getting rid of it, all right," Paerl said. "But it was going into the atmosphere and ending up somewhere else."

How big of impact is it having? Paerl still isn't sure. The fact is, the trend toward large-scale hog production is still so new that no one knows what the long-term effects might be.

What is known is that pollutant levels in water and in soil tend to build slowly. Nitrates that leach into the soil today, for example, may not turn up in drinking water for several years, Chesnin says.

But once groundwater becomes contaminated, it's virtually impossible to clean it up by mechanical means. The only solution is time -- a long, long time.

"You may not find deterioration of your well water immediately or in the first few years, but the nitrates continue to travel through the soil layers, into the ground," said Chesnin, who has investigated contaminated sites throughout the Midwest.

"Once you remove the animals, it takes about 20 years for it to quit coming down," he said. "And then it took another 20 years to clear out of the groundwater on its own accord.

"That's two generations."



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