Dr. Bernhard Debatin
67 Morris Avenue
Athens, OH 45701

January 4, 2015

re: UIC Permit Application aPATT026224 / proposed K&H #3 Well

To: Chief Simmers, ODNR, Division of Oil & Gas Resources, oilandgas@dnr.state.oh.us

CC: Ms. Susan Hedman, Regional Administrator, USEPA Region 5 hedman.susan@epa.gov,
State Senator Lou Gentile Steven.Blalock@ohiosenate.gov,
State Rep. Debbie Phillips Rep94@ohiohouse.gov,
Athens County Commissioner Lenny Eliason leliason@athensoh.org

Dear Chief Simmers:

I combine my wishes for a Happy New Year with the expression of my utmost concern regarding the proposed Athens County injection well K&H #3. My concern is that this injection well raises the risk of potentially irreversible pollution of our air, water, and surface, that it poses risks to public health and safety, increases the risk of earthquakes, and damages roads and bridges, as well as property values.

As you know from the public opposition against earlier applications by the same company, many community members are deeply concerned about the continuing installation of fracking waste injection wells in Athens County. I am deeply disturbed by the fact that the application for the new well is not showing any adequate measures to prevent the pollution of land, surface water, and drinking water sources as required by Ohio law (OAC 1501:9-3-04). Thus, the application appears highly deficient.

As the public comment period is unfortunately during the holidays, not everybody will be able to respond as they may travel. I only could complete this letter at the last minute due to my own travels. All the more, I urge you to take the comments seriously and **to grant a public hearing**, in accordance with OAC 1501:9-3-06 (H)(2) (c), on the K&H #3 application due to the serious health and safety concerns.

Below, I am listing the main concerns with regard to the application and the expectable but undesirable side-effects of this new well.

1. Injection volume and fluid migration risk: The sheer volume of waste to be injected (according to the application 12,000 barrels per day) increases likelihood of water contamination. This is aggravated by the proximity to the K&H 2 well, which—according to the map in the application—is located about 800 yards west of the new well.

The geological and physical properties of the strata for the injection ("Ohio Shale") are not sufficiently known. In general, shale formations need to be naturally faulted and extensively fractured to accept the injected waste. However, the presence of this type of fractured strata also allows migration at a much quicker and more extensive rate than, say, in a porous sandstone formation. Therefore, an expanded area of geological review would be needed to make sure that the intended reservoir is indeed properly confined.

Moreover, due to the lack of geological data, it is simply unknown what kind of interactions may occur between the two injection wells and whether the injected waste from the two wells will

compete for space, which would create additional pressure. A possible outcome of such a scenario could be that wastewater migrates laterally and upwards into aquifers. Another ill-fated outcome could be that wastewater is even more likely to migrate through cracks in the casing and tubing. Studies, such as those done by A. Ingraffea, have shown that fracking wastewater corrodes the tubing and cement, with damaging impact on their integrity (see for instance http://www.pnas.org/content/111/30/10955). The application does not seem to take these issues into account and does not include any measures to prevent them.

2. Intolerable normal operation risks: Even under normal, failure-free conditions, there's great cause for concern. According to the application, the protective casing of the proposed K&H #3 well is 2050 feet deep. The lack of reliable geological data raises the questions of whether the casing is sufficiently confining the waste and whether the lack thereof will lead to adverse effect on human health and/or contamination to ground water, protected by O.R.C. Chapter 1509 and the federal Safe Drinking Water Act. ODNR states on its website:

> "Prior to making a determination regarding an application for permit, geologists evaluate the suitability of a proposed site for injection. As part of the permit review process, geologists determine the depth of the deepest USDW and examine the thickness and nature of confining strata on a site specific basis. (…) Geologists establish the depth of surface casing necessary to extend through and protect all USDWs." (http://oilandgas.ohiodnr.gov/citizens/public-comment#KHP)

However, to my knowledge, earlier public record requests regarding such geological data (concerning the K&H #2 permit) revealed that no specific geological data exist, which implies that the decisions are made blindly at the desk without an actual site-specific geological evaluation of the strata. The depth of the casing appears to be determined based on a general assumption of where the "Ohio Shale" formation for the injection may be located. The application does not provide any specific data about the actual depth and thickness of the (supposedly) confining formations ("1st Intermediate" and "2nd Intermediate"). Specific analyses of potential unknown faults have not been executed.

Moreover, aquifers in this region are not even mapped. Their horizontal and vertical extent is virtually unknown and is thus not taken into account in the siting and plans for this well, which appears to be a violation of Safe Drinking Water Act and USEPA standards. This is even more problematic as the chemical composition of fracking wastewater is unmonitored. However, by now it is common knowledge that wastewater from the Marcellus Shale is not only contaminated with fracking chemicals, oil and other volatile organic compounds, but has also high levels of radioactivity, sometimes up to 3,609 times higher than the federal safety limit for drinking water (http://ohiocitizen.org/ohio-is-not-the-oil-andgas-industry-toxic-waste-dump).

I assume that you are aware of the fact that only the gas and oil industry is allowed to dispose this type of toxic wastewater in unmonitored class II injection wells. The same contaminated wastewater, coming from any other industry, would be considered hazardous waste and would need to be disposed of under much higher safety requirements.

3. Increased risk of earthquakes: Experience all over the country has shown that high volume injection of fracking wastewater increases the likelihood of earthquakes. Multiple such seismic events linked to injection wells and to fracking have occurred in recent years in Ohio, including the magnitude 4.0 earthquake near Youngstown on December 2011.

The current application does not includes any seismic data, nor is the actual geological situation of the site known, such as fissures, fractures, voids, and faults. The Youngstown earthquakes have shown that the injection of waste fluids can cause a series of earthquakes. ODNR confirmed:

> "Evidence gathered by ODNR regulators and geologists suggests that fluid from a deeply drilled injection well intersected an unmapped fault in a near-failure state of stress causing movement along the fault." (ODNR 2013: Class II Disposal Well Reforms/Youngstown Seismic Activity Questions and Answers, no date. URL: http://ohiodnr.com/downloads/northstar/YoungstownFAQ.pdf)

Fracking fluids contain lubricants and sand, used to lubricate and prop open the fracked shale formation in order to release the trapped oil or gas. Fracking waste fluids have a similar lubrication effect when introduced into an injection well and thus facilitate cracking. Both the injection pressure and the injected volume exert considerable pressure on the area where the fluids are stored. This can result in the creation of new fractures or the extension of already existing fractures. Contrary to assurances from the industry and ODNR, this may then lead to a pollution of drinking water sources. An EPA training document states:

> "If faults or fractures are present, the injected fluid, introduced into the injection interval at an elevated pressure, will seek the path of lower pressure and move upward into a USDW." [USDW = underground source of drinking water]
> (USEPA 2002: Introduction to UIC Permitting. April 2002, p. 1-64. URL: http://water.epa.gov/learn/training/dwatraining/upload/dwaUIC-uicpermit.pdf)

On November 20, 2013, Athens County experienced a magnitude 3.5 earthquake near Nelsonville (see http://earthquake.usgs.gov/earthquakes/eventpage/usb000l2y3#summary). This earthquake has shown that we live in a seismically active area, regardless of whether this seismic event was caused by natural tectonic movement or induced by the injection wells in our area. The mere occurrence of this earthquake makes injecting fracking fluids in our area a potentially dangerous and irresponsible activity. Every earthquake, injection-induced or not, may introduce new faults and fractures or extend existing ones that then can serve as a migration path for polluted waste water into underground sources of drinking water.

4. History of incidents and location suitability: The existing K&H #1 and K&H #2 injection wells at the same location have a record of numerous incident reports. A complaint letter to the Federal EPA, dated July 4, 2014, lists a number of concerning failures, malfunctions, and other incidents that indicate that the facility is not carefully operated and that the formation in which the waste is injected ("Ohio Shale") is not suitable for this kind of high-volume wastewater injections, as some of the incidents indicate the existence of unknown faults and cracks (see https://appalachiaresist.wordpress.com/complaint-to-federal-epa-re-kh-2/).

Given the lack of oversight and preventive measures, it seems likely that such incidents, ranging from vacuum operation upon start-up and loss of annulus pressure to water contamination and disappearing cement at the drilling site, will continue to occur and ail the K&H #3 well, too. All this means that this new well may likely result in additional adverse effects on human health and contamination to ground water, prohibited by R.C. Chapter 1509 and the federal Safe Drinking Water Act.

5. Water and air monitoring: The application does not include any monitoring plan for the surface and ground water around the facility. Since ODNR also does not provide any monitoring of surface or ground water around injection wells, including the current K&H wells, local residents will not know if and when contaminants find a pathway to groundwater from the K&H wells. There is indeed no assurance that the existing K&H injection wells have not already contaminated local underground drinking water sources.

Similarly, the application also does not include any air-monitoring plan. Emission studies have shown the presence of benzene and other known carcinogens at fracking waste injection wells, often at extremely high and even illegal levels. I have visited four of the injection well sites in Athens County (including the K&H facility) multiple times with my students and we always witnessed the presence of volatile organic compounds of the BTEX group near the open pits and when waste was pumped from the trucks into the facility tanks, as it smelled strongly like a gas station, even from a distance. ODNR does no air monitoring around its injection wells, so nearby residents will not know what chemicals they are being subjected to in the air they breathe. The current facility with its 12 storage tanks vents toxic hydrocarbons and volatile organic compounds directly into residential neighborhoods almost constantly, leading to chronic if low dose exposure of chemical combinations.

6. Concerns about infrastructure, public safety, and property values: The additional operation of a third injection well at the K&H facility will further increase heavy truck traffic, which has a known damaging impact on roads and bridges. At this point, the severance tax on the oil and gas industry (House Bill 375) can "only be used to help communities negatively impacted by production alone — not those that could suffer from the disposal of fracking waste" (http://woub.org/2014/03/02/athens-council-urges-state-raise-fracking-severance-tax). Communities near injection wells have to carry the burden without receiving any benefits. Roads may become less safe. As experience from fracking sites shows, high volume truck traffic poses a particular danger to the safety of our children who are being bussed to and from their schools.

Similarly, local residents have to expect that their property values will decrease with the crumbling infrastructure and the continuing danger of air, water, and surface contamination due to the transportation, storage, and injection of contaminated fracking fluids. As far as I know, neither ODNR nor the State of Ohio provide any compensatory mechanism for such damages.

For all these reasons, I request a public hearing in Athens County based on my substantive concerns with the serious deficiencies of this permit application to prevent contamination and pollution of surface of the land, surface water and groundwater, as required by Ohio Administrative Code 1501:9-3-04, which states: "(A) All persons engaged in any phase of saltwater disposal operations shall conduct such operations in a manner which will not contaminate or pollute the surface of the land, or water on the surface or in the subsurface..."

My concerns, substantive and relevant to public health, safety and environmental conservation, merit a public hearing because *Ohio law requires that the Chief grant a public hearing if ANY comments are substantive and relevant to health, safety, or good conservation practices*. (OAC 1501:9-3-06 (H)(2) (c)).

Sincerely,

Dr. Bernhard Debatin (67 Morris Avenue**,** Athens, OH 45701)