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Division of Oil and Gas Resources Management
Ohio Department of Natural Resources
2045 Morse Road, Building H
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SUBMITTED VIA: minerals@dnr.state.oh.us

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COMMENTS ON DRAFT PROPOSED AMENDMENTS, RESCISSIONS, AND NO-CHANGE RULES RELATING TO SENATE BILL 165 AND FIVE-YEAR REVIEW

Ohio Division of Oil and Gas Resources Management Officers and Staff:

The Ohio Environmental Council, the Buckeye Forest Council, the Sierra Club Ohio Chapter, and the Center for Health, Environment & Justice submit the following comments regarding the Division’s proposed draft rule amendments, rescissions, and no-change rules. In order to assist the Division in its review, we have prepared these comments in consultation with the following technical experts:

- Dr. Julie Wetherington Rice, Senior Scientist at Bennet & Williams Environmental Consultants, Inc. and Adjunct Professor at The Ohio State University’s Department of Food, Agricultural, and Biological Engineering

- Linda Aller, Executive Vice President, Principal Geologist, and Hydrogeologist at Bennet and Williams Environmental Consultants, Inc.
COMMENTS

1. The Division of Oil and Gas Must Regulate Cuttings, Used Drilling Muds/Fluids, and Other Associated Oil and Gas Field Wastes.

Because ORC 1509.02 purports to give the Division of Oil and Gas sole and exclusive authority to regulate the disposal of oil and gas well wastes, it is the Division’s responsibility to regulate the storage and disposal of cuttings, used drilling muds/ fluids, and associated wastes.

Currently, however, the Division has no rules governing the disposal of cuttings, used drilling muds, and associated wastes, despite the fact that the Revised Code requires their adoption: See ORC 1509.22(C) (“The chief of the division of oil and gas resources management shall adopt rules and issue orders regarding storage and disposal of brine and other waste substances.”). Moreover, ORC 1509.22(C)(2) provides that “Muds, cuttings, and other waste substances shall not be disposed of in violation of any rule.” Again, though, it appears that these rules do not exist. In addition, ORC 1509.03(A)(4) requires the Division to adopt rules that specify permit conditions governing “Containment and disposal of drilling and production wastes.”

Drilling fluids and cuttings make up two to four percent of oil and gas wastes.¹ They include rock removed during drilling (drill cuttings) and drilling muds, also known as drilling fluids, which can be either water or oil-based and often contain various additives.² A joint EPA/API survey found drilling fluids in reserve pits to contain “chromium, lead and pentachlorophenol at hazardous levels.”³ The survey also found that “oil-based fluids may contain benzene”⁴ and that when oil-based fluids are used, “potentially toxic hydrocarbons” will be present in greater quantities.⁵ Drilling muds may also contain other “potentially hazardous substances including . . . cadmium, arsenic . . . mercury, copper . . . diesel oil; grease; and various other hydrocarbons and organic compounds (e.g., methanol, chlorinated phenols, formaldehyde, benzene, toluene, ethyl benzene, xylene, and acrylamide),” as well as additives including acids and caustics, corrosion inhibitors, bactericides and biocides, surfactants,

¹ US. Congress, Office of Technology Assessment, Managing Industrial Solid Wastes from Manufacturing,
³ “Water-based drilling muds can contain glycols, chromium, zinc, polypropylene glycol, and acrylamide copolymers. Synthetic-based muds contain mineral oil and oil-based muds can contain diesel oil, although diesel oil is being replaced by a palm oil derivative or hydrated caster [sic] oil. Other additives typically used in drilling fluids include: polymers (partially hydrolyzed polyacrylamide (PHPA) and polyanionic cellulose (PAC)); drilling detergents; and sodium carbonate (soda ash). PHPA is used to increase viscosity of fluid and inhibit clay and shale from swelling and sticking. PAC is used to increase the stability of the borehole in unconsolidated formations. Drilling detergents or surfactants are used with bentonite drilling fluids to decrease the surface tension of the drill cuttings. Soda ash is used to raise the pH of the water and precipitate calcium out of the water.” Id. (internal citations omitted).
⁵ Oil & Gas Accountability Project, Pit Pollution—Backgrounder on the Issues, with a New Mexico Case Study 6 (2004)
defoamers, emulsifiers, filtrater reducers, shale control inhibitors, thinners and dispersants, weighing materials, bentonite clay, and acrylamide.\(^6\)

Associated wastes include oily sludges, workover wastes, well completion and abandonment wastes and other small volume wastes associated with oil or gas production. “Although associated wastes constitute a relatively small proportion of total wastes, they are most likely to contain a range of chemicals and naturally occurring materials that are of concern to health and safety.”\(^7\)

In addition to these hazards, drill cuttings, muds/fracking fluids, and associated wastes often contain significant amounts radioactive material. Marcellus shale rock in particular has a high concentration of radium,\(^8\) a radioactive material that is highly water-soluble, and dissolves into naturally occurring formation water. Fracking fluids often mix with this radium-bearing formation water and come back to the surface as production water. The production water absorbs even more radium because the fluid is put under high pressure and temperature during fracturing, and this temperature and pressure combination is favorable for dissolving more radium. Thus, when this water comes back to the surface during pressure let-off, it often has enhanced concentrations of radium. Finally, drilling fluid may be reused many times, progressively increasing the radium concentration after each use. Ohio Department of Health (“ODH”) defines “TENORM” radioactive material as “naturally occurring radioactive material whose radionuclide concentrations are increased by or as a result of past or present human practices”—thus the production water and wastewater qualify as TENORM.\(^9\)

OEPA ordinarily has authority over solid waste matters, but a simple phone call reveals that they have ceded to authority over NORM and TENORM disposal to ODH. However, ODH has explicitly ceded regulatory authority of all waste products resulting from oil and gas drilling to ODNR in its draft rules,\(^10\) pursuant to ODNR’s status as the primary regulator of Oil and Natural Gas industry, codified at ORC 1509.02.

Thus, TENORM from cuttings, muds/drilling fluids, and associated wastes are currently not regulated in Ohio. It is common practice for operators to bury these wastes on-site. In addition, many landfills across Ohio ultimately dispose of their leachate at public waste-water treatment plants. The radium contained in the drill cuttings and the wastewater that coats them is very water-soluble and will seep into the leachate. As we saw recently when Ohio’s Attorney General overturned wastewater treatment plants’ permits to accept brine water and fracking fluids, most POTWs are not equipped to handle this radioactive and otherwise hazardous

\(^{6}\) Id.

\(^{7}\) Dara O’Rourke & Sarah Connolly, Just Oil? The Distribution of Environmental and Social Impacts of Oil Production and Consumption, 28 ANNUAL REV. ENVTL. RESOURCES 587, 595 (2003).

\(^{8}\) The exact concentration varies significantly from one drill site to another. We are aware of no studies of the radioactivity of Utica shale.


material, and it is contrary to Ohio law to allow this material into a POTW. The Division should close this loophole before it enables an end-run around Ohio’s preclusion of oil and gas waste treatment in POTWs.

2. The Division Should Strengthen Its Rules to Better Protect Ohioan’s Drinking Water.

OAC 1509:9-1-02(F): Water sampling of water wells is only mandated in urban areas, and then only where water wells are located within 300 feet of the oil or gas well. Moreover, the limited sampling that the Division’s BMPs may require for urban areas does not test for many of the toxic substances or other materials that would demonstrate contamination due to oil and gas operations, were such contamination to occur. In addition, the Division’s BMP’s for water well sampling appear not to any establish mandatory testing parameters.

The rule should be amended to require: water well testing in nonurbanized areas; a minimum testing radius of 1km; and a mandatory list of parameters – including radioactivity.

A recently released study by Duke University researchers that sampled water wells in Pennsylvania and New York found that “[m]ethane concentrations were 17-times higher on average (19.2 mg CH4 L−1) in shallow wells from active drilling and extraction areas than in wells from nonactive areas (1.1 mg L−1 on average; P < 0.05).” The Duke study also found that the average methane concentration in shallow ground water in active drilling areas “fell within the defined action level (10–28 mg L−1) for hazard mitigation recommended by the US Office of the Interior,” and that the “maximum observed value of 64 mg L−1 is well above this hazard level.” For purposes of the Duke study, active drilling areas were defined as having an active oil and gas well within one km of the sampled water well; non-active areas had no oil or gas well within one km of the sampled water well.

In addition, samples of produced water in the Marcellus Shale analyzed by the New York State Department of Environmental Conservation (NYSDEC) were reported to contain “levels of radium 226, a derivative of uranium, as high as 267 times the limit safe for people to drink.”

A study sponsored by the U.S. Department of Energy demonstrated that oil production yields “environmentally hazardous” produced water. The West Virginia Department of Environmental Protection (WVDEP) found many contaminants of concern present in oil and gas wastewaters, including arsenic, lead, and hexavalent chromium, while EPA Region 8 identified

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14 C. Tsouris, Oak Ridge National Laboratory, Emerging Applications of Gas Hydrates 7.
15 The contaminants of concern included: “sulfate, chloride, arsenic, titanium, cobalt, nickel, silver, zinc,
the presence of barium, chloride, sodium, sulfates, and other minerals, and the Oklahoma Corporation Commission Oil and Gas Conservation Division stated that produced water can contain high levels of boron. In 2009, the Colorado Oil and Gas Conservation Commission (COCG) documented multiple spills of produced water containing benzene levels exceeding the state’s water quality standards, at least one of which was confirmed to have impacted groundwater.

Wastewaters from hydraulic fracturing, largely composed of used fracturing fluids, are also toxic. Common substances found in these wastewaters include: surfactants, friction reducing chemicals, biocides, scale inhibitors, polymers, cross linkers, pH control agents, gel breakers, clay control agents and propping agents. Many of these substances are possible and probable carcinogens. Analysis of fracturing fluid flowback waters from Pennsylvania and West Virginia found the known carcinogen benzene present in nearly half of all fracturing fluid flowback waters at average concentrations nearly one hundred times the maximum acceptable contaminant levels established by EPA.

In light of these significant risks to our water supply, we request that the Division consider the following additional suggestions:

**1501:9-1-02(A)(3):** The proposed amendment rescinds the existing requirement that applicants must "submit a plan for disposal of water and other waste substances resulting from, obtained, or produced in connection with exploration, drilling, or production of oil or gas" (...) and the “identification of any disposal well or disposal wells to be used,” as well as “name of the person or company disposing of the salt water and the ultimate location of its disposal.” However, these permitting requirements are important for establishing applicant competence and chain-of-custody for toxic waste materials. The proposed rescission states that these requirements were “Removed because this requirement was removed from the law in the mid-1990’s,” but it should be noted that the division nonetheless has the authority and discretion to retain these requirements under ORC 1509.03(A) (“The chief of the division of oil and gas resources management shall adopt, rescind, and amend, in accordance with Chapter 119. of the Revised Code, rules for the administration, implementation, and enforcement of this chapter.”) and ORC 1509.22(C) (“The chief of the division of oil and gas resources management shall adopt rules and issue orders regarding storage and disposal of brine and other waste substances”).


Oklahoma Corporation Commission Oil and Gas Conservation Division, *Guidelines for Responding to and Remediating New or Historic Brine Spills* 2(2009).

Colorado Oil and Gas Conservation Commission, Inspection/Incident Inquiry, Spill Reprots, Doc. Nos. 1631502, 1631508 (groundwater impact confirmed).

OAC 1501:9-1-02 and 1501:9-3-06(B)(3) should be amended to prohibit drilling for oil or gas, or for a deep injection site respectively, within a US EPA Public Water Supply Source Water or Wellhead Protection Zone, and within a reasonable distance from them. We suggest a “zone of safety” of one mile. If the proposed drilling site is up gradient from such an area, the site should be set back a further distance that provides an ample margin of safety for the Source Water or Wellhead Protection Zone. In addition, OAC 1501:9-3-06 should require applicants to map the groundwater in the area and install groundwater monitoring wells near the injection well sites. Monitoring data could be publicly available and posted online. Such monitoring is the only way to be sure that our vital groundwater resources are being protected. If the data were made easily available online, the public would be able to inspect the data and see for themselves whether or not the injection sites are safe.

OAC 1501:9-3-11: Annular disposal should be prohibited. Class II brine injection wells are far more protective of human health and the environment. The Division has full discretion to prohibit annular disposal – while ORC 1509.22(C)(1) offers annular disposal as an option, the code section is careful to condition that option on approval of the chief: “Brine from any well except an exempt Mississippian well shall be disposed of only by injection into an underground formation, including annular disposal if approved by rule of the chief.”

OAC 1501:9-1-02(C): At present, there are no requirements that an ODNR inspector be on site to inspect commencement of construction, pit construction and closure, drilling of the borehole, or placement of casings. In these cases, only notification within 48 hours of commencement is required; however, the proposed amendments would reduce this notice to 24 hours. This period should be extended to 72 (seventy-two) hours to accommodate better scheduling and availability of the Division’s limited number of inspectors, and on-site inspectors should be present for these activities.

OAC 1501:9-1-02(D): Currently, Best management practices for oil and gas well site construction are only required in urban areas. Construction BMPs should be required for all wells.

OAC 1501:9-9-03: Currently, blow out preventers are only required in urban areas or when a well is located within 200 feet of a home. Blowout preventers should be required for all wells where hydraulic fracturing is to occur.

OAC 1501:9-1-03(A): Ohio’s surety bond requirements are much lower than those required in several other states (currently, for an individual bond covering a single well, five thousand dollars; for a blanket bond covering all such wells operated by the principal, fifteen thousand dollars). We recommend that the Division increase single well bond amounts to $10,000 per well; and blanket bond amounts to $250,000 statewide.²⁰

²⁰ARKANSAS PUBLIC POLICY PANEL, MODEL OIL AND GAS LAWS, REGULATIONS AND ORDINANCES, (March 2011), pp. 28-30; available at: http://arpanel.org/content/Model%20Gas%20Laws.pdf
3. The Division Should Prohibit the Open Pit Storage of Waste Materials.

The undersigned parties strongly recommend that the division require the use of closed-loop systems for the temporary storage of all brine and other oil and gas-related waste materials. Concurrently, the division should prohibit the use of pits for the (temporary) storage of brine and other drilling, completion, flowback, and production wastes. Mandating these requirements would result in a significant “win-win” for both public health and the industry.

Recent cost analyses indicate the use of more environmentally sound disposal practices actually saves oil and gas companies money. For example, a study conducted in New Mexico found that eliminating pits, traditionally considered the cheapest disposal method, is actually more cost-effective than their continued use.\(^1\) An Oil and Gas Accountability Project (OGAP) analysis demonstrates that closed-loop drilling systems, which use storage tanks and other equipment instead of pits, are cost-effective and can save money compared to conventional waste management with pits.\(^2\) While initial costs may be higher, closed-loop drilling systems create long-term savings because there is no need to construct pits, drilling waste can be dramatically reduced, water use can be reduced by as much as eighty percent, truck traffic is reduced by as much as seventy-five percent, and tanks can be reused.\(^3\) Comparisons have found closed-loop drilling can result in a cost savings of up to $180,000 per pit.\(^4\) U.S. EPA’s own studies confirm that closed-loop drilling systems are a safer and cost-saving waste disposal process.\(^5\)

Moreover, open pit storage of wastes results in air emissions of methane, sulfur-based chemicals, and volatile organic compounds (VOCs),\(^6\) and poses far more serious threats of accidental contamination than do closed-loop systems. These risks include wildlife and livestock mortality, and ground or surface water contamination resulting from liner failure, berm failure, or overtopping. As illustration, in Ohio, a fracturing flowback pit was cut with a track hoe in 2010, causing more than 1.5 million gallons of fluid to spill into the environment.\(^7\) In 2008, the back wall of a pit in Ohio gave way, causing pit contents to spill and flow towards a creek.\(^8\)

Indeed, Ohio EPA personnel have stated that open pit storage is not expected to be a favored or commonplace practice in Ohio.\(^9\) Open pit storage poses clear environmental risks, and there are readily available alternatives in closed-system storage that are not only safer, but generally preferred by industry. There is no reason for DNR to allow the out-dated method of open pit storage, particularly given that the Revised Code Gives the Division the Authority to Prohibit the Use of Pits for Purposes of Brine and Waste Storage, with the possible Exception of

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\(^{2}\) Oil & Gas Accountability Project, “Alternatives to Pits.”
\(^{3}\) *Id.*
\(^{4}\) *Id., see also Rogers et al., supra* note 29 at 4-5.
\(^{7}\) Ohio Department of Natural Resources, *Notice of Violation No. 1278508985*, June 21, 2010.
\(^{8}\) Ohio Department of Natural Resources, *Notice of Violation No. 2016754140*, May 16, 2008.
\(^{9}\) Personal communication from meeting with OEPA air quality staff on 11/15.
Pits or Dikes for Spill Prevention and Control. See ORC 1509.22(C) (“The chief of the division of oil and gas resources management shall adopt rules and issue orders regarding storage and disposal of brine and other waste substances”). Moreover, while ORC 1509.22(C)(4) specifies that “A dike or pit may be used for spill prevention and control,” ORC 1509.22(C)(3) differs significantly from it in stating that “Pits or steel tanks shall be used as authorized by the chief for containing brine and other waste substances.” This section clearly gives the division the discretion to prohibit the use of pits for waste storage purposes.

1501:9-9-03(F): This division should be further amended to specify that the mandatory waste pits therein contemplated are solely for the purposes of spill prevention and spill control, and their use is not otherwise authorized for temporary storage. See ORC 1509.22(C)(4) (“A dike or pit may be used for spill prevention and control.”) As proposed, the division currently reads: “A pit or pits of sufficient size and shape must be constructed adjacent to each drilling well to contain all the drilling muds, cuttings, salt water and oil flowed that flow into same. No oil or salt water will be permitted to overflow the pit.”

Any Waste or Drilling Fluid Pits the Division Does Permit Should Always Be Fenced and Screened. OAC 1501:9-9-03(H) is sorely inadequate, as it provides that pits need only be fenced in urbanized areas or when within 150 feet of a home or other inhabited structure, and then only to a height of three feet. Any pits should also be screened or netted. See ORC 1509.03(A)(3) requires that the Division’s rules, as they relate to permit conditions for urbanized areas, shall address “Fencing and screening of surface facilities of a well.” In addition, OAC 1501:9-9-05(C) should be amended so that pumps and flares are always fenced.

4. The Division Should Adopt More Protective Rules Regarding the Surface Application of Brine.

The Division should amend or adopt rules governing the surface application of oilfield. Any and all brines destined for surface application on roadways for dust and ice control should be tested for toxic hydrocarbons, heavy metals, and radioactivity prior to application. Any and all such application should be prohibited if test results demonstrate contaminant amounts exceeding USEPA safety levels.

ORC Section 1509.226(B)(10) provides that only “produced” brine may be spread on roads. Specifically, “Only brine that is produced from a well shall be allowed to be spread on a road. Fluids from the drilling of a well, flowback from the stimulation of a well, and other fluids used to treat a well shall not be spread on a road.” Unfortunately, neither the Revised Code nor the Division’s rules provide any means of verifying whether any real-world brines actually qualify: there are no testing or chain-of-custody requirements in place that might verify whether drilling fluids, flowback, or treatment fluids are present in the brine. Moreover, “produced” water from most oil and gas wells is bound to contain drilling or treatment fluids if such fluids were ever injected into the well. The Division should require testing and should screen out any brines containing unsafe contaminant levels, flowback, drilling fluids, and treatment fluids.
ODNR, DMRM’s own surface application guide evidences a number of disquieting findings.\(^{30}\) Note, for instance, the listing of contaminant concentrations of brines produced from conventional operations in Ohio found in Table 4.\(^{31}\) As the table illustrates, conventional, “produced” Ohio brines grossly exceed several USEPA contaminant safety levels:

**TABLE 4**

<table>
<thead>
<tr>
<th>Trace Element</th>
<th>Range in Ohio Brines</th>
<th>Maximum Contaminant Level for Drinking Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barium</td>
<td>0.1 to 255 mg/l</td>
<td>2 mg/l</td>
</tr>
<tr>
<td>Zinc</td>
<td>0.05 to 4.1 mg/l</td>
<td>-----</td>
</tr>
<tr>
<td>Cadmium</td>
<td>0.4 to 181 ug/l</td>
<td>5 ug/l</td>
</tr>
<tr>
<td>Chromium</td>
<td>0.6 to 644 ug/l</td>
<td>100 ug/l</td>
</tr>
<tr>
<td>Cobalt</td>
<td>0.4 to 155 ug/l</td>
<td>-----</td>
</tr>
<tr>
<td>Copper</td>
<td>0.3 to 220 ug/l</td>
<td>1300 ug/l</td>
</tr>
<tr>
<td>Lead</td>
<td>5 to 1300 ug/l</td>
<td>50 ug/l</td>
</tr>
<tr>
<td>Mercury</td>
<td>0.915 to 0.70 ug/l</td>
<td>2 ug/l</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>4 to 51 ug/l</td>
<td>-----</td>
</tr>
<tr>
<td>Nickel</td>
<td>0.7 to 637 ug/l</td>
<td>100 ug/l</td>
</tr>
<tr>
<td>Vanadium</td>
<td>0.6 to 30 ug/l</td>
<td>-----</td>
</tr>
</tbody>
</table>

The ODNR guide also notes that, “benzene, toluene, ethyl benzene, and xylene (BTEX) […] have been found at shallow depths of less than two feet in soil and water samples collected near road spreading sites,” and that “toluene and xylene have been observed at greater depths.”\(^{32}\)

In addition, the Division should ensure that brine is screened for radioactivity before eligibility for surface application is determined. The risks associated with NORM-contaminated soils and waters can persist for decades. In particular, land contaminated by radium 226, such as that found in produced water from the Marcellus Shale, can pose a threat to “many generations of individuals living or working on NORM-contaminated land for a period covering nearing 20,000 years.”\(^{33}\)


\(^{31}\) Id. at 20.

\(^{32}\) Id. at 21.

5. The Division Should Reconsider Its Proposed Amendments to Rules Governing the Duration of Permit Validity.

1501:9-1-02(I), et al.: In the proposed amendment, permit validity no longer expires after 12 months (or after 24 months for nonurbanized areas) if drilling is “commenced but not completed.” The same changes are made in the passages about permits for injection wells, see p. 45, Section (I), for conversion operations, see p. 63, Section (I), for solution mining operations, see p. 79, Section (L), and for plugging, see p. 103, Section (E). However, ORC 1509.06(I) specifies the applicable permit validity periods as 12 months and 24 months for urbanized and nonurbanized areas, respectively. Consequently, permit holders should be required to reapply for a permit prior to expiration even if drilling has commenced but is not completed before the respective 12 and 24-month periods.

Thank you for the opportunity to comment; we hope that the Division will give serious thought to our suggestions. Ohio’s incipient shale “boom” merits a close consideration of currently existing rules, and we believe that regulatory improvements and advancements that are both fair and more protective can and should be made.

The undersigned request a written response.

Respectfully Submitted,

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