



May 12, 2017

Michelle Mountjoy
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Dear Ms. Mountjoy:

Thank you for the opportunity to submit comments on the draft rules on oil and gas production waste recently issued by the Ohio Environmental Protection Agency (OEPA). These regulatory changes would require solid waste landfills and transfer facilities to modify their permits if they manage Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) generated by oil and gas operators.

Please accept these comments on behalf of Earthworks, a national nonprofit organization committed to protecting communities and the environment from the impacts of mining and energy development while seeking sustainable solutions. For more than 25 years, we have fulfilled our mission by working with communities and grassroots groups to reform government policies, improve corporate practices, influence investment decisions and encourage responsible materials sourcing and consumption.

Earthworks has a long track record on issues pertaining to oil and gas waste. We played a leading role in the development and adoption of the New Mexico Pit Rule, which improved the construction and management of oil and gas waste pits and prohibited the storage of waste in open-air pits close to residences and water resources.¹ We helped advance revisions to Pennsylvania's oil and gas regulations (known as Chapter 78/78a), including new requirements for closed-system waste storage and impoundment construction.² We also conducted a comprehensive review of regulations and management practices in Ohio, Pennsylvania, West Virginia, and New York related to the rapidly growing volume of oil and gas waste from Marcellus and Utica Shale development.³

For nearly four years since the passage of House Bill 59 directing OEPA, the Ohio Department of Natural Resources (ODNR), and the Ohio Department of Health (ODH) to provide better oversight of oil and gas waste, Ohio residents have waited for the agencies to take action. The proposed regulations indicate that OEPA recognizes the risk of radioactivity entering solid waste facilities. In light of this, Earthworks believes that the draft rules are a step in the right direction.

¹ See overview of the New Mexico Pit Rule at

² See Earthworks' comments on the PA DEP's final draft oil and gas regulations at https://www.earthworksaction.org/library/detail/comments_on_the_final_draft_regulations_for_oil_and_gas_surface_activities.

³ Nadia Steinzor and Bruce Baizel, *Wasting Away: Four states' failure to manage oil and gas waste in the Marcellus and Utica Shale* (Earthworks 2015), available at <http://wastingaway.earthworksaction.org>.

However, the proposed rules are not nearly enough to reduce the environmental and health risks posed by radioactive oil and gas waste. To date, OEPA, ODNR, ODH, and state policymakers have refused to seriously address the problems posed by ever-growing volumes of waste generated as a result of Utica and Marcellus Shale development. Nor have the agencies taken steps to develop comprehensive, science-based requirements that would help ensure accountability by oil and gas operators for the toxic and radioactive waste they generate and any impacts on water, soil, health, and private property that result.

OEPA's guidance for the Solid Waste Disposal Facility Radioactive Material Detection Program states that, "Facilities are required to comply with the State of Ohio Radioactive Materials Licensing Program for the handling of radioactive material once it's detected." However, this statement is based on a faulty premise: the steps that solid waste landfills and transfer facilities would take to detect radioactive material are inadequate to protect water supplies and soil from potential contamination.

Earthworks has identified five key reasons for this gap, which OEPA (together with ODNR) should address through changes to both the proposed rules and oil and gas waste regulations more broadly:

1. Landfill disposal is not an appropriate management approach for oil and gas wastes. The overall concept of "drilling waste" represents a chemically complex mixture of fluid and solid organics, salts, minerals, metals, and radionuclides. Radium is particularly dangerous for health and the environment because it bio-concentrates and bio-accumulates, and does not degrade significantly (e.g., Ra-226 has a half-life of 1,600 years).⁴ Given this, the increasing disposal of radioactive material into landfills poses a strong risk of cumulative effects on surrounding soil and water, and in turn people and wildlife.

Due to the potentially hazardous and radioactive characteristics of oil and gas wastes, OEPA and ODNR should end the practice of categorizing oil and gas wastes as general "solid waste." The disposal of oil and gas wastes should occur only at facilities designed and equipped to handle hazardous and low-level radioactive waste.

The characteristics of drill cuttings, muds, fracturing sand, and other wastes—and in turn their interaction with water, soil, and air—have not been fully documented. Researchers in West Virginia recently summed up the need for both further investigation and caution: "At present little is known about the risks associated with the solid wastes from hydraulic fracturing in the Marcellus: spent drilling mud, drill cuttings and filtrates/precipitates from flowback. Characterization of their inorganic, organic and radioactive contaminants is at present, incomplete. A systematic study including worker, environmental and community risks is needed."⁵

In addition, for transfer and disposal at standard waste facilities, oil and gas operators and associated haulers are required only to certify that "representative samples" of waste have been tested, not necessarily the actual waste being disposed of. As a result, solid waste facilities can approve the disposal of many loads of waste from different locations over the course of several months or more. This is clearly inadequate given that the nature and concentration of constituents

⁴ Marc Glass, Comments on Proposed Changes to New York State Solid Waste Regulations (Downstream Strategies 2016).

⁵ Paul Ziemkiewicz, John Quaranta, and Michael McCawley, *Practical Measures for Reducing the Risk of Environmental Contamination in Shale Energy Production*, ENVIRONMENTAL Science (2014).

can vary depending on geological conditions and potentially even within the same well bore or on the same well site.⁶

2. The proposed regulatory changes should not distinguish between TENORM and Naturally Occurring Radioactive Material (NORM). According to the United States Environmental Protection Agency (USEPA), NORM is defined as materials that are left completely “undisturbed,” while TENORM includes “materials that have been concentrated or exposed to the accessible environment as a result of human activities.”⁷

In effect, this definition means that any radioactive material brought to the surface by oil and gas drilling can be classified as TENORM. Similarly, the State Review of Oil and Gas Environmental Regulations (STRONGER), an entity developed largely by industry to ensure effective state regulations, does not distinguish between NORM and TENORM. Instead, STRONGER defines both types of radioactive materials as ones “whose radionuclide concentrations have been enhanced by human activities.”⁸

Oil and gas wastes can contain radioactivity in the form of produced water, drill cuttings, drilling muds, sludges, pipe and equipment scale, and even materials such as waste pit liners. Because of the potential for different types of oil and gas wastes to mix during storage at well sites, transportation, and processing—as well as when liquids and sludges are dewatered and bulked prior to disposal—a variety of radioactive substances can easily enter landfills.

According to researchers with Downstream Strategies, a science-based environmental consulting group with expertise in oil and gas waste management, “The composition of the drilling waste stream may present an even greater management challenge to MSW [Municipal Solid Waste] landfills than the sheer volume. Drilling wastes will, at a minimum, consist of drill cuttings...from the vertical portion of the wellbore, organic-rich layers from the shale formation, and components of the muds and chemicals used to lubricate the drilling tools and assist with the return of drill cuttings to the surface. Once oxidized by interactions above the ground surface, both metals and radionuclides may become much more water soluble, especially under acidic conditions.”⁹

3. Ohio’s refusal to define drill cuttings as TENORM is arbitrary and poses environmental risks. Ohio faces a growing problem with the safe disposal of drill cuttings, with an estimated 600 tons generated from a typical Utica Shale well.¹⁰ As noted above, the proposed draft regulations pertain only to TENORM. As a result, they effectively—and deliberately—do not apply to drill cuttings, which are specifically excluded from the definition of TENORM in Ohio law.¹¹

Earthworks strongly recommends that OEPA remove from the Definitions section of the draft proposed regulations (§3745-515-02(S)(2)) the wording, “...excluding source-separated drill cuttings generated during the phase of drilling performed through underground sources of drinking

⁶ M. Glass and K. Hatcher, Comments on Proposed Changes to the West Virginia Solid Waste Management Rule, 33CSR1 (Downstream Strategies 2014).

⁷ USEPA, TECHNICAL REPORT ON TECHNOLOGICALLY ENHANCED NATURALLY OCCURRING RADIOACTIVE MATERIALS FROM URANIUM MINING, VOLUME 2 (2008).

⁸ 2014 STRONGER Guidelines, Section 7, Naturally Occurring Radioactive Materials.

⁹ M. Glass and K. Hatcher, Comments on Proposed Changes to the West Virginia Solid Waste Management Rule, 33CSR1 (Downstream Strategies 2014).

¹⁰ Ted Auch, FracTracker, “Utica Shale Drill Cuttings Production—Back of the Envelope Recipe.” May 2014. <http://www.fractracker.org/2014/05/utica-drill-cuttings-production/>.

¹¹ Ohio Revised Code §3748.01(Y).

water prior to the cementation of surface casing. [Comment: For the purposes of this chapter, drill cuttings are considered earthen material when generated during the phase of well construction performed through underground sources of drinking water, except when using additives not suitable for drilling through potable water supplies or subsequently mixing with non-earthen material.]”

We support OEPA’s caveat that drill cuttings mixed with “non-earthen material” or with “additives not suitable for drilling through potable water supplies” would be subject to the proposed regulations. However, neither OEPA nor ODNr have sufficient regulations or enforcement mechanisms in place to ensure that the drill cuttings disposed of at solid waste disposal facilities are absent of additives, or haven’t been mixed with other regulated wastes prior to disposal. Instead, waste characterization is left up to waste haulers and disposal facilities, with little regulatory review or oversight.¹²

At the same time, drill cuttings are by definition processed and altered in such a way as to be considered TENORM. Once a well bore is drilled, shale is brought to the surface and broken into many smaller pieces—representing an alteration of physical characteristics using machinery and mechanical devices. While cuttings initially appear as “rock,” they may be mixed with other wastes during storage and transportation, a further physical alteration. At landfills, loads of drill cuttings may be dewatered in order to meet the “solid content” threshold for disposal, which is an alteration of volume and physical characteristics.

Importantly, the original chemical characteristics of cuttings are also altered through the use of drilling fluids and coating with produced water following drilling. Ohio’s legal definition of drill cuttings acknowledges that they “may include a de minimus amount of fluid that results from a drilling process.”¹³ This implies that drill cuttings (as well as other wastes such as drilling muds) may contain fluids that, if contained in any other type of waste, would qualify as “technologically enhanced” and trigger TENORM testing and disposal protocols.

Ohio’s legal exclusion of cuttings from the definition of TENORM has no scientific basis. Recent analysis of both vertical and horizontal drill cutting samples in West Virginia showed that they contain chloride, arsenic, barium, iron, manganese, strontium, benzene, and fluoride, as well as Radium 226 and 228.¹⁴

In addition, a report by the Pennsylvania Department of Environmental Protection (PADEP) concluded that, “Because landfills accept natural gas industry wastes such as drill cuttings and treatment sludge that may contain TENORM, there is a potential for leachate from those facilities to also contain TENORM.”¹⁵ Unlike Ohio, Pennsylvania does not make a distinction between NORM and TENORM with regard to drill cuttings, instead stating that, “[s]ince naturally occurring

¹² See the analysis of Ohio’s waste characterization and disposal mechanisms in Nadia Steinzor and Bruce Baizel, *Wasting Away: Four states’ failure to manage oil and gas waste in the Marcellus and Utica Shale* (Earthworks 2015), available at <http://wastingaway.earthworksaction.org>.

¹³ Ohio Revised Code §3748.01(Y).

¹⁴ MARSHALL UNIV. CTR FOR ENVTL., GEOTECHNICAL AND APPLIED SCIENCES, *EXAMINATION OF LEACHATE, DRILL CUTTINGS AND RELATED ENVIRONMENTAL, ECONOMIC AND TECHNICAL ASPECTS ASSOCIATED WITH SOLID WASTE FACILITIES IN WEST VIRGINIA*; STUDY AND REPORT FOR WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION (2015).

¹⁵ PERMAFIX ENVIRONMENTAL SERVICES FOR PADEP, *TECHNOLOGICALLY ENHANCED NATURALLY OCCURRING RADIOACTIVE MATERIALS (TENORM) STUDY REPORT* (2015).

radioactive material is brought to the surface during drilling, the wastes are classified as TENORM.”¹⁶

OEPA and ODNR have yet to address this discrepancy between the regulations of a neighboring state, even though it is directly connected to how oil and gas wastes are managed. Records submitted by unconventional oil and gas operators to the PADEP indicate that from January 2016-February 2017, about 25,000 tons of drill cuttings generated in Pennsylvania were sent to Ohio landfills.¹⁷

As a result, solid waste disposal facilities in Ohio are accepting drill cuttings from a state that considers them to be TENORM. Yet because Ohio regulations specifically exclude drill cuttings from radioactive screening and testing, these facilities can simply accept them as standard solid waste.

This illogical situation can have real environmental consequences. A recent report on radioactivity in drilling wastes from Pennsylvania found that samples of horizontal drill cuttings had Ra-226 levels nearly twice as high as samples of vertical cuttings.¹⁸ Just one story demonstrates the risk posed to Ohio: in 2013, a load of drill cuttings from Pennsylvania was trucked all the way to a specialized facility in Idaho due to excessive levels of radioactivity.¹⁹

4. Portal radiation monitors are insufficient for the detection of radioactive material in oil and gas wastes. We support OEPA’s proposal to strengthen radiation detection programs at solid waste and transfer facilities by requiring “Detection monitoring of incoming waste prior to acceptance” (§3745-515-25(C)(1)).

However, fixed radiation detector units, or portal monitors, do not actually quantify specific radionuclide isotopes (such as Radium 226).²⁰ They are therefore not an effective method to screen whether waste loads meet municipal landfill activity limitations for Radium 226 and/or Radium 228. This shortcoming is due to the fact that fixed radiation detectors are designed to detect energy, primarily gamma or neutron waves—not the activity levels (i.e., as measured in pCi/g) for those radioactive isotopes.²¹

Importantly, Radium 226 primarily emits alpha particles, which are extremely hazardous to the environment and human health but cannot be detected through a thin barrier (such as the metal or cloth side or top of a waste hauling truck). Given this, allowing measurements be taken as far as one meter away (§3745-515-25(C)(1)(i)) would likely have the effect of allowing significant concentrations of Radium 226 to go undetected.

¹⁶ PADEP Bureau of Waste Management, Presentation on Origin of TENORM-Containing Drill Cuttings and Treatment Sludges Generated at Well Sites and Wastewater Treatment Facilities in the 2012 Calendar Year (May 2013).

¹⁷ PADEP Oil & Gas Reporting Website, Waste Reports by Waste Facility, <https://www.paoilandgasreporting.state.pa.us/publicreports/Modules/Waste/WasteByWasteFacility.aspx> (data downloaded and summed for all Ohio facilities for January-June 2016; July-December 2016; and January & February 2017).

¹⁸ PERMAFIX ENVIRONMENTAL SERVICES FOR PADEP, TECHNOLOGICALLY ENHANCED NATURALLY OCCURRING RADIOACTIVE MATERIALS (TENORM) STUDY REPORT (2015).

¹⁹ Tara Kinsell, *Rejected Waste Taken to Idaho*, WASH. OBSERVER-REP. (July 12, 2013).

²⁰ Marc Glass, Comments on Proposed Changes to New York State Solid Waste Regulations (Downstream Strategies 2016).

²¹ *Id.*

Such considerations point to the need for each load of waste—not just “representative samples”—disposed of at solid waste facilities to be accompanied by a laboratory analysis of chemical and radiological characteristics. As noted above, the complexities of radioactivity detection in oil and gas wastes underscore the need for OEPA and ODNR to take a precautionary approach and prohibit oil and gas wastes from entering solid waste disposal facilities, and instead require them to be disposed of at specialized facilities.

Related to the draft regulations, OEPA should remove from the Solid Waste Disposal Facility Radioactive Material Detection Program guidance document the caveat (in section (C)(1)(a)(ii)) that solid waste disposal facilities “should establish an alarm set-point that will minimize the number of false alarms.” The *only* goal of a facility’s radioactive material detection program should be radiation detection, not avoidance of alarms.

According to the guidance document, if a load of waste triggers an alarm, it will be isolated and further tested and assessed for appropriate disposal elsewhere. The adage “better safe than sorry” applies here, making it imperative for facilities to keep alarm set-points as low as possible. This approach would be in keeping with OEPA’s Business Impact Analysis for the proposed regulations, which stated that, “The public purpose is to safeguard public health from unnecessary exposure to radiation from oil and gas waste.”

5. Ohio residents do not have access to information on the type of waste generated by operators, the specific well site where it was generated, and the facility where it was taken for disposal. This information is critical to help the public identify potential causes of negative impacts on water supplies, vegetation, wildlife, and health and create a record of waste generation, transport, and disposal in their communities and on or near their properties.

OEPA should amend §3745-515-20 (E), Recordkeeping, to specify that the agency will collect records and make them available to the public, not merely that operators have to provide them to OEPA upon request. This section should be changed to read: “Copies of records on the waste type and amount received for disposal kept by the owner and operator of a sanitary landfill facility shall be submitted to Ohio EPA and the approved board of health and made available to the public in an online database and upon request.”

In closing, Earthworks would like to call OEPA’s attention to the fact that in 2016, seven environmental organizations filed suit against the USEPA to fulfill its legal obligation to revise federal regulations and guidelines for the disposal, storage, transportation, and handling of oil and gas wastes.²² Despite agency requirements under Subtitle D of the Resource Conservation and Recovery Act (RCRA), which applies to solid waste management, USEPA has neglected to review and update rules pertaining to the management of oil and gas wastes.

Specifically, the plaintiffs assert that, “In their current forms, the Subtitle regulations and state plan guidelines are outdated, contain generic provisions that do not specifically address the modern oil and gas industry, and fail to adequately protect against potential harm to human health and the environment resulting from oil and gas wastes.”²³

²² Petitioner Complaint, Environmental Integrity Project et al. v. McCarthy (No. 1:16-cv-842) (D.C. Cir. May 4, 2016), available at <http://environmentalintegrity.org/wp-content/uploads/2016-05-04-RCRA-OG-Wastes-Deadline-Suit-Complaint-FILED.pdf>.

²³ *Id.*

Depending on the outcome of this lawsuit and any related actions taken in the future by USEPA, state regulatory agencies may eventually be compelled to take action. It would be advantageous for OEPA and ODNR to look ahead and work to strengthen regulations pertaining to the management of oil and gas waste—rather than leaving inadequacies in place and the environment and health at risk.

Thank you for your time and attention.

Sincerely,

A handwritten signature in black ink, appearing to read "Nadia Steinzor". The signature is fluid and cursive, with a long, sweeping underline that extends to the right.

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