



September 13, 2016

Basil Seggos, Commissioner  
New York State Department of Environmental Conservation  
625 Broadway  
Albany, NY 12233-6510

**Attn: Part 360 Series regulations, Solid Waste Management Facilities**

Cc: Catherine A. Dickert, Director, Division of Mineral Resources  
David Vitale, Director, Division of Materials Management  
Melissa Treers, P.E., Division of Materials Management

Dear Commissioner Seggos:

Earthworks, Environmental Advocates of New York, and Riverkeeper, Inc., appreciate the opportunity to comment on NYSDEC's proposed revisions to the Part 360 series of solid waste regulations and related amendments.

We submit these comments with the support of the Adirondack Mountain Club, Catskill Citizens for Safe Energy, Catskill Mountainkeeper, Center for Environmental Health, Citizens Campaign for the Environment, Compressor Free Franklin, Concerned Citizens of Allegany County, Damascus Citizens for Sustainability, Delaware Riverkeeper Network, Environment New York, Finger Lakes Zero Waste Coalition Inc., Food and Water Watch, Fossil Free Tompkins, Grassroots Environmental Education, Natural Resources Defense Council, Partnership for Policy Integrity, People for a Healthy Environment, Protect the Adirondacks, Residents for the Preservation of Lowman and Chemung, Sierra Club Atlantic Chapter, Stop the Algonquin Pipeline, and Stop Polluting Orleans County. Collectively, we represent hundreds of thousands of New Yorkers.

We appreciate NYSDEC's efforts to strengthen the regulations, most of which have not been revised in decades. While the New York Code, Rules and Regulations (NYCRR) Part 360 series covers many aspects of solid waste management, we focus our comments on those related to oil and gas exploration, development, and production wastes (collectively known as E&P waste). Specific topics

covered include the characterization of oil and gas wastes; management and disposal procedures at landfills, including those related to landfill leachate; radioactivity detection; and the Beneficial Use Determination program for oil and gas brine.

We appreciate and support key improvements that the NYSDEC has proposed in Part 360 and other regulatory amendments, in particular:

- The installation of radiation detectors at landfills to monitor waste loads.
- Standardized parameters for the testing of landfill leachate.
- The storage of leachate in tanks rather than open-air impoundments.
- New tracking requirements for several categories of waste, including drilling waste.

As detailed in the following pages, our organizations firmly believe that much more is needed to address the problems posed by oil and gas waste. Neither NYSDEC nor state policymakers have yet fully weighed and addressed the well-documented risks to the environment and health posed by ever-growing volumes of waste generated by operations within New York and by Marcellus and Utica Shale development in other states.

Further, accurate tracking and accounting of these potentially harmful wastes is lacking. Conventional drillers in New York continue to produce E&P waste, yet it is impossible to say how much or where it ends up because the state does not maintain a centralized database on the oil and gas field waste stream nor provide public information on waste production and disposal. It is therefore impossible to assess the types or volumes of oil and gas waste actually being disposed of at landfills.

However, we do know from records submitted by both conventional and unconventional operators in Pennsylvania to the Department of Environmental Protection (PADEP) that since 2010, at least five New York landfills have accepted oil and gas waste from Pennsylvania, including 597,000 tons of drill cuttings; 23,000 barrels of fracturing and produced fluids; 200 tons of used fracturing sand; 480 tons of used well site pit liners; 550 tons of contaminated soils; and 420 barrels of sediment.<sup>1</sup> In addition, eight road-spreading, well services, and waste treatment companies in New York have

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<sup>1</sup> PADEP Oil & Gas Reporting Website, Waste Reports by Waste Facility, <https://www.paoilandgasreporting.state.pa.us/publicreports/Modules/Waste/WasteByWasteFacility.aspx> (last visited Aug. 17, 2016) (data downloaded and summed for all New York facilities included in the database).

accepted 55,000 barrels of fracturing and produced fluids.<sup>2</sup>

As these data indicate, the oil and gas waste disposed of at New York landfills includes both fracturing and produced fluids, which contain toxic chemicals. At the same time, drill cuttings, muds, contaminated soil, pit liners, and fracturing sand often contain numerous chemicals, radioactive material, high levels of salts, and hydrocarbons.

Accordingly, New York is now disposing significant volumes of E&P waste, but because of weak management protocols and insufficient oversight, these wastes are barely tested prior to disposal. At the same time, special exemptions for the oil and gas industry in federal and state laws allow operators to keep the chemicals they use secret and to skirt the more stringent waste tracking and disposal requirements that other industries must follow.

On the whole, New York currently lacks systems to track and account for the volume, origin, and destination of oil and gas waste; effective waste characterization requirements to determine the actual content of waste and, in turn, proper disposal regimes; comprehensive, consistent oversight of waste management facilities; and regulatory enforcement capacity at NYSDEC. **Given this, we believe that in order to protect the environment and communities, NYSDEC should prohibit:**

- 1. Disposal of oil and gas drilling, exploration, and production waste in municipal solid waste (MSW), industrial, and construction & demolition (C&D) landfills.**
- 2. Disposal of leachate from landfills accepting oil and gas drilling, exploration, and production waste at Publicly Owned Treatment Works (POTWs).**
- 3. Application of liquid waste from oil and gas drilling and production sites on roads as a de-icing and dust suppressant agent.**

**We also strongly believe that NYSDEC should close the loophole in state law that exempts oil and gas waste from ever being subjected to classification as hazardous.** Doing so would provide the waste characterization and tracking that is sorely needed in New York. As noted by the US Environmental Protection Agency (USEPA), were it not for the exemption for E&P waste in the US Resource Conservation and Recovery Act (RCRA), some oil and gas waste would certainly meet the definition of “hazardous waste.”<sup>3</sup> Although New York has replicated this exemption in its own

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<sup>2</sup> *Id.*

<sup>3</sup> USEPA, Office of Solid Waste, EXEMPTION OF OIL AND GAS EXPLORATION AND PRODUCTION WASTES FROM FEDERAL HAZARDOUS WASTE REGULATIONS (2002). See also the discussion on RCRA and state waste laws in Nadia

waste laws and regulations, fortunately the state also has the ability to close the loophole and provide commonsense protection for the long-term health and safety of residents statewide.

The following comments detail the reasons and justifications for these positions, as well as recommendations for strengthening specific sections of the proposed Part 360 revisions and related amendments.

In addition, we draw your attention to and incorporate by reference the attached report prepared by Downstream Strategies on behalf of Earthworks.<sup>4</sup> The report includes comments and recommendations on the proposed Part 360 revisions, including with regard to radionuclides and toxic substances in oil and gas waste and landfill monitoring and disposal practices. Downstream Strategies, based in West Virginia, draws on its extensive technical expertise on water and soil quality, including in relation to the management of oil and gas waste.

Lastly, our organizations' overall perspective on the regulatory proposals put forth by NYSDEC is informed by the fact that nearly two years ago, New York made the historic decision to prohibit shale gas production because of concerns for health and the environment—concerns that are increasingly legitimized by scientific research and realities on the ground nationwide. In fact, the Final Supplemental Generic Environmental Impact Statement on hydraulic fracturing in the Marcellus and Utica Shale included waste generation among the reasons not to permit unconventional oil and gas production.<sup>5</sup> NYSDEC can, and should, now apply this same level of concern and caution to the regulation and management of oil and gas field waste generated both within and outside of its borders.

## **1. Close the hazardous waste loophole**

As noted above, we believe that there is credible justification for NYSDEC to close the loophole in state law that exempts oil and gas waste from ever being subjected to classification as hazardous. Along with revisions to the Part 360 regulations, NYSDEC has proposed regulatory amendments to Part 371 on the Identification and Listing of Hazardous Wastes, thereby opening up this section of

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Steinzor's and Bruce Baizel's *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>.

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

<sup>5</sup> NYSDEC, FINAL SUPPLEMENTAL GENERIC ENVIRONMENTAL IMPACT STATEMENT ON THE OIL, GAS AND SOLUTION MINING PROGRAM FINDINGS STATEMENT 14 (2015).

regulation to revisions. Part 371.1(e)(2)(v)—Exclusions in effect serves as a loophole for hazardous oil and gas waste.

New York's current hazardous waste regulations grant a special exemption that allows the oil and gas industry to circumvent state requirements for the generation, transportation, treatment, storage, and disposal of waste that would otherwise meet the definition of hazardous waste. NYSDEC should amend Part 371.1(e)(2)(v) by eliminating the words "crude oil, natural gas or" from this section. With that modification, the loophole would only exclude, "drilling fluids, produced waters and other wastes associated with the exploration, development, or production of geothermal energy."

Nearly 30 years ago, the US Congress and USEPA established a categorical exemption for the regulation of E&P wastes under Subtitle C of the US Resource Conservation and Recovery Act (RCRA). As a result, E&P wastes are not defined as hazardous regardless of their actual content and risks posed to the environment.

This federal exemption persists today, and has made it possible for states to define and manage E&P wastes as "solid" or "residual" regardless of whether or not they meet those definitions of waste with regard to their chemical make-up and potentially hazardous (and radioactive) characteristics. In turn, states have avoided the application of additional federal tracking, testing, transport, and disposal requirements established under RCRA.

Unfortunately, instead of using its authority to provide protections against E&P wastes with hazardous characteristics, New York has simply replicated the RCRA exemption. This "path of least resistance" may be convenient for oil and gas operators and reduce oversight and regulatory responsibilities for NYSDEC. However, ignoring the potentially hazardous nature of E&P waste poses risks to the environment and health—particularly because the volumes being transported, processed, and managed in New York (as well as nationwide) have increased over time.

As detailed below (see section on waste characterization), neither NYSDEC nor landfills accepting E&P wastes currently have the regulations and systems in place to test for and determine the chemical constituents of waste. This step is necessary to ensure proper disposal at facilities capable of handling specific types of E&P wastes. Reversing the hazardous waste loophole would solve this problem, since testing and tracking requirements would then be required for E&P wastes.

The current rulemaking offers a critical opportunity for NYSDEC to remove the nonsensical and dated exemption for oil and gas wastes and subject oil and gas wastes actually exhibiting the characteristics of hazardous waste to the same comprehensive transport, treatment, and disposal standards and oversight that all other hazardous waste are subject to. Other industries and generators of potentially hazardous waste in New York are subject to these requirements—there is no reason for the oil and gas industry to enjoy a special preference.

A legal exemption does not make E&P waste benign. In fact, the USEPA study used to determine the RCRA exemption recognized that between 10 and 70 percent of the oil and gas wastes sampled “could potentially exhibit RCRA hazardous waste characteristics,” leading the agency to conclude, “It is clear that some portions of both the large-volume and associated waste would have to be treated as hazardous if the Subtitle C exemption were lifted.”<sup>6</sup>

In addition, in the 30 years since the USEPA study was conducted, oil and gas development extraction methods have become more aggressive and generate more harmful wastes. New techniques, such as high-volume hydraulic fracturing, use much greater volumes of chemicals and create much greater volumes of waste, which are in turn influenced by many new contaminants acquired from the formations accessed (e.g., deep shale). In the revised draft SGEIS on high-volume hydraulic fracturing, 300 different chemicals—ranging from likely harmless to known toxins and carcinogens—are listed as potential constituents in E&P wastes.

As discussed below in the section on waste characterization, NYSDEC allows waste generators and facilities to self-report what types of waste are being disposed of in landfills. Current testing practices and oversight capacity are insufficient to ensure that E&P wastes ending up in New York’s landfills are *not* hazardous, particularly in light of growing evidence that some wastes have characteristics that meet the definition of hazardous. In this context, a categorical exemption for E&P wastes from the state’s hazardous waste regulations is both illogical and environmentally risky.

Both the USEPA and New York use four technical criteria to determine if a waste is hazardous: ignitability, toxicity, corrosivity, and reactivity.<sup>7</sup> Waste can be considered hazardous if it exhibits *any* of these characteristics.

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<sup>6</sup> USEPA, Regulatory Determination for Oil and Gas and Geothermal Exploration, Development, and Production Wastes, 53 Federal Register 25447, 25455 (Jul. 6, 1988).

<sup>7</sup> USEPA, RCRA Orientation Manual, Chapter III: RCRA Subtitle C, Managing Hazardous Waste; 40 CFR § 261.20 et seq.; NYSDEC, 6 NYCRR § 371.3.

A growing body of **documentation and scientific evidence confirms that oil and gas waste contains toxic (as well as potentially radioactive) substances that, if comprehensively tested, could meet concentration thresholds for the hazardous characteristic of toxicity.**<sup>8</sup> During the determination on the RCRA exemption, USEPA clearly stated that E&P wastes contain toxic substances that endanger both human health and the environment, including benzene, phenanthrene, lead, arsenic, barium, antimony, fluoride, and uranium at “levels that exceed 100 times USEPA’s health based standards.”<sup>9</sup> Of these, New York’s regulations include arsenic, barium, benzene, and lead among the contaminants that can give a waste the characteristic of toxicity.<sup>10</sup>

Drill cuttings, which can display toxic characteristics, make up a large proportion of the E&P wastes accepted at New York landfills. NYSDEC has stated that drill cuttings are simply “rock and soil residue” and that their disposal in municipal solid waste landfills is “environmentally safe.”<sup>11</sup> As discussed in more detail below, NYSDEC appears to base this view on very limited sampling and analysis conducted in 2010, not on more recent scientific studies on the content of cuttings and potential environmental risks. NYSDEC also ignores the fact that because cuttings are essentially ground up bits of shale formations, they can contain heavy metals such as barium and chromium—both of which are included in New York’s list of substances with toxicity characteristics.<sup>12</sup>

In addition, NYSDEC’s assertion that drill cuttings are “safe” appears to be based on the specious faith that drill site operators are thoroughly separating drill cuttings from other wastes at the well-site and guaranteeing that they are not “oil-based.” As discussed below, drill cuttings can be coated with the fluids and muds used to bore oil and gas wells, which are made from chemicals and petroleum products.

In addition, different types of wastes are often stored in reserve pits and tanks at well sites for extended periods of time before they are removed for disposal. As a result, loads of cuttings may end up blended with liquid waste from other parts of an operation, including flowback, produced water, and chemicals used in hydraulic fracturing.

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<sup>8</sup> See, e.g., M. Glass and K. Hatcher, Comments on Proposed Changes to the West Virginia Solid Waste Management Rule, 33CSR1, (Downstream Strategies 2014); and U.S. Occupational Safety and Health Administration, Drilling fluid, <https://www.osha.gov/SLTC/etools/oilandgas/drilling/drillingfluid.html> (last accessed Sept. 12, 2016).

<sup>9</sup> USEPA, Regulatory Determination for Oil and Gas and Geothermal Exploration, Development, and Production Wastes, 53 Federal Register 25447, 25448 (Jul. 6, 1988).

<sup>10</sup> 6 NYCRR § 371.3(e) tbl.1.

<sup>11</sup> NYSDEC, CHEMUNG COUNTY LANDFILL EXPANSION RESPONSIVENESS SURVEY SUMMARY, at response R2 (2016).

<sup>12</sup> 6 NYCRR § Part 371.3(e) tbl 1; See Tracy L. Bank, Lauren A. Fortson, et al., A GEOCHEMICAL AND GEOSPATIAL INVESTIGATION OF HEAVY METALS IN THE MARCELLUS SHALE (University of Buffalo and Chevron USA Inc. 2012).

Drilling muds can also be of great concern. In a 2013 report developed for the West Virginia Department of Environmental Protection, researchers found that samples of drilling muds from vertical wells in the state contained high concentrations of contaminants, including chlorides, benzene, and surfactants.<sup>13</sup> Although little research has been conducted on the chemical content of fracturing sand, it is mixed with chemicals before being used—and thus the waste may contain toxic substances.

The line between “solid” and “liquid” can easily be blurred prior to acceptance and disposal at landfills. Since cuttings are brought to the surface after drilling, they can become coated with both drilling fluids and produced (formation) water. Although produced water, flowback, and fracturing fluids are primarily disposed of at industrial wastewater treatment plants or centralized waste treatment facilities, they can also end up in landfills designed for solid waste. In fact, operators in Pennsylvania have reported sending “drilling fluid waste,” “fracing fluid waste,” “produced fluid,” and “servicing fluid” to landfills; as noted above, New York landfills have accepted nearly 23,000 barrels of liquid waste from Pennsylvania since 2010.<sup>14</sup>

Even if New York landfills only take loads of E&P wastes that they deem to be “solid waste,” it is highly possible that some of this waste contains flowback, fracturing fluids, production brine, or muds that have simply been dewatered and bulked either prior to transport to New York landfills or at the landfills themselves.

New York’s threshold for wastes being defined as “solid” is only 20 percent solid content,<sup>15</sup> i.e., landfills are allowed to accept wastes which can be as much as 80 percent liquid. In the absence of regulatory requirements and oversight to ensure the proper chemical characterization of wastes (see discussion below), there is simply no way to categorically exclude muds, fluids, and other substances from disposal at landfills. NYSDEC continues to insist that solid waste “will not consist of brine or similar wastes.”<sup>16</sup> Yet NYSDEC has never provided a credible basis for this assumption nor documentation that the E&P wastes accepted at landfills consist solely of drill cuttings that have not

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<sup>13</sup> W. VA. WATER RESEARCH INST., ASSESSING ENVIRONMENTAL IMPACTS OF HORIZONTAL GAS WELL DRILLING OPERATIONS (2013).

<sup>14</sup> PADEP Oil & Gas Reporting Website, Waste Reports by Waste Facility, <https://www.paoilandgasreporting.state.pa.us/publicreports/Modules/Waste/WasteByWasteFacility.aspx> (last visited Aug. 17, 2016) (data downloaded and summed for all New York facilities included in the database).

<sup>15</sup> Richard Clarkson, NYSDEC Div. of Materials Mgmt., Presentation on Current Solid Waste Disposal Regulatory Framework for Gas Development Wastes (2013).

<sup>16</sup> NYSDEC, CHEMUNG COUNTY LANDFILL EXPANSION RESPONSIVENESS SURVEY SUMMARY, at response R12 (2016).



been additionally contaminated by chemicals used in drilling, fracturing, and other processes.

Importantly, samples of flowback from the Marcellus Shale have shown consistently high levels of the toxic substance barium,<sup>17</sup> as well as toxic volatile organic compounds such as benzene and trichloroethylene.<sup>18</sup> As discussed below regarding roadspreading of brine (which by definition may encompass both produced water and flowback), this type of E&P waste can contain a range of chemicals, metals, and radioactive materials.<sup>19</sup>

Many of the chemicals used in drilling and hydraulic fracturing that could end up in E&P wastes are known to be toxic, while the health effects of others are unstudied but potentially harmful. A recent investigation of EPA's regulation of new chemicals proposed for use in drilling and fracturing found that the agency had health concerns about 88 of 105 such chemicals reviewed between 2009 and 2014, ranging from developmental toxicity, liver toxicity and neurotoxicity to irritation to eyes, lungs, mucous membranes, and skin.<sup>20</sup>

Yet EPA had approved all but seven of the chemicals for commercial use, in most cases without receiving or asking for health testing data from the manufacturers. In EPA's draft study of hydraulic fracturing and drinking water published in 2015, the EPA acknowledged that "major knowledge gaps exist regarding the toxicity of most chemicals used in hydraulic fracturing fluids or detected in flowback/produced water...."<sup>21</sup> The agency reported that among the chemicals used in hydraulic fracturing and found in flowback were arsenic, benzene, ethylbenzene, toluene and xylene.<sup>22</sup>

Similarly, a 2011 Congressional review of hydraulic fracturing fluids found that they included more than 650 different products that contained chemicals that were known or possible human carcinogens, regulated under the Safe Drinking Water Act for risks to human health, or listed as

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<sup>17</sup> Paul Ziemkiewicz, John Quaranta, and Michael McCawley, *Practical Measures for Reducing the Risk of Environmental Contamination in Shale Energy Production*, ENVIRONMENTAL Science (2014).

<sup>18</sup> U.S. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, HYDRAULIC FRACTURING AND FLOWBACK HAZARDS OTHER THAN RESPIRABLE SILICA (2014), available at <https://www.osha.gov/Publications/OSHA3763.pdf>.

<sup>19</sup> Robert B. Jackson et al., *The Environmental Costs and Benefits of Fracking*, 39 ENVIRONMENT AND RESOURCES 327 (2014); U.S. GEOLOGICAL SURVEY, RADIUM CONTENT OF OIL AND GAS FIELD PRODUCED WATERS IN THE NORTHERN APPALACHIAN BASIN (USA): SUMMARY AND DISCUSSION OF DATA (2011), available at <http://pubs.usgs.gov/sir/2011/5135/>.

<sup>20</sup> Dusty Horwitt, TOXIC SECRETS: COMPANIES EXPLOIT WEAK US CHEMICAL RULES TO HIDE FRACKING RISKS (Partnership for Policy Integrity 2016).

<sup>21</sup> USEPA, ASSESSMENT OF THE POTENTIAL IMPACTS OF HYDRAULIC FRACTURING FOR OIL AND GAS ON DRINKING WATER RESOURCES, at 9-35. 2015.

<sup>22</sup> *Id.* at 9-34.

hazardous air pollutants under the Clean Air Act.<sup>23</sup>

New York's current solid waste regulations provide another reason why E&P waste would likely be defined as hazardous if the exemption were reversed. Part 371.1(d)—Definition of hazardous waste specifies that wastes excluded from the definition of hazardous can be considered hazardous if mixing with other substances gives it hazardous characteristics. This is consistent with USEPA's 2002 warning to oil and gas operators that waste mixtures "might become a non-exempt waste and require management under RCRA Subtitle C regulation."<sup>24</sup>

Currently, however, **NYSDEC does not appear to enforce Part 371.1(d) by requiring landfills to conduct chemical testing of mixtures that contain excluded E&P wastes to determine if they are hazardous.** Instead, E&P wastes solidified or downblended with other products in order to meet "solid" thresholds for disposal at landfills are left untested for toxic or radioactive contaminants. According to Argonne National Laboratory, the effectiveness of solidification is limited and various factors can result in the leaching of contaminants into the environment from mixtures.<sup>25</sup>

Given this, NYSDEC should prevent compounding the risks to soil and water by adopting mechanisms to ensure that landfills in New York that accept E&P wastes do not mix them with materials that also contain toxic or radioactive materials. For example, some landfills mix E&P waste with coal ash, which contains arsenic, mercury, and lead and is defined by the USEPA as Technologically Enhanced Naturally Occurring Radioactive Material (TENORM), or auto shredder residue, which contains high enough levels of heavy metals, petroleum products, and polychlorinated biphenyls to render it "hazardous wastes according to the [USEPA] Toxicity Characteristic Leaching Procedure (TCLP)."<sup>26</sup>

Finally, **realities in oil and gas fields nationwide indicate that E&P wastes can have the hazardous characteristic of ignitability.** For example:

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<sup>23</sup> STAFF OF H. COMM. ON ENERGY AND COMMERCE, 112TH CONG., CHEMICALS USED IN HYDRAULIC FRACTURING COMMERCE (2011) (Committee Minority Staff Report).

<sup>24</sup> USEPA, EXEMPTION OF OIL AND GAS EXPLORATION AND PRODUCTION WASTES FROM FEDERAL HAZARDOUS WASTE REGULATIONS (2002).

<sup>25</sup> Argonne National Laboratory Drilling Waste Information System, Fact Sheet - Solidification and Stabilization, <http://web.ead.anl.gov/dwm/techdesc/solid/index.cfm> (last visited Sept. 12, 2016).

<sup>26</sup> Michael C. Mensinger, Amir Rehmat, Satish Saxena, and N.S. Rao, Treatment Technology for Auto Fluff, available at [https://web.anl.gov/PCS/acsfuel/preprint%20archive/Files/38\\_3\\_CHICAGO\\_08-93\\_0837.pdf](https://web.anl.gov/PCS/acsfuel/preprint%20archive/Files/38_3_CHICAGO_08-93_0837.pdf).

- In January 2003, a Texas collection pit of oil and gas waste ignited when hydrocarbon vapors interacted with sediments and water in the pit.<sup>27</sup>
- In May 2006, a natural gas condensate tank and pit in Colorado caught fire and burned for five hours.<sup>28</sup>
- In April 2010, a wastewater impoundment in Pennsylvania ignited reportedly shooting flames 100 feet in the air.<sup>29</sup>

## 2. Strengthen waste characterization

According to researchers with Downstream Strategies, “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.”<sup>30</sup>

Yet even in the face of such realities and rapidly growing volumes of E&P wastes entering New York landfills, **NYSDEC has never taken the important step of determining whether landfill disposal is an appropriate management approach for E&P wastes.** Despite their complex chemical and radiological characteristics, NYSDEC continues to categorize E&P wastes as general “solid waste,” effectively sanctioning the disposal of substances with unknown content and, in turn, with unknown environmental consequences.

NYSDEC has not been clear about how E&P wastes are categorized and which landfills in New York can permissibly accept this waste stream. According to a letter from NYSDEC, drilling and

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<sup>27</sup> US Dep’t of Labor, Occupational Safety and Health Admin., Potential Flammability Hazard Associated with Bulk Transportation of Oilfield Exploration and Production (E&P) Waste Liquids, SHIB 03-24-2008. It is possible also that this incident shows that E&P waste meets the RCRA standard for reactivity.

<sup>28</sup> Earthworks Oil & Gas Accountability Project, Spring/Summer 2006 Report (2006), *available at* <https://www.earthworksaction.org/files/publications/OGARspringsummer2006.pdf>.

<sup>29</sup> Janice Crompton, *Residents Reported Gas Odors Before Explosion*, PITTSBURG POST-GAZETTE (Apr. 1, 2010), *available at* <http://www.post-gazette.com/local/washington/2010/04/01/Residents-reported-gas-odors-before-explosion/stories/201004010317>.

<sup>30</sup> M. Glass and K. Hatcher, Comments on Proposed Changes to the West Virginia Solid Waste Management Rule, 33CSR1 (Downstream Strategies 2014).

production waste has sometimes been classified as construction and demolition (C&D) debris.<sup>31</sup> It is clear from PADEP's waste records that both C&D and MSW landfills in New York have been accepting this waste stream.

This lack of clarity is made worse by NYSDEC's broadening of the definition of "industrial waste" in the proposed Part 360 revisions. The definition in the current 6 NYCRR Part 360 regulations clearly states that E&P waste is not industrial waste.<sup>32</sup> However, in the proposed revisions, NYSDEC simply states in the Definitions section that, "*Industrial waste* means waste generated by manufacturing or industrial processes."

MSW, C&D, and Industrial landfills all have different requirements and regulations governing their operations, maintenance, and structure. Due to the potentially hazardous and radioactive characteristics of E&P wastes, we firmly believe that this waste stream is best suited for disposal at hazardous or low-level radioactive waste facilities (as discussed previously). However, NYSDEC must be explicit as to whether or not the agency considers E&P waste to be industrial waste, C&D waste, or its own category of waste for the purposes of regulation and enforcement. If E&P waste is its own category of waste, the proposed regulations should clearly spell out which facilities can accept it and under what conditions.

We recognize that NYSDEC oversees waste treatment and disposal facilities and requires them to submit reports on the volumes and types of waste managed to NYSDEC regional offices. However, it does not appear that NYSDEC has ever assessed information held (presumably in hard copy format) at regional offices to determine whether current practices offer a sufficient level of environmental protection.

In 2014, Citizens Campaign for the Environment submitted a Freedom of Information Law (FOIL) request to NYSDEC on the types of oil and gas waste disposed of in landfills. Unfortunately, NYSDEC's response included spreadsheets with titles of reports that had been submitted to regional NYSDEC offices—but no actual data or information on what those reports contained.

Further, in a comprehensive review of 100 permit applications from drillers, Environmental Advocates of New York (EANY) found that NYSDEC simply asks operators how drilling fluids and waste will be stored, contained, and disposed of—leaving it up to operators to decide how much

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<sup>31</sup> Letter from Ruth Earl, NYSDEC Records Access Officer, to Sarah Eckel, Citizens Campaign for the Environment, June 13, 2014.

<sup>32</sup> 6 NYCRR § 360-1.2 (b)(88).

detail to provide.<sup>33</sup> EANY’s analysis indicates that responses provided by drillers vary greatly and are often based on generic statements, such as that wastes will be disposed of “at approved facilities” and “in accordance with NYSDEC regulations.”<sup>34</sup>

A 2015 review of oil and gas waste management practices found that in the absence of a standardized state form, New York waste disposal facilities often develop their own waste characterization forms—which may not even include solidified/bulked drill cuttings or other E&P wastes.<sup>35</sup> Further, both NYSDEC and landfill forms require only basic descriptions of wastes (such as texture, size, appearance, and degree of odor) and give operators wide latitude in whether or not to submit actual laboratory analysis of the content of the waste.<sup>36</sup>

Oil and gas operators are required only to certify that “representative samples” of waste have been tested, not necessarily the actual waste being disposed of. As a result, they and associated transporters may be approved to dispose of many loads or tons 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 can vary depending on geological conditions and potentially even within the same well bore or on the same well site.<sup>37</sup>

In the absence of comprehensive chemical testing and standardized documentation, the actual content of waste entering New York landfills remains largely unknown. **Such lack of scrutiny and oversight is unacceptable when managing E&P wastes, which have complex chemical profiles, contain radioactive material, and (as discussed above) could potentially meet the definition of hazardous if properly characterized.**

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<sup>33</sup> ENVIRONMENTAL ADVOCATES OF NEW YORK, OUT OF SIGHT, OUT OF MIND: NEW YORK’S FAILURE TO TRACK OR TREAT FRACKING WASTE ENDANGERS PUBLIC HEALTH AND THE ENVIRONMENT (2012).

<sup>34</sup> *Id.*

<sup>35</sup> Discussion in N. Steinzor and B. Baizel, WASTING AWAY: FOUR STATES’ FAILURE TO MANAGE OIL AND GAS FIELD WASTE FROM THE MARCELLUS AND UTICA SHALE REGION (Earthworks 2015). See NYSDEC, Application for Treatment or Disposal of an Industrial Waste Stream, *available at* [http://www.NYSDEC.ny.gov/docs/materials\\_minerals\\_pdf/indwasteform.pdf](http://www.NYSDEC.ny.gov/docs/materials_minerals_pdf/indwasteform.pdf); Casella Resource Solutions, Special Waste Characterization Form, *available at* <http://www.casella.com/what-we-do/landfills/special-waste/special-waste-new-york>; and Chautauqua County Landfill, Generator Waste Characterization Report Form, *available at* <http://www.co.chautauqua.ny.us/DocumentCenter/Home/View/349>.

<sup>36</sup> See NYSDEC, Application for Treatment or Disposal of an Industrial Waste Stream, *available at* [http://www.dec.ny.gov/docs/materials\\_minerals\\_pdf/indwasteform.pdf](http://www.dec.ny.gov/docs/materials_minerals_pdf/indwasteform.pdf); Casella Resource Solutions, Special Waste Characterization Form, *available at* <http://www.casella.com/what-we-do/landfills/special-waste/special-waste-new-york>; and Chautauqua County Landfill, Generator Waste Characterization Report Form, *available at* <http://www.co.chautauqua.ny.us/DocumentCenter/Home/View/349>.

<sup>37</sup> M. Glass and K. Hatcher, Comments on Proposed Changes to the West Virginia Solid Waste Management Rule, 33CSR1 (Downstream Strategies 2014).

The overall concept of “drilling waste” represents a chemically complex mixture of fluid and solid organics, salts, minerals, metals, and radionuclides. The characteristics of drill cuttings, muds, fracturing sand, and other “solid” wastes, and in turn their interaction with water, soil, and air, are not yet completely 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.”<sup>38</sup>

Nonetheless, recent scientific analysis of both vertical and horizontal drill cutting samples in West Virginia showed they contain chloride, arsenic, barium, iron, manganese, strontium, benzene, and fluoride, as well as Radium 226 and 228.<sup>39</sup> NYSDEC does not currently distinguish in regulation between cuttings generated from different types of formations and drilling depths, factors that determine the concentration of metals, radioactivity, and hydrocarbons contained in resulting waste. For example, a recent analysis of radioactivity in E&P wastes by the Pennsylvania Department of Environmental Protection showed that samples of horizontal drill cuttings had Ra-226 levels nearly twice as high as samples of vertical cuttings.<sup>40</sup>

NYSDEC should establish clear definitions of different types of cuttings and establish regulations prohibiting disposal of those containing concentrations of chemicals and radiological substances higher than thresholds in New York’s hazardous waste and radioactive waste disposal laws.

Even the way in which cuttings are generated can influence contaminant levels; for example, those generated with mud drilling techniques have been found to contain higher chloride concentrations, presumably due to additives in the mud.<sup>41</sup> A new study indicates that a “green” synthetic drilling mud has the potential to lower toxicity levels in cuttings, compared to other muds that are much

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<sup>38</sup> Paul Ziemkiewicz, John Quaranta, and Michael McCawley, *Practical Measures for Reducing the Risk of Environmental Contamination in Shale Energy Production*, ENVIRONMENTAL Science (2014).

<sup>39</sup> 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).

<sup>40</sup> PERMAFIX ENVIRONMENTAL SERVICES FOR PADEP, *TECHNOLOGICALLY ENHANCED NATURALLY OCCURRING RADIOACTIVE MATERIALS (TENORM) STUDY REPORT* (2015).

<sup>41</sup> *Id.*

more widely used today.<sup>42</sup>

In recognition of these variations, New York allows “water-based” drill cuttings to be buried onsite unless they contain oil- and polymer-based mud or lubricant, at which point they are considered to be “industrial non-hazardous waste” and must be removed from the site for disposal in a landfill.<sup>43</sup> However, due to limitations in waste characterization discussed above, NYSDEC does not have mechanisms in place to ensure that cuttings managed and disposed of onsite are in fact “uncontaminated.” This makes it even more critical for NYSDEC to link the management and disposal of cuttings to established contaminant thresholds.

**In light of the chemical and radiological complexities of E&P wastes and the potential for different wastes to be mixed during transport and disposal, the wastes should be properly characterized at the site where they are generated *prior to disposal*.** NYSDEC should develop requirements for oil and gas operators to conduct comprehensive waste characterization at the well site; and require landfills accepting E&P waste from both within and outside of New York to obtain documentation from the generators of that waste at the point of origin.

In addition, NYSDEC should require that the full list of chemicals used at the well sites where the wastes being characterized were generated be made publicly available before those wastes can be accepted at landfills in New York. The chemicals should be listed by Chemical Abstracts Service (CAS) registry number and, if the chemical is a new chemical, by the EPA tracking number assigned to chemicals reviewed by EPA’s New Chemicals program (e.g. P-09-0205). The CAS number is a unique chemical identifier that enables regulators and others to know precisely what chemical is being used. The EPA tracking number would enable regulators to know, among other things, whether EPA has identified health or environmental concerns about new chemicals and other information. If NYSDEC adopts this disclosure standard, the agency should require drilling operators to waive claims of confidentiality regarding chemical identities that are often asserted by

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<sup>42</sup> 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).

<sup>43</sup> NYSDEC, REVISED DRAFT SUPPLEMENTAL GENERIC ENVIRONMENTAL IMPACT STATEMENT ON THE OIL, GAS AND SOLUTION MINING REGULATORY PROGRAM WELL PERMIT ISSUANCE FOR HORIZONTAL DRILLING AND HIGH-VOLUME HYDRAULIC FRACTURING TO DEVELOP THE MARCELLUS SHALE AND OTHER LOW-PERMEABILITY GAS RESERVOIRS § 5.13.1 (2011).

chemical manufacturers and operators.<sup>44</sup>

As stated above, our organizations hold the position that NYSDEC should prohibit E&P waste disposal at MSW, Industrial, and C&D landfills. At the same time, the current rulemaking gives NYSDEC the opportunity to take a significant step forward in strengthening waste characterization procedures at landfills, as follows.

Part 360.16—Permit applications and permit provisions. Part 360.16(4)(h)(2) requires landfills, municipal waste combustors, and transfer facilities to include in their facility operating manuals a detailed plan that, “describes procedures and timeframes for conducting periodic waste characterization surveys.” We support this provision because such procedures are essential to tracking what landfills are accepting and the potential environmental risks.

However, the current language is too general to ensure that landfills will survey waste frequently or comprehensively enough to prevent the eventual contamination of soil and groundwater. Because this provision lacks associated standards, it will be difficult to actually enforce.

NYSDEC should amend Part 360.16, Section 4(h)(2) to require characterization procedures and timeframes for E&P wastes specifically. These revisions should include consistent, binding protocols for the testing and characterization of both raw and solidified waste. Protocols should address chemical and radiological parameters for testing; frequency of testing; and the origin and maximum volume of E&P wastes that can be tested as a “representative sample.”

As discussed earlier, NYSDEC should amend Part 371.1(e)(2)(v) to close the loophole in state regulations that exclude E&P wastes from characterization as hazardous. We therefore support NYSDEC’s specification in Part 363-8.1 (p) that special handling and disposal procedures for drilling and production wastes must be included in landfill waste control plans. However, this section should be expanded and amended to require that all landfill waste control plans include the analytical testing of oil and gas waste for its potentially hazardous characteristics (ignitability, toxicity, corrosivity, and reactivity), and if the waste tests as hazardous, it must be sent to a facility specifically licensed to manage hazardous waste.

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<sup>44</sup> Dusty Horwitt, TOXIC SECRETS: COMPANIES EXPLOIT WEAK US CHEMICAL RULES TO HIDE FRACKING RISKS (Partnership for Policy Integrity 2016); see Katherine Konschnik and Archana Dayalu, *Hydraulic Fracturing Chemicals Reporting: Analysis of Available Data and Recommendations for Policymakers*, 88 ENERGY POLICY 504-514 (2016); STAFF OF H. COMM. ON ENERGY AND COMMERCE, 112TH CONG., CHEMICALS USED IN HYDRAULIC FRACTURING COMMERCE (2011) (Committee Minority Staff Report) (finding that companies are injecting fluids containing chemicals that they themselves cannot identify).



Currently, waste management facilities in New York do not consistently require documentation of laboratory analysis to determine if wastes have hazardous characteristics. Testing parameters should include, at minimum, all of those on NYSDEC's lists of substances with primary hazardous properties.<sup>45</sup> Until landfills update their waste control plans to ensure comprehensive analytical testing, NYSDEC should prohibit them from accepting oil and gas waste.

It is vital for landfills to take measures to ensure greater protection against the impacts of E&P waste they accept. At the very minimum, NYSDEC should require any landfill it permits to obtain documentation from waste transporters to certify that the specific load of waste in question has been thoroughly analyzed by a laboratory using USEPA Toxicity Characteristic Leaching Procedure (TCLP) analyses for Metals, Volatile Organic Compounds, Semi-volatile Organic Compounds, and Total Petroleum Hydrocarbons. These certifications should be made available to both NYSDEC to ensure regulatory compliance and to the public upon request.

### **3. Adequately manage and test landfill leachate**

We believe that insufficient testing, characterization, and regulation warrant a prohibition on the disposal of leachate from landfills accepting E&P wastes at POTWs. The environmental consulting company Downstream Strategies has analyzed trends for several common drilling waste contaminants detected in leachate from West Virginia landfills, finding that chloride, arsenic, and barium increased in tandem with growing rates of E&P waste disposal, and that the leachate frequently contained concentration of Ra-226 and Ra-228 that exceeded the federal Maximum Contaminant Level (MCL).<sup>46</sup> Another analysis of leachate from six West Virginia landfills by researchers at Marshall University found that barium was present only in the leachate from landfills that accept drill cuttings.<sup>47</sup>

A recent report by PADEP concluded that, "Because landfills accept natural gas industry wastes such as drill cuttings and treatment sludge that may contain TENORM [Technologically Enhanced

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<sup>45</sup> 6 NYCRR § 597.3 (listing hazardous substances).

<sup>46</sup> M. Glass and K. Hatcher, Comments on Proposed Changes to the West Virginia Solid Waste Management Rule, 33CSR1 (Downstream Strategies 2014).

<sup>47</sup> 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).

Naturally Occurring Radioactive Material], there is a potential for leachate from those facilities to also contain TENORM.”<sup>48</sup>

Such findings indicate that solidification practices at landfills may be insufficient to stabilize contaminants and prevent the possibility of groundwater contamination—a condition that may well exist at landfills in New York that accept E&P wastes. Given the strong potential that both E&P wastes entering landfills and the leachate leaving them will have elevated levels of toxic and radioactive contaminants, we offer the following comments.

Part 363-6.20—Aboveground and on-ground leachate storage tank requirements. We strongly support these provisions to properly contain leachate in closed systems prior to disposal, including subpart (a) requiring a secondary containment system in the event of a leachate spill. Containment is particularly vital because the design provisions in this requirement implicitly allow for the storage of leachate onsite up to three months.

Part 363-6.1—General Requirements. The Publicly Owned Treatment Works (POTWs) to which landfill leachate is sent for disposal are generally designed to remove suspended solids and organic material using biological treatment. They do not monitor for Ra-226 and Ra-228 or other contaminants associated with E&P wastes (such as benzene or barium), largely because Federal National Pollutant Discharge Elimination System (NPDES) permits don’t generally require it.<sup>49</sup> Unfortunately, New York’s State Pollutant Discharge Elimination System (SPDES) is equally limited in its testing and monitoring requirements.

Two such New York State POTWs serving the towns of Wellsville (SPDES Permit No. NY0020621) and the Village of Bath (SPDES Permit No. NY0021431) have accepted or may accept leachate from landfills that store E&P wastes. Without treatment methods designed for E&P wastes, the POTWs may discharge radionuclides or other E&P pollutants to New York’s waterways. Any unregulated discharge of these dangerous pollutants most likely would run afoul of the federal Clean Water Act’s anti-degradation provision, as they could impair the receiving water’s existing use, whether for drinking, recreation, or fish propagation.<sup>50</sup>

Unless landfills can guarantee that the leachate going to POTWs is free of toxic substances and has a

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<sup>48</sup> PERMAFIX ENVIRONMENTAL SERVICES FOR PADEP, TECHNOLOGICALLY ENHANCED NATURALLY OCCURRING RADIOACTIVE MATERIALS (TENORM) STUDY REPORT (2015).

<sup>49</sup> *Id.*

<sup>50</sup> *See* 40 CFR § 131.12(a)(1).

radiological content no greater than drinking water standards (5pCi/g), their leachate should not be disposed of at POTWs—since this practice effectively means direct discharge of contaminants into rivers and streams. NYSDEC should amend Part 363-6.1 to include a provision that any landfill accepting E&P wastes is prohibited from sending its leachate to Publicly Owned Treatment Works (POTWs). This is necessary to prevent toxic and radioactive substances associated with oil and gas activities from reaching potentially causing harm to aquatic life, drinking water resources, and public health.

The inability of POTWs to remove substances contained in E&P wastes is reflected in USEPA's 2016 rule prohibiting the disposal of wastewater from unconventional oil and gas operations at POTWs because it can, "...contain high concentrations of dissolved solids (or salts), as well as pollutants such as radioactive elements, metals, chlorides, sulfates, and other dissolved inorganic constituents that POTWs are not designed to remove...constituents can be discharged, untreated, from the POTW to the receiving water; can disrupt the operation of the POTW (e.g., by inhibiting biological treatment); can accumulate in biosolids (sewage sludge), limiting their use; and can facilitate the formation of harmful DBPs [disinfection by-products]"<sup>51</sup>

For the same reasons cited by USEPA with regard to oil and gas wastewater, leachate associated with the disposal of E&P wastes should only be disposed of at specialized treatment plants capable of removing and safely disposing of toxic and radioactive substances. Notably, the National Association of Clean Water Agencies recently called on USEPA to expand its review of effluent discharge guidelines and consider the adoption of federal standards on the treatment and disposal of landfill leachate at POTWs. Although this request did not specify problems associated with E&P wastes, it was based on growing evidence that landfill leachate interferes with POTW treatment systems.<sup>52</sup>

NYSDEC should also incorporate into Part 363-6.1 a provision that any landfills accepting drill cuttings and other E&P wastes must dispose of them in dedicated cells. These cells should be constructed to segregate leachate generated from E&P wastes within the cell from the leachate generated from all other municipal solid wastes at the facility. Since 2013, municipal solid waste

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<sup>51</sup> USEPA, Fact Sheet: Pretreatment Standards for the Oil and Gas Extraction Point Source Category (2016), available at [https://www.epa.gov/sites/production/files/2016-06/documents/uog-final-rule\\_fact-sheet\\_06-14-2016.pdf](https://www.epa.gov/sites/production/files/2016-06/documents/uog-final-rule_fact-sheet_06-14-2016.pdf) (last visited Aug. 21, 2016).

<sup>52</sup> National Association of Clean Water Agencies, comment letter on USEPA's Preliminary 2016 Effluent Guidelines Program Plan, available at <https://www.nacwa.org/images/stories/public/2016elgcom.pdf> (accessed Aug. 21, 2016).

facilities in West Virginia at risk of exceeding their tonnage limits due to E&P waste streams have been given the option by the state of developing such cells, which are considered necessary to prevent contaminants from drilling waste from reaching larger waste streams.<sup>53</sup>

Part 363-6.1(c) states that leachate collection and removal systems should be designed to “effectively protect surface and groundwater resources from uncontrolled releases of landfill leachate.” Studies indicate that over time, most landfills will experience leachate leakage into the environment; known pathways to water resources include the overflow of leachate collection units, cracks in piping systems, as well as landfill liner failures.<sup>54</sup>

Given this, NYSDEC should amend Subpart 363-6.1(c) to include a monitoring and repair requirement for the full leachate collection and removal system, including, at minimum, weekly inspections and full repair within three days of a spill.

Part 363-7.4—Environmental Monitoring Plan. We strongly agree with DEC’s requirement that landfills have a detailed plan in place for the frequency and location of monitoring. Part 363-7.4(a)(3) should specify that the “analyses to be performed” must be in accordance with USEPA standard methods for the relevant contaminants, as specified in Part 363-7.6.

In addition, Part 363-7.4(b)(3) should clarify that leachate monitoring for both baseline and expanded parameters in both the primary and secondary collection systems must be conducted on at least a quarterly basis. These improvements are particularly critical at landfills that treat leachate onsite for direct discharge, but also necessary to reduce the possibility that leachate with excessive concentrations of chemicals, metals, and radionuclides will be sent to POTWs.

Part 363-7.6—Water Quality Analysis Tables. We disagree that radionuclide monitoring for groundwater, surface water, and sediment should only occur under a contingency sampling scenario. Table 3A should be made a requirement for facility environmental monitoring plans for groundwater, surface water, and sediment monitoring (not only leachate pools), with radionuclide sampling and analysis performed on at least a routine basis.

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<sup>53</sup> Marc Glass, Comments on Proposed Changes to New York State Solid Waste Regulations (Downstream Strategies 2016).

<sup>54</sup> 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).

#### 4. Adopt appropriate systems for detecting and managing radioactivity

The level of radioactivity that exists in oil and gas waste is vigorously debated, and in turn how the waste should be managed to protect workers and residents from exposure and natural systems from contamination. This longstanding question has become more focused as drilling and generation of associated waste increases. Levels of radioactivity can vary across shale formations depending on depth and concentration. The Marcellus Shale has been found to contain considerably higher levels of radioactivity than many other formations.<sup>55</sup>

Oil and gas development is known to bring radioactivity to the surface through produced water, drill cuttings, and drilling muds, and can also result in radioactive deposits in sludges and scale that accumulate on pipes and equipment. Because of gaps in waste characterization (discussed above), as well as the potential for different types of E&P wastes to mix during storage and transportation, radioactive substances can easily enter landfills.

The current rulemaking indicates that NYSDEC recognizes the risk of radioactivity entering landfills. However, we offer the following comments based on concern over the lack of specific provisions to adequately detect and manage radioactive substances associated with E&P wastes.

Part 363-8.1(a)(4)—Radioactive waste detection procedures and requirements. We strongly support NYSDEC's requirement for the installation of fixed radiation detection units at landfills, including provisions for regular background readings and calibration. However, NYSDEC should amend this provision to specify the required type and capabilities of radioactive waste detection units. Otherwise, it will be left up to landfill operators to determine which technology to use—in turn risking that radioactivity in waste goes undetected.

Fixed radiation detector units, or portal monitors, do not actually quantify specific radionuclide isotopes (such as Radium 226).<sup>56</sup> For drilling wastes, fixed radiation detectors are not an effective method to screen whether waste loads meet municipal landfill activity limitations for Radium 226 and/or Radium 228. This is because 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

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<sup>55</sup> U.S. GEOLOGICAL SURVEY, RADIUM CONTENT OF OIL AND GAS FIELD PRODUCED WATERS IN THE NORTHERN APPALACHIAN BASIN (USA): SUMMARY AND DISCUSSION OF DATA (2011), *available at* <http://pubs.usgs.gov/sir/2011/5135/>.

<sup>56</sup> Marc Glass, Comments on Proposed Changes to New York State Solid Waste Regulations (Downstream Strategies 2016).

radioactive isotopes.<sup>57</sup>

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). 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).<sup>58</sup> 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.

The complexities of radioactivity detection in E&P wastes further underscore the importance (discussed above) of conducting laboratory analysis of chemical and radiological characteristics. It also points to the critical need for NYSDEC to take a precautionary approach and prohibit this waste stream from entering landfills and landfill leachate from being sent to POTWs.

For the purposes of the proposed regulations, NYSDEC should at minimum amend Part 363-8.1(a)(4)(ii) by lowering the investigation alarm setpoint to no higher than 5piC/g. This is USEPA's concentration criterion for surface soil under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, commonly known as the Superfund Act).<sup>59</sup> This standard is based on gamma radiation detection, which is relevant to NYSDEC's very limited proposal for radioactivity detection methods. It is also notable that industrial solid waste landfills nationwide generally follow an even lower limit of 3 piC/g of radium for waste disposal.<sup>60</sup>

Part 363-8.1(a)(4)(vi). We support NYSDEC's requirement that "[e]ach instance in which the radiation detector is triggered by a waste load must be documented," including such details as the origin and hauler of the waste. However, as written, there is nothing in the regulation that would prevent a landfill from transferring the waste that triggered an alarm to another location, potentially without its radioactive content being addressed prior to disposal. Nor does this section require further evaluation of the content of a "hot" waste load and potential risks to landfill

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<sup>57</sup> *Id.*

<sup>58</sup> Marc Glass, Comments on Proposed Changes to New York State Solid Waste Regulations (Downstream Strategies 2016).

<sup>59</sup> USEPA, Memorandum: Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation Goals for CERCLA sites (1998).

<sup>60</sup> USEPA, Radionuclides in Drinking Water; Waste Disposal Options, [https://cfpub.epa.gov/safewater/radionuclides/radionuclides.cfm?action=Rad\\_Disposal%20Options](https://cfpub.epa.gov/safewater/radionuclides/radionuclides.cfm?action=Rad_Disposal%20Options) (last visited Aug. 21, 2016).

personnel and the environment.

NYSDEC should amend Part 363-8.1(a)(4)(vi) with specific procedures that landfills must follow once a radiation detector is triggered. Landfills should, at minimum, be required to report the detection event to NYSDEC, contact the generator of the waste, and take precautionary measures to segregate the radioactive waste from contact with personnel, other wastes, and soil and water. Landfills should also be required to document measures taken to ensure the proper management, transport, and disposal of the waste (e.g., at a specialized low-level radioactive waste facility).

In West Virginia, for example, any landfill detecting radiation readings above established limits must immediately cease accepting the affected E&P wastes; in addition, the state Department of Environmental Protection must conduct an inspection to determine when radiation levels have returned to below limits.<sup>61</sup> In addition to incorporating these procedures, NYSDEC should establish a requirement that if radioactivity detectors are triggered at landfills, the “hot” load must be sampled and analyzed for Radium 226 and 228.

Part 363-8.1 (o)—Disposal Prohibitions. We support the prohibitions in Part 363-8.1 (o)(7) on the disposal of low-level radioactive waste and processed and concentrated Naturally Occurring Radioactive Material (NORM) waste, as well as in Part 363-8.1 (o)(8) on waste with a concentration of Radium 226 greater than 25 pCi/g (though, as discussed above, we believe this level should be set much lower).

Regarding Technologically Enhanced Radioactive Material (TENORM), we believe that oil and gas-related drill cuttings meet the definition of TENORM and that DEC should clarify that they will be regulated as such. Metals and radionuclides do not degrade significantly in the environment over time, but as part of E&P wastes their environmental mobility may be enhanced over natural conditions.<sup>62</sup> According to the USEPA, Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) includes “materials that have been concentrated or exposed to the accessible environment as a result of human activities;” in contrast, NORM is defined as materials that are left completely “undisturbed.”<sup>63</sup>

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<sup>61</sup> H.B. 107 amending Article 15 of W. Va. Code §§ 22-15-8, 22-15-11 (2014).

<sup>62</sup> M. Glass and K. Hatcher, Comments on Proposed Changes to the West Virginia Solid Waste Management Rule, 33CSR1 (Downstream Strategies 2014).

<sup>63</sup> USEPA, TECHNICAL REPORT ON TECHNOLOGICALLY ENHANCED NATURALLY OCCURRING RADIOACTIVE MATERIALS FROM URANIUM MINING, VOLUME 2 (2008).

For the purposes of the current proposed regulations, however, we strongly recommend that DEC amends the list of disposal prohibitions to include drill cuttings, by revising Part 363-8.1(o)(7) to read “low-level radioactive waste, processed and concentrated NORM waste, including drill cuttings from the exploration and production of oil and natural gas....”

NYSDEC frequently insists that drill cuttings are simply “rock and soil residue” and “do not contain liquids with high concentrations of radioactivity.”<sup>64</sup> The agency’s longstanding position that drill cuttings do not pose a threat to health or the environment does not have a credible scientific basis. Instead, NYSDEC appears to rely on a single 2010 study by a private consulting company (CoPhysics), as well as the views of a waste management company with a financial interest in landfills accepting drill cuttings.<sup>65</sup>

The CoPhysics report included data on only four samples of Marcellus Shale cuttings from unidentified well sites in Pennsylvania, one of which contained the drilling mud additive barite, which can block gamma radiation.<sup>66</sup> The methodology of the CoPhysics study has been questioned by other scientists in the field, and it is unclear whether the samples of cuttings were taken from high-volume hydraulic fracturing sites.<sup>67</sup>

As discussed above, E&P wastes aren’t properly characterized prior to disposal at New York landfills, and liquid wastes are clearly entering landfills. Recent analyses of drill cuttings confirm that this E&P waste contains radioactive material, as well as metals, salts, and chemicals.<sup>68</sup> In 2015, Casella Resource Solutions stated that the company’s facilities accept drill cuttings that are “mixed with small amounts of drilling fluids.”<sup>69</sup>

In addition, NYSDEC’s current approach to the regulation of drill cuttings is inherently illogical. New

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<sup>64</sup> NYSDEC, CHEMUNG COUNTY LANDFILL EXPANSION RESPONSIVENESS SURVEY SUMMARY, at response R2 and RMR2, (2016).

<sup>65</sup> NYSDEC, In re Application for Modification of the Part 360 Permit for a Municipal Solid Waste Landfill on County Route 60 in Lowman, Town of Chemung, New York (August 4, 2011) (Commissioner Decision), available at <http://www.dec.ny.gov/hearings/76112.html>.

<sup>66</sup> COPHYSICS, RADIOLOGICAL SURVEY REPORT, MARCELLUS SHALE DRILL CUTTINGS (2010); Society of Petroleum Engineers, PetroWiki: Gamma Ray Logs, [http://petrowiki.org/Gamma\\_ray\\_logs](http://petrowiki.org/Gamma_ray_logs) (last visited Aug. 17, 2016).

<sup>67</sup> NYSDEC, In re Application for Modification of the Part 360 Permit for a Municipal Solid Waste Landfill on County Route 60 in Lowman, Town of Chemung, New York (August 4, 2011) (Commissioner Decision), available at <http://www.dec.ny.gov/hearings/76112.html>.

<sup>68</sup> 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).

<sup>69</sup> Larry Shilling, Vice President of LF Marketing, Casella Resource Solutions, Presentation to the New York State Bar Association on disposal of Oil and Gas Waste, Oct. 3, 2015.



York's regulations at Part 380-1.2 exclude NORM or materials containing NORM from requirements for specialized disposal and discharge of radioactive material, unless the NORM is "processed and concentrated."<sup>70</sup> According to Part 360.2 in the currently proposed regulations, NYSDEC defines "processing" as "the use of a combination of structures, machinery or devices to alter the volume or the chemical or physical characteristics of solid waste."

Once the activity of drilling a well bore begins, the shale is brought to the surface and broken into many smaller pieces—representing an alteration of physical characteristics using machinery and devices. While cuttings initially appear as "rock," they may be mixed with other wastes during storage and transportation, a further physical alteration. The cuttings' original chemical characteristics are also altered through the use of drilling fluids and coating with produced water during drilling. At landfills, loads of drill cuttings may be dewatered in order to meet the "20 percent" solid content limit for disposal—a clear alteration of volume and physical characteristics.

Given the changes that drill cuttings undergo prior to disposal, NYSDEC should state clearly that this E&P waste meets the definition of "processed or concentrated" NORM and therefore cannot be disposed of at municipal landfills.<sup>71</sup>

USEPA currently leaves management of oil and gas waste that may be classified as TENORM up to the states. This gives New York the legal prerogative to define drill cuttings as TENORM and strictly regulate their management and disposal. However, NYSDEC's continued failure to do so appears to have no basis besides a preference to continue allowing the disposal of potentially radioactive and toxic waste at landfills.

For years, New York landfills have been accepting loads of drill cuttings generated in Pennsylvania from Marcellus Shale well sites. Unlike New York, Pennsylvania does not make an arbitrary distinction between NORM and TENORM with regard to drill cuttings or other types of waste, instead stating that, "[s]ince naturally occurring radioactive material is brought to the surface during drilling, the wastes are classified as TENORM."<sup>72</sup> A recent report on radioactivity in drilling wastes from Pennsylvania found that samples of horizontal drill cuttings had Ra-226 levels nearly

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<sup>70</sup> 6 NYCRR § 380-1.2(e).

<sup>71</sup> Richard Clarkson, P.E. NYSDEC Div. of Materials Mgmt., Presentation on Current Solid Waste Disposal Regulatory Framework for Gas Development Wastes (2013).

<sup>72</sup> 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).

twice as high as samples of vertical cuttings.<sup>73</sup> This scientific fact is borne out on the ground; for example, in 2013 drill cuttings generated in Pennsylvania were trucked all the way to a specialized facility in Idaho due to their excessive levels of radioactivity.<sup>74</sup>

## **5. Prohibit the road-spreading of brine**

The new proposed section 360.12(f) sets forth regulatory requirements for case specific Beneficial Use Determinations (BUDs) governing the use of gas storage brine and oil and gas production brine on roads for de-icing, dust control, and road stabilization. While the proposed revisions are a step in the right direction—and in many cases would clarify and improve upon the existing guidance for road spreading of oil and gas brine—they fall short of ensuring that the significant risks of applying oil and gas brine on roadways will be avoided or minimized to the maximum extent practicable, as required by the State Environmental Quality Review Act (SEQRA).

Even with these new regulatory requirements, we remain deeply concerned about NYSDEC's ability to enforce control measures once it approves BUDs for the use of oil and gas brine. This lack of enforcement and oversight capability ultimately undermines the proposed regulatory revisions and leaves human health and the environment at significant risk from the use of oil and gas brine on New York State roads. For the reasons set forth below, we strongly urge NYSDEC to simply prohibit road spreading of oil and gas brine.

The process of extracting oil and natural gas produces large amounts of liquid and solid waste. Liquid waste includes flowback fluid, which is fluid that returns to the surface soon after a well is drilled and fractured, and production brine, which is wastewater that flows to the surface during gas production. As discussed above, waste generated through the extraction of oil or natural gas—including production brine—can contain a number of pollutants, such as chemicals, metals, excess salts, and carcinogens like benzene and radioactive materials.<sup>75</sup> Brine from gas storage facilities can have similar contaminants.<sup>76</sup>

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<sup>73</sup> PERMAFIX ENVIRONMENTAL SERVICES FOR PADEP, TECHNOLOGICALLY ENHANCED NATURALLY OCCURRING RADIOACTIVE MATERIALS (TENORM) STUDY REPORT (2015).

<sup>74</sup> Tara Kinsell, *Rejected Waste Taken to Idaho*, WASH. OBSERVER-REP. (July 12, 2013).

<sup>75</sup> Robert B. Jackson et al., *The Environmental Costs and Benefits of Fracking*, 39 ENVIRONMENT AND RESOURCES 327 (2014); U.S. GEOLOGICAL SURVEY, RADIUM CONTENT OF OIL AND GAS FIELD PRODUCED WATERS IN THE NORTHERN APPALACHIAN BASIN (USA): SUMMARY AND DISCUSSION OF DATA (2011), available at <http://pubs.usgs.gov/sir/2011/5135/>.

<sup>76</sup> In 2013 and 2014, Riverkeeper obtained records from NYSDEC regarding BUDs for use of oil and gas brine on roads. These records included associated test results that showed excessive levels of chloride (salts) in

NYSDEC currently allows the use of production brine from low-volume oil and gas production wells and brine from gas storage facilities to be used on roads. According to a list of BUDs compiled by the agency in January 2016, NYSDEC has currently authorized sixty-six BUDs for the use of oil or natural gas waste for road de-icing, dust control, and/or stabilization.<sup>77</sup> The process is governed by provisions applying in general to case-by-case BUD determinations under the current Part 360 regulations and a NYSDEC-issued memorandum that lays out additional requirements for oil and gas brine BUDs.<sup>78</sup>

These existing requirements raise a number of concerns, including the use of representative brine samples rather than samples of the final brine mixture to be spread on roads, the absence of publicly available numerical testing criteria, the lack of provisions for follow-up monitoring and enforcement, and the fact that approvals authorize multiple applications of oil or natural gas brine per roadway yet do not appear to have an expiration date.

While some of these concerns are addressed in the proposed revisions to Part 360, several remain outstanding or inadequately addressed. To the extent that NYSDEC does not prohibit the issuance of BUDs for E&P waste, we offer the following recommendations.

Part 360.12(f)(2)—Case specific brine beneficial use determination petition. The required content of a BUD petition for oil and gas brine under the proposed revisions would include “a description of the system used at the well location(s) to remove and minimize any oil or gas residue from becoming part of the brine.” While identification of some oil or gas residue separator is a laudable goal, the requirement to merely include a description of the unspecified system used is vague and potentially confusing. Rather than this general requirement, NYSDEC should specify the system(s) that *must* be used and include provisions for follow-up monitoring and enforcement.

Under the regulations, BUD applicants would also be required to submit testing results as part of a BUD petition. However, NYSDEC is continuing to require only a representative sample of the brine, rather than a sample of the brine mixture that will be applied on roads. In practice, this has resulted

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brine from both natural gas production wells and gas storage facilities. Sample results for brine from gas storage facilities also revealed the presence of benzene and toluene. *See* Riverkeeper, *The Concerns in New York*, <http://www.riverkeeper.org/campaigns/safeguard/fracking-waste-in-new-york/the-concerns-in-new-york> (last visited July 6, 2016).

<sup>77</sup> NYSDEC, *Granted Beneficial Use Determinations, Sorted by Waste Type* (Jan. 2016), *available at* [http://www.NYSDEC.ny.gov/docs/materials\\_minerals\\_pdf/budwst.pdf](http://www.NYSDEC.ny.gov/docs/materials_minerals_pdf/budwst.pdf).

<sup>78</sup> 6 NYCRR § 360.15; NYSDEC, *Notice to Oil and Gas Well and LPG Storage Fluid Haulers* (Jan. 2009).

in BUD applicants submitting testing results from a single well field or gas storage sample covering dozens of other wells or facilities.<sup>79</sup>

This level of testing is inadequate to determine the pollutants in a given batch of brine that is spread on roads, as toxicity levels can vary from well to well within the same field and/or storage facility, and over time.<sup>80</sup> Moreover, one recent study has shown that “when produced [brine] fluids are sealed to the release of radon gas, the total radioactivity concentration of produced fluid can increase by a factor greater than five within the first 15 days following extraction due to the ingrowth of [radon] decay products.”<sup>81</sup> Without testing the final solution, NYSDEC cannot determine the contaminant level or radioactivity of the brine being used on roads, nor the subsequent risk to public health and the environment. Therefore, NYSDEC should clearly indicate in the regulations that the representative sample will be collected from the final brine sample slated to be spread on roads.

Part 360.12(f)(3)—Conditions for brine use—all uses. We support NYSDEC’s proposal to prohibit the use of gas storage brine and production brine derived from the Marcellus Shale. Brine from the Marcellus Shale can contain dangerous concentrations of pollutants including high salt content, organic and inorganic chemicals, metals, and naturally-occurring radioactive materials<sup>82</sup> and is wholly inappropriate for application on roads. We also support the proposed prohibition on the use of drilling fluids, flowback water, and plugging fluids, which—in addition to contaminants found in the underground formation—can contain high concentrations of added chemicals such as ethylene glycol and sulfuric acid.<sup>83</sup>

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<sup>79</sup> See Riverkeeper Freedom of Information Law documents received from NYSDEC in 2013 and 2014, available at <http://www.riverkeeper.org/campaigns/safeguard/fracking-waste-in-new-york/the-concerns-in-new-york>.

<sup>80</sup> Peter Mantius, *New York Imports Pennsylvania’s Radioactive Fracking Waste Despite Falsified Water Tests* NATURAL RES. NEWS SERV. (Aug. 14, 2013), available at <https://dcbureau.org/201308148881/natural-resources-news-service/new-york-imports-pennsylvanias-radioactive-fracking-waste-despite-falsified-water-tests.html#more-8881>.

<sup>81</sup> Andrew W. Nelson et al., *Understanding the Radioactive Ingrowth and NYSDECay of Naturally Occurring Radioactive Materials in the Environment: An Analysis of Produced Fluids from the Marcellus Shale*, 123 *Envtl. Health Perspectives* 689, 690 (2016).

<sup>82</sup> U.S. Environmental Protection Agency, *Unconventional Oil and Gas Extraction Effluent Guidelines Documents* (Mar. 2015), available at <https://www.epa.gov/eg/unconventional-oil-and-gas-extraction-effluent-guidelines-documents>; U.S. GEOLOGICAL SURVEY, *RADIUM CONTENT OF OIL AND GAS FIELD PRODUCED WATERS IN THE NORTHERN APPALACHIAN BASIN (USA): SUMMARY AND DISCUSSION OF DATA* (2011), available at <http://pubs.usgs.gov/sir/2011/5135/>.

<sup>83</sup> Robert B. Jackson et al., *The Environmental Costs and Benefits of Fracking*, 39 *ENVIRONMENT AND RESOURCES* 327 (2014); NATURAL RESOURCES DEFENSE COUNCIL, *IN FRACKING’S WAKE: NEW RULES ARE NEEDED TO PROTECT OUR*

However, NYSDEC has provided no justification for prohibiting the use of certain types of oil and gas wastewater on roads while allowing others that carry similar risks of harm to public health and the environment. Further, and critically, NYSDEC does not have any oversight or enforcement mechanisms in place to actually ensure that brine being used is not generated through Marcellus Shale drilling.

Brine from conventional wells and the Utica formation (i.e., non-Marcellus formations) can also contain many of the same contaminants, including ammonium and iodide.<sup>84</sup> Documents obtained by Riverkeeper through Freedom of Information Law requests in 2013 and 2014 contained testing results for approved oil and gas brine BUDs that revealed high levels of chloride, as well as the presence of benzene and toluene in brine from non-Marcellus formations.<sup>85</sup> In addition, non-Marcellus formations in New York State are also known to contain NORM that can be present in production brine.<sup>86</sup>

Further, the distinction between production brine, drilling fluids, and flowback water is not always clearcut. While a substantial amount of chemical additive laced drilling fluid does return to the surface as flowback fluid, a sizeable quantity also often remains underground and can be mixed with production brine. In which case, the production brine may contain both contaminants from the formation and chemical additives.<sup>87</sup>

The proposed revisions also include several restrictions governing the use of oil and gas brine post-BUD approval. Unfortunately, a number of these restrictions are either inadequate or too vague to offer real protection to the public and environment. For example, the new regulations would include requirements that “methods must be employed at the well site to minimize the amount of

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HEALTH AND ENVIRONMENT FROM CONTAMINATED WASTEWATER (2012), available at <https://www.nrdc.org/sites/default/files/Fracking-Wastewater-FullReport.pdf>.

<sup>84</sup> Aurana Lewis, WASTEWATER GENERATION AND DISPOSAL FROM NATURAL GAS WELLS IN PENNSYLVANIA 18 (2012), available at [http://dukespace.lib.duke.edu/dspace/bitstream/handle/10161/5320/Lewis\\_MP2.pdf](http://dukespace.lib.duke.edu/dspace/bitstream/handle/10161/5320/Lewis_MP2.pdf) rent if both wells types [Marcellus and conventional] are hydraulic fractured.”; *Water Contamination Just as High from Conventional as from Shale Wells – Scientists Find*, Shale Gas Int’l (Jan. 15, 2015), available at <http://www.shalegas.international/2015/01/15/water-contamination-just-as-high-from-conventional-as-from-shale-wells-scientists-find/>; Zoe Schlanger, *Industry’s Solution to Toxic Wastewater: Spray It on Roads*, NEWSWEEK (Mar. 2, 2015), available at <http://www.newsweek.com/oil-and-gas-wastewater-used-de-ice-roads-new-york-and-pennsylvania-little-310684>.

<sup>85</sup> See Riverkeeper, *The Concerns in New York*, <http://www.riverkeeper.org/campaigns/safeguard/fracking-waste-in-new-york/the-concerns-in-new-york> (last visited July 6, 2016).

<sup>86</sup> U.S. GEOLOGICAL SURVEY, RADIUM CONTENT OF OIL AND GAS FIELD PRODUCED WATERS IN THE NORTHERN APPALACHIAN BASIN (USA): SUMMARY AND DISCUSSION OF DATA (2011), available at <http://pubs.usgs.gov/sir/2011/5135/>.

<sup>87</sup> Robert B. Jackson et al., *The Environmental Costs and Benefits of Fracking*, 39 ENVIRONMENT AND RESOURCES 327 (2014).

hydrocarbons present in the brine” and “brine application measurement methods must be used to ensure that brine application rates are within limits.” Both requirements are vague to the point of confusion, and provide no assurance that “methods” will be successful. NYSDEC needs to specify which methods may be employed and provide measures for oversight and enforcement in order for these provisions to have any practical effect.

The requirement that brine cannot be applied within 50 feet of a stream, creek, lake, or other body of water is also inadequate to protect water quality. The restriction fails to include wetlands, which are crucial components of watersheds and water quality protection and are just as sensitive as the listed waterbodies to contamination from oil and gas brine. It also neglects to prohibit spreading on wet roads or when rain is imminent. The widely recognized minimum buffer for wetlands and waterbodies is 100 feet,<sup>88</sup> and NYSDEC provides no justification for using a shorter buffer for the application of oil and gas brine. By contrast, Pennsylvania prohibits brine spreading within 150 feet of a stream, creek, lake, or other waterbody.<sup>89</sup>

While requiring follow-up testing is a step in the right direction, three years is an inappropriately long timeframe. As discussed above, the fact that NYSDEC would continue to allow only representative sampling undermines the testing requirements, as contaminant levels can vary from well to well over time. Since pollutant levels may vary over time and by well, requiring testing only every three years falls short of providing the up-to-date information that NYSDEC needs to adequately determine the type and levels of contaminants allowed to be applied to roads. In addition to requiring testing of each batch of brine rather than representative samples, a more appropriate timeframe for follow-up testing would be one year, since private entities and municipalities are likely to be restocking brine for use in the next winter season.

Finally, we support the five-year limit for E&P waste and other BUD approvals, as new information on public health and environmental dangers could require that the agency modify or prohibit the activity. The five-year limit will require that NYSDEC reassess its decisions periodically. We also

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<sup>88</sup> See T. Schueler, *SITE PLANNING FOR URBAN STREAM PROTECTION*, METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS 111 (1995); USEPA, *Draft National Management Measures to Control Nonpoint Source Pollution from Urban Areas 3-17* (2002), available at [https://www.epa.gov/sites/production/files/2015-09/documents/urban\\_guidance\\_0.pdf](https://www.epa.gov/sites/production/files/2015-09/documents/urban_guidance_0.pdf); ENVIRONMENTAL LAW INST., *CONSERVATION THRESHOLDS FOR LAND USE PLANNERS* 20 (2003), available at <https://www.eli.org/sites/default/files/eli-pubs/d13-04.pdf>; and R. Fischer, and J. Fisichenich, *Design Recommendations for Riparian Corridors & Vegetated Buffer Strips*, U.S. Army Engineer Research and Development Center 4 (2000).

<sup>89</sup> PADEP, *Fact Sheet: Roadspreading of Brine for Dust control and Road Stabilization* (2015), available at <http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-106718/8000-FS-DEP1801.pdf>.

support the requirement that all BUD grantees submit an annual report to NYSDEC detailing their use of oil and gas brine for road spreading. Moreover, the reports should be made available to the public on NYSDEC's website. Yearly reports would help the public identify and/or prevent contamination buildup and create a record of waste spreading, in turn allowing an assessment of the practice's potential to affect the environment and public health.

Part 360.12(f)(3)—Numerical criteria for the use of oil/gas brine on roadways. Although we would prefer to see a prohibition on BUDs for E&P wastes, the addition of numerical criteria for the use of oil and gas brine on roads is a step in the right direction. This section will provide the public long-overdue insight into NYSDEC's decision-making criteria for approving oil and gas brine BUDs.

NYSDEC regulations should reflect the basic fact that inorganic components of brine do not degrade much and can therefore accumulate and concentrate in environments for a long time. In turn, this increases the chance that they will ultimately migrate into drinking water.

In light of this fact, **we question NYSDEC's allowance of concentrations of contaminants in road brine at levels several orders of magnitude greater than would be permissible for a public drinking water source.** Although brine is obviously not the same as drinking water, the comparison of chemical components to this higher health standard is warranted, for example as Ohio has done in its brine-spreading guidance due to potential impacts on soil and water.<sup>90</sup>

NYSDEC's proposed brine standards would allow concentrations of lead at over 160 times and benzene at 100 times the USEPA's safe drinking water standards. A 2011 study by the US Geological Survey indicated that there is a positive correlation between high levels of salinity (represented by TDS) and the presence of Ra-226 in both conventional and unconventional brines.<sup>91</sup> It is therefore very concerning that NYSDEC would allow concentrations of Total Dissolved Solids (TDS) for a BUD above 17,000 mg/L, which could be expected to include total radium activity frequently exceeding 1,000 pCi/L.<sup>92</sup>

In addition, this section and associated parameter tables should be amended to require analysis of

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<sup>90</sup> OHIO. DEP'T OF NAT. RESOURCES, DIV. OF MINERAL RESOURCES MGMT, SPREADING OIL-FILED BRINE FOR DUST AND ICE CONTROL IN OHIO, A GUIDANCE FOR LOCAL AUTHORITIES (2004), *available at* <http://worldcat.org/arcviewer/6/OHI/2012/04/20/H1334937108106/viewer/file2.pdf>.

<sup>91</sup> U.S. GEOLOGICAL SURVEY, RADIUM CONTENT OF OIL AND GAS FIELD PRODUCED WATERS IN THE NORTHERN APPALACHIAN BASIN (USA): SUMMARY AND DISCUSSION OF DATA (2011), *available at* <http://pubs.usgs.gov/sir/2011/5135/>.

<sup>92</sup> Marc Glass, Comments on Proposed Changes to New York State Solid Waste Regulations (Downstream Strategies 2016).

radiological parameters. A 2015 study on TENORM in E&P wastes conducted for the PADEP indicated that oil and gas brines from both conventional and unconventional wells contain radioactive substances that may be transferred to road during application. The authors concluded that, “[w]hile limited potential was found for radiation exposure to recreationists using roads treated with brine from conventional natural gas wells, further study of radiological environmental impacts from the use of brine from the O&G industry for dust suppression and road stabilization should be conducted.”<sup>93</sup>

NYSDEC should amend this provision to require users of oil and gas brine to analyze the waste using EPA Method 900.1 for gross alpha activity and EPA Method 901.1M by gamma spectrometry for Radium 226. These methods are necessary to avoid potential interferences and underreporting of concentrations in samples with elevated total dissolved solids—a common occurrence in brines.<sup>94</sup>

**6. Develop a comprehensive environmental review of alternatives for BUD requirements, including a prohibition on the road-spreading of brine**

NYSDEC has prepared and made available for public review a Draft Generic Environmental Impact Statement (DGEIS) that covers the proposed revisions set forth in the Part 360 regulatory package. Unfortunately, the DGEIS is little more than a summary list of the regulatory changes, with scant information and almost no substantive evaluation of the impacts that each proposed revision is likely to have on the environment.

The section on revisions to the BUD requirements for oil and gas brine is no different, with approximately half a page dedicated to an issue that is likely to have significant impacts on human health and the environment. Both the discussion and environmental impact sections consist of one sentence each, and the evaluation of alternatives is merely a paragraph that only briefly raises and then dismisses the No Action alternative.<sup>95</sup>

This scant analysis utterly fails to comply with SEQRA, pursuant to which NYSDEC is required to take a “hard look” at the “relevant areas of environmental concern.” *Jackson v. New York State Urban*

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<sup>93</sup> PERMAFIX ENVIRONMENTAL SERVICES FOR PADEP, TECHNOLOGICALLY ENHANCED NATURALLY OCCURRING RADIOACTIVE MATERIALS (TENORM) STUDY REPORT (2015).

<sup>94</sup> Marc Glass, Comments on Proposed Changes to New York State Solid Waste Regulations (Downstream Strategies 2016).

<sup>95</sup> NYSDEC, DRAFT GENERIC ENVIRONMENTAL IMPACT STATEMENT (GEIS) ON THE PROPOSED AMENDMENTS TO 6 NYCRR PART 360, ET AL. 15 (2016).



*Dev. Corp.*, 494 N.E.2d 429, 436 (N.Y. 1986). An Environmental Impact Statement (EIS) must include information sufficient to understand a proposed action’s likely environmental impacts and alternatives that might be undertaken to reduce or avoid those impacts. N.Y. E.C.L. § 8-0109(2); 6 NYCRR § 617.9(b). It must include a “description and evaluation of the range of reasonable alternatives” to the proposed action, which “should be at a level of detail sufficient to permit a comparative assessment of the alternatives discussed.” N.Y. E.C.L. §§ 8-0109(2)(d),(4); 6 NYCRR § 617.9(b)(5)(v).

The purpose of the alternatives analysis is to afford the lead agency and the public the opportunity to compare different potential actions and identify the one that best avoids or minimizes adverse environmental impacts.<sup>96</sup> While a Generic EIS may be broader or more general than a site specific EIS, it must still contain the same basic elements as an EIS and conform to the same requirements. 6 NYCRR § 617.10.<sup>97</sup>

As such, NYSDEC has a responsibility under SEQRA to take a hard look at the proposed revisions and reasonable alternatives, and choose the alternative that best minimizes environmental impacts. N.Y. E.C.L. § 8-0109(1); 6 NYCRR § 617.11(d). *See also Jackson v. New York State Urban Dev. Corp.*, 494 N.E.2d 429, 436 (N.Y. 1986) (“An agency may not approve an action unless it makes ‘an explicit finding that ... consistent with social, economic and other essential considerations, to the maximum extent practicable, adverse environmental effects revealed in the environmental impact statement process will be minimized or avoided.’”) (internal citations omitted).

To that end, NYSDEC must provide the public with a comprehensive evaluation of the likely significant adverse environmental impacts of the use of oil and gas brine for road spreading, and the effect that the proposed revisions to the BUD program will likely have on those impacts. As part of the required SEQRA analysis, NYSDEC must also evaluate a range of reasonable alternatives—including any viable alternatives in addition to the No Action alternative. The Part 360 DGEIS must be amended to include an analysis of an alternative that would prohibit the use of oil and gas brine on roads, and provide sufficiently detailed information about the likely environmental impacts so that the agency and the public are able to take the required hard look and make an informed decision regarding the alternative that best minimizes environmental impacts.

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<sup>96</sup> NYSDEC, *THE SEQR HANDBOOK: 3<sup>RD</sup> EDITION* AT 101 (2010).

<sup>97</sup> *See also id.* at 146-147.

## 7. Other sections of the Part 360 revisions

Part 364-1.2(e)(6)—Oil and gas drilling and production waste tracking. This section would require tracking for several new categories of waste, including drilling and production waste. We fully support these new provisions, which are necessary to ensure that E&P wastes (including from high-volume hydraulic fracturing operations in other states) are not illegally dumped—a common problem in and other states. In a recent example, tests of water flowing from the abandoned Clyde Mine in Washington County, Pennsylvania—which discharges to the Ten Mile River and the Monongahela River, a major drinking water source—show high levels of radioactivity suspected to be caused by illegal dumping of hydraulic fracturing wastewater.<sup>98</sup>

In particular, we support the clarification in Part 364-2(b)(5) that small shipments (under 2,000 pounds) of drilling and production wastes would *not* be exempt from tracking provisions. This is critical given the use of single trucks to transport such wastes from well sites.

Given the toxic and potentially hazardous and radioactive nature of drilling and production wastes, NYSDEC should include them in the waste tracking documentation requirements of Part 364-3.3(d), and in turn develop a standardized form for all transporters of E&P wastes disposed of in New York State.

Part 364-3.4(a) should be amended to ensure public access to waste tracking records, to read: “These records must be provided to the department within five business days and will be made available to the public upon request to the department.”

Part 363-8.1 (p)—Industrial waste or drilling and production wastes. We strongly support the requirement that any landfill accepting E&P wastes must include them in the facility’s waste control plan. However, NYSDEC should amend this provision to describe in detail the “special handling or disposal procedures” implied in general terms by this provision. As discussed above, this should include, at minimum, thorough chemical and radiological waste characterization, the development of designated cells for E&P wastes, and testing for Radium 226 and 228 using appropriate technologies.

Part 363-9.2(a)—Reporting. In light of the limited tracking and reporting mechanisms in place

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<sup>98</sup> Dan Hopey, *Tests Find Radiation in Clyde Mine Water in Washington County*, PITTSBURGH POST-GAZETTE (July 28, 2015), available at <http://www.post-gazette.com/news/environment/2015/07/28/Tests-find-radiation-in-Clyde-Mine-water/stories/201507280086>.

with regard to E&P wastes, NYSDEC should amend this section to require landfill operators to submit reports twice a year, rather than annually. NYSDEC should also specify in this section that the data provided will be posted online and made easily accessible to the public. NYSDEC should also make all drilling and production waste tracking forms available to the public in an online database.

Part 360.12(b)—Uses of solid waste that are unacceptable beneficial uses. In light of the discussion above regarding the potential hazardous characteristics of E&P wastes, NYSDEC should specifically include such wastes in Part 360.12(b) as an unacceptable use of solid waste as a beneficial use. This could be achieved by adding the following language: “Any wastes generated through the exploration, drilling, and production of oil and natural gas that are classified and managed as solid waste, including but not limited to drill cuttings, muds, sludges, and fluids.”

## **8. Conclusions**

The preceding pages detail many of the inherent challenges posed by waste generated through the exploration and production of oil and gas, based on current science and our organizations’ policy and regulatory expertise. We have also provided extensive information on the status of E&P waste management in New York State.

In conclusion, we believe that it is imperative for NYSDEC to swiftly adopt the changes to the Part 360 series and other regulatory amendments recommended in this comment letter. Such measures are necessary given the numerous and significant gaps in how E&P wastes are managed in New York.

Strengthening the Part 360 series is a critical first step toward ensuring protection of the environment against the risks posed by an ever-growing volume of waste from oil and gas operations both within and outside of New York State. However, we hope that NYSDEC will use the current regulatory revision process as a starting point to contemplate comprehensive change in E&P waste management policies and regulations.

Unless and until NYSDEC can ensure that water, soil, land, and natural and human communities will be protected against the risks posed by toxic and potentially hazardous and radioactive E&P wastes, we believe that the department has an obligation to prohibit the disposal of oil and gas waste in landfill, disposal of landfill leachate at POTWs, and the application of liquid waste on roads.

Going forward, NYSDEC should use its regulatory authority to remove any exemptions that prevent oil and gas waste from being subjected to classification as hazardous.

This past spring, 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.<sup>99</sup> Despite agency requirements under Subtitle D of RCRA, which applies to solid waste regulation at landfills, USEPA has neglected to review and update rules pertaining to the management of E&P 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.”<sup>100</sup>

Depending on the outcome of this lawsuit and any related actions taken by USEPA, state regulatory agencies may eventually be compelled to take action. It would be advantageous for NYSDEC to look ahead and work to resolve New York’s own outdated, limited, and inadequately protective regulations pertaining to the management of E&P wastes.

In closing, we fully recognize that NYSDEC’s resources and staff are limited and that the expansion of the oil and gas industry in surrounding states poses a new challenge for the Department. However, a lack of capacity should never be an excuse for allowing environmentally risky practices to occur without strong oversight and regulatory enforcement. The generators of contaminated and potentially hazardous and radioactive waste—as well as the waste facilities that accept it—must be held accountable for proper disposal and any resulting environmental harm. This is a task that NYSDEC is clearly mandated to do.

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<sup>99</sup> 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>.

<sup>100</sup> *Id.*

Thank you for your time and attention. We look forward to continuing to work with NYSDEC to achieve strong, binding requirements for the management of oil and gas wastes—and in so doing, to better protect the environment and health for the benefit of all New Yorkers.

Sincerely,



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