Cooper, Kathy

From:	RegComments@pa.gov
Sent:	Monday, March 17, 2014 3:32 PM
To:	Environment-Committee@pasenate.com; apankake@pasen.gov; IRRC; RegComments@pa.gov; eregop@pahousegop.com; environmentalcommittee@pahouse.net
Cc:	ra-epmsdevelopment@pa.gov
Subject:	Proposed Rulemaking - Environmental Protection Performance Standards at Oil and Gas Well Sites

Re: Proposed Rulemaking - Environmental Protection Performance Standards at Oil and Gas Well Sites

The Environmental Quality Board (EQB) has received the following comments regarding the above-referenced proposed rulemaking.

Commentor Information:

Nadia Steinzor
Earthworks, Oil and Gas Accountability Project (nsteinzor@earthworksaction.org)
PO Box 149
Willow, NY 12495 US

Comments entered:

No text comments were provided as part of this comment submittal. Please refer to attachments below.

These links provide access to the attachments provided as part of this comment. You are advised to save the attachments to your local computer or a network share when prompted by your browser.

Comments Attachment: Earthworks.pdf

Please contact me if you have any questions.

Sincerely,
Hayley Book

Hayley Book
Director, Office of Policy
PA Department of Environmental Protection
Rachel Carson State Office Building
P.O. Box 2063
Harrisburg, PA 17105-2063

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RECEIVED
MAR 17 2014
INDEPENDENT REGULATORY
REVIEW COMMISSION

March 14, 2013

Pennsylvania Environmental Quality Board
P.O. Box 8477
Harrisburg, PA 17105-8477

Dear Environmental Quality Board members:

Thank you for the opportunity to submit comments on the proposed regulations for oil and gas surface activities (amendments to 25 Pa. Code Chapter 78, Subchapter C). Because Pennsylvania's regulatory framework should have been updated and strengthened several years ago—*before* the state's shale gas boom began—there is no time to waste in doing so now.

Earthworks is a nonprofit organization dedicated to protecting communities and the environment from the impacts of mineral and energy development while seeking sustainable solutions. For more than two decades, we've worked to advance policy reforms, improve corporate practices, and safeguard land and public health. The Oil & Gas Accountability Project of Earthworks works with local communities, partner organizations, public agencies, and elected officials to advance these goals nationwide, including across Pennsylvania.

Earthworks is pleased to have contributed and signed on to the extensive technical comments on the proposed revisions to Chapter 78 submitted by Earthjustice. In the following pages, we submit additional comments that focus on a critical aspect of oil and gas regulations: the handling, processing, and disposal of solid and liquid waste.

The rapidly growing volume of waste resulting from the shale gas boom poses a significant risk to environmental quality and the health of both people and wildlife. Oil and gas field waste can be contaminated with chemicals, oil, heavy metals, naturally occurring radioactive material (NORM), and a range of other toxic and polluting substances.

Marcellus Shale operators reported a 70 percent increase in wastewater generated just between 2010 and 2011, when the volume reached 613 million gallons.[1] Not surprisingly, the industry is constantly seeking new methods and locations to dispose of the waste it produces. In the last few years, the Pennsylvania Department of Environmental Protection (DEP) has received permit applications to conduct Research & Development for the creation of new products from gas field waste, for example construction materials made from drill cuttings.[2] Last summer, a shipment of highly radioactive waste produced in Pennsylvania had to be trucked to a specialized facility in Idaho, since the operator failed to find a proper disposal option anywhere in the Commonwealth or the surrounding region.[3]

Such challenges are the direct result of the industry's insistence on forging ahead with more and more drilling before appropriate waste management practices could be determined and established. The DEP and the Environmental Quality Board (EQB) have both the responsibility and the authority to stop allowing industry's problems and preferences to take precedence over the protection of residents and the environment from exposure to dangerous substances—and to do so before the impacts associated with oil and gas field waste become insurmountable.

Unfortunately, the proposed revisions to Chapter 78 do not sufficiently address the risks posed by drilling waste or establish in regulation available measures to help prevent those risks.

In June 2013, the U.S. Environmental Protection Agency (EPA) in Region 3 entered into a consent decree with XTO Energy, Inc. after the company allowed contaminated wastewater leaking from a storage tank to continuously enter the Susquehanna River in 2010, in violation of the U.S. Clean Water Act.[4] The consent decree lays out requirements for waste management that XTO must follow going forward, including practices that EPA considers to currently be both feasible and necessary to avoid environmental damage.

EQB should include such requirements in revisions to Chapter 78 in order to "raise the bar" and ensure that all operators statewide play by the same rules. In particular, the feasible and necessary requirements include recycling of flowback and produced fluids to the maximum extent practicable (but no less than 50 percent) and prohibitions against storing flowback or produced fluids in tanks with open tops, open pits, lagoons, or other surface impoundments. EPA Region 3 has also required XTO to develop an EPA-approved standard operating procedure for the loading and unloading of all tanks, as well as reporting requirements to document the amount of wastewater that is recycled, tank locations, secondary containment, and records of spills and leaks.

With such opportunities for waste management improvements in mind, Earthworks strongly believes that **all open impoundments, pits, and tanks for the temporary storage or on-site processing of drill cuttings, wastewater, production fluids, and residual wastes should be prohibited.** This recommendation pertains to relevant parts of Sections 78.56, 78.57, 78.58, 78.59, 78.61, and 78.62. Following are specific reasons and supporting information for this position.

Only closed-loop tank systems should be used to collect and store regulated substances and production fluids (such as wastewater, drill cuttings, gels, and used frac sand). These systems cause less surface disturbance than pit construction and reclamation, enable the separation of wastes, and reduce the use of water, truck traffic, and air emissions. (Note that concerns with large-scale tank facilities that the proposed regulations fail to address are discussed below.) Such impacts have already led some companies to transition away from the use of impoundments and pits and toward closed-loop systems, including in the Marcellus Shale region.[5]

Pennsylvania's proposal to continue to allow the use of open pits also runs counter to recognized "Best Management Practices" (BMPs) for the oil and gas industry and lags behind regulatory advances in other states. A 2013 report from Maryland's Marcellus Shale Safe Drilling Initiative emphasizes closed-loop systems as a BMP for handling drilling fluids, hydraulic fracturing chemicals, and both liquid and solid waste, and concludes that due to the high risks of environmental pollution, "Under no circumstances should open pits be used for storage of wastes or wastewater...."[6] New York's proposed revisions to its oil and gas regulations specify that only closed-loop systems would be allowed for the management of fluids and drill cuttings produced through horizontal drilling.[7] New Mexico has also developed regulations for closed-loop systems, signaling the increasing use of this method of waste containment.[8]

In addition, in 2013, the State Review of Oil and Natural Gas Environmental Regulations (STRONGER) report on Pennsylvania concluded that: "...many liner failures still occur with pits and other types of waste are being dumped into pits" and recommended that DEP "consider adopting regulations or incentives for alternatives to pits used for unconventional wells in order to prevent the threat of pollution to the waters of the Commonwealth."[9]

DEP does not require individual permits for the use of drilling and production pits (although it does for centralized impoundments)—allowing operators to avoid, for example, providing information on the number, location, and capacity of pits at well sites, as well as complete planning for waste

management at the outset of site development. This permitting gap in turn means that pits can be "rolled into" the construction, use, and restoration standards for well sites in general, rather than being subject to considerations that can increase the safe operation of pits (such as soil stability and setbacks from water resources). Such lax regulatory oversight is unacceptable given that drilling waste stored at pits and impoundments can be contaminated with chemicals, barium, strontium, heavy metals, radioactive materials, and other substances.

There is ample evidence of spills, leaks, and liner tears at waste pits and impoundments across Pennsylvania that violate current Chapter 78 regulations, in particular Sections 78.61, 78.62, and 78.63. A review of DEP inspection reports (obtained through a Right-to-Know request) indicate that between January 2010 and August 2013, DEP issued notices of violations in the area of improper management and disposal of drill cuttings at 48 well sites statewide. The violations were issued for a range of problems, such as structural instability; improper encapsulation; liner holes, tears, and breaches; leakage of fluid into springs, ponds, and streams; seepage of contaminated fluids to the surface; and erosion and runoff at poorly reclaimed or unreclaimed pit sites.

Yet even these documented examples of environmental harms only reflect what is *known* to have occurred and instances in which problems were recorded by DEP as violations. Because DEP remains understaffed and underfunded in relation to the expansion of the industry statewide, it is virtually impossible for the Department to detect, let alone prevent, such problems.

In a 2012 report on oil and gas oversight and enforcement (see http://enforcement.earthworksaction.org), Earthworks found that on an annual basis, the vast majority of wells in Pennsylvania go uninspected, operators repeatedly violate the same rules at multiple sites, and when inspectors do go looking, they inevitably find problems.[10] This research applied to all active oil and gas wells, which is particularly relevant with regard to waste management, as both conventional and unconventional drillers in Pennsylvania continue to use impoundments and waste pits onsite and produce waste that must be transported and disposed offsite.

DEP itself clearly acknowledges the inherent environmental risks of open waste pits—making it illogical and dangerous to continue to allow the practice under Chapter 78. In a letter to Marcellus Shale gas well operators dated September 17, 2013 but referring to information requested in 2010 (obtained through a Right-to-Know request and attached at the end of these comments), Scott Perry, Director of the DEP Bureau of Oil and Gas Management, stated that "Department inspectors have been documenting a number of violations pertaining to the operation of open pits used for the management of drilling and fracturing fluids at Marcellus Shale wells sites. These violations, which have included both the over topping and leaking of pits, have resulted in the contamination of both soil and the waters of the Commonwealth."

Director Perry also emphasizes the importance of eliminating pits: "Several Marcellus Shale well operators have expressed a desire to move towards a pitless drilling and fracturing system to more effectively manage these fluids in an environmentally sound manner. The management of drilling and fracturing fluids in tanks, rather than open pits, could significantly reduce the possibility of a release of industrial waste to the environment."

Unfortunately, this official view by the agency in charge of overseeing oil and gas operations is not reflected in the proposed Chapter 78 revisions. One critical example of this omission is Section 78.56(11), which requires that pits and impoundments be only 20 inches above the seasonal high groundwater table. This inexcusably short distance gambles with water quality in a state with many

shallow water resources. It is notable that other states require greater separation, such as 25 feet in New Mexico[11], 5 feet in Louisiana[12], and 4 feet in Michigan.[13]

Even current regulations for temporary storage and disposal of residual waste onsite are clearly inadequate to prevent the myriad of environmental problems posed by pits. **It is therefore imperative that EQB prohibit the continued use of solidifiers, dusting, unlined pits, attenuation, or other "alternative practices" for the onsite storage or disposal of drill cuttings (Section 78.61(d), as well as the use of alternate liner or natural materials for pits (Section 78.62(a)(11).**

Statements in the proposed revisions that DEP will provide a "list of approved solidifiers" and has to approve "the material and the installation procedure to be used" are simply too vague to be effective. The proposed regulations do not contain any information, procedures, protocols, and analytical data (e.g., on contaminant levels, corrosivity, or permeability) on which the Department would base its determinations and issuance of permits.

In turn, it is impossible to know whether alternative practices and materials provide "equivalent or superior protection" and would not result in pollution, which is required in Sections 78.56(b), 78.59(o), 78.58, and 78.61(d). As currently written, there is no reason to presume that this standard would be met—leaving unanswered the question of whether operator convenience or preference for particular products would become a determining factor for DEP in allowing numerous "exceptions to the rules."

The lack of specificity and transparency regarding allowable onsite waste disposal practices is particularly troubling because DEP frequently issues waivers for "alternative waste management practices," a process that should be prohibited in the Chapter 78 revisions. Reviews of these waivers (issued on form OG-0071) indicate that a widespread "alternative" for waste management has been the use of 20 mil pit liners to contain drilling, exploration, and production wastes, rather than the thicker 30 mil liner required in Section 78.62. DEP approved the practice of using thinner high density polyethylene (HDPE) liners in January 2009.[14] Yet such HDPE liners overall have only been given a rating of "fair" for puncture performance, installation damage resistance, and stress cracking by Geosynthtica.net, as well as lower ratings for these aspects than the Linear Low-Density Polyethylene (LDPE) liners required in some other states (such as New Mexico).[15]

Yet not long after DEP approved the use of thin HDPE pit liners, Scott Perry, Director of the DEP Bureau of Oil and Gas Management, stated in an August 20, 2010 letter to well operators (obtained through a Right-to-Know request and attached at the end of these comments) that "...pits used by operators that produce gas from unconventional shale formations to dispose of residual waste must be lined with an impervious liner that is at least 30 millimeters [sic] thick. 25 Pa. Code 78.62(a)(l 0). DEP will be rescinding its approval to use 20 millimeter [sic] liners at these sites through a notice in the *Pennsylvania Bulletin.* The volume of material, the length of time the pits are in use, and the potential impacts to the environment from leaking pits necessitate this action."

However, it does not appear that the allowance of a thinner pit liner was in fact rescinded. This leaves in place the option for drillers to apply for and obtain a waiver for this "alternative" waste management practice—one that DEP has itself acknowledged to be risky and inappropriate for current drilling operations.

In addition, even the 30 mil liner thickness required in Pennsylvania's oil and gas regulations is at best anachronistic, particularly given practices in some other states. For example, Michigan recognizes the potential for pit leakage by requiring the use of a second liner to encapsulate the entire pit, not just its contents.[16] Colorado specifies that liners must be of sufficient thickness and length to withstand expansion, contraction, and settling of the underlying earth, and in some circumstances must be 60 mils thick.[17] Utah's regulations indicate the need for a minimum of 60 mils for primary liners and a minimum of 40 mils for secondary ones.[18]

Although thinner pit liners is just one of the many possible "alternatives" that operators in Pennsylvania can use, it exemplifies the risks to groundwater and soil quality that are not addressed in Chapter 78. Inadequate liners are particularly concerning because **the proposed regulations continue to allow the onsite burial of residual waste pits—a practice that should be explicitly prohibited in Sections 78.61 and 78.62.**

This "out of sight, out of mind" practice may be convenient for operators by reducing the amount of waste they have to truck offsite for treatment and disposal. But experience in other states shows that nearly every buried pit poses a threat to groundwater and soil and creates a potential toxic legacy—the costs of which will have to be borne by landowners, the public, and the environment long after the companies responsible for the damage have left the site.

DEP is not taking measures to prevent the environmental risks of pit burial to water and soil, nor even keeping track of where these risks might arise. DEP does not require operators to map or list the location and volume of buried pits, maintain a database (or even a spreadsheet) of buried pits, or follow any protocols to monitor whether or not they remain solidified and impermeable over time. The only clear documentation of whether a pit has been buried is well restoration records, which are kept in individual paper well files at regional DEP offices. But operators are not required to file these reports until after the last well on a site is completed and can request a restoration extension of up to two years. As a result, it can take years for the Department and the public to have access to information about whether pits have been buried on a site—even though they may be close to a wetland, stream, backyard, or farm field.

Finally, based upon a written opinion from the Environmental Protection Agency in Region 10, pit liners are non-exempt waste under the U.S. Resource Recovery and Conservation Act (RCRA) and must be disposed of accordingly.[19] Therefore, the proposed regulations cannot allow that these liners be buried on site.

Similarly, the burial of tanks used to store liquid waste should be prohibited under Section 78.57, as tanks may corrode and leak. It is worth noting, however, that the requirements that operators provide to DEP a list of locations of buried tanks and remove them within three years at least offers an opportunity—albeit limited and insufficient—to prevent or remediate environmental impacts. That aspect of DEP's mandate is completely ignored when it comes to buried pits containing drill cuttings and residual waste.

Section 78.63 should be removed in order to prohibit the land application of residual waste and drill cuttings, a practice that poses risks to water, soil, and aquatic life, particularly if the waste has not been subjected to rigorous chemical analysis. Land application inevitably leads to pollution from waste runoff, particularly in a state like Pennsylvania that has frequent rain, shallow groundwater sources, widespread reliance on private well water, and a sloped/hilly landscape.

In light of these on-the-ground realities, the currently required setbacks for land spreading of drill cuttings in Section 78.61(b) for water supplies (200 feet) and water bodies and wetlands (100 feet) are so limited as to be meaningless, particularly in the absence of testing or studies showing that such setbacks are effective. One indication that they are not is Oklahoma's regulation (in place since 2003) that land application of waste is prohibited within 300 feet of private water wells and within one-quarter of a mile from municipal wells.[20]

The use of brine for dust suppression, de-icing, and road stabilization should be prohibited under Section 78.70. Brine from even conventional wells can push salinity loads excessively high. DEP has never proven the safety of this practice, nor whether the parameters for chemical analysis and application contained in the regulations provide sufficient protection of waterways, vegetation, and soil. In addition, codification of this regulation in Chapter 78 would allow DEP to evade its own beneficial use requirements, as a waste management permit for brine spreading has never been publicly issued for review and adopted accordingly.

As emphasized at the beginning of these comments, Earthworks supports efforts by both operators and regulators to phase out open pits and adopt the use of closed waste storage and processing systems. However, **the proposed regulations do not sufficiently define allowable modular and aboveground waste structures, nor consider whether their use should be restricted or prohibited under certain conditions. These gaps must be corrected before Chapter 78 revisions are finalized.**

Specifically, Section 78.56(a) allows for "other approved storage structures" and Section 78.57(d) allows for "other above ground storage structures." As noted above with regard to pits, such language is too vague to be effective. The proposed regulations should specify the procedures, information, and data that DEP would use to determine whether or not these "other" structures would ensure protection of water and air quality.

Even though closed containment systems are preferable, it would be foolhardy to presume—as the proposed regulations largely do—that any form they take would be risk-free. Because all facilities that hold flowback water, brine, and other gas wastes can pose threats to the environment, they require strong, detailed regulations and consistent oversight. For tanks to be beneficial, their location and size must be appropriate for the site in question. They also must have sufficient containment to prevent leaks and subsequent water and soil contamination, be consistently and properly maintained, and have systems to prevent air emissions and filter pollutants (particularly if they are vented). Unfortunately, such aspects are not addressed in the proposed regulations.

Yet problems related to land disturbance and air and water quality will inevitably arise as operators develop and expand the use of closed waste containment and processing systems. Some operators in Pennsylvania are already pursuing the construction of large "tank farms" and "tank pads"—yet the proposed regulations do not even acknowledge or address these facilities. Yet such facilities could be used to collect, store, process, and transfer millions of gallons of waste at a time, service dozens or more wells across a wide geographic area, and require an expansive network of roads and pipelines.

Given this, the proposed regulations should clarify that operators would be required to obtain a Waste Management Permit (WMGR 123) for tank facilities (a point that was discussed at the April 23, 2013 Technical Advisory Board meeting on the Chapter 78 revisions), as well as any other relevant permits and requirements related to erosion and sedimentation control, land disturbance, setbacks, water and air quality, and other concerns. DEP should also consider whether tank-based

facilities would be large enough or constructed in such a way as to require regulation under 25 Pa. Code Chapter 105, for example with regard to an environmental assessment, water obstruction and encroachment permit, or design criteria. If so, appropriate language would need to be developed for inclusion in Chapter 78 regulations.

In the context of all types and stages of waste management, it is troubling that a clear definition of "freshwater" is missing from the proposed regulations. **The term "freshwater" should be included in the definitions section of the proposed regulations to clarify that it comprises uncontaminated sources that are part of the natural hydrologic cycle**, including underground sources of drinking water protected under the Safe Drinking Water Act. As currently written in Section 78.1, freshwater impoundments could be used hold "surface water," "groundwater," and "other Department approved substances"—the latter being vague enough to allow operators to use impoundments permitted for freshwater to store and treat fluids that contain toxic substances such as effluent, mining water, or recycled flowback. This would in turn pose potential environmental risks similar to those caused by waste pits and impoundments.

Finally, **Earthworks strongly encourages EQB to take the steps necessary to regulate flowback and produced water through Chapter 78 in accordance with Subtitle C of the U.S. Resource Conservation and Recovery Act (RCRA).**

More than 25 years ago, the EPA determined that exploration and production (E&P) wastes would receive a categorical exemption from Subtitle C of the Resource Conservation and Recovery Act.[21] Most states have incorporated this exemption into their own oil and gas regulations, including Pennsylvania, which classifies all wastewater from industrial operations as nonhazardous.[22] However, the RCRA exemption was established long before the advent of high volume horizontal hydraulic fracturing now practiced across Pennsylvania and the United States, and long before the oil and gas industry routinely produced large amounts of wastewater and solid waste containing high levels of salt, chemicals, and NORM.

Importantly, even at the time that the exemption was established, EPA acknowledged that regulation of certain E&P waste streams as hazardous would otherwise be appropriate, stating that "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."[23]

This perspective has been supported by a number of recent news reports and studies that have documented toxicity and ignitability levels high enough to trigger RCRA, were it not for the exemption. For example, in 2002, the California Department of Toxic Substances Control found that 11 percent of oil waste samples tested exceeded flashpoint regulatory thresholds.[24] As early as 2003, federal regulators became aware that E&P wastes can spontaneously combust; in January of that year, a Texas collection pit of E&P waste ignited when hydrocarbon vapors interacted with sediments and water in the pit.[25] In May 2006, a natural gas condensate tank and pit operated by Encana in Colorado caught fire and burned for five hours.[26] In April 2010, a wastewater impoundment in Washington County, Pennsylvania ignited, reportedly shooting flames 100 feet in the air.[27]

In addition, some chemicals have exhibited toxicity characteristics that would normally require management as a hazardous waste if they were not otherwise exempt under RCRA. The EPA has developed the Toxicity Characteristic Leaching Procedure (TCLP) to estimate the leaching potential of waste and has codified a series of regulatory thresholds based upon contaminant concentrations to determine which wastes exhibit the characteristic of toxicity.[28] A 2009 study analyzing

constituents of flowback in West Virginia and Pennsylvania revealed detections of both barium and BTEX chemicals (i.e., benzene, toluene, ethylbenzene, and xylene) in excess of TCLP regulatory thresholds.[29]

In sum, ignoring the applicability of RCRA to the increasingly common realities in oil and gas fields, including in Pennsylvania, effectively implies that weak environmental regulation on the federal level renders acceptable equally weak regulation on the state level.

Both the hazardous waste loophole in RCRA and other shortcomings in the proposed revisions to Chapter 78 discussed above may reflect a wish on the part of Pennsylvania's government to promote oil and gas development. But such reasoning directly contradicts, and must not be allowed to trump, the EQB and the DEP's shared mandate to protect health and the environment by adopting strong, effective regulations and ensuring that they are followed.

Thank you for your time and attention. Please feel free to contact me with any questions or if you need additional information.

Sincerely,

Nadia Steinzor
Eastern Program Coordinator, Earthworks Oil & Gas Accountability Project
PO Box 149
Willow, NY 12495
nsteinzor@earthworksaction.org; 202-887-1872, ext. 109

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[1] E. Hansen, D. Mulvaney, and M. Betcher. *Water Resource Reporting and Water Footprint from Marcellus Shale Development in West Virginia and Pennsylvania.* Downstream Strategies and San Jose State University, 2013. This report also documented that reuse and recycling of flowback fluid makes up only 8% of recent water use in West Virginia and 14% in the Susquehanna River Basin in Pennsylvania, despite claims of companies that they will soon be able to use these practices to vastly reduce both freshwater use and the volumes of

[2] General Permit Application No. WMGR097R025, Range Resources—Appalachia, LLC, *Pennsylvania Bulletin,* February 1, 2014.

[3] Tara Kinsell. "Rejected frack waste taken to Idaho." *Observer Reporter,* July 11, 2013. www.observer-reporter.com/article/20130711/NEWS02/130719870/-1/NEWS

[4] United States of America v. XTO Energy, Inc. Consent Decree in U.S. District Court, Middle District of Pennsylvania.

[5] See, for example, Exxon Mobil's Corporate Citizenship Report, 2010 (http://cdn.exxonmobil.com/~/media/Reports/Corporate%20Citizenship%20Report/2010/community_ccr_2010.pdf); Anadarko, "Questions and Answers regarding fracture stimulation" (https://www.anadarko.com/sitecollectiondocuments/hydraulic%20fracturing/fracQA.pdf); and Chief Oil & Gas Marcellus Shale Best Practices, www.chiefog.com/marcellus_shale_best_practices.html.

[6] Keith N. Eshleman and Andrew Elmore. *Recommended Best Management Practices for Marcellus Shale Gas Development in Maryland.* University of Maryland Center for Environmental Science. www.mde.state.md.us/programs/Land/mining/marcellus/Documents/Eshleman_Elmore_Final_BMP_Report_22113_Red.pdf

[7] New York Codes, Rules, and Regulations. Revised Express Terms 6 NYCRR, Section

560.6 (c)(7). www.dec.ny.gov/regulations/77353.html.

[8] New Mexico Commission of Public Records. Title 19, Chapter 15 (Oil and Gas), Part 17 (Pits, Closed-Loop Systems, Below-Grade Tanks and Sumps). www.nmcpr.state.nm.us/nmac/_title19/T19C015.htm

[9] STRONGER. "Pennsylvania Follow-Up State Review." September 2013. http://strongerinc.org/sites/all/themes/stronger02/downloads/Final%20Report%20of%20Pennsylvania%20State%20Review%20Approved%20for%20Publication.pdf

[10] *Breaking All the Rules: the Crisis in Oil and Gas Regulatory Enforcement.* Earthworks Oil & Gas Accountability Project. 2012. http://enforcement.earthworksaction.org.

[11] New Mexico Commission of Public Records. Title 19, Chapter 15 (Oil and Gas), Part 17 (Pits, Closed-Loop Systems, Below-Grade Tanks and Sumps), Section 19.15.17.10(A)(1)(a). www.nmcpr.state.nm.us/nmac/_title19/T19C015.htm.

[12] Louisiana Department of Natural Resources. Title 43, Part 19, Office of Conservation. Section 313(D)(6). http://dnr.louisiana.gov/assets/OC/43XIX_June2010.pdf#page=30.

[13] Michigan Natural Resources and Environmental Protection Act, No. 451 of the Public Acts of 1994. Part 615, Supervisor of Wells and the Administrative Rules, R324.407. www.michigan.gov/documents/deq/ogs-oilandgas-regs_263032_7.pdf.

[14] "Approved Alternate Liners for Pits at Oil and Gas Well Sites." 39 Pa.B. 368. *Pennsylvania Bulletin,* Saturday, January 17, 2009. www.pabulletin.com/secure/data/vol39/39-3/78.html.

[15] Geosynthetica.net, based on research by M. Sadlier and R. Frobel; www.geosynthetica.net/resources/a-flexible-membrane-liner-comparison-1/.

[16] Michigan Department of Environmental Quality. Natural Resources and Environmental Protection Act, R324.407(9)(e). www.michigan.gov/documents/deq/ogs-oilandgas-regs_263032_7.pdf.

[17] Colorado, Rule 904 Pit Lining Requirements and Specifications, https://cogcc.state.co.us/Announcements/Rule904.pdf.

[18] Utah Division of Oil Gas and Mining, Utah Administrative Code, Oil and Gas Rule R649-9 (Waste Management. www.rules.utah.gov/publicat/code/r649/r649-009.htm.

[19] U.S. Environmental Protection Agency, Office of Resource Conservation and Recovery. September 15, 2010 letter in response to an inquiry from Earthjustice on the status of pit liners under RCRA.

[20] Office of Administrative Rules, State of Oklahoma. Title 165, Chapter 10 (Oil and Gas Conservation). 165:10-7-19(h)(6); ftp://204.87.70.98/occrules/Ruleshtm/forweb04newrules.htm

[21] U.S. Environmental Protection Agency. "Regulatory Determination for Oil and Gas and Geothermal Exploration, Development, and Production Wastes." Federal Register Volume 53, 1988. www.epa.gov/osw/nonhaz/industrial/special/oil/og88wp.pdf.

[22] PA Annotated Statutes, in reference to the state's Solid Waste Management Act. 35 Pa. Stat. Ann. §§ 6018.103, 6018.301.

[23] U.S. Environmental Protection Agency. "Regulatory Determination for Oil and Gas and Geothermal Exploration, Development, and Production Wastes." Federal Register Volume 53, 1988. www.epa.gov/osw/nonhaz/industrial/special/oil/ogreg88.txt.

[24] Claudia Zagrean Nagy, California Dep't of Toxic Substances Control, Oil, Exploration and Production Wastes Initiative (2002)

[25] U.S. Department of Labor, Occupational Safety and Health Administration. *Potential Flammability Hazard Associated with Bulk Transportation of Oilfield Exploration and Production (E&P) Waste Liquids.* 2008. www.osha.gov/dts/shib/shib032408.pdf.

[26] Earthworks, Oil & Gas Accountability Project Report, Spring/Summer 2006. www.earthworksaction.org/library/detail/oil_gas_accountability_report_--_spring_summer_2006#.UyMiwlFdV5t.

[27] Janice Crompton, "Residents Reported Gas Odors Before Explosion." *Pittsburgh Post-Gazette*, April 1, 2010. www.post-gazette.com/local/washington/2010/04/01/Residents-reported-gas-odors-before-explosion/stories/201004010317.

[28] U.S. Code of Federal Regulations, "Toxicity Characteristic" (40 CFR § 261.24). Government Printing Office. www.gpo.gov/fdsys/granule/CFR-2011-title40-vol26/CFR-2011-title40-vol26-sec261-24/content-detail.html.

[29] T. Hayes. *Sampling and Analysis of Water Streams Associated with the Development of Marcellus Shale Gas*, Gas Technology Institute, report prepared for the Marcellus Shale Coalition. December 2009. http://energyindepth.org/wp-content/uploads/marcellus/2012/11/MSCommission-Report.pdf

Rachel Carson State Office Building
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September 17, 2013

Bureau of Oil and Gas Management

717-772-2199
Fax 717-772-2291

CONTACT NAME
COMPANY
STREET ADDRESS 1
STREET ADDRESS 2
CITY, STATE, ZIP

Dear Marcellus Shale Gas Well Operator:

Department inspectors have been documenting a number of violations pertaining to the operation of open pits used for the management of drilling and fracturing fluids at Marcellus Shale wells sites. These violations, which have included both the over topping and leaking of pits, have resulted in the contamination of both soil and the waters of the Commonwealth. Several Marcellus Shale well operators have expressed a desire to move towards a pitless drilling and fracturing system to more effectively manage these fluids in an environmentally sound manner. The management of drilling and fracturing fluids in tanks, rather than open pits, could significantly reduce the possibility of a release of industrial waste to the environment.

Department records indicate that you have drilled at least one gas well into the Marcellus Shale formation within the past year. Department of Environmental Protection Secretary John Hanger respectfully requests that you provide the Department with information regarding what steps, if any, your company has taken to convert to a pitless drilling and fracturing system. Please provide this information to the Department, to my attention at the address above, by October 7, 2010.

If you have any questions, please contact me at 717-772-2199. Thank you for your cooperation in this matter.

Sincerely,

Scott R. Perry
Director
Bureau of Oil and Gas Management

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bureau of Oil and Gas Management

August 20, 2010

Dear well operator:

DEP has recently investigated several significant incidents resulting from leaking pits adjacent to well sites. Due to the frequency of these events and the potentially severe impacts to the environment, I am writing this letter to remind all operators that produce gas from unconventional shale formations such as the Marcellus, Utica, Burket, Mandata, Rhinestreet and other similar formations, of the regulatory requirements governing the use of pits to temporarily store or ultimately dispose of residual wastes generated by well drilling or production.

Pit Construction
Rocks or other debris can tear pit liners. 25 Pa. Code § 78.56 requires pits to be constructed so that the liner subbase is smooth, uniform and free from debris, rock and other material that may puncture, tear, cut or otherwise cause the liner to fail. The liner subbase and subgrade shall be capable of bearing the weight of the material above the liner without settling that may affect the integrity of the liner. If the pit bottom or sides consist of rock, shale or other materials that may cause the liner to fail, a subbase of at least 6 inches of soil, sand or smooth gravel, or sufficient amount of an equivalent material, shall be installed over the area as the subbase for the liner. Hay or other similar organic material is not a suitable alternative to soil, sand or smooth gravel.

In addition to building a proper subbase, the bottom of the pit must be 20 inches above the seasonal groundwater table. This provision applies to pits used for temporary storage of waste only. Pits may not be used to dispose of residual waste if the bottom of the pit will be within 20 inches of the seasonal groundwater table during any part of the year. 25 Pa. Code 78.62.

Finally, pits used by operators that produce gas from unconventional shale formations to dispose of residual waste must be lined with an impervious liner that is at least 30 millimeters thick. 25 Pa. Code 78.62(a)(10). DEP will be rescinding its approval to use 20 millimeter liners at these sites through a notice in the *Pennsylvania Bulletin*. The volume of material, the length of time the pits are in use, and the potential impacts to the environment from leaking pits necessitate this action.

Disposal of Waste
Only residual waste that is generated by well drilling or production may be disposed of on-site. Trash, land clearing waste, or other waste that was not generated by well drilling or production may not be disposed of in pits on-site. In addition, only residual waste that meets the requirements of 25 Pa. Code 78.62(b) may be disposed of on-site. DEP requests that prior to disposing of waste on-site, a chemical analysis of a representative sample of the waste be

performed to demonstrate compliance with this section. Failure to do so may result in an enforcement action by DEP. A list of parameters that must be tested is enclosed with this letter. Because shale formations have the potential to produce an acid discharge, the shale should be analyzed and handled according to the enclosed fact sheet.

The regulations governing the use of pits to store and dispose of waste generated by well drilling or production are minimum standards that, if strictly followed, will protect the environment. Well operators should instruct contractors on proper pit construction and routinely inspect pits prior to liner installation and while the pit is in use to detect and repair any defects. DEP also urges operators to consider using superior waste containment facilities.

Thank you for your attention to this important matter. Please contact me at (717) 772-2199 if you have any questions.

Sincerely,

Scott Perry
Director

enclosures