

June 16, 2020

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

RE: Residual Waste General Permit WMGR123; Proposed Modifications and Renewal

These comments are submitted by Delaware Riverkeeper Network on behalf of our organization's 25,000 members, many of whom live and work in Pennsylvania. Delaware Riverkeeper Network is opposed to some provisions of the proposed modifications to the Residual Waste General Permit WMGR123, under the Solid Waste Management Act (35 P.S. §§ 6018.101—6018.1003); the Municipal Waste Planning, Recycling and Waste Reduction Act (53 P.S. §§ 4000.101—4000.1904). Delaware Riverkeeper Network's concerns arise from the substantial adverse impacts that can result from the processing, transfer and "beneficial use" of oil and gas liquid waste to develop or hydraulically fracture an oil or gas well.

Delaware Riverkeeper Network is commenting solely on the proposed modifications to the General Permit and not on the current regulatory language. There are important definitions in the proposed modifications that have the potential to result in the release of pollution from the liquid waste produced by hydraulic fracturing (fracking) being handled at the reuse facility, adversely impacting the environment, public health, and site worker health. The newly defined terms are integrated into the provisions of the General Permit, expanding the permitted activity. Delaware Riverkeeper Network objects to the definitions provided for processing, transfer, and storage because the expanded activities weaken the regulations' ability to prevent pollution and degradation and do not provide adequate oversight. Delaware Riverkeeper Network is focusing on "Storage", a new definition in the General Permit.

STORAGE DEFINITION

The newly added definition reads:

Storage - The containment of waste on a temporary basis in a manner that does not constitute disposal of the waste. It shall be presumed that containment of waste in excess of 1 year constitutes disposal. This presumption can be overcome by clear and convincing evidence to the contrary.

Delaware Riverkeeper Network objects to this definition. There are several problems with the use of this term:

- The allowance of storage of fluid waste up to a year is excessive considering its dangerous constituents.
- The added allowance of an extension of the length of time for storage of waste constitutes a potentially perpetual or never-ending retention of wastewater under the permit, particularly considering that there is no end date or maximum period specified. This adds unnecessary risk because the "units" or impoundments are not designed as long-term storage facilities.

- The dictionary definition of storage is “the action or method of storing something for future use”. However, it is not clear that the waste will definitely be reused. The proposed definition sets up a loophole that would allow the wastewater to be stored for up to a year or longer and then simply disposed of as waste. Let’s look at these issues one at a time.

1. The allowance of storage of fluid waste up to a year is excessive considering its dangerous constituents.

The General Permit requires in Appendix A that certain maximum concentrations of constituents be met by the fluids that are stored. However, there are many components of wastewater produced by fracking that are not included in Appendix A that pose significant danger if released to the environment through a leak, spill, volatilization/venting to the air or if released through other manner.

The storage and processing of fluids on site allows and prolongs the handling of dangerous materials at the well site. Due to the current exemption of oil and gas activities from the U.S. Resource Conservation and Recovery Act Subtitle C standards, these materials are not classified as hazardous and are not required to be handled as hazardous substances despite the many wastewater constituents that do have hazardous properties. This reality must be reflected in strict regulation of these fluids, not the extension of time for potentially toxic materials to be stored on site.

Some of the materials in wastewater that is to be stored for reuse under the General Permit is not even accounted for by the well operator or perhaps even by PA Department of Environmental Protection (DEP). A 2018 report “Keystone Secrets” documents that drilling companies have extensively used exemptions in Pennsylvania rules that allow companies to withhold chemical identities as trade secrets. Regulations at the federal and state level allow for the information about the chemicals injected into drilled wells to be kept from the public and, in some cases, even from emergency responders and regulatory agencies. (“Keystone Secrets: Records Show Widespread Use of Secret Fracking Chemicals Is a Looming Risk for Delaware River Basin, Pennsylvania Communities”, Dusty Horwitt, Partnership for Policy Integrity (PFPI), September 11, 2018)

Drilling companies injected secret fracking chemicals 13,632 times into 2,515 “unconventional” wells in Pennsylvania between 2013 and 2017, primarily in Marcellus and Utica shale formations. The companies injected at least one hydraulic fracturing (“fracking”) chemical with an identity kept hidden from the public into each of the 2,515 unconventional natural gas wells drilled in Pennsylvania, amounting to 55 percent of the more than 4,500 unconventional gas wells drilled in the state during the five-year period. Each well received an average of more than five secret chemical injections. (“Keystone Secrets: Records Show Widespread Use of Secret Fracking Chemicals Is a Looming Risk for Delaware River Basin, Pennsylvania Communities”, Dusty Horwitt, Partnership for Policy Integrity (PFPI), September 11, 2018)

Under Pennsylvania law, well operators must report the chemicals they use to fracture unconventional gas wells to FracFocus, a publicly-accessible database operated by non-governmental organizations. However, well operators are allowed to withhold the identities of fracking chemicals as trade secrets. When they do, they must indicate in the FracFocus database that the chemical is a trade secret. Keystone Secrets is based on these public disclosures.

The amount of secret chemical use in oil and gas wells is likely much greater than publicly disclosed because of regulatory exemptions that don't require reports or readily accessible records of all chemicals used in drilling and fracking. For instance, no drilling chemicals (drilling precedes fracking in the oil and gas extraction process) used in either conventional or unconventional wells are required by Pennsylvania to be disclosed at all, so these occurrences could not be included in the report, even though, according to US Environmental Protection Agency (EPA) records, it is known that some drilling chemicals have been kept secret from the public at the federal level, and some are known to be linked to adverse health effects. ("Keystone Secrets: Records Show Widespread Use of Secret Fracking Chemicals Is a Looming Risk for Delaware River Basin, Pennsylvania Communities", Dusty Horwitt, Partnership for Policy Integrity (PFPI), September 11, 2018)

If chemical manufacturers, as opposed to other companies involved in fracking, assert trade secret claims, Pennsylvania law appears to allow no one to learn the chemicals' identities, even in the case of a leak or spill. The exemption relieves chemical manufacturers of the duty to report the chemicals in their fracking fluid products to the public, regulators such as DEP, emergency personnel and first responders, health professionals, and even well operators using the products. ("Keystone Secrets: Records Show Widespread Use of Secret Fracking Chemicals Is a Looming Risk for Delaware River Basin, Pennsylvania Communities", Dusty Horwitt, Partnership for Policy Integrity (PFPI), September 11, 2018)

Another source of information about the dangers of chemicals used in fracking is the EPA. EPA has found that some chemicals used in drilling and fracking have serious health risks. In response to a Freedom of Information Act request filed by PFPI in 2014, EPA disclosed health assessments and regulatory determinations for dozens of new chemicals proposed for use in drilling and fracking fluid. PFPI has reviewed records for 126 of the chemicals reviewed under EPA's New Chemicals program between 2003 and 2014. Of the 126, EPA expressed health concerns about 109 of the chemicals proposed for use in oil and gas drilling and fracking. Regardless, EPA approved most of the 109 chemicals for use, and 62 of them were most likely used in oil and gas wells. The health effects noted by EPA include "irritation to the eye, skin, and mucous membranes," kidney toxicity, liver toxicity, neurotoxicity, and developmental toxicity. ("Keystone Secrets: Records Show Widespread Use of Secret Fracking Chemicals Is a Looming Risk for Delaware River Basin, Pennsylvania Communities", Dusty Horwitt, Partnership for Policy Integrity (PFPI), September 11, 2018)

Yet these chemicals are not captured in Appendix A; many because there is no way to know if these chemicals were used in the fluids that are to be reused in fracking under this General Permit. Of the 62 chemicals likely used in oil and gas wells despite EPA's health concerns, manufacturers concealed the identities of 41 with trade secret claims. ("Keystone Secrets: Records Show Widespread Use of Secret Fracking Chemicals Is a Looming Risk for Delaware River Basin, Pennsylvania Communities", Dusty Horwitt, Partnership for Policy Integrity (PFPI), September 11, 2018)

It has been well established that there are constituents in wastewater produced by fracking that are not required to be tested for. Some have been included in Appendix A but many toxic ingredients have not. New York's 2009 DSGEIS contained a list of constituents in gas drilling Marcellus shale wastewater from Pennsylvania and West Virginia (NYSDEC Draft Supplemental Generic Environmental Impact Statement on the Oil, Gas, and Solution Mining Regulatory Program (DSGEIS), 2009, Tables 5-8 and 5-9, p. 5-109). Many are hazardous, some have known harmful health impacts, and some are carcinogenic. New York tested flowback from these shale gas extraction operations in Pennsylvania and West Virginia and found 154 parameters.

Delaware Riverkeeper Network considers these uncertainties as to what is required in the Radiation Protection Action Plan to be too great to provide the protection needed from TENORM and that the General Permit requirements must be strengthened to prevent release.

“It has been known since the 1960’s that the Marcellus shale formation is radioactive. Drilling logs by gas companies and reports by USGS show that underground/subsurface radium concentrations in the Marcellus shale are up to 32 times surface background concentrations. Measurements by New York State DEC show radium in rock cuttings over 200 times background concentrations. (NYSDEC, Division of Environmental Remediation, August 2012, re. Allied Landfill, Niagara County) Drilling and natural gas production brings this radioactivity to the surface in the form of solids (rock cuttings), liquids (drilling fluids, flowback water and brine), and gas (radon).” (Review of Pennsylvania Department of Environmental Protection Technologically Enhanced Naturally Occurring Radioactivity Materials (TENORM) Study Report, Marvin Resnikoff, Ph.D. December 2015)

Interstitial or formation water (the brine in the shale formation) can be highly radioactive (as concentrated as 15,000 pCi/L), so each time the water is reused, the radium is concentrated. This will result in TENORM, or Technically Enhanced Naturally Occurring Radioactive Materials. (Radioactive Waste Management Associates, “Comments on Marcellus Shale Development”, Marvin Resnikoff, Ph.D., October 2011) TENORM is highly toxic and can be even more dangerous than Radium 226. The liquid waste stored on site under the General Permit is required under Appendix A to meet a standard for Radium 226 and 228 of 5 pCi/L (combined). However, the problem of TENORM complicates the storage of wastewater produced by fracking over a period of time. As radioactive elements are stored, radioactive properties can build up in tanks, liners, piping and residual material in the storage vessel. There is no requirement for sampling of these tanks, units or other infrastructure over time and the sampling of the fluids may not accurately represent the level of radioactivity embodied in the units, impoundment liners, or other related components of the storage system.

For these reasons, Delaware Riverkeeper Network also points out that the removal of decommissioned tanks, units, and other related storage and processing infrastructure must require sampling for radioactivity before reuse, recycling, or disposal, applying this comment to condition C.8 in the General Permit to prevent human health and environmental damage. Also under C.8, components of storage or processing units or systems that will continue to be used on the site must be sampled for radioactivity before being used for other purposes.

2. The added allowance of an extension of the length of time for storage of waste constitutes a potentially perpetual or never-ending retention of wastewater under the permit, particularly considering that there is no end date or maximum period specified. This adds unnecessary risk because the “units” or impoundments are not designed or regulated as long-term storage facilities.

In the 2013 review of Pennsylvania’s Oil and Gas Regulations it was noted that General Permit WMGR123 serves DEP’s goals of encouraging the “beneficial use” of wastewater produced by hydraulic fracturing but that long term facilities increase the potential for adverse environmental impacts. “At the same time, long term facility [sic] present potential for environmental impacts that warrants closer regulation, such as bonding, siting and oversight.” (Pennsylvania Follow-up State Review, State Review of Oil and Natural Gas Environmental Regulations, Inc. (STRONGER), September 2013, p. 62.)

One problem caused by reuse of the wastewater is the resulting concentration of certain contaminants. The wastewater produced by fracking that is regulated under the General Permit will be

held in “temporary” storage units that may not be designed to hold the potentially corrosive and/or concentrated materials found in this waste stream. Impoundments that hold the stored fluids use plastic liners that may not have the required strength to hold these potent fluids for a year or more, as allowed in the General Permit.

There is no requirement limiting the size of these units, which are being built in enormous sizes today, increasing the potential adverse impacts should a unit break. There, likewise, is no size or capacity limit on impoundments.

There is no requirement to prevent all vapors and emissions from the storage vessels to be treated and filtered to remove all contaminants, including methane, except to reference current DEP air regulations that address fugitive emissions of a select group if certain volume thresholds are met. As stated in the General Permit at Condition C.13, the capture of emissions in the state regulations is: “(relating to prohibition of certain fugitive emissions and fugitive particulate matter)”.

Construction specifications that prevent leaks and subsequent water and soil contamination must be required with adequate inspection and maintenance routines but these are not prescribed in the General Permit.

3. The dictionary definition of storage is “the action or method of storing something for future use”. However, it is not clear that the waste will definitely be reused. The proposed definition sets up a loophole that would allow the wastewater to be stored for up to a year or longer and then simply disposed of as waste.

The problem of long term storage is compounded by the lack of strict regulation of the stored waste’s ultimate fate, which is allowed to remain on the site in what is considered a “temporary storage” unit or impoundment even if the fluids are too toxic to reuse in fracking. Under Condition C.3.d., “If the results of any future sampling taken to satisfy this condition fail to meet the concentration limits in Appendix A, the permittee must immediately notify the DEP and manage the processed oil and gas liquid waste as a residual waste.”

Remarkably, the operator does not have to remove the waste if the fluids do not meet Appendix A requirements but apparently may allow them to stay on site for a year or for the life of the General Permit. It is entirely possible that processing does not accomplish the reduction of regulated constituents to DEP’s requirements and a “bad batch” can stay on site for a year and may be extended even longer if permitted by DEP. This provision in the General Permit can be used as a loophole where waste is kept on site because it is a convenient storage location until disposal is economic or available. The storage of fluids for reuse at a well site for fracking was never meant to be a *de facto* wastewater storage location yet there is nothing in the General Permit to preclude this.

It is not farfetched to imagine that the sites where fluids to be reused may become waste storage sites. There is tremendous pressure today for locations to dispose of wastewater produced by fracking because of the downturn in the drilling and fracking of new production wells. The demand for reused wastewater for fracking has plummeted with the lack of new well starts, creating a glut of wastewater that is more expensive to dispose when it must be transported to injection wells or industrial treatment plants.

As stated in a peer-reviewed report:

“The vast majority of reuse is for hydraulic fracturing of new wells, thus reuse is only a viable waste handling practice while new development stays apace. Evidence has already been found in Pennsylvania that lower ratios of reused water by operators occur when there are pauses in new drilling.

[In 2016] The cost of oil and gas dropped to a point where new well development was no longer economically feasible for some operators, and their market for wastewater dropped.”

(Excerpted from: Science of the Total Environment, “Temporal and spatial trends of conventional and unconventional oil and gas waste management in Pennsylvania, 1991–2017”, Lee Ann L. Hill, Eliza D. Czolowski, Dominic DiGiulio, Seth B.C. Shonkoff, <https://doi.org/10.1016/j.scitotenv.2019.03.475> , p.630)

The supersized gas wells being drilled today in the Marcellus and Utica shale formations use 10-20 million gallons of water per well. According to FracFocus data, the average well in Pennsylvania’s Marcellus Shale used 11.4 million gallons in 2017, up from 4.3 million gallons reported by agencies in 2011. This means not only more water is needed to fracture the extended horizontal well bores but also means there are greater volumes of wastewater produced by these wells - between 1-1.5 million gallons of wastewater (for 10 M gallons of water used in fracking a well), increasing the volumes many times over the amount typically produced previously in Pennsylvania. (See: FracTracker Alliance Issue Paper, “Potential Impacts of Unconventional Oil and Gas on the Delaware River Basin”, March 20, 2018. Main Author: Matt Kelso.

<https://www.delawariverkeeper.org/sites/default/files/FT-WhitePaper-DRB-2018%20%28003%29.pdf>)

Coupled with this is the fact that fracked wells today are using more water and, as a result, more wastewater is being produced by these “super wells”. Drilling and gas development companies are looking for locations they can take or keep their wastewater and, if available and not prohibited by regulation, well sites could easily become like today’s nuclear power plants where waste is allowed to be stored on site indefinitely, despite the tremendous risks.

SAMPLING by Processors

Delaware Riverkeeper Network objects to the allowance in Condition C.4 and C.5 for reduction of frequency of sampling and analysis, and a reduction in the number of parameters to be sampled for the reasons outlined above in this comment. One of the key characteristics of wastewater produced by fracking is that it is variable depending on local geology, construction materials of the well (steel, cement, etc.); the formula of stimulation fluids used to frack the well, drilling fluids used to drill the well, and other variable environmental factors. It is not reasonable to allow for less frequent and fewer parameters to be tested for when the waste stream cannot be reliably consistent. This provision makes it more likely that pollutants will go undetected, unprocessed, and travel through to the environment and needs to be removed from consideration.

LOCATION

Delaware Riverkeeper Network objects to the addition of the emphasized language under C.7.f.: “Within 150 feet of high quality or exceptional value waters, as defined in 25 Pa. Code § 93.1., ***unless the storage and processing will not occur within that distance and no adverse hydrologic or water quality impacts will result.***” This provision to allow a waiver of the 150-foot buffer for High Quality and

Exceptional Value streams would be a heavy blow to the clean waters of Pennsylvania, providing a pathway for degradation for streams and waterways that are supposed to be the most highly valued in the Commonwealth.

DEP states in their explanation of the Special Protection Waters program:

The Pennsylvania Department of Environmental Protection (DEP) classifies streams based on their water quality. Among the classifications are Exceptional Value (EV), High Quality (HQ) and Warm Water Fisheries (WWF). EV is the highest or top tier classification/level of protection and HQ is the next step down. The Clean Water Act requires states to have protective uses for their surface waters. Once a protective use is established for a surface water, that use must be maintained and the surface water is not permitted to degrade. This DEP policy of anti-degradation, which originated from the U.S. Department of the Interior and the Clean Water Act, promotes the maintenance and protection of existing water quality in the State. (<https://waynecountypa.gov/265/Special-Protection-Waters>)

As concluded in a study of gas well development patterns, “Gas wells are often sited close to streams, increasing the probability of harm to surface waters, and preliminary data suggest the potential for detectable effects from sedimentation.” (“Rapid expansion of natural gas development poses a threat to surface waters”, Sally Entekin, Michelle Evans-White, Brent Johnson, and Elisabeth Hagenbuch, *Front Ecol Environ* 2011; 9(9): 503–511, doi:10.1890/110053 (published online 6 Oct 2011) p. 9)

Why would DEP consider jeopardizing the most valued of these protected streams by allowing a potential source of pollution to be located within its designated protective buffer? This allowance is not only reckless, it is likely a violation of the federal Clean Water Act and the state Clean Streams Law, in spirit as well as in the letter of the law. This proposed modification must be removed to save these irreplaceable exceptional value and high quality waters and to support the efficacy of Pennsylvania’s Special Protection Waters anti-degradation program.

STORMWATER DISCHARGES

Pertaining to Condition C.20, Delaware Riverkeeper Network objects to the language added regarding stormwater discharges, which reads (emphasis added):

“The permittee shall not cause or allow a point or non-point source discharge of any of the following: residual wastes; liquid waste; combined stormwater runoff and leachate, if generated; or runoff from the staging, processing, and storage areas where solid waste management activities are conducted; to the surface waters of the Commonwealth, unless permitted by DEP. ***This does not include rainwater or stormwater that is collected in a containment area that has not been mixed with a residual waste.***”

Under the General Permit for stormwater for a gas well site, monitoring is not required. If a discharge is to occur from a stormwater system, an individual stormwater NPDES permit must be obtained but typically, gas well sites operate under DEP’s General Permit. Due to the activity at a gas well site undergoing drilling, stimulation, fracking, and the processing of wastewater, there is an enormous amount of activity and traffic. For sites located well off a paved road, thousands of trucks are required to carry various chemicals, water, machinery, equipment, etc., traveling typically on a gravel road installed from the well to the nearest roadway. These trucks cause sediment pollution and BTEX-laden particulates to be washed off in a storm event, often not captured in the on-site stormwater system. The trucks also emit diesel air pollution that is deposited on the surfaces, soil, and vegetation to be washed into the nearest waterway with precipitation. These emissions and airborne pollutants also

deposit directly on surface water. This runoff is unmitigated, negatively impacting water quality, human health, and habitats.

There is no requirement to prevent air emissions that could deposit on the surface and be carried with stormwater as polluted runoff. DEP recognizes in this General Permit that fugitive and vented air emissions occur on gas well sites. It is not possible to control where land-deposited air pollutants, including heavy metals, priority pollutants, and volatile organic compounds, will fall to the surface.

Studies have shown that air pollution accompanies gas well development as discussed in a report that examined the Marcellus Shale among other gas fields:

Air pollutants are released during at least 15 different parts of the oil and gas development process.

(Tanja Srebrotnjak and Miriam Rotkin-Ellman, Natural

Resources Defense Council, *Fracking Fumes: Air Pollution from Hydraulic Fracturing Threatens Public Health and Communities*, December 2014) Many of the chemicals used in fracking are known air pollutants, and wastewater produced from fracking operations includes volatile compounds that can evaporate into the air, and have been linked to human health problems. (U.S. House of Representatives, Committee on Energy and Commerce, *Chemicals Used in Hydraulic Fracturing*, April 2011)

Leaking or vented natural gas can also contain toxic chemicals such as toluene and xylenes, which can cause breathing difficulty, and benzene, which can cause leukemia – even at low levels of exposure. (Gabe Rivin, “Fracking Regulators Won’t Create Rules for Air Pollution,” *North Carolina Health News*, 29 July 2014)

A 2010 study by the Pennsylvania Department of Environmental Protection found elevated levels of ethane, propane and benzene – all toxics associated with fracking – “in the air near Marcellus Shale drilling operations.” (Pennsylvania Department of Environmental Protection, *Southwestern Pennsylvania Marcellus Shale Short-Term Ambient Air Sampling Report*, 1 November 2010)

(Excerpted from: “Fracking Failures; Oil and Gas Industry Environmental Violations in Pennsylvania and What They Mean for the U.S.”, Jeff Inglis, John Rumpfer, Environment America Research & Policy Center, 2015. P. 10)

The mixing of runoff, particularly during a severe storm event, is common on this type of an industrial site and has led to degradation of receiving waterways that are proximate to a site. Without monitoring and tracing stormwater runoff to its source, it is not reasonable to expect that pollution will not be mixed into the portions of the site that are supposed to be segregated as the capture area for a stormwater control. Pollutants are deposited from both land activities (including spills, leaks, accidents, etc.) and air emissions that are deposited on the land surface.

As explained in a paper regarding the impacts of gas development on the environment, explaining why stormwater is one of the “key” aspects of gas site development that requires better control (emphasis added):

Stormwater discharges are regulated by state and local governments. The National Pollution Discharge Elimination System (NPDES) program regulates stormwater runoff at the federal level, although states can receive primacy to administer their own permitting program. At the federal level, oil and gas operations have been afforded special protections and are exempt from provisions in the Clean Water Act. Consequently, oil and gas operators are not required to obtain a stormwater permit, unless over the course of operation, the facility generates stormwater discharge containing a reportable quantity of oil or hazardous substances or if the facility violates a water quality standard (40 CFR 122.26(c)(1)(iii)).¹⁰ In

2005, the definition of oil and gas exploration and production was broadened to include construction and related activities, although regulations still require well pads larger than one acre to apply for an NPDES stormwater permit (Wiseman 2012).¹¹ ***A 2005 study on the surface water impacts of natural gas drilling noted the difficulty of monitoring and suggested that few facilities were monitoring in a way that would allow them to determine whether they even required an NPDES permit (U.S. EPA 2007b).***

(“Hydraulic Fracturing and Water Resources: Separating the Frack from the Fiction”, Heather Cooley, Kristina Donnelly. June 2012, p. 28. https://pacinst.org/wp-content/uploads/2013/02/full_report5.pdf)

An extensive examination of sediment runoff contained in stormwater from oil and gas well sites found that gas well sites with disturbance produce greater amounts of sediment pollution than undisturbed land on the site. From the report:

The main goals of this research was to determine the extent of sediment movement off of gas well sites, identify conditions that might contribute to sediment movement, and characterize the types of materials that are moving as sediment. The results show that sediments are eroding from the gas well sites examined in this study. Observations made during the study include: the amount of runoff and erosion from the gas well sites appears to be greater than that from non-disturbed areas around the sites; the slope of the land where a gas well is built affects erosion; the total rain per event and rain intensity affects erosion in most cases; eroded materials may enter local stream channels from gas well site construction; and vegetation (including revegetation of disturbed areas) appears to effectively slow storm water runoff and decrease the potential for erosion.

(“Assessment of sediment runoff from natural gas well development sites”, Havens, David Loran, M.S. thesis May 2007, available at

http://digital.library.unt.edu/ark:/67531/metadc3665/m1/1/high_res_d/thesis.pdf)

An analysis of the land to be disturbed and forest to be changed by Marcellus Shale gas development in Pennsylvania concluded:

Well development – We estimated that 47,600 additional wells could be developed on 5,950 well pads over the next 30 years if the Interior Marcellus’s technically recoverable resources were fully developed.

Land use change – The construction of natural gas infrastructure (well pads, gathering pipelines, and access roads) to support projected well development would result in about 94,000 acres of land disturbance. Over half (about 51,000 acres) of the land disturbance would impact agricultural land, while about 28,000 acres would constitute the clearing of forest cover.

Forest change – Of the 28,000 acres of forest that would be cleared, we found that 12,700 acres were core forest areas (over 100 meters from the nearest forest edge). Additionally, over 88,000 acres of core forest would be fragmented by road and pipeline development and converted to edge forest. Thus, over 100,000 acres of core forest would be lost due to the combined effect of clearing and fragmentation.

(Excerpted from: “Potential Environmental Impacts of Full-development of the Marcellus Shale in Pennsylvania”, Lars Hanson, Steven Habicht, and Paul Faeth, CNA, September 2016. Document Number: IRM-2016-U-01369)

These land use changes cause increases in rate and volume of stormwater and add pollutants to the runoff, despite the regulations that are currently in place. It is essential that strict regulatory controls be included in the General Permit with no loophole left open for a case-by-case exemption from the rule available. This proposed modification should be removed.

INSPECTIONS

Delaware Riverkeeper Network opposes the monthly-only inspections of the area where the General Permit activities occur if the operations are not currently active in processing and transfer – in other words where wastewater produced by fracking is stored.

Condition C.24 states (emphasis added):

At a minimum, weekly inspections of all processing and storage areas are to be conducted to determine compliance with the terms and conditions of this general permit, and for evidence of failure. This includes the processing and storage areas for operations permitted under WMGR123 that are located on a well pad that is actively engaged in drilling, casing, cementing, hydraulic fracturing, or flowback operations. **For operations permitted under WMGR123 that are located on a well pad and are not actively engaged in drilling, casing, cementing, hydraulic fracturing or flowback operations, or WMGR123 operations that are not actively engaged in processing or transfer, a monthly inspection of all processing and storage areas is adequate.**

It makes no sense to not require “at a minimum, weekly inspections” of the area where wastewater produced by fracking is stored. For the reasons detailed above in this comment regarding the potential toxicity and public safety issues of wastewater produced by fracking and the fact that polluted fluids that do not meet the standards set by DEP in Appendix A could be stored for a year or more on the site, it is essential that these areas are at a minimum inspected weekly.

As discussed in a 2019 paper that assessed the impacts of fracking in Pennsylvania on the environment, leaks and spills are often the pathways of pollution from well sites into the environment. As stated in the report regarding violation data for Pennsylvania (emphasis added):

In 2017, there were 821 violations at unconventional wells and 3,273 violations at conventional wells. Almost all (92 percent) of the unconventional well violations were environmental health and safety-related, including “**failure to properly store, transport, process or dispose of a residual waste**”, “conducting an activity...without a permit or contrary to a permit issued by DEP”, “failure to prevent gas flow in the well annulus”, “failure to plug a well upon abandoning it”, “conducting casing and cementing activities that failed to prevent pollution or diminution of fresh groundwater”, and other violations.

The number of unconventional well violations for all wells (821) exceed the number of unconventional wells drilled in Pennsylvania in 2017 (810) (Figure 11). Well violations occur for wells at all stages of its lifespan.

Further discussed in the 2019 Report, spills were plentiful and there are not enough inspections to keep on top of violations in Pennsylvania. The impacts can be high-consequence if the material spilled is toxic:

In Pennsylvania from 2008 to 2013 violations occurred for 3.4 percent of wells. (Vidic, R. D., Brantley, S. L., Vandenbossche, J. M., Yoxtheimer, D., & Abad, J. D. (2013). Impact of shale gas development on regional water quality. *Science*, 340(6134), 1235009)

Based on the limited data, the median volume of the spills is 120 gallons. The total volume of the reported spills from 2005 to 2014 is 0.26 million gallons in Pennsylvania. (Patterson, L. A., Konschnik, K. E., Wiseman, H., Fargione, J., Maloney, K. O., Kiesecker, J., ... & Saiers, J. E. (2017). Unconventional oil and gas spills: Risks, mitigation priorities, and state reporting requirements. *Environmental Science & Technology*, 51(5), 2563-2573.

The spatial distribution of violations corresponds to areas with high well density. The number of inspectors is also very low relative to the number of wells, which leads to poorly regulated wells. (Bosquez IV, T., Carmeli, D., Esterkin, J., Hau, M. K., Komoroski, K., Madigan, C., & Sepp, M. (2015). Fracking debate: the importance of pre-drill water-quality testing. *In American Bar Association Section of Litigation.*)

The effect of violations, spills, and explosions endanger habitat. Untreated releases of fracking fluid have caused 100 percent mortality of some species in the area. (Adams, M. B., Edwards, P. J., Ford, W. M., Johnson, J. B., Schuler, T. M., Thomas-Van Gundy, M., & Wood, F. (2011). Effects of development of a natural gas well and associated pipeline on the natural and scientific resources of the Fernow Experimental Forest. *US Department of Agriculture Forest Service, Northern Research Station. General Technical Report NRS-76. Newtown Square, Pennsylvania.* And: Auchmoody, L. R., & Walters, R. S. (1988). Revegetation of a brine-killed forest site. *Soil Science Society of America Journal*, 52(1), 277-280.)

(Excerpted from: "The Economic Costs of Fracking in Pennsylvania" May 2019, ECONorthwest, KOIN Center, 222 SW Columbia Street, Suite 1600, Portland, OR 97201, 503-222-6060. P. 14, 15)

DEP must employ a rigorous inspection program to catch potential leaks and spills before they occur. Prevention of pollution is the best management practice and an important part of that pro-active practice is to require and carry out inspection consistently and regularly. This proposed modification should be removed.

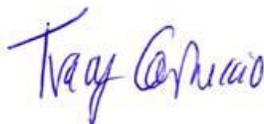
In closing, Delaware Riverkeeper Network is opposed to the proposed modifications to and provisions of the Residual Waste General Permit WMGR123, under the Solid Waste Management Act (35 P.S. §§ 6018.101—6018.1003); the Municipal Waste Planning, Recycling and Waste Reduction Act (53 P.S. §§ 4000.101—4000.1904) that we herein reviewed. Delaware Riverkeeper Network respectfully requests that DEP not allow those proposed modifications.

Delaware Riverkeeper Network's concerns arise from the substantial adverse impacts that can result from the processing, transfer and "beneficial use" of oil and gas liquid waste to develop or hydraulically fracture an oil or gas well under General Permit WMGR123.

Thank you for the opportunity to comment.



Maya van Rossum
the Delaware Riverkeeper



Tracy Carluccio
Deputy Director
Delaware Riverkeeper Network