

GAS GATHERING LINES

Gas gathering lines are an integral component of the infrastructure necessary for the transportation of natural gas from the well head to natural gas transmission lines (transmission lines). While the parameters for natural gas transmission lines are clearly identified and federal laws and rules are in place to regulate them, the same cannot be said of natural gas gathering lines (gathering lines). As more fully described below, many aspects of gathering lines are not subject to federal or state oversight and the federal laws and rules that address them can be subject to interpretation, particularly on the part of the industry responsible for moving the gas downstream transmission line, compressor stations and other related infrastructure. While some health and safety regulations and restrictions are in place for more populated areas, there are with fewer, if any, restrictions in the rural areas where the gathering lines would be located in Maryland. While other environmental regulation would address certain aspects of gathering lines e.g. stream crossings, there are essentially no controls on other damaging impacts e.g. introduction of invasive species, cumulative ecological impacts, habitat destruction and forest fragmentation. The goal of this analysis is to provide background on gathering lines including current and proposed regulations, environmental impacts and potential BMPs. The conclusion of this report is a risk assessment of ecological impacts from gathering lines based on current standards, uses and regulations. While the literature indicates that health impacts can occur from gathering lines, it is not addressed in this report.

DEFINITION

The definition of gas gathering lines involves several factors including diameter, pressure per square inch and place in the gas transportation stream.

Gathering lines are those pipelines that are used to transport crude oil or natural gas from the production site (wellhead) to a central collection point. They generally operate at relatively low pressures and flow, and are smaller in diameter than transmission lines. However, these standards are changing for certain practices using gathering lines such as transportation of gas from Marcellus Shale drilling operation well pads. Like oil and gas transmission pipelines, gathering lines are regulated by the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA). Historically, those gathering lines that were regulated were required to comply with the respective regulations for transmission pipelines, as found in 49 CFR Parts 192 & 195. In response to a Congressional mandate, PHMSA revised its regulations concerning gas gathering pipelines on March 15, 2006. The new requirements incorporate an industry standard, American Petroleum Institute Recommended Practice 80 (API RP 80), to better define which portions of the natural gas pipeline network are considered “gathering” pipelines. The revision also changed how a pipeline operator must determine which of its gas gathering pipelines are subject to regulation, i.e., which are “regulated gathering lines.” This is done using criteria that determine when a gas gathering pipeline is close enough to a number of homes or to areas/buildings where people congregate, that an accident on the pipeline could impact them.

A current definition for gathering lines as it relates to location, size and pressure is identified in the March 2006 Final Rule: Onshore Gas Gathering which uses the American Petroleum Institute Recommended Practice 80 (API RP 80) as the basis for defining an onshore gathering line, with additional limitations. Under this rule gathering lines fall into two categories:

- *Type A Regulated Onshore Gas Gathering Lines* which are Metallic lines with a maximum allowable operating pressure (MAOP) of 20% or more of specified minimum yield strength (SMYS), as well as nonmetallic lines with an MAOP of more than 125 psig, in a Class 2, 3, or 4 location. Subject to all of the requirements for transmission lines, except for the accommodation of smart pigs in new and replaced lines and the gas integrity management requirements. Permitted to use an alternative process for complying with the operator qualification requirements.
- *Type B Regulated Onshore Gas Gathering Lines* which are Metallic lines with an MAOP of less than 20% of SMYS, as well as nonmetallic lines with an MAOP of 125 psig or less, in a Class 2 location (as determined under one of three formulas) or in a Class 3 or Class 4 location.

In terms of the functional perspective of the definition for gathering lines, Gregory D. Russell in the October 2010 edition of *The American Oil and Gas Report* advises that based on current rules a Gathering line means any pipeline or part of a connected series of pipelines used to transport gas from the furthest downstream series of endpoints, which physically may have intermediate deliveries (to production operations, pipeline facilities, farm taps, or residential/commercial/industrial end users) that are not necessarily part of the gathering line. Thus the gathering line starts only after the production function ends, and terminates only after the gathering function ends entirely. The key is whether the activity is intended to prepare the gas for transportation. If it is, it should be viewed as production not gathering. The DOT's rule, therefore, expressly contemplates that production operations and gathering lines continue to fulfill their respective functions until defined and recognized endpoints are reached "Commingling of production from multiple fields may, in some instances occur as part of the production process and does not necessarily mean that gas is in "transportation"

CHANGES IN USE

"Historical, smaller and thought to be less risk but many gathering lines today are as big or bigger than many transmission lines and may operate at the same extremely high pressures. Not gathering lines can be more than 24" inches in diameter and operate at pressures upward of 1400 lbs. per square inch."

Natural Resources Defense Council website

Gathering lines are of particular concern in rural areas. NRDC Legal Fellow Matthew McFeeley wrote in an NRDC blog post:

As noted in a recent Philadelphia Inquirer article, gathering lines in [lightly populated rural areas] are completely unregulated; there are no rules for pipe thickness or strength, welding, burial depth or inspections. Gathering lines in other areas are subject to regulations, but they are much weaker than those for transmission lines. This may be because, historically, gathering lines were smaller and thought to be less risky. But many gathering lines today are as big as, or bigger than many transmission lines and may operate at the same extremely high pressures. New gathering lines can be more than 24 inches in diameter and operate at pressures upward of 1400 pounds per square inch. This is bad news when it comes to the safety of gathering lines. Compounding the problem, it gives companies an incentive to classify pipelines as gathering lines even when they travel long distances at high pressure.

It's important to note that there are other lines which PHMSA doesn't even consider "pipelines" and, as a result are completely unregulated by PHMSA. The pipes, called "flow lines" or "production piping" transport a mixture of oil, gas and /or water that emerges from the well through the production process (which includes separation, dehydration and metering). It's not until after this production process that gathering lines begin. In natural gas production these activities often occur on the wellpad. However, when these activities occur far from a well, long unregulated flow lines may pose a significant risk of breakage, spills or even explosions.

In a discussion of gathering line risk reduction, William C. Schillaci cited Government Accounting Office (GAO) research that "found that some gathering lines have diameters and operate at pressures that are equivalent to those traditional transmission pipelines, absent the regulatory requirements. For instance the GAO sites a 2010 report on pipelines in Fort Worth, which stated that some gathering pipelines were as large as 24 inches in diameter with maximum allowable operating pressures similar to those of transmission pipelines."

Inside Climate News reporter Naveena Sadasivam highlights how the development of Marcellus shale has brought changes in gathering line usage:

In the past, gathering lines operated at pressures of between 5 and 800 pounds per square inch, according to the GAO. But the pressures increased when drilling companies began switching from traditional drilling techniques to hydraulic fracturing, which allows them to extract small molecules of gas trapped in shale rocks. During the fracking, a mixture of water, sand and chemicals is sent into the earth at a very high pressure in order to break up the rock and release the gas. The gas is then discharged into the gathering lines at a similarly elevated pressure.

One of the most abundant shale gas reserves is the Marcellus region, which underlies parts of New York, Pennsylvania, Ohio, Maryland and Virginia. Prior to the rise in fracking, gathering lines in the Marcellus typically operated at a maximum of 800 pounds per square inch or psi. "But now these gathering lines are running in excess of 1000 psi," said Emily Krafjack, president of Connection for Oil, Gas & Environment in the Northern Tier, citizen's group that has made the regulation of gathering lines a priority.

Nature Conservancy report on energy impacts in Pennsylvania discusses the scope of gathering line development:

In the Marcellus region, gathering lines may range from 6 to 24 inches in diameter and may clear rights-of-way (ROW) of 30 to 150 feet wide. These are much larger than gathering lines used in shallow gas fields, which generally range from 2 to 6 inches in diameter. Transport lines vary in size, generally ranging from 24 to 36 inches in diameter, and have right-of-way widths of up to 200 feet, depending on the size and number of lines. At various points along the pipeline, including at line junctions, compressor stations pressurize the natural gas to ensure a continuous and regulated flow. This report assesses the spatial footprint and scenarios for future expansion of gathering lines. Gathering lines are likely to comprise by far the greatest extent of new large diameter pipeline constructed in Pennsylvania during the next 20 years(Johnson et al, 1)."

In its report to Congressional Investigators on pipeline safety, the GAO states that "[a]ccording to responses to our [GAO] survey and interviews with industry officials and representatives, land-use changes and the

increased extraction of oil and natural gas from shale deposits are two changes in the operating environments that could increase the safety risks for unregulated gathering pipelines(9-10).”

CURRENT REGULATION

Regulatory Focus

Gathering line regulations are focused primarily on safety issues. The following descriptions of current regulations have little reference to control over impacts to sensitive species and habitat protection.

Federal

Pipeline regulation is the responsibility of [t]The Pipeline and Hazardous Materials Safety Administration (PHMSA), “which is located within the U. S. Department of Transportation is charged with ensuring the safe, reliable and environmentally sound operation of the nation’s pipeline transportation system. PHMSA’s safety jurisdiction over pipeline infrastructure currently extends to Class 1 transmission lines and all Class 2, 3 and 4 lines: its jurisdiction does not extend to Class 1 rural gathering pipelines.”

The GAO description of the role of PHMSA is that it ““administers the national regulatory program to ensure the safe transportation of hazardous liquid and gas by pipeline. PHMSA carries out its mission through regulation, national consensus standards, research, education, inspections, and enforcement when safety problems or regulatory violations are found(5).”

P 5 GAO United States Government Accountability Office, Report to Congressional Investigators, PIPELINE SAFETY Collecting Data and Sharing Information on Federally Unregulated Gathering Pipeline Could Help Enhance Safety, GAO 12-388. The Office of Pipeline Safety (OPS), within the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA), has overall regulatory responsibility for hazardous liquid and gas pipelines under its jurisdiction in the United States

The same GAO report provides additional detail on the role of PHMSA as it relates to gathering lines:

PHMSA regulates hazardous liquid and natural gas gathering pipelines-using uniform minimum standards based on their proximity to populated and environmentally sensitive areas. For natural gas gathering pipelines,⁹ PHMSA uses class locations---the same classification system used for natural gas transmission and distribution pipelines. (See table 1.) Under this system, PHMSA generally regulates onshore natural gathering lines in Class 2, 3 and 4 locations. For hazardous PHMSA uses class locations—the same classification system used for natural gas transmission and distribution pipelines. (See table 1.) Under this system, PHMSA generally regulates onshore natural gas gathering pipelines in Class 2, 3, or 4 locations. For hazardous liquid gathering pipelines, PHMSA regulates those pipelines in incorporated and unincorporated cities, towns, and villages; pipeline segments that cross a waterway currently used for commercial navigation; and certain rural gathering pipelines within one-quarter mile of

environmentally sensitive areas. This includes high-consequence areas, as defined for the hazardous liquid integrity management program. High-consequence areas can also be in Class 1, 2, 3, or 4 locations, which can entail different reporting requirements. For example, gathering pipeline operators in high-consequence areas that are in Class 1 locations are not required to report data on pipeline-related incidents, including fatality, injury, and property damage information(6).

**Table 1: PHMSA
Class Designations
for Gas Pipelines
Class designation**

Location features

Class 1	An offshore area or any location with 10 or fewer buildings intended for human occupancy within 220 yards of the centerline of the pipeline.
Class 2	Any location with more than 10 but fewer than 46 buildings intended for human occupancy within 220 yards of the centerline of the pipeline.
Class 3	Any location with more than 46 buildings intended for human occupancy within 220 yards of a pipeline, or an area where the pipeline lies within 100 yards of either a building or a small, well-defined outside area (such as a playground) that is occupied by 20 or more persons at least 5 days a week for 10 weeks in any 12-month period.
Class 4	Any location where unit buildings with four or more stories above ground are prevalent.”

8Part 191 (Gas Reporting), Part 192 (Gas), Part 193 (Liquid Natural Gas), Part 194 (Liquid Facility Response Plans), and Part 195 (Hazardous Liquid) of Title 49 of the Code of Federal Regulations.

949 C.F.R. §192.5.

Generally, PHMSA retains full responsibility for inspecting and enforcing regulation on interstate pipelines. However, states may be authorized to conduct inspections for interstate pipelines, as well as inspections and promulgate regulations for intrastate pipelines, including gathering pipelines. PHMSA has arrangements with 49 states, the District of Columbia and Puerto Rico to assist with overseeing interstate, intrastate, or both interstate and intrastate pipelines. Under the current regulatory system, PHMSA does not regulate most gathering pipelines in the United

Stated based on location. For example, out of the more than 200,000 estimated miles of natural gas gathering pipelines, PHMSA regulates roughly 20,000 miles(7).

In our [GAO] survey of 52 state agencies, 39 agencies – 10 monitoring hazardous liquid and 29 monitoring natural gas---responded that they had onshore gathering lines that PHMSA does not regulate in their state. For these 39 agencies, four of the top five responses cited the following risk factors for onshore unregulated gathering pipelines as among the highest public safety risks. Construction quality, Maintenance Practices, Location and Pipeline Integrity(9-10).

“

John Clementson of the Maryland Public Service Commission presented the findings of the Marcellus Shale Advisory Committee on pipeline regulation from the State’s perspective:

- The regulation of the Nation’s pipeline infrastructure falls in the hands of the U.S. Department of Transportation’s Pipeline and Hazardous Materials Administration (PHMSA)
- However, through agreements with the States, the States are given regulatory enforcement authority over interstate pipelines. In Maryland the Public Service Commission (PSC) has been designated as the Maryland agency with authority.

In a draft evaluation of its regulations, PHMSA states that “[c]urrently, the regulations do not cover production facilities or onshore gathering lines in locations outside cities, towns, villages or designated residential or commercial areas (hereinafter “rural locations”)(1). “Rural Locations” are where the lines would likely occur in Maryland as that is where the Marcellus Shale gas plays are located. Therefore, the lessened level of regulation for gathering lines in rural areas is of particular concern.

States

Maryland

The presentation of the Marcellus Shale Advisory Committee also discussed in more detail the State’s role in pipeline regulation:

How is the location of the gathering lines regulated? Intrastate lines do not have to come to the FERC or the Maryland Public Service Commission (PSC) for approval of their routes. The routes are developed through agreements with landowners for the right-of-way. They do have to get approval for environmental issues through other State agencies.

What is left unregulated? Neither type A or B gas gathering lines are regulated in Class 1 areas.

- A Class 1 area is an area located either offshore or in a rural area where there are 10 or fewer buildings intended for human occupancy within 220 yards on either side of the centerline of any continuous one mile segment of pipeline.

The PSC’s role

- To ensure that the operators, under the Commission’s jurisdiction, are in compliance with the pipeline safety regulations.
- The PSC’s Pipeline Safety Group inspects;
 - Procedures
 - Records
 - Field Operations
 - Incidents

Other States

While PHMSA continues to review comments and reporting on gathering lines and their regulation, some of the states are developing their own oversight and regulatory strategies.

Inside Climate News reports that “[w]hile PHMSA debates how far it should go in regulating gathering lines, Ohio and Texas have already taken action. Last year Ohio passed an energy bill that included regulations for rural gathering lines. This year Texas passed similar legislation(Sadasivam).”

Ohio’s regulation of gathering lines was discussed in the Oil and Gas Monitor by Kathy Milenkovski

By statute, the Ohio Power Siting Board (OPSB) has jurisdiction over the location of “major utility facilities” within the state of Ohio. This includes electric generating plants and electric and natural gas transmission lines. Natural gas gathering lines “as defined by the power siting board” are excluded from the Ohio Power Siting Board’s jurisdiction. The problem is the Ohio Power Siting Board has never defined what constitutes gathering. And as major companies are planning significant capital investments to construct new midstream facilities in Ohio to gather shale gas from the Marcellus and Utica plays, the questions of what constitutes gathering and is it regulated take on greater significance.

What Is Exempt As Gathering?

As noted, no definition of “gathering” appears in the Ohio Revised Code or the regulations governing the jurisdiction of the OPSB; there is no Ohio case law on the issue either. The industry tends to rely upon the definition of gathering embodied within the Natural Gas Pipeline Safety Act, which in turn references the American Petroleum Institute’s Recommended Practice 80 (RP-80) as a tool for evaluating where gathering begins and ends. Under RP-80, there are numerous factors to be considered when determining whether something is or is not gathering. The OPSB seems unwilling to accept that the current regulatory exemption for gathering could apply as broadly as RP-80 would indicate; instead, OPSB staff appear to be looking for ways to exert some degree of control over gathering lines.

One factor allowing the OPSB to potentially exert jurisdiction over gathering lines is the fact that what constitutes transmission regulated by the OPSB is defined by pipe size and diameter. The OPSB defines transmission lines to be those pipelines greater than 9” in outside diameter as well

as capable of transporting gas at pressures in excess of 125 psi. While gathering lines in Ohio have historically been smaller in diameter than 9” and have operated at pressures less than 125 psi, the anticipated volumes and pressures of gas associated with the Marcellus and Utica shales mean that gathering lines built to move shale gas are likely going to be larger than this cutoff, further confusing the question of what is exempt as “gathering” in Ohio.” “Given the need for new midstream facilities in Ohio, these uncertainties over whether the OPSB has jurisdiction and over what are coming to a head. As more companies are considering making capital expenditures, they want clarification over whether OPSB approval will be necessary. Government regulators also want to see their jurisdiction more clearly defined, if not expanded. Ultimately, legislative and regulatory revisions appear likely

The GAO report to Congress cites Texas as an example of state regulations requiring stricter reporting and inspection standards.

Besides PHMSA, states may collect data on unregulated gathering pipelines, but the scope and nature of this data collection can vary. Although the federal government is responsible for setting minimum pipeline safety standards, states can adopt additional or stricter safety standards for intrastate pipeline facilities and transportation—including standards for data collection. For example, Texas’s state regulation further defined that the state’s safety jurisdiction for onshore gas gathering pipelines begins after the first point of measurement—where the product is first measured to determine the volume being extracted from the well—and is based on population, which is stricter than the federal standard(18).”

Inspectors with the Texas Railroad Commission, in addition to sampling on-site pipeline facilities in the field, also review pipeline operators’ records and documentation on selected pipeline systems for compliance with federal and state pipeline safety regulations. These risk-based safety evaluations have included the construction of gathering pipelines related to shale development and pipelines not regulated by PHMSA(25).

The Gathering Lines section from the New York State Draft Generic Environmental Assessment notes that, “Gathering lines not subject to the Federal Minimum Pipeline Standards 49 CFR Part 192 must be designed, constructed, tested, operated and maintained as specified in Appendix 14-K of Part 255(1).”

Additionally, the Commonwealth of Kentucky has promulgated regulations pertaining to gathering lines which: authorizes the department to promulgate administrative regulations to administer KRS 353.500 to 353.720. KRS 353.500(2) requires the department to promulgate administrative regulations pertaining to gathering lines, in order to minimize their potential effects on the citizens and the environment of the Commonwealth. EO 2009-538, effective June 12, 2009, abolishes the Environmental and Public Protection Cabinet and establishes the new Energy and Environmental Cabinet. This administrative regulation establishes provisions for the installation of gathering lines, reclamation of disturbed areas, and safety requirements of gathering lines as they pertain to oil and gas production operations.

FUTURE REGULATION

Federal

To respond to concerns about the current rule, a new risk basis and rule making is being proposed to address deficiencies, conflicts and ambiguities in existing regulations and the API Recommended Practice (RP) to define beginning/endpoints of gathering with intended regulatory constraints including editorial flaws in the regulatory constraints, conflicting and ambiguous language in the RP and because the necessary shale developments do not fit the current risk analysis in terms of pipe diameter and pressure (MAOP) Regulation of Gathering Lines, U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration Power Point presentation addresses the history, problems and potential future actions of gathering line regulation. PHMSA is still reviewing the public comments it received in 2012 and is “close” to scheduling a Notice of Proposed Rulemaking, the next step toward creating new rules, said Hill, the PHMSA spokesman (Sadasivam).

The understanding of the Maryland Marcellus Shale Advisory Committee on future regulations was part of the presentation to the Public Service Commission:

PHMSA’s Advanced Notice of Proposed Rule Making (ANPRM)

- PHMSA is proposing to expand its regulation of gas gathering lines. PHMSA has expressed concerns that the current regulatory oversight of gathering lines does not adequately cover current practices and allows gathering line operators to avoid necessary safety regulation
- PHMSA is considering:
 - Amending the regulations to require annual, incident and safety related conditions reports by operators of all gathering lines;
 - Expanding the definition of gathering lines used in the regulation to include pipelines downstream from processing or compression facilities;
 - Establishing safety requirements for large diameter, high pressure gas gathering lines, including those located in rural locations; and
- Adopting requirements for pipelines associated with gas landfill systems.

According to Inside Climate Change, the GAO has “recommended that PHMSA begin collecting the data and create an online clearinghouse where states can share information about unregulated lines(Sadasivam).”

While the PHMSA ANPRM may seem to suggest that additional safety and ecological oversight and control may be required in the near future, the federal legislative history for stronger oversight of these lines does not indicate that change would be easily facilitated. Over the past 10-years attempts to modify the regulatory approach regarding gathering lines has not been successful and when changes were made U.S. DOT selected the practice in place today which relates to the API standards over other more extensive alternatives from their various studies.

FACTORS AFFECTING GAS GATHERING LINE PLACEMENT

To deal with the complexities of gas gathering line placement, the Pennsylvania legislature required a report by the Governor's office. These are the relevant findings:

The placement of pipelines typically follows the development plans, needs, and opportunities of the exploration and production operator. Therefore, the considerations of gathering line placement are inextricably linked to the considerations of siting production wells. These constraints may create obstacles in developing certain regulatory requirements to control the siting of gathering lines. Among these considerations:

Terms of Leases & Location of Producing Wells

A lease to explore and produce natural gas is for a primary, fixed length of time. Many leases are for three to five years, though the exact length and terms of a lease are subject to negotiation between the owner of the oil and natural gas resource and the exploration and production operator (operator). Under this scenario, the operator must initiate drilling activities or produce natural gas (depending on the specific terms of the lease) within the primary, fixed length of time or lose the exclusive right to develop the resources underlying the land.

Once these terms are met, the land under lease is considered "held by production," allowing the operator to drill and operate additional wells for as long as the wells are "producing in paying quantities." (see *T.W. Phillips Gas & Oil Company & PC Exploration Inc. v. Ann Jedlicka. No. 19 WAP 2009*).

Operators therefore must be cognizant of the various terms and primary term expiration dates of their leases, and often make decisions upon where and when to drill a well to ensure that as much acreage as possible is "held by production." Other ancillary factors can also effect and alter an operator's original anticipated plan of development. Additionally, operators must be cognizant of their proximity to connect with intrastate and interstate transmission pipelines.

Securing Landowner Consent & Lack of Eminent Domain Power

The cooperation and willingness of property owners to enter into a right-of-way agreement is a critical consideration in determining the route of a gathering line. Property owners may also dictate where a pipeline is placed on their land. Pipeline operators must negotiate with multiple property owners in order to site a pipeline from the producing well to the ultimate delivery endpoint of the natural gas.

Natural gas gathering line operators are not currently granted the power of eminent domain. Therefore, the siting of gathering lines is dependent upon compliance with applicable state and

federal permitting requirements, as well as the consent of the property owners over whose property the pipeline will traverse. Additionally, property owners willing to host a pipeline may specify where on their property they are willing to permit a pipeline. Consideration of private rights-of-way, such as those held by railroads or utility companies, must also be considered. Landowners who agree to host a pipeline sign a right-of-way agreement, or easement, which grants a limited property right to the pipeline operator. Typically, a temporary right-of-way will have a width of between 60-100 feet, with a corresponding permanent right-of-way having a width of 50-75 feet. The pipeline is placed underground after excavation. The right-of-way must be cleared of trees, brush, and other obstructions. Similar to leases for oil or natural gas exploration and production, pipeline right-of-way agreements may involve an up-front “bonus” payment to the landowner, in addition to a fixed dollar payment per linear foot.

Producing Formation Characteristics

The characteristics of unconventional shale gas formations in Pennsylvania vary, such as depth, pressure, tightness of formation, and other characteristics. Seismic testing is utilized by geologists and petroleum engineers to map and better understand the underground geologic characteristics of a particular leasehold. Testing involves emitting and evaluating the return of seismic waves sent from at or near the surface of the land to deep underground formations. The test results assist the well operator in identifying the ideal location to drill and hydraulically fracture a production well. In addition, evaluating existing production characteristics informs operators on the performance of wells and assists in future development planning.

Environmental Permitting & Historical/Cultural Review

The siting of gathering lines requires adherence to numerous environmental and conservation laws intended to protect the air, water, and land quality of the Commonwealth, as well as wildlife, aquatic species, plant life, and sensitive habitat. Specific permitting standards are described in more detail in Section 5. For example, operators of proposed pipelines are required to utilize the Pennsylvania Natural Heritage Program’s (PNHP) Pennsylvania Natural Diversity Inventory Environmental Review Tool to screen projects for potential impacts on threatened, endangered, and special concern species and resources. If a potential conflict is identified, efforts to avoid or mitigate impacts must be undertaken. Additionally, reviews to avoid or mitigate impacts on historical or culturally significant locations must be undertaken. These avoidance or mitigation efforts may include re-routing a proposed pipeline around or away from the potential conflict area. Additional environmental and safety permitting considerations apply to compressor stations and processing facilities and can impact pipeline placement.

Local Permitting & Zoning

Act 13 of 2012 established laws pertaining to local ordinances relating to oil and gas operations. Among its primary objectives, Chapter 331 of Act 13 seeks to establish uniformity among local zoning ordinances while recognizing state law as the exclusive authority for regulating oil and gas operations which are otherwise governed by the environmental statutes of the Commonwealth. Municipalities retain zoning authority, as outlined in 58 Pa. C.S. Chapter 33, and may impose certain general requirements on related facilities, such as natural gas compressor

stations or processing facilities, that can significantly influence the siting and route selection of gathering lines(7-10).

A mix of private and public ownership of mineral rights can also complicate control of gathering line placement.

In their fight to preserve forests and biodiversity, conservationists and other wildlife advocates in Pennsylvania have confronted another adversary – the state's property-rights system. In their fight to preserve forests and biodiversity, conservationists and other wildlife advocates in Pennsylvania have confronted another adversary – the state's property-rights system. In a study of land-usage patterns in Pennsylvania's interior forests, Brittingham and her colleagues [at Pen State University] found that development is greater on properties with private ownership of mineral rights. They said the split in private and public management of land will complicate the preservation efforts by agencies and nonprofit groups (Sadasivam).

ENVIRONMENTAL IMPACTS

Documented evidence, studies and observations from practical experience clearly indicate the high risk of adverse impacts to ecological resources from construction and maintenance of gathering lines. According to The Nature Conservancy and the United States Fish and Wildlife Service, gathering lines raise specific concerns regarding to their potential for adverse impacts to sensitive resources and habitat.

“Pipelines (especially gathering lines) are the most important threat to terrestrial and aquatic habitats. Requiring or providing incentives to co-locate gathering pipelines with roads, power lines, and other pipelines could dramatically reduce ecological impacts in the Appalachian region.(The Nature Conservancy, Land Use and Ecological Impacts).”

Habitat fragmentation could be one of the greatest impacts associated with Marcellus gas development in New York State. The required infrastructure includes well pads, construction areas, sedimentation ponds, and compressor stations. However, the many linear features, such as roads, gathering lines, pipelines, water lines, and electric transmission lines have the potential to greatly fragment existing habitats. Fragmentation of large habitat blocks into smaller ones may be harmful to some wildlife. Habitat fragmentation is detrimental to area-sensitive species, can promote nest parasitism and predation, and facilitate generalist species and potentially invasive species. Our concern stems from the current condition of an already fragmented landscape, and we believe it is important to limit additional loss of large blocks of habitat. To limit the amount of fragmentation, proposed infrastructure should be required to be placed within existing utility right-of-way corridors including roads, transmission lines, and pipelines. If this is not feasible, any proposed linear infrastructure (i.e. electric lines, water lines, and pipelines) should be placed within the right-of-way of new access roads. This collocation of utilities and infrastructure will reduce the potential “spider web” effect which has occurred at

drilling sites in other states (Pennsylvania and Colorado) (US Fish and Wildlife Service, New York Field Office, Marcellus Shale Drilling, webpage).

This is also an issue for the Marcellus Shale Roundtable which notes in the report that “This ongoing development of a gathering and transmission network for Pennsylvania’s unconventional wells caught the Roundtable’s attention for multiple reasons:

Building pipelines includes both substantial surface and subsurface disturbance (both temporary and permanent) and construction activities that have environmental risks in areas such as erosion and sedimentation, invasive species introduction, forest fragmentation and stream crossings and encroachments(77).”

A variety of stakeholders including naturalists and sportsmen have seen the evidence of impacts from webs of gathering lines in the United States and internationally. Naveena Sadasivam discusses extensively the impact of gas pipelines on forest fragmentation in Inside Climate News.

[Jerry] Skinner is the resident naturalist at Woodbourne Forest and Wildlife Preserve, a 650-acre forestland that runs through parts of northeastern Pennsylvania that are experiencing extensive gas drilling. Skinner worries that as drilling activity heads deeper into forests and pipelines chop up large blocks of land, rare species native to Pennsylvania will be driven out. (Sadasivam)

Gas drilling has long raised concerns about water contamination and air pollution. But until recently, little public attention has been paid to the pipelines that must be built to carry the gas. In Pennsylvania, concerns about these pipelines are growing because many of them are being built in the state’s 16 million acres of forest, which include some of the largest contiguous blocks of forestland east of the Mississippi River.

Of particular concern are gathering lines, the pipes that carry gas from wells to long-distance lines. Although, they are often the same size as transmission lines and operate at the same pressure levels, about 90 percent of the nation’s gathering lines aren’t regulated by state and federal authorities.

In fact regulators don’t even know where many gathering lines are located, even though the sometimes run close to homes and businesses.

The gas industry disagrees with conservationists about the impact of pipeline corridors on wildlife habitats. Right-of ways with, “widths typical of single natural gas pipe lines facilities are not likely to present major problems,” said Catherine Landry, communications director for the Interstate Natural Gas Association of America.”

For decades now, ecologists and conservationists have been studying how human activities have disrupted forest ecosystems, including how far the impact extends from the actual site of a pipeline right-of-way. They have confirmed that the reverberations go deep into woodlands.

Recently, for example, researchers in Wyoming concluded that energy development in the state was leading to excessive habitat alteration and accelerating the decline of songbirds.

Scientists abroad have also examined the relationship between forest fragmentation and habitat loss.

Researchers in Australia analyzed several forest areas in India, South America and Indonesia and found that linear clearings like those linked to road and pipeline construction block the movement of some native animals and serve as pathways for invasive species.

"Pipelines are going in and dissecting forest habitats and creating corridors within (them)," said Margaret Brittingham, an ecologist at Penn State University who has been studying the impact of gas drilling on forest habitats, concentrating on songbirds in Pennsylvania.

She and others have discovered that right-of-ways enable larger animals to move into parts of the interior forest they had not explored. As a result, interior species become exposed to new predators.

Brittingham and her colleagues predict that as more forest territory is chopped up into smaller pieces, habitat for specialists—species that require a specific set of conditions for survival—will decrease, which may in turn lead to their extinction. Those include the scarlet tanager, the blue-headed vireo and the hooded warbler.

In contrast, animals that tend to do well around people will likely increase in number. Raccoons, deer, crows and blue jays are among them.

"It's a shift in the competitive advantages that you give species," Brittingham said. "It's biotic homogenization."

The Nature Conservancy has conducted a detailed analysis of environmental impacts from pipelines in Pennsylvania.

Current and future Marcellus gas development will dramatically increase the miles of large diameter gas pipelines in the state. The two most important reasons for the pipeline expansion are the large number Marcellus well sites that are likely to be developed over the next two decades and the transport lines needed to get growing volumes of shale gas – from various formations – delivered to different parts of the country (INGAA, 2011). Although pipelines are buried, their construction, monitoring, and maintenance require clearing and maintaining open rights-of-way. While their widths vary, pipeline rights-of-way often create a significant and permanent fragmenting feature through natural habitats. Extensive soil disturbance during construction can also increase the risk of erosion and sedimentation if controls are not carefully designed and implemented (1).

Therefore, we [TNC] project that statewide forest area cleared from future pipeline development could be approximately 60,000 acres in the low scenario, 100,000 acres in the medium scenario, and 150,000 acres in the high scenario over the next two decades. In addition to these direct impacts, new gathering pipelines will create between 360,000 and 900,000 acres of new forest edges that deprive interior forest species, such as black-throated blue warblers, salamanders, and many woodland flowers, of the shade, humidity, and tree canopy protection that only deep forest environments can provide. We were unable to find any comprehensive plans for new transport lines in Pennsylvania. In general, however, we believe that the length of new gathering lines will dwarf mileage of new transport lines, perhaps by an order of magnitude(5).

The large amount of soil disturbance involved in laying pipelines also poses erosion and sedimentation risks, particularly in steeper areas, near water bodies, and during heavy rain events. Heavy rains during two tropical storms in August and September 2011 caused extensive failures to erosion and sediment controls on pipelines under construction in north central Pennsylvania (Tanfani & McCoy, 2011). Stream and wetland crossings may create erosion and sedimentation problems, as well, especially with an “open cut” process, and there is a risk of stream bed collapse with “bore crossing” techniques if poorly designed or executed. The “open cut” process uses a trench dug across the stream channel with water temporarily diverted around the trench, while the “bore crossing” technique uses a drill or hydraulic ram to create a bore for the pipeline under the stream. Stream crossings require a permit from the PA Department of Environmental Protection with specific requirements to minimize erosion and sedimentation during and following construction. Air emissions from pipelines and compressor stations are another concern, and may include methane, ethane, benzene, toluene, xylene, carbon monoxide, ozone and other pollutants (DEP, 2011b). High emission levels for some of these pollutants have been detected in the Barnett Shale region of Texas near pipelines and compressor stations and have exceeded human health standards at times (Armedariz, 2009). Short-term monitoring in north central Pennsylvania has detected some of the same pollutants but at lower levels not likely to trigger public health concerns, according to the Pennsylvania Department of Environmental Protection (DEP, 2011b). Air emissions – especially low level ozone – can also affect forest health. The focus of this assessment, however, is on habitat impacts from natural gas pipelines(7).

Key findings from the Pennsylvania Energy Impacts Assessment for natural gas pipelines include:

- Pennsylvania’s existing network of large diameter natural gas pipelines (including transport and gathering pipelines) will at least double, and possibly even quadruple, over the next two decades. This expansion will be largely due to a five- to twelve-fold increase in gathering pipeline mileage associated with Marcellus development.
- A low expansion scenario indicates 10,000 miles of new pipelines could be built (based on 6,000 new well pads), a medium scenario projects 16,500 miles (10,000 new well pads), and a high scenario shows up to 25,000 miles (15,000 well pads). Each new well

pad on average requires 1.65 miles of gathering pipeline (based on data from Bradford County);

- Between 120,000 and 300,000 acres will be affected by natural gas pipeline construction, an area larger than the cumulative area affected by all other Marcellus gas infrastructure (e.g., well pads, roads, water containment, and staging/storage areas). Approximately half of this area is likely to be in forest areas.
- The expanding pipeline network could eliminate habitat conditions needed by “interior” forest species on between 360,000 and 900,000 acres as new forest edges are created by pipeline right-of-ways. This is substantially greater than the combined forest interior impacts from all other energy types examined in the *Pennsylvania Energy Impacts Assessment*(8).

Conservation Impacts of Natural Gas Pipelines

Natural gas pipelines can impact the environment in several ways. This includes natural habitat loss and fragmentation, changes in species movement, sedimentation, and air emissions. Rights-of-way for Marcellus gathering lines are generally cleared up to a width of 100 feet, but may be up to 150 or 200 feet if transport lines share the same corridor. After construction is completed, some portion of the right-of-way may be allowed to re-vegetate to trees and shrubs. At least 50 feet of the right-of-way, centered on the pipeline, is generally kept open, though vegetated with grass to minimize erosion and to facilitate monitoring, maintenance and repairs of the pipeline. This area represents a long-term loss of the cleared habitat. Even where forest remains, pipeline corridors can fragment large patches of forest into smaller ones. The new open corridor inhibits the movement of some species, such as forest interior nesting birds, which are reluctant to cross openings where they are more exposed to predators (Bennett). Pipelines, however, can also facilitate the movement of other species, both native and invasive (Transportation Research Board, 2004).

Large contiguous forest patches are especially valuable because they sustain wide-ranging forest species, such as northern goshawk, and provide more habitat for “forest interior” species. Habitat fragmentation deprives “interior” forest species—such as blackthroated blue warblers, salamanders, and many woodland flowers—of the shade, humidity, and tree canopy protection that only deep forest environments can provide. Large forest patches are also more resistant to the spread of invasive species, suffer less tree damage from wind and ice storms, and provide more ecosystem services—from carbon storage to water filtration—than small patches. The large amount of soil disturbance involved in laying pipelines also poses erosion and sedimentation risks, particularly in steeper areas, near water bodies, and during heavy rain events. Heavy rains during two tropical storms in August and September 2011 caused extensive failures to erosion and sediment controls on pipelines under construction in north central Pennsylvania (Tanfani & McCoy, 2011). Stream and wetland crossings may create erosion and sedimentation problems, as well, especially with an “open cut” process, and there is a risk of stream bed collapse with “bore crossing” techniques if poorly designed or executed. The “open cut” process uses a trench dug across the stream channel with water temporarily diverted around the trench, while the “bore crossing” technique uses a drill or hydraulic ram to create a bore for the pipeline under the stream. Stream crossings require a permit from the PA Department of Environmental Protection with specific requirements to minimize erosion and

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TNC's power point report, Marcellus Gas Development Projections and Conservation Impact, Tamara Gagnolet, describing the work of a collaborative analytical team including staff from The Nature Conservancy, Western Pennsylvania Conservancy and Audubon indicates potential impacts to natural habitat for forest interior dwelling bird species, brook trout and rare species from forest clearing and other activities related to Marcellus Shale development in central Appalachian forests.

Interior Forest

The USGS reported on the impact of natural gas extraction on interior forest:

Interior forest is a special form of habitat that is preferred by many plant and animal species and is defined as the area of forest at least 100 meters from the forest edge (Harper and others, 2005). Interior forest is an important landscape characteristic because the environmental conditions, such as light, wind, humidity, and exposure to predators, within the interior forest are very different from areas closer to the forest edge. Interior forest habitat is related to the size and distribution of forest patches and is closely tied to the concept of forest or habitat **fragmentation**—the alteration of habitat into smaller, less functional areas. The amount of interior forest can be dramatically affected by linear land use patterns, such as roads and pipelines, which tend to fragment land patches into several smaller patches and destroy available habitat for certain species (Slonecker et al. 15). Pipeline construction was the source of most of the increase in forest patch number(Slonecker et al. 31).

Trout and their supporting habitat are significant ecological and recreational resources in western Maryland as in Pennsylvania. Therefore, concerns are similar to those raised in Pennsylvania regarding the serious impacts should problems occur during construction and maintenance of gathering lines.

As natural gas companies ramp up their pipeline work in rural Pennsylvania, environmentalists and sportsmen have been raising alarms about the effects on the landscape. They worry about construction mud clogging waters and disrupting fish spawning, and about pipeline rights-of-way cutting swaths through forests, destroying treetop canopies. "We're really early in this process," said Katy Dunlap, eastern water project director for Trout Unlimited, a national conservation organization. "What is going to be the impact of the loss of the forest? On quality of water?" When rivers and streams are jammed with silt, she told a U.S. Senate committee in October,

research shows that fish can suffer gill damage or stop reproducing. "In the heart of the Marcellus development area, in places such as Pennsylvania, well-intentioned state regulatory programs are struggling mightily to keep up with the challenges posed by rapid gas development," she testified. In September, near the start of trout spawning season, erosion from a pipeline project in Potter County damaged five feeder streams for Pine Creek, a world-renowned trout stream designated as a federal "wild and scenic" river, DEP reports said. Glenn Dunn II, resource conservationist at the Potter County Conservation District, said crews working to expand the Tennessee transmission line left miles of open trench through Potter County. If they instead had completed one section at a time, "it would definitely have limited the chance of this happening," he said. A DEP spokesman said the agency was considering additional action. In an e-mail to The Inquirer, El Paso Corp. spokeswoman Gretchen Krueger acknowledged that flash floods caused erosion and that the firm was working on the problem. Peter Ryan, a Potter County dentist and president of the local God's Country chapter of Trout Unlimited, said he saw a risk for "exceptionally high-value trout streams." "That is what our county is famous for," he said. "That's what brings people up here. That's what we hope to not have ruined." The hilly terrain of Pennsylvania's woodlands is creating challenges for companies more accustomed to laying pipes through Oklahoma and Texas. Often, the companies choose to bore under streams rather than dig a trench through the streambed. Sometimes, though, mud leaks into streams. As for the Lycoming Line outside Williamsport, its builder, PVR Partners, said its erosion controls, too, had been overwhelmed by heavy rain. The firm has spent \$170 million on 30-inch pipelines in central Pennsylvania in the last two years. Daniel Spadoni, DEP spokesman, credited the company for "prompt compliance." "Obviously, we seek to be a responsible operator," said Stephen R. Millbourne, a PVR executive. "But we simply don't have control of weather conditions(Tanfani and McCoy)."

Ancillary Infrastructure and Testing to Support Gathering Lines

Compressors

A gas gathering system works on the principle of gas moving from a higher pressure to a lower pressure. A reciprocating compressor is used to create this differential in pressures by pulling the gas from the wells and pushing it into the gathering system. The compressor is driven by an electric motor where power is available or a gas fired engine using a small amount of gas from the feed lines. (Corken.com/gas gathering web 9/19/14)

A gathering system may need one or more field compressors to move the gas to the pipeline or the processing plant. A compressor is a machine driven by an internal combustion engine or turbine that creates pressure to "push" the gas through the lines. Most compressors in the natural gas delivery system use a small amount of natural gas from their own lines as fuel.

Some natural gas gathering systems include a processing facility, which performs such functions as removing impurities like water, carbon dioxide or sulfur that might corrode a pipeline, or inert gases, such as helium, that would reduce the energy value of the gas. Processing plants also can remove small quantities of propane and butane. These gases are used for chemical feedstocks and other applications. (American Gas Association)

According to information available through regulatory agencies and other sources, there is some probability that compressors may be necessary at different locations along gathering lines. These compressors have been potential to create various impacts to terrestrial and aquatic habitat and species from sediment and erosion and fragmentation during construction, maintenance and eventual removal as well as sensitive species from noise and air quality changes. At this point it is not clear, whether and how compressors would be used along gathering lines for natural gas operations in western Maryland and therefore it is not possible to evaluate risk.

Hydrostatic Testing

Gathering lines require hydrostatic testing during the post construction process and for period maintenance to ensure that the pipeline construction and integrity can withstand certain pressure levels. In Maryland, these discharges are regulated under the **“GENERAL PERMIT FOR DISCHARGES FROM TANKS, PIPES and OTHER LIQUID CONTAINMENT STRUCTURES at FACILITIES OTHER THAN OIL TERMINALS DISCHARGE PERMIT NO. 11-HT NPDES PERMIT NO. MDG67 Effective Date: March 1, 2012 Expiration Date: February 28, 2017**

PART I. APPLICABILITY AND COVERAGE

Pursuant to the provisions of Title 9 of the Environment Article, Annotated Code of Maryland, and the provisions of the Federal Clean Water Act (CWA), 33 U.S.C. §1251 et seq. and implementing regulations 40 CFR Parts 122, 123, 124, and 125, the Maryland Department of the Environment, hereinafter referred to as the “Department”, hereby authorizes operators located in the state of Maryland, who have submitted a notice of intent (NOI) and received written approval from the Department, to discharge wastewater from hydrostatic testing and related discharges described herein to waters of the state of Maryland in accordance with the eligibility requirements and other conditions set forth in this permit and consistent with the permittees’ NOI on file with the Department.

http://www.mde.state.md.us/programs/Permits/WaterManagementPermits/WaterDischargePermitApplications/Documents/GDP%20-%20HT%20Documents/11_HT_PERMIT_FINAL.pdf

It has been DNR’s experience in those cases where a proposed Notice of Intent has been provided for agency review is that there is limited or not potential for inclusion of site specific details e.g discharge points since oversight of this activity is based on a set of generic requirements and standards set forth in the 11 HT. This can be problematic when the work will occur in areas with sensitive aquatic and other significant resources and for which site specific conditions written into the approval could provide addition surety in the avoidance and minimization of adverse impacts such as those which occurred in Pennsylvania.

There are ecological concerns for a variety of factors including introduction of invasive species and other pollutants, run-off into streams causing sediment erosion and temperature and turbidity changes, if this process is not carefully regulated and effectively enforced at the site specific level. The following incident occurred in Pennsylvania and was reported on the Marcellus Effect web site:

Chief Gathering LLC Slapped with Fine, Surrenders Permit

Today the Pennsylvania Department of Environmental Protection (DEP) announced that it has fined Chief Gathering LLC, of Dallas, Texas (a subsidiary of Chief Oil and Gas) a \$34,000 fine for illegally discharging industrial waste in Lycoming County.

In August 2010 Chief was conducting hydrostatic testing at a pipeline project. Hydrostatic tests involve placing water in a natural gas pipeline at the required pressure to ensure there are no leaks before it is placed into service.

During those tests Chief discharged more than 25,000 gallons of hydrostatic testing water into the Big Run watershed – after an earlier notification in which Chief indicated to DEP that no discharge would occur. According to DEP none of the discharged water reached any nearby surface streams

A DEP investigation also revealed numerous other violations including:

- Failure to minimize the flow rate from the discharge point and allowing the formation of a 150-foot erosion channel;
- Failure to submit accurate, detailed Notice of Intent project information;
- Discharging hydrostatic test water with a total chlorine residual greater than 0.05 parts per million;
- Allowing an unknown industrial waste to co-mingle in five storage tanks with the hydrostatic test water, which was subsequently discharged; and
- A failure to monitor the discharge for the specified effluent parameters at the minimum frequency required.

In conjunction with the enforcement action, Chief voluntarily surrendered its discharge permit in early December.

BMPS

In order to minimize ecological impacts from gathering lines Maryland may want to consider tools and regulations are that are being adopted and explored by other states and non-profits.

Pennsylvania

Sections from Marcellus Shale Roundtable Report, Executive Summary, Page 9, four areas for targeted attention based on the established framework and goals

- a strong, adaptive legal and regulatory system with adequate implementation staff and resources;

- aggressive development and industry adoption of best management practices and other operational performance standards;
- investments in technological and operational innovation; and
- carefully targeted and balanced research to inform the continual improvement of statutes, regulations, best management practices, standards, and technology.

If Pennsylvania and its surrounding states pursue excellence in these four areas, the Appalachian Basin could serve as a national model for getting unconventional upstream, midstream, and downstream development right. Specifically, the Roundtable believes that Pennsylvania could best implement this framework by aiming progress at three interrelated goals:

- Minimizing the acute and cumulative impacts of oil and gas activity on the environment, public health, and local communities
- Minimizing surface disturbance from oil and gas activity and maximizing the efficiency of resource recovery and transport
- Enhancing the regional use of natural gas and supporting opportunities for regional economic growth based on the full natural gas value chain

Midstream development (pipelines and related infrastructure):

developing recommendations that minimize the environmental and surface footprints of midstream construction, improve pipeline safety, enhance coordination and planning of siting decisions, and provide increased opportunity for economic and community development. The Roundtable's full report contains extensive background information and recommendations for each of these four areas along with a set of core recommendations that emerged from the Roundtable's discussions. All of the recommendations were constructed using a thorough and deliberative process to prioritize and address critical issues for Southwestern Pennsylvania.

Water management: protecting water resources by identifying improvements in management and regulation in the areas of water sourcing, hydraulic fracturing chemical disclosure, erosion and sedimentation, impoundments, vehicle traffic for water transport, wastewater treatment and disposal, groundwater protection, water related violations, regional water management, and water monitoring

The Roundtable's deliberations in this area were based on review of existing federal and state policies and on dialogue with key stakeholders, including DEP, the PUC, staff and members of the Pennsylvania General Assembly and conservation and industry representatives. In order to promote midstream development that is environmentally protective and economically beneficial, the Roundtable recommends that the Commonwealth and interested stakeholders pursue a suite of important goals including the following: The Commonwealth should actively seek opportunities for improving the efficiency of intrastate midstream infrastructure

development, possibly including the sharing of pipeline capacity to transport produced gas.” “In addition to sharing infrastructure, such coordinated systems could jointly take advantage of existing rights of way that may be available and even co-locate with other utilities or natural gas related infrastructure.” “To the degree that operators are proposing common/shared gas infrastructure, sited using environmental best practices, the Commonwealth may wish to consider granting priority review of required permits for these applicants(83-84).

In the near future, PUC and DEP should consider partnering to convene three in—depth work shops to guide thinking on midstream issues in the Commonwealth” including: Environmental and community impacts: A targeted discussion on present and future potential issues of concern regarding pipeline infrastructure, Industry; landowners; municipal and county officials and environmental conservation, and sportsmen’s groups would be natural participants. What are the high priority concern areas? How are the companies proactively addressing them? Are the appropriate state regulatory tools available to manage those areas of concern(84)?

Most states, including Pennsylvania, lack regulatory power for the review of intrastate pipeline siting determinations. However, in the absence of eminent domain power, individual property owners can impact siting decisions through easement negotiations with midstream operators. In the absence of state review, multiple avenues are available to the Commonwealth and to operators in minimizing the environmental footprint of midstream infrastructure: The Roundtable’s proposed framework for updating the Oil & Gas Conservation Law, explained earlier in this report, could be one of the strongest tools available to the state in avoiding surface disturbance and forest fragmentation. The Conservation Law framework is designed to rationalize units and prevent the construction of unnecessary well pads to extract the resource. Fewer pads should translate to less pad-related infrastructure, including gathering lines and access roads.” Ecological impacts also can be reduced through the increased use of siting decision support tools, which some operators already employ to great effect.” These tools...the identification and use of low impact utility corridors where infrastructure can be clustered to avoid other, more sensitive areas. Conservation groups can be important partners in crating and effectively using such tools. For example, The Nature Conservancy has designed and built the Energy by Design protocol, which uses ecological data and computer models to help natural gas infrastructure avoid and/or mitigate impacts on high-value conservation areas. The first recommendation in this section, regarding improved efficiency to avoid unnecessary infrastructure, also could be an important method for minimize the surface footprint of the pipeline system (86).

In order to assess impacts to macroinvertebrates, Maryland should consider a similar strategy to that of the Institute for Energy and Environmental Research described below. Based on protocols developed by DNR, permittees could be required to conduct upstream and downstream water quality monitoring for baseline status as well as during and post construction.

The IEER will also be conducting comprehensive macroinvertebrate sampling of the surface waters in northeastern Pennsylvania. This program will complement the chemical analysis being performed. Sites for the macroinvertebrate sampling include several locations upstream and downstream of the Williams Springville Gathering line as well as the Sutton Creek, Silver Creek, and Hoagland Branch watersheds. When impacts from the natural gas infrastructure occur such as well blowouts and or pipeline accidents, the IEER plans to sample for macroinvertebrates upstream and downstream of the impact to determine any impact on the aquatic community.

The State of Pennsylvania has conducted studies and has begun to assess regulatory and other changes to address the impacts from gathering lines.

“Act 13 [signed by Governor Corbett in 2012] also requires the state to study the placement of natural gas gathering lines and investigate their environmental impact. The study, conducted last year, recommended that pipeline operators consult with experts to restore vegetation in right-of-ways and identify better ways to assess the environmental footprint of their activities (Sadasivam)”

Recommendations from the Report of the [Pennsylvania General Assembly]

7. RECOMMENDATIONS

- 1) Legal impediments to the sharing of State and local roadway rights-of-way should be repealed or modified to allow for and encourage the use of existing rights-of-way and minimize new surface disturbances. For example, Section 3 of the Limited Access Highway Law (Act 402 of 1945)), was repealed in part by Act 88 of 2012 to encourage the creation of Public-Private Partnerships and should be further repealed so as to permit the sharing of rights-of-way where appropriate.*
- 2) The Public Utility Code should be amended to clarify that the sharing of pipeline capacity, for purposes of increased efficiency and smarter deployment of gathering lines, shall not constitute public utility status.*
- 3) In conjunction with the U.S. Army Corps of Engineers, State and federal stream-crossing permits, including those required in 25 Pa. Code Chapter 105 and the Pennsylvania State Programmatic General Permit-4, should be aligned to remove existing duplications related to the protection and preservation of historic, cultural and natural resources while increasing predictability in planning and permit processing time.*
- 4) The Department of Environmental Protection should regularly review its Permit Decision Guarantee policy to ensure that administratively complete permits are reviewed in a timely manner, and where able, consider providing expedited review for projects that share rights-of-*

way or otherwise demonstrate steps that minimize conflicts with historic, cultural or natural resources.

5) The Pennsylvania Natural Diversity Inventory environmental review tool should continue to be enhanced so as to assist in the up-front avoidance of conflicts with threatened and endangered species, flora, fauna, habitat and other sensitive natural resources and increase certainty in decision making and long-term planning of pipeline operators.

6) The Underground Utility Line Protection Law, commonly referred to as "PA One Call," should be amended to include mandatory participation beyond the requirements of 58 Pa. C.S. § 3218.5, including specific location registration of all gathering lines.

7) The Public Utility Commission should work with PA One Call for purposes of creating a state map of unconventional natural gas pipelines.

8) County planning offices should be encouraged to work with drilling operators and gathering line companies so that operators and companies understand current and future development plans and can seek to maximize opportunities to share rights-of-way and pipeline capacity.

9) In accordance with standards adopted by the Department of Environmental Protection that ensure the protection of water quality, permits seeking to utilize horizontal directional drilling to cross under waterways and other topographic land features, such as steep inclines and declines, should be prioritized during review to recognize their potential to avoid surface disturbances, impacts on sensitive lands, forest fragmentation, viewsheds, and direct intersection with waterways.

10) Pipeline operators should collaborate to standardize right-of-way markers, including the spacing of markers, contact information for the pipeline operator, location of the pipeline, notation to contact PA One Call prior to any excavation, and other critical information. Multiple pipelines in a common right-of-way should be noted on the marker.

11) Landowner outreach efforts, such as those of the county extension offices, should be enhanced to expand landowner awareness of the opportunities, implications, standard terms and conditions and other important information related to engaging in the leasing of pipeline rights-of-way.

12) County and municipal governments should be encouraged to consult with gathering line operators to better understand the implications of a proposed project on a county or municipal comprehensive plan.

13) The Public Utility Commission and the Department of Environmental Protection should continue their efforts at coordination and public outreach to further citizens' understanding of the respective roles each agency plays in the review of permitting, siting, and placement of natural gas gathering lines.

14) The Governor's Center for Local Government Services, in cooperation with the Public Utility Commission and the Department of Environmental Protection, should work with local government associations and county planning offices to assist in disseminating information on applicable laws, regulations and other standards related to the construction and installation of natural gas gathering lines.

15) Pipeline operators should be encouraged to consult with the appropriate experts to replant right-of-ways with vegetation that fosters habitat development for wildlife.

16) Consideration should be given to utilization of existing or new pipeline pathways near existing or potential industrial development to maximize job creation, lower energy costs, and secure the nation's energy independence(19-20).

Governor's Marcellus Shale Advisory Commission Report 7/22/2011

9.2.35

Identify legislative/regulatory changes needed to:

Effect the sharing of pipeline capacity and reduce surface disturbance and associated environmental impacts;

Encourage the use of existing pipeline infrastructure and co-location with other rights-of-way;

Achieve coordination and consistency of infrastructure planning and siting decisions by State, county and local governments;

Provide sufficient authority and resources for appropriate government agencies to ensure that ecological and natural resource data are used in the review and siting of proposed pipelines, in order to avoid or minimize impacts to these resources.

The Nature Conservancy

The Pennsylvania Chapter of The Nature Conservancy has taken an active role in the study and identification of impacts from gathering lines and developing best management practices and tools in an effort to minimize those impacts.

“Since activists and state regulators have little legal leverage over where gas wells are dug and pipelines laid in Pennsylvania, some environmental groups are looking for other strategies. Working with the University of Tennessee, the Nature Conservancy has produced **Development by Design**, a software tool that allows pipeline companies to find routes that minimize ecological damage while also being cost-effective(Sadasivam).”

“In cooperation with energy companies and academic researchers, The Nature Conservancy has built an analytical tool that will help shale developers reduce ecological impacts while profitably developing shale oil and gas reserves. What it offers The Shale Siting Tool offers a new approach to shale development that facilitates higher-level planning for cost-effective and lower-impact results. The ArcGIS-based Tool generates feasible siting options that consider factors beyond regulatory requirements, such as habitat fragmentation, to help reduce overall environmental impacts”. (Gagnolet)

Conclusion and Risk Level

Given the current relatively broad determination of the nature of gathering lines, the lack of federal and state laws and regulations that specifically address certain ecological impacts, the number of significant ecological areas within western Maryland, the probability of risk to aquatic and terrestrial habitat and sensitive species is high. Given the potential cumulative and potentially unrecoverable ecological impacts from gathering lines, the consequence of risk to ecological resources would be moderate to high depending on the number of lines and their location in relation to sensitive habitat and species. An added factor that could compound the impacts and risks from gathering lines is the feasibility of extensive use of gathering lines to move Maryland produced gas downstream to the existing and proposed gas transmission lines in adjacent states. The relatively

close proximity to the FERC regulated out-of-state transmission lines will likely increase the presence of relatively unregulated gathering lines in western Maryland.

Maryland's proposed Comprehensive Gas Drilling Plans should facilitate early determination of potential adverse impacts from proposed gathering lines as well as initial discussion of avoidance and minimization between the state agencies and the applicants. However, the need for additional oversight of the location, construction and maintenance of gathering lines is clearly indicated. The best approach to avoid or minimize serious ecological impacts would best be addressed by the development of gathering line specific BMPs based on the best available technology that will be required and enforced through modified and new regulations.

Prepared as part of the Maryland Department of the Environment and Maryland Department of Natural Resources, Marcellus Risk Assessment by:

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Maryland Department of Natural Resources
Integrated Policy and Review Unit/Review Division

References for Marcellus Risk Assessment Step 6 Gathering Lines

American Gas Association, "How Does the Natural Gas Delivery System Work?", Retrieved from: <http://www.aga.org/KC/ABOUTNATURALGAS/CONSUMERINFO/Pages/NGDeliverySystem.aspx>

Armendariz, A. (2009). Emissions from Natural Gas Production in the Barnett Shale Area and Opportunities for Cost-Effective Improvements. Retrieved from: <http://energy.wilkes.edu/PDFFiles/Issues/Air%20Pollution%20barnett%20shale.pdf>

Bennett, A.F. (2003). *Linkages in the Landscape: The Role of Corridors and Connectivity in Wildlife Conservation*. < <http://data.iucn.org/dbtw-wpd/edocs/FR-021.pdf>>

"Chief Gathering LLC Slapped with Fine, Surrenders Permit", The Marcellus Effect, January 7, 2011, <http://marcelluseffect.blogspot.com/2011/01/chief-gathering-llc-slapped-with-fine.html>.

Drohan, P. J., M. Brittingham, J. Bishop and K. Yoder, "Early Trends in Landcover Change and Forest Fragmentation Due to Shale-Gas Development in Pennsylvania: A Potential Outcome for the Northcentral Appalachians", *Environmental Management*, May 2012, Volume 49, Issue 5, pp. 1061-1075

Gagnolet, Tamara, Marcellus Gas Development Projections and Conservation Impacts, Development by Design, The Nature Conservancy, Powerpoint presentation, [http://www.northeasternforests.org/FRPC/files/1340973031Protecting%20Nature%20in%20the%20Face%20of%20Energy%20Development%20\(Gagnolet\).pdf](http://www.northeasternforests.org/FRPC/files/1340973031Protecting%20Nature%20in%20the%20Face%20of%20Energy%20Development%20(Gagnolet).pdf)

GAO (United States Government Accountability Office), Report to Congressional Investigators, PIPELINE SAFETY Collecting Data and Sharing Information on Federally Unregulated Gathering Pipeline Could Help Enhance Safety, GAO 12-388.

Gilbert, Michelle M. and Anna D. Chalfoun, "Energy development affects population of sagebrush songbirds in Wyoming," *Wildlife Management*, May 2011, Volume 75, Issue 4, pp. 816-824

[Pennsylvania] Governor's Marcellus Shale Advisory Commission Report, 7/22/2011 Retrieved from: <http://www.marcellus.psu.edu/resources/PDFs/MSACFinalReport.pdf>

Institute for Energy and Environmental Research For Northeastern Pennsylvania, "Aquatic Macroinvertebrate Sampling," Retrieved from: <http://energy.wilkes.edu/pages/237.asp>

Johnson, Nels, Tamara Gagnolet, Rachel Ralls and Jessica Stevens, "Natural Gas Pipelines," Excerpt from Report 2 of the Pennsylvania Energy Impacts Assessment, December 16, 2011, The Nature Conservancy Pennsylvania Chapter

Marcellus Shale Roundtable Report, Retrieved from: <http://www.iop.pitt.edu/shalegas/PDF/90696%20SHALE%20GAS%20FULL%20REPORT-final.pdf>

McFeeley, Matthew, “Many hazards from natural gas gathering lines remain, despite new pipeline safety law,” NRDC SWITCHBOARD, Natural Resources Defense Council Staff Blog, , posted December 20, 2011 in Health and Environment, Amy Mall’s Blog

Milenkovski, Kathy, “The ‘Gathering’ Storm – Jurisdiction Over Gathering In Ohio Unclear,” Oil and Gas Monitor, October 2012

New York State, Draft Generic EIS, On the Oil and Gas Solution Mining Regulations, Appendix 6, Gathering Lines

Russell, Gregory, The American Gas and Oil Report, October 2010

Public Service Commission, Marcellus shale Advisory Committee Presentation 10/23/13, Presented by John Clementson, Assistant Chief Engineer, Public Service Commission, 6 Saint Paul St., Baltimore, MD 21202

PHMSA (Pipeline and Hazardous Materials Safety Administration), PHMSA mission, powers, and goals <<http://www.phmsa.dot.gov/about/mission>>

Report to the General Assembly on Pipeline Placement of Natural Gas Gathering Lines, as required by Act 13 of 2012, Submitted by Patrick Henderson, Energy Executive, Office of Governor Tom Corbett, December 11, 2012

Sadasivam, Naveena, “Boom in Unregulated Natural Gas Pipelines Posing New Risks”, InsideClimateNews.org, September 26, 2013.

Sadasivam, Naveena, “Gas Pipeline Boom Fragmenting Pennsylvania’s Forests”, InsideClimateNews.org, Dec. 10, 2013

Schillaci, William C., Enviro. BLR.com, Compliance Tools for Environmental Professionals, Environmental Management White Papers, July 12, 2012, Improved risk reduction needed for gathering pipelines

Slonecker, E.T., L.E. Milheim, C.M. Roig-Silva, A.R. Malizia, D.A. Marr, and G.B. Fisher, “Landscape Consequences of Natural Gas Extraction in Bradford and Washington Counties, Pennsylvania, 2004–2010”, Open-File Report 2012-1154, U.S. Department of the Interior, U.S. Geological Survey, <<http://pubs.usgs.gov/of/2012/1154/of2012-1154.pdf>>

Sonderman, Andrew J., “Will Ohio Law Catch Up to the Utica Shale Boom? The Confusing Statutory Maze for Developers and Operators of Natural Gas Gathering and Liquids Pipelines,” *Energy and Mineral Law Foundation, Kentucky Mineral Law Conference* October 13, 2013

Tanfani, J. and C.R. McCoy, (2011, December 13). Environmentalists and sportsmen raise alarms over pipelines. *Philadelphia Inquirer*. Retrieved from: <http://www.philly.com/philly/news/special_packages/inquirer/marcellusshale/20111212_Environmentalists_and_sportsmen_raise_alarms_over_pipelines.html?cmpid=131298059>

Transportation Research Board. (2004). *Transmission Pipelines and Land Use: A Risk - Informed Approach*. Transportation Research Board of The National Academies. Washington, DC.

U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration
Draft Regulatory Evaluation
Regulated Natural Gas Gathering Lines
Docket RSPA-1998-4868
Federal Register Volume 70, Number 190 (Monday, October 3, 2005)
[Proposed Rules]
[Pages 57536-57549] From the Federal Register Online via the Government Printing Office [www.gpo.gov] [FR
Doc No: 05-19455]
DEPARTMENT OF TRANSPORTATION
Pipeline and Hazardous Materials Safety Administration
49 CFR Part 192
[Docket No. RSPA-1998-4868; Notice 5]
RIN 2137-AB15
Gas Gathering Line Definition; Alternative Definition for Onshore
Lines and Proposed Safety Standards

United States Fish and Wildlife Service, New York Field Office, Marcellus Shale Drilling, webpage
<<http://www.fws.gov/northeast/nyfo/fwc/marcellus.htm>>