PROTECTING PENNSYLVANIA'S THREE RIVERS' WATER RESOURCES FROM SHALE GAS DEVELOPMENT IMPACTS

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INTRODUCTION

Energy and water are two critically important and closely linked resources. Energy development and utilization demand massive amounts of water for resource extraction, refining, processing, and transportation as well as for electric-power generation.[1] Inevitably, use of water resources for energy production affects water quality and quantity.[2] The energy sector consumes nearly 40% of U.S. daily freshwater withdrawals.[3] Although the Energy Information Administration (EIA) forecasts increased energy efficiency, decreased per-capita energy demand, and lower energy use per dollar of GDP, the EIA still projects primary energy use by the U.S. will increase by 0.7% annually from 2009 to 2035.[4] This increase in demand will further strain water resources where freshwater withdrawals already exceed precipitation: the high plains, the Southwest, Florida, and California.[5]

Shale gas will likely be an important resource in meeting increased energy demand. From 2006 to 2010 alone, shale gas production in the U.S. grew by an average of 48% per year.[6] Innovations in horizontal-drilling techniques and hydraulic fracturing (fracking) are the primary drivers of this boom, allowing for natural-

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1. U.S. DEP'T OF ENERGY, ENERGY DEMANDS ON WATER RESOURCES 9 (2006) [hereinafter ENERGY DEMANDS].

2. *Id.* at 29–37.

3. *Id.* at 18.

4. U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY OUTLOOK 2011: WITH PROJECTIONS TO 2035, 4 (2011) [hereinafter ENERGY OUTLOOK].

5. ENERGY DEMANDS, *supra* note 1, at 14.

6. ENERGY OUTLOOK, *supra* note 4, at 2.

gas extraction that was once considered economically unviable. In 2009 the Potential Gas Committee, a nationwide group of natural gas experts including geologists and engineers, incorporated the impacts of these new technologies into its reserves estimates, causing the U.S.'s natural gas reserve to swell by 35%.[7]

Drilling a traditional gas well uses only 66,000 to 600,000 gallons of water, but the hydraulic fracturing of a typical shale gas well uses as much as 5 million gallons of water.[8] Drillers often seek water resources in close proximity to the well pad to meet their water needs.[9] In areas such as Texas' Barnett Shale, fracturing has consumed as much as 3% of groundwater in recent years.[10] While gas companies have taken actions to recycle fracturing fluids—known as "flowback water"—the technologies to do so are still in development, and shale gas development will likely continue to rely upon large amounts of freshwater in the near future.[11]

One of the most gas-rich, and therefore lucrative, regions for shale gas development is the Marcellus Shale, running through much of the Appalachian Basin.[12] Sitting over the heart of the shale, Pennsylvania has seen 2469 natural gas wells drilled from 2008 to 2010. Nearly 1500 wells were drilled in 2010 alone.[13] Assuming no recycling and an average use of 5 million gallons per well, these wells would have consumed over 12.3 billion gallons of Pennsylvania's

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7. Jad Mouawad, *Estimate Places Natural Gas Reserves 35% Higher*, N.Y. TIMES, June 18, 2009, at B1.

8. *Water Use in Deep Shale Gas Exploration*, CHESAPEAKE ENERGY (Feb. 2012), http://www.chk.com/Media/Educational-Library/Fact-Sheets/Corporate/Water_Use_Fact_Sheet.pdf.

9. *See* R. Timothy Weston, *Water Supply and Wastewater Challenges in Marcellus Shale Development*, 30 ENERGY & MIN. L. INST. 501 (2009), *reprinted in* R. Timothy Weston, *Water and Wastewater Issues in Conducting Operations in a Shale Play–The Appalachian Basin Experience*, *in* DEVELOPMENT ISSUES IN THE MAJOR SHALE PLAYS 1 (2010), *available at* http://www.klgates.com/publications/weston_article (detailing the water requirements for deep shale gas extraction).

10. *Water Use in the Barnett Shale,* R.R. COMM'N OF TEX. (Jan. 24, 2011), http://www.rrc.state.tx.us/barnettshale/wateruse_barnettshale.php.

11. Weston, *supra* note 9, at 1.

12. *USGS Releases New Assessment of Gas Resources in the Marcellus Shale, Appalachian Basin*, USGS NEWSROOM (AUG. 23, 2011, 11:30 AM), http://www.usgs.gov/newsroom/article.asp?ID=2893.

13. *Oil and Gas Reports*, PA. DEP'T OF ENVTL. PROT., http://www.portal.state.pa.us/portal/server.pt/community/oil_and_gas_reports/20297 (follow "Permits Issued Detail Report" hyperlink; then run report for all counties and municipalities for 01/01/2008 through 12/31/2009 for all operators for Marcellus only) (last visited Feb. 23, 2012).

freshwater.[14] The flowback from these wells results in significant volumes of wastewater that contains hazardous materials from the fracking process, including, high salt content, radioactive particles, and other constituents from the underground formations through which the water passes. Thus, hydraulic fracturing threatens not only water quantity, but also quality.

This article focuses on the threats to Pennsylvania's water resources from hydraulic fracturing in the Marcellus Shale. Part I introduces basic Pennsylvania water resource law and the practice of hydraulic fracturing and its impacts. Part II delineates the regulatory context of hydraulic fracturing at the federal and state levels and concludes that the current regime is inadequate to address the water-resource challenges posed by hydraulic fracturing. Part III focuses on the impacts of this inadequate regime on the three most significant rivers in Southwestern Pennsylvania: the Allegheny, the Monongahela, and the Ohio. It then suggests changes to the management of water resources and regulations to better address the impacts on the Three Rivers region.

I. THE HYDRAULIC FRACTURING PROCESS AND ITS IMPACTS

A. Shale Gas Development

Traditional oil and gas drilling seeks natural accumulations of hydrocarbons in reservoir rocks.[15] These accumulations are the result of oil and gas moving from an organic-rich source rock through permeable rocks until they are trapped by an impermeable layer, creating a reservoir full of hydrocarbons.[16] When a well is drilled into a high-pressure area, the hydrocarbons gush through the well bore and up to the surface.

Rather than simply drilling a conventional vertical well to release natural gas, shale-gas drilling requires an additional horizontal spur and fracturing of the formation with fluids and solids known as proppants.[17] Shale is not as permeable as other source rocks and traps

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14. Calculation assumes (2469 wells)*(5,000,000 gal H_2O/well) = 12,345,000,000 gal H_2O.

15. *See EIA's Energy in Brief: What is Shale Gas and Why is it Important?*, ENERGY INFO. ADMIN., http://www.eia.doe.gov/energy_in_brief/about_shale_gas.cfm (last visited Feb. 13, 2012) [hereinafter *EIA's Energy in Brief*] (describing natural gas in shale rock as hydrocarbons).

16. *Id.*

17. Aileen Alfonso, *Water Rights in the Marcellus Shale and How They Concern Oil and Gas Companies,* 4 APPALACHIAN NAT. RESOURCES L.J. 1, 3–4 (2009), *available at* Westlaw 4 APPNRLJ 1.

the gas in the formation, preventing it from easily flowing out.[18] The well is first drilled vertically to the depth of the shale formation, usually to a distance of several thousand feet in the case of the Marcellus Shale.[19] Then, the well driller begins to drill horizontally for several thousand more feet, perforating the formation to expose more gas-rich shale.[20]

Perforating the formation alone is not enough to create an economically viable level of flow because of the low permeability of the shale.[21] Well operators must inundate the well with millions of gallons of water mixed with added chemicals and solids to create fissures in the rock surrounding the horizontal spur.[22] The many fissures create space for the gas molecules to flow through the shale and up out of the well.[23] The combination of horizontal drilling with hydraulic fracturing consumes many times more water than traditional drilling techniques.[24] This increase in water use also corresponds to a significant increase in wastewater when the water used to drill and stimulate the well is returned to the surface and when water trapped in the formation is released.

B. Impacts of Hydraulic Fracturing

1. Water Quantity

Freshwater withdrawals for use in hydraulic fracturing create economic and environmental challenges. The demand can impinge on available freshwater for other users. Mineral leases for gas extraction often contain general language that secures use of the landowner's water rights, either surface or groundwater, for drilling operations.[25] The limits upon the well operator's water use are (1) that the water withdrawn must be used on the property from which the right derives and (2) that the water rights of the leaseholder will be no greater than

18. *EIA's Energy in Brief*, *supra* note 15.

19. *See* Josh A. Harper, *The Marcellus Shale—An Old "New" Gas Reservoir in Pennsylvania*, 38 PA. GEOLOGY 2, 7 (2008), *available at* http://www.dcnr.state.pa.us/topogeo/pub/pageolmag/pdfs/v38n1.pdf (graph details shale depth).

20. *EIA's Energy in Brief, supra* note 15.

21. *Id.*

22. Chesapeake Energy, *The Process*, HYDRAULIC FRACTURING FACTS, http://www.hydraulicfracturing.com/Process/Pages/information.aspx (last visited Feb. 13, 2012).

23. *EIA's Energy in Brief*, *supra* note 15.

24. Weston, *supra* note 9, at 1.

25. *Id.* at 9.

the water rights of the landowner and may actually be less.[26] Such an arrangement places few constraints on a driller's water use and does not explicitly take into account the landowner's own needs.

Pennsylvania's riparian and groundwater schemes allow for water withdrawals for hydraulic fracturing because: (i) mineral extraction is generally considered a reasonable or beneficial use and (ii) takes place on the land. In an attempt to gain some regulatory control in a state that does not require permits for surface or groundwater withdrawals, the Pennsylvania Department of Environmental Protection (PA DEP) "has claimed authority through a combination of the Pennsylvania Oil and Gas Act and [the] Pennsylvania Clean Streams Law to review and approve 'water management plans' governing water sources utilized by Marcellus Shale gas operators."[27]

Cumulative consumptive use from well operators and all other users threatens aquatic habitats during times of water shortages.[28] Reduced flow decreases the assimilative capacity of a water body; so one that can typically receive a certain pollutant load without harmful impacts on aquatic life or humans can no longer receive that full load without harmful effects.[29] Reductions in flow can also affect estuary salinity[30] and reduce habitat.

Chesapeake Energy predicts that the natural gas industry is only expected to increase water withdrawals in each shale gas region by 1.5%,[31] but as water-law expert Timothy Weston explains, "the location, amount, timing, and conditions of withdrawals" are of importance.[32] For example, much of the development of the Marcellus is occurring in the vicinity of small headwater streams.[33] These streams are often of high quality and support cold-water fisheries.[34] Consumptive-use withdrawals at these locations, even when there is no water shortage, may have significant impacts on stream flow and

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26. *Id.*

27. *Id.* at 28.

28. *Id.* at 3.

29. *Id.* at 64.

30. *Id.* at 3.

31. Chesapeake Energy, *Water Usage*, HYDRAULIC FRACTURING FACTS, http://www.hydraulicfracturing.com/Water-Usage/Pages/Information.aspx (last visited Mar. 18, 2012).

32. Weston, *supra* note 9, at 3.

33. *Id.*

34. *Fish Species Feature Pages*, PA. FISH & BOAT COMM'N, http://fishandboat.com/fish_species.htm (last visited Jan. 20, 2012).

aquatic life.[35] Similar threats to stream health may arise in downstream wetlands that require a minimum ecological flow. During times of drought or dry months, surface water withdrawals may be particularly harmful to local aquatic ecosystems.

2. Water Quality: Wastewater

The hydraulic fracturing process generates wastewater when the used water returns to the surface. Approximately 25% to 50% of the original input returns to the surface along with production brines, or dissolved salts.[36] The constituents of the flowback vary across the Marcellus, but usually the wastewater contains 4% to 25% salts, oil, gas, and the chemicals used in fracturing.

The total dissolved solids (TDS) in the wastewater from Marcellus shale wells may be greater than 100,000 milligrams per liter, levels several times than that of typical seawater.[37] TDS are not usually directly deleterious to people even though high levels of TDS can change the color, taste, and odor of water, and lead to mineral buildup on equipment, such as that at water treatment facilities.[38] However, TDS do pose a threat to freshwater ecosystems by increasing salinity. Furthermore, high levels of TDS can cause exceedances of drinking water standards and formation of toxic disinfection byproducts at drinking water treatment facilities.[39]

Relatedly, flowback waters also may contain elevated levels of radioactive materials and carcinogens such as benzene, which occur naturally in the rock formation. As a part of its series on the impacts of hydraulic fracturing, the *New York Times* reported that wastewater often contains high levels of radioactivity and have not been appropriately treated before disposal.[40] Accompanying documents reveal concern from EPA scientists about the level of radioactivity in wastewater.[41] The EPA is currently studying the potential impacts of

35. Weston, *supra* note 9, at 3.

36. *Id.* at 2.

37. *Id.*

38. Joaquin Sapien & ProPublica, *With Natural Gas Drilling Boom, Pennsylvania Faces Flood of Wastewater*, SCIENTIFIC AMERICAN (Oct. 5, 2009), http://www.scientificamerican.com/article.cfm?id=wastewater-sediment-natural-gas-mckeesport-sewage.

39. 39 Pa. Bull. 6468 (Nov. 7, 2009), *available at* http://www.pabulletin.com/secure/data/vol39/39-45/39_45_prm.pdf.

40. Ian Urbina, *Regulation Lax as Gas Wells' Tainted Water Hits Rivers*, N.Y. TIMES, Feb. 27, 2011, at A1.

41. Memorandum from Nidal Azzam, Senior Health Physicist, Scientist, U.S. Envtl. Prot. Agency Region II, Div. of Envtl. Planning & Prot. (DEPP), Radiation & Indoor Air Branch to

hydraulic fracturing, but the final study will not be released until 2012.[42]

3. Water Quality: Constituents of Fracking Fluids

Environmental groups are concerned about the components of fracking fluid from a wastewater perspective, but they also fear the potential for groundwater contamination from failures in the drilling process or for surface and groundwater contamination from spills of hazardous chemicals in fracking fluids. From 2005 to 2009, 780 million gallons of non-water fracturing products were used throughout the United States to stimulate shale wells.[43] Some of the chemicals are harmless, but over the four-year period, shale developers used twenty-nine chemicals that are "(1) known or possible human carcinogens, (2) regulated under the Safe Drinking Water Act for their risks to human health, or (3) listed as hazardous air pollutants under the Clean Air Act."[44]

Included in this list are benzene, toluene, xylene, and ethylbenzene, which are used independently and as components of diesel;[45] 10.2 million gallons of fracking "products" contained at least one of these possible, probable, or known human carcinogens.[46] Companies used 11.7 million gallons of fluids containing at least one of the chemicals typically regulated under the Safe Drinking Water Act (SDWA).[47] The hazardous air pollutants used include hydrogen fluoride, lead, methanol, formaldehyde, and hydrogen chloride.[48] This information, collected by the minority staff of the House Committee on Energy and Commerce, does not include components of

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Lingard Knutson, Envtl. Scientist, DEPP, Strategic Planning Multi-Media Branch (Nov. 9, 2009), *in* N.Y. Times, *Documents: Natural Gas's Toxic Waste*, DRILLING DOWN (Feb. 26, 2011), *available at* http://www.nytimes.com/interactive/2011/02/27/us/natural-gas-documents-1.html#document/p388/a9933.

42. *Natural Gas Extraction—Hydraulic Fracturing*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/hydraulicfracturing/#content (last visited Mar. 18, 2012).

43. STAFF OF H.R. COMM. ON ENERGY & COMMERCE, 112TH CONG., REP. ON CHEMICALS USED IN HYDRAULIC FRACTURING 1 (2011) [hereinafter CHEMICALS USED IN HYDRAULIC FRACTURING].

44. *Id.*

45. FREDERIC LEUSCH & MICHAEL BARTKOW, GRIFFITH UNIV., A SHORT PRIMER ON BENZENE, TOLUENE, ETHYLBENZENE AND XYLENES (BTEX) IN THE ENVIRONMENT AND IN HYDRAULIC FRACTURING FLUIDS 2 (2010), *available at* http://www.derm.qld.gov.au/environmental_management/coal-seam-gas/pdf/btex-report.pdf.

46. CHEMICALS USED IN HYDRAULIC FRACTURING, *supra* note 43, at 9.

47. *Id.*

48. *Id.* at 11.

proprietary or trade-secret chemicals.[49] The presence of these chemicals in unfiltered drinking water supplies and in ecosystems has not been thoroughly studied.

Poor well construction further exacerbates the potential harms from fracking. Reports of methane escaping the wellbore and seeping into nearby drinking water wells have surfaced in a number of shale plays.[50] In the Barnett Shale in Texas, the EPA used isotopic fingerprint analysis of gas in private drinking water wells and gas in a nearby shale well to trace contamination.[51] After finding sufficient similarity, the EPA issued an emergency order alleging contamination by the gas company and instructing the company to provide water to the families and to test surrounding drinking wells.[52] The company denied causation, and the Texas Railroad Commission refused to act.[53] Subsequently, a federal judge stayed the case pending Fifth Circuit review of the emergency order.[54] In May 2011, the PA DEP fined Chesapeake Energy $1.1 million for contaminating private water supplies from improper casing of a well.[55] At least one major lawsuit has alleged methane contamination of drinking water in Canada.[56]

II. REGULATORY FRAMEWORK

A. Federal Regulation

Despite a range of federal environmental regulations that apply to oil and gas development, federal law only regulates portions of the fracking process. Inherent limitations of the Clean Water Act (CWA), the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), the Hazardous Materials Transportation Act (HMTA), the Endangered Species Act (ESA),

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49. *Id.* at 12.

50. *EPA Heightens Scrutiny Over Pennsylvania Gas Drilling*, WALL ST. J. (Mar. 5, 2011), http://online.wsj.com/article/APaf90d38401e943448a5f0f5ddf7242ba.html.

51. Chris Hawes, *EPA Acts After Water Contaminated by Drilling*, WFAA.COM (Dec. 7, 2010), http://www.wfaa.com/news/local/EPA-orders—111474704.html.

52. *Id.*

53. *Id.*

54. United States v. Range Prod. Co., 793 F.Supp. 2d 814, 824 (N.D. Tex. 2011).

55. Laura Olson, *Chesapeake Fined $900,000 for Bradford County Contamination*, PITTSBURGH POST-GAZETTE (May 17, 2011, 12:13 AM), http://shale.sites.post-gazette.com/index.php/news/archives/23962-chesapeake-fined-900000-for-bradford-county-contamination.

56. Dianne Saxe, *Fracking, Drinking Water and Regulation,* ENVTL. L. & LITIG. (May 2, 2011), http://envirolaw.com/fracking-drinking-water-regulation/.

loopholes written into the SDWA, the Emergency Planning and Community Right to Know Act (EPCRA), and Subtitle C regulations of the Resource Conservation and Recovery Act (RCRA), combine to significantly reduce the federal regulatory burden upon shale gas developers.[57] These limitations prevent, for example, the federal regulation of disposal of drilling wastewater on land, underground injection of wastewater, surface activities associated with well development, and information collection and reporting.

This patchwork of federal regulations does provide some limits on oil and gas development. Before drilling operations begin, the presence of an endangered species or its habitat can limit or completely prevent fracking operations.[58] The HMTA controls the transport of hazardous additives in fracking fluid to and from the well site.[59] The CWA prevents well operators and other entities from disposing of pollutants in U.S. waters without a permit.[60] More specifically, the CWA limits well operators from discharging wastewater into water bodies and sewage treatment facilities until after they have obtained a permit from the state or the EPA, but it does not limit land disposal of wastewater. In addition, CERCLA could potentially subject well operators to liability under specific circumstances; if a well operator contaminates a site with hazardous wastes other than natural gas or oil, he may be liable for clean-up costs under the Act.[61] Thus, only releases of certain chemicals contained in oil and gas, which are otherwise regulated, can impose liability.[62]

1. Federal Regulatory Exemptions

The most significant exemption of fracking activities from federal regulation is the exploration-and-production exemption in RCRA regulations.[63] In its 1988 report *Regulatory Determination for Oil and*

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57. *See generally* Hannah Wiseman, *Regulatory Adaptation in Fractured Appalachia*, 21 VILL. ENVTL. L.J. 229, 243–44 (2010) (detailing statutory exemptions for shale gas developers).

58. *See id.* at 242.

59. 49 U.S.C. § 5103 (2006); *see* David Spence, *Fracking Regulations: Is Federal Hydraulic Fracturing Regulation Around the Corner?*, ENERGY MGMT. & INNOVATION CTR. (Sept. 22, 2010), http://www.mccombs.utexas.edu/Centers?EMIC/~/media/Files/MSB/Centers/EMIC/Fracking-Regulations-Is-Federal-Hydraulic-Fracturing-Regulation-Around-Corner.ashx.

60. 33 U.S.C. §§ 1311, 1342, 1362; Wiseman, *supra* note 57, at 242.

61. 42 U.S.C. §§ 9601, 9607; Wiseman, *supra* note 57, at 242.

62. *See* 42 U.S.C. § 6921; 33 U.S.C. §§ 1317(a), 1321(b)(2)(a); 15 U.S.C. § 2606; 42 U.S.C. § 7412 (specifying regulated chemicals and exempting oil and gas).

63. Wiseman, *supra* note 57, at 243–44; Spence, *supra* note 59.

Gas and Geothermal Exploration, Development and Production Rates, the EPA concluded that regulation of oil and gas wastes as hazardous wastes under Subtitle C of RCRA was unnecessary.[64] The exemption includes all wastes "intrinsic to and uniquely associated with" primary exploration and production operations.[65] Thus, fracking surface activities involving oil and gas wastes that would otherwise be subject to RCRA are exempt from the arduous "cradle-to-grave" regulations on hazardous wastes.[66]

Under the Energy Policy Act of 2005, Congress provided oil and gas producers with another exemption from federal regulation by excluding fracking from the SDWA.[67] This "Halliburton Loophole"[68] redefines the SDWA's definition of underground injection to not include "underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities."[69]

A third exemption for fracking limits the ability of persons to acquire information on toxic releases from the sites of oil and gas production activities.[70] The EPCRA requires certain entities to disclose toxic chemical releases from their facilities.[71] In the absence of a legal obligation created by EPCRA, the EPA requested that nine natural-gas companies disclose fracking additives to water to aid an EPA study of possible harms to public health and drinking water supplies.[72] Halliburton initially refused to fully comply with the EPA request. However, after it changed its fracking-fluid mixture and offered disclosure of the chemicals in the new mixture on its website,

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64. Regulatory Determination for Oil and Gas and Geothermal Exploration, Development and Production Wastes, 53 Fed. Reg. 25,446, 25,447 (July 6, 1988); Wiseman, *supra* note 57, at 248.

65. Clarification of the Regulatory Determination for Wastes From the Exploration, Development, and Production of Crude Oil, Natural Gas and Geothermal Energy, 58 Fed. Reg. 15,284, 15,284 (Mar. 22, 1993) (to be codified at 40 C.F.R. pt. 261).

66. *See* 42 U.S.C. §§ 6922(a)–(c); Wiseman, *supra* note 57, at 244.

67. 42 U.S.C. § 300H(d)(1)(B)(ii).

68. *The Halliburton Loophole*, N.Y. TIMES, Nov. 3, 2009, at A28.

69. 42 U.S.C. § 300H(d)(1)(B)(ii).

70. *See* Community Right-to-Know; Toxic Chemical Release Reporting Using North American Industry Classification System (NAICS); Final Rule, 71 Fed. Reg. 32,464, 32,474 (June 22, 2006) (to be codified at 40 C.F.R. pt. 372) (excluding oil and gas production activities as facilities for toxic release reporting); Wiseman, *supra* note 57, at 250 n.125 (detailing some notable times when oil and gas production have been exempted from federal regulation).

71. *See* 42 U.S.C. § 11023(a) (2011).

72. *EPA's Study of Hydraulic Fracturing and Its Potential Impact on Drinking Water Resources*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/hfstudy/ (last visited Feb. 23, 2012).

and after the EPA issued a subpoena for the remaining information, it finally complied.[73]

Environmentalists have sought to overcome the EPCRA exemption through the Toxic Substances Control Act (TSCA).[74] In November 2011, the EPA granted a portion of a petition for disclosure. Under TSCA §§ 8(a) and 8(d), the EPA will require chemical manufactures and processors of fracking fluids to submit detailed reports on the component chemicals as well as any health and safety data available to them. But it will not require development of toxicity test data under § 4,[75] as the testing requirements imposed under that section require the EPA to make a statutory hazard or exposure finding.[76]

These exemptions from federal law fail to adequately protect water resources from the potential harms of hydraulic fracturing to either water-resource quantity or quality. Traditionally, management of water quantity has been an issue reserved for state resolution, often as a subset of property law,[77] In contrast, the federal government has regulated water quality since the River and Harbor Act of 1886.[78] Though RCRA and EPCRA are not strictly water-quality statutes, both are an important means of protecting water quality. RCRA's strict cradle-to-grave provisions are preventive measures that limit opportunities for mismanagement of chemicals that can contaminate surface and groundwater through improper disposal or spills. And EPCRA's information-release requirements equip communities with information necessary to properly monitor for impacts of toxic chemicals on water resources and to pursue legal and political remedies. The SDWA, however, is in every sense a water-quality statute. Even the EPA characterizes the statute as, "the main federal law that ensures the quality of Americans' drinking

73. Circle of Blue, *EPA and Halliburton Skirmish—Promises of Safer Fracking Fluid*, WATER NEWS (Nov. 20, 2010, 6:08 PM), http://www.circleofblue.org/waternews/2010/world/epa-and-halliburton-skirmish-promises-of-safer-fracking-fluid/.

74. Toxic Substances Control Act, 15 U.S.C. §§ 2601–2692.

75. Letter from Stephen A. Owens, Assistant Adm'r, U.S. Envtl. Prot. Agency, to Deborah Goldberg, Managing Attorney, Earthjustice (Nov. 23, 2011), *available at* http://www.epa.gov/oppt/chemtest/pubs/EPA-Letter-to-Earthjustice-on-TSCA-Petition.pdf.

76. *TSCA Section 4 Test Rules*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/oppt/chemtest/pubs/sct4rule.html (last visited Mar. 29, 2012).

77. United States v. Gerlach Live Stock Co., 339 U.S. 725, 734–36 (1950).

78. Rivers and Harbors Act § 13, 33 U.S.C. § 407; U.S. ENVTL. PROT. AGENCY, THE CHALLENGE OF THE ENVIRONMENT: A PRIMER ON EPA'S STATUTORY AUTHORITY 12 (1972).

water."[79] It specifically targets surface and groundwater quality used for drinking water supply.[80] The exceptions in these three statutes effectively handicap preventative management of contamination of water resources from shale gas development.

The applicable federal statutes not subject to shale gas loopholes are inadequate to address these gaps. The CWA regulates discharges of pollutants from point sources into navigable surface waters. The CWA gives no regulatory jurisdiction over land disposal of hazardous chemicals in landfills or by underground injection, and therefore cannot adequately protect groundwater. CERCLA is only useful in response to preexisting contamination of soil, groundwater, or surface water. The HMTA regulates only the transportation of hazardous chemicals; it is no longer applicable once the chemicals are being used at the well site, which is the portion of the development process that is most likely to pose a threat to water resources. The ESA alone can pre-empt deleterious actions to water quality and quantity; yet, its reach is limited to protection of endangered species and their habitat.[81]

B. State Regulatory Framework

1. Pennsylvania Water Resource Law

Water resources are often classified into several categories: (1) surface waters in defined streams and lakes, (2) diffused surface water like sheet flow from precipitation moving over the ground, (3) ground waters in subterranean streams, and (4) percolating ground waters.[82] Despite the interconnection of these resources, states often apply separate and inconsistent rules to each of these categories.[83]

Pennsylvania water resources law is governed primarily by the common law of property and torts.[84] For surface water in defined lakes and streams, landowners hold usufructuary rights to water; the rights cannot be severed from the land.[85] This common law system is characterized as "riparian" because the right is derivative of land

79. *Safe Drinking Water Act (SDWA),* U.S. ENVTL. PROT. AGENCY, http://water.epa.gov/lawsregs/rulesregs/sdwa/index.cfm (last visited Jan. 31, 2012).

80. *Id.*

81. Babbit v. Sweet Home Chapter Cmtys. for Or., 515 U.S. 687, 708 (1995).

82. PAMELA BISHOP, A SHORT REVIEW OF PENNSYLVANIA WATER LAW 4 (2006).

83. *Id.* at 3.

84. *Id.* at 5.

85. *Id.*

ownership. Originally, the right to use the water was associated with owning land along flowing water.[86]

Pennsylvania subscribes to the reasonable-use variation of riparianism.[87] Reasonable use shuns assigning rights to withdraw a specific amount of water in favor of a correlative approach in which all withdrawals other than those for domestic uses are subject to balancing.[88] The aim is that no one user unreasonably harms another user.[89] As a result, Pennsylvania precludes extraordinary uses or uses not incident to the land for ordinary purposes, like diversions off the land.[90] Statutory authorizations are needed for off-land uses like public water supply.[91]

Percolating groundwater is governed by the common law doctrine of the reasonable user: a landowner may withdraw water beneath her property for "beneficial uses" located on the land.[92] The only limitations on the landowner are that she may not be malicious or negligent in her use or cause foreseeable harm to her neighbor's use,[93] and "off-land uses are unreasonable and unlawful per se if [they] interfere with other users."[94] Again, there is no quantification of the water right. While those alleging harm may seek damages or an injunction, in practice the party with the deepest well or biggest pump often wins.[95]

Pennsylvania has modified the common law water doctrine through a series of statutes related to public safety and municipal planning. Additionally, Pennsylvania is part of four different interstate water compacts for some of its major water resources. Together, the common law, statutes, and compacts form the state regulations for water quality and quantity. In addition to Pennsylvania's common law riparian system and groundwater reasonable user doctrine, the Oil and Gas Act, and the Clean Streams Law, several other water-based statutes and river compacts complete

86. JOSEPH L. SAX ET AL., LEGAL CONTROL OF WATER RESOURCES: CASES AND MATERIALS 28 (4th ed. 2006).

87. *See* Alburger v. Phila. Elec. Co., 535 A.2d 729, 731 (Pa. Commw. Ct. 1988); Alfonso, *supra* note 17, at 7.

88. BISHOP, *supra* note 82, at 7–8.

89. Pa. R.R. Co. v. Miller, 3 A. 780, 781–82 (Pa. 1886).

90. BISHOP, *supra* note 82, at 9.

91. *Id.*

92. *Id.* at 10.

93. *Id.*

94. *Id.* at 11.

95. *Id.*

the patchwork of Pennsylvania's regulatory system for water quantity and quality.[96]

2. Statutory Additions

One of the first statutes governing water use in Pennsylvania is the 1923 Limited Power and Water Supply Act, which requires state permits for hydroelectric and thermal-electric power projects on non-navigable waters.[97] While the state statute regulates waters not subject to the CWA, it provides no authority to regulate shale-gas operators.

The 1939 Water Rights Act created an allocation permit system for surface water withdrawals by public water-supply agencies.[98] The permits are not necessary for industrial, commercial, or agricultural water uses, or for groundwater withdrawals. The Act regulates roughly ten percent of surface water withdrawals in the state.[99]

The 1956 Water Well Drillers License Act imposes annual licensing requirements on drillers and requires data reporting of well location, penetrated strata, design, and yield.[100] It places no limits on the amount or use of water because the law is focused on drilling and not the use of groundwater.

The 1984 Pennsylvania Safe Drinking Water Act (Pa. SDWA) was originally designed to regulate drinking water quality through a permitting process for public-water systems.[101] In *Oley Township v. PA DEP*, an environmental trial court interpreted the statute to include the impact of groundwater withdrawal on nearby water resources.[102] This case has given the PA DEP significantly more authority to address harms to water resources.[103] The Pa. SDWA does not apply to groundwater withdrawals for oil and gas production, but *Oley Township* is nonetheless important to regulating hydraulic fracturing because it indicates a willingness by the state courts to expand their interpretation of harms to include hydrologic connections between groundwater and surface water.

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96. *See* discussion *infra* Part II.B.2.

97. *See* 25 PA. CODE § 105 (1980) (incorporating and describing the Limited Power and Water Supply Act); BISHOP, *supra* note 82, at 12.

98. 32 PA. CONS. STAT. ANN. §§ 631–641 (West 2012).

99. Weston, *supra* note 9, at 28.

100. *Id.* at 29.

101. 35 PA. STAT. ANN. § 721.2 (2003).

102. Oley Twp. v. Pa., Dep't of Envtl. Prot., 1996 EHB 1098 (Pa. Envtl. Hearing Bd. 1996).

103. Weston, *supra* note 9, at 24.

The 1978 Emergency Management Services Code enables the governor to declare natural-resource shortages and drought regulations as a part of emergency management coordination.[104] While this law could regulate oil and gas water withdrawals, the governor's authority is limited to times of emergency, such as drought.

The most recent statute regulating water withdrawals is the 2002 Water Resources Planning Act (WRPA).[105] This statute required the state to update its water plan by 2008 and to continue updating the plan every five years. The Act requires registration of all water withdrawals exceeding 10,000 gallons per day and bars municipalities and other political subdivisions from allocating water resources.[106] The WRPA planning process is directed by a state water resources committee and six regional committees.[107] The regional committees recommend portions of the state water plan, which the state committee ultimately approves in conjunction with the secretary of the PA DEP.[108]

The state water plan is ultimately a policy and guidance document for stakeholders.[109] The plan inventories all surface and groundwater resources in a region,[110] supplies information on water availability, identifies and prioritizes water supply projects, identifies needed improvements for water infrastructure, and gives direction to state agencies on reduction of flooding risks, water shortages, and conflicts between users.[111] The process identifies "Critical Water Planning Areas" as "comprising any significant hydrologic unit where existing or future demands exceed or threaten to exceed the safe yield of available water resources,"[112] and requires more detailed planning in those areas.[113]

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104. 35 PA. CONS. STAT. §§ 7101–7104 (2011).

105. Water Resources Planning Act, 27 PA. CONS. STAT. §§ 3101–3136.

106. BISHOP, *supra* note 82, at 15.

107. Bryan Swistock & Harry Blanchet, *The Water Resources Planning Act*, PENN ST. C. OF AGRIC. SCI. COOPERATIVE EXTENSION 1, *available at* http://resources.cas.psu.edu/WaterResources/pdfs/PlanningAct.pdf.

108. *Id.*

109. *Id.*

110. 27 PA. CONS. STAT. § 3112(a)(1)–(2).

111. Swistock & Blanchet, *supra* note 107, at 1.

112. 27 PA. CONS. STAT. § 3112(a)(6).

113. *Id.* § 3112(d)(2), (5).

The WRPA process is for planning only and aims to bolster voluntary conservation without requiring it.[114] The law does not allocate or permit water use or withdrawals and does not give the PA DEP enforcement powers to allocate or permit withdrawals.[115] Despite these limitations, Weston argues that the plans are important because they are already a mandatory consideration in some state regulations and their role as guidance documents will likely cause them to be "'considered and weighed' in a broad range of decisions."[116]

Well operators may be subject to reporting requirements because, under the WRPA, PA DEP requires registration and reporting of any withdrawals exceeding 10,000 gallons per day over a 30-day period or purchases of more than 100,000 gallons per day.[117] Importantly, the trigger amounts are calculated based on the total withdrawals of one person or entity from all points in one system.[118] So if a gas company has multiple wells in a watershed then the withdrawals from all of the wells over the 30-day period are added together.[119]

Taken together, the common law and water resource statutes offer limited protection for Pennsylvania's watersheds because the state ultimately lacks authority to regulate use by the most significant consumers. Though the common law requires reasonable and beneficial use of surface and groundwater, agriculture, drilling, mining, and industry are all beneficial and reasonable uses of water.[120] As such, the common law is unable to disqualify or limit those users to preserve watersheds. Furthermore, the common law is solely reactive; an individual must suffer harm to bring a claim. There is no opportunity for preventative management or planning through the courts. The Water Rights Act and the Pa. SDWA regulate withdrawals for public drinking water through a permitting system, but the focus is on quality control, not conservation or regulation of the amount used. Notably *Oley Township* does provide some limiting principles on water withdrawals by forcing public water suppliers to consider the impacts of water withdrawals on nearby resources.

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114. Swistock & Blanchet, *supra* note 107, at 2.
115. *Id.*
116. Weston, *supra* note 9, at 31.
117. *Id.*
118. *Id.*
119. *Id.*
120. Sanderson v. Pa. Coal Co., 86 Pa. 401, 408 (1878).

Nevertheless, the limitations do not apply to oil and gas well operators. Unfortunately, the WRPA is ineffective in curbing use in regions where use already exceeds safe yield.

C. Novel Statutory Interpretation

In the gaps left by federal regulations, common law, and state statutes, the PA DEP has claimed authority to review and approve use of water resources for shale gas development. Though the Pennsylvania Clean Streams Law does not grant the PA DEP authority to regulate withdrawal, it does allow regulation of "pollution" or "potential pollution."[121] The statute defines "pollution" broadly to include contamination which "will create or is likely to create a nuisance or to render such waters harmful . . . to public health, safety or welfare, or to . . . other legitimate beneficial uses, . . . wild animals, . . . [or] other aquatic life . . . by alteration of the physical, chemical or biological properties . . . ."[122] Drawing on the court's reasoning in *Oley Township* regarding the Pa. SDWA, the PA DEP reasons that water withdrawals that alter the physical, chemical, or biological properties of water are pollution or potential pollution, which the agency may regulate.[123] The Act allows the agency to issue orders to limit the pollution or "by rule or regulation, require that such activity be conducted only pursuant to a permit issued by the department."[124]

Rather than issue orders or promulgate regulations on fracking, the PA DEP has opted to institute a "water resource review system via administrative forms and guidance."[125] The PA DEP leverages the Oil and Gas Act's permitting requirements to compel drillers and operators to create Water Management Plans (WMPs) for Marcellus Shale developments.[126] This process developed out of an addendum the PA DEP required operators to file with permit applications.[127]

The PA DEP aims to provide a consistent framework for statewide water management.[128] The WMP requirement essentially

121. 35 PA. STAT. ANN. § 691.1 (West 2011).
122. *Id.*
123. Weston, *supra* note 9, at 32.
124. 35 PA. STAT. ANN. §§ 691.401, 691.402.
125. Weston, *supra* note 9, at 32.
126. David Jostenski, Pa. Dep't of Envtl. Prot., Water Management Plans 3, 5 (2010).
127. Weston, *supra* note 9, at 32.
128. *Id.* at 9.

applies existing protections for the Susquehanna River to the other basins in the state—the Delaware and the Ohio.

The WMP must identify water resources to be utilized, the basin affected, and any mitigation necessary to protect the resource, including analysis of low flow events.[129] Additionally, the operator must inform the local government of the withdrawal and create a monitoring and reporting plan.[130]

D. Interstate Water Compacts

A final component of Pennsylvania's regulation of water resources is the series of interstate compacts and agencies that protect its major water resources. The Delaware River Basin Commission (DRBC) is a federal–interstate compact agency established to govern water quality and quantity issues for the Delaware River's four basin states.[131] The DRBC adopts rules to manage the river apart from each state's regulations and has the power of equitable apportionment.[132] Each state, however, is responsible for overseeing the obligations imposed by the DRBC with respect to the river's watershed within that state. Currently, the DRBC is promulgating regulations for shale gas drilling that are generally more stringent than those in place in all basin states that permit drilling.[133]

The Susquehanna River Basin Commission (SRBC) is also a federal–interstate compact agency created to govern the use of the water and related natural resources of the Susquehanna River.[134] The SRBC has not attempted to regulate hydraulic fracturing, but the SRBC does regulate consumptive use if a user withdraws more than 100,000 gallons per day from ground or surface waters.[135] Users must gain approval from the SRBC, which has the power to limit the water withdrawal to the "reasonably foreseeable needs of the project operator," and to approve, deny, or modify a withdrawal based on a number of factors such as aquatic life, stream flow, or effects on other

129. *Id.* at 5.

130. *Id.* at 11.

131. *About DRBC*, DEL. RIVER BASIN COMM'N, http://www.nj.gov/drbc/about/ (last visited Feb. 23, 2012).

132. Alfonso, *supra* note 17, at 7.

133. *Draft Natural Gas Development Regulations*, DEL. RIVER BASIN COMM'N, http://www.state.nj.us/drbc/programs/natural/draft-regulations.html (last visited Feb. 13, 2012).

134. *Susquehanna River Basin Commission Overview*, SUSQUEHANNA RIVER BASIN COMM'N, http://www.srbc.net/about/geninfo.htm (last visited Feb. 13, 2012).

135. Alfonso, *supra* note 17, at 8.

water users.[136] Additional pass-by flow requirements at certain downstream locations can further limit withdrawals for shale gas production.[137]

The Great Lakes Commission (GLC) is an interstate compact agency that acts "to promote the orderly, integrated, and comprehensive development, use, and conservation of the water resources of the Great Lakes Basin."[138] Like the SRBC, the GLC requires shale-gas developers withdrawing more than 100,000 gallons per day in a 30-day period to register withdrawals.[139] The GLC requires each state to notify other GLC states, Quebec, and Ontario of "any proposal that intends to withdraw a new or increased consumptive use of 5 million [gallons per day] or greater in any 90-day period."[140]

III. THE OHIO RIVER BASIN COMMISSION AND IMPACTS ON THE THREE RIVERS

A. Water Resources of the Three Rivers Region

The Ohio River begins at the junction of the Allegheny and Monongahela Rivers in downtown Pittsburgh.[141] The three rivers are the culmination of more than 30,000 miles of rivers and streams in Pennsylvania, New York, and West Virginia.[142] Prior to the enactment of the CWA, the rivers were an industrial cesspool around the city.[143] Water regularly reached 130 degrees, steamboats couldn't use the rivers for fear of corrosion to their metal parts, municipal sewage was dumped directly into the river, and nearly every fish species died

136. *Id.*

137. *Id.*

138. *About the Great Lake Commission*, GREAT LAKES COMM'N (Oct. 20, 2010), http://www.glc.org/about/. The Council of Great Lakes Governors is a non-profit, non-partisan partnership of Governors of the Great Lakes states—Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin. The Premiers of Ontario and Quebec are associate members.

139. THE COUNCIL OF GREAT LAKES GOVERNORS, THE GREAT LAKES CHARTER: PRINCIPLES FOR THE MANAGEMENT OF GREAT LAKES WATER RESOURCES 6 (1985), *available at* http://www.cglg.org/projects/water/docs/GreateLakesCharter.pdf.

140. Alfonso, *supra* note 17, at 9.

141. *Ohio River Information*, U.S. ARMY CORPS OF ENG'RS (2011), http://www.lrp.usace.army.mil/nav/ohioback.htm.

142. John Dawes, *America's Three Rivers*, PITTSBURGHGREENSTORY.ORG, http://www.pittsburghgreenstory.org/html/3_rivers.html (last visited Feb 13, 2012).

143. *Id.*

out.[144] Today the rivers are a testament to the power of the CWA with the return of eighty-seven species of fish and twenty-seven species of freshwater mussels and clams; they are also the home of several endangered species.[145] Abandoned mine drainage programming also has reclaimed 440 miles of once-dead streams.[146]

Though the Ohio River Basin and its major tributaries do not traditionally suffer from a shortage of water, hydraulic fracturing still poses threats to the basin. Many streams and aquifers suffer from the effects of acid mine drainage, limiting potable water supplies.[147] The rock formations offer limited groundwater storage capacity, impeding development of large-volume water wells and causing well yield to vary from year to year.[148] During periods of low flow, the Monongahela is particularly susceptible to increased TDS levels that exceed state water quality and secondary drinking water standards.[149]

B. Inadequate Regulation

While the Ohio River is also the subject of an interstate compact, the Ohio River Valley Sanitation Commission (ORVSC) only regulates water quality.[150] Unlike the other commissions, the main actions of the ORVSC include setting wastewater-discharge standards, monitoring for chemical and physical properties of the waterways, and conducting special surveys and studies.[151] The ORVSC has been reluctant to exercise its authority, limiting its strategic plan to coordination of state efforts.[152]

Compared to other river basins in the state, the Three Rivers basin is more vulnerable to hydraulic fracturing because there is less control over activities occurring in the watershed. Though the City of Pittsburgh has issued a moratorium on shale development within city limits, the moratorium is more aimed at preventing drilling in a

144. *Id.*

145. *Id.*

146. *Id.*

147. Weston, *supra* note 9, at 5.

148. *Id.*

149. *Id.*

150. *About Us*, OHIO RIVER VALLEY WATER SANITATION COMM'N, http://www.orsanco.org/home (last visited Feb. 13, 2012).

151. *Id.*

152. *See* OHIO RIVER VALLEY WATER SANITATION COMM'N, STRATEGIC PLAN FOR THE OHIO RIVER VALLEY WATER SANITATION COMMISSION 1 (2008), *available at* http://www.orsanco.org/orsanco-strategic-plan (expressing ORANCO's mission of "coordinating the actions of the member states").

densely populated area than protecting the rivers.[153] In 2008, wastewater discharges into the Monongahela increased TDS levels to such a degree that the water corroded steel mill machinery.[154] The PA DEP responded by reducing drilling water discharges into the river and releasing water from dams upstream to dilute the pollution.[155]

In February 2011, a *New York Times* series focusing on hydraulic fracturing again raised concerns about wastewater discharge into the Monongahela and Allegheny.[156] At the request of the EPA, the PA DEP has begun testing the water for a broader scope of pollutants.[157] The EPA fears that Pennsylvania treatment facilities are unable to remove many of the pollutants in wastewater from fracking,[158] and has requested the PA DEP to test for radioactive contaminants, organic chemicals, metals, and dissolved solids. At this point, Pennsylvania lacks adequate water-quality testing stations on the rivers as the state is only testing seven critical locations. The PA DEP expects to introduce technical guidance for fracking wastewater treatment facilities in the near future.[159]

C. Recommendations

There are four basic categories of state regulation that a state could implement or improve to better protect the water resources of a region: (1) well development activities at the surface, (2) collection and disposal of flowback, (3) proximity of well sites to surface waters, and (4) information collection and reporting.[160]

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153. Joe Smydo, *City OKs Ban on Gas Drilling*, PITTSBURGH POST-GAZETTE (Nov. 17, 2010), http://www.post-gazette.com/pg/10321/1103877-53.stm.

154. Sapien & ProPublica, *supra* note 38.

155. *Id.*

156. Urbina, *supra* note 40.

157. Don Hopey, *EPA Asks State to Improve Gas Well Water Checks*, PITTSBURGH POST-GAZETTE (May 16, 2011), http://www.post-gazette.com/pg/11136/1146912-503-0.stm?cmpid=newspanel5.

158. *See* Letter from Shawn M. Garvin, Reg'l Adm'r, U.S. Envtl. Prot. Agency Region III, to Michael Krancer, Sec'y, Pa. Dep't of Envtl. Prot. (May 12, 2011), *available at* http://www.epa.gov/region03/marcellus_shale/pdf/letter/krancer-letter5-12-11.pdf.

159. *Pennsylvania DEP to Issue Technical Guidance on Wastewater Treatment Permitting*, PR NEWSWIRE (Nov. 3, 2011), http://www.prnewswire.com/news-releases/pennsylvania-dep-to-issue-technical-guidance-on-wastewater-treatment-permitting-133162903.html.

160. Wiseman, *supra* note 57, at 253.

1. Well Development Activities at the Surface

During initial site clearing and construction, Pennsylvania already requires operators to follow best management practices for sedimentation and erosion control for all well sites.[161] Additionally, Pennsylvania has recently adopted more stringent casing and cementing regulations[162] that may better address methane contamination[163] by reducing well pressure, among other things.[164] One potential area of improvement may be in disposal of cuttings from the drilling process and pit disposal of residual wastes. In both instances, the PA DEP only requires a 100-foot setback (that may be waived for pits containing only cuttings) from streams, wetlands, and water bodies,[165] and a 200-foot setback from drinking water supplies.[166] The setbacks and pit lining requirements could be revamped to prevent groundwater contamination or runoff to surface waters.

2. Collection and Disposal of Flowback

Pennsylvania has full authority to regulate collection and disposal of flowback water on land and water. The state's residual waste pit lining and on-land disposal regulations already address storage of wastewater on land.[167] These requirements were last modified in 2001 and should be revisited to ensure that they are adequate to address the contaminants associated with hydraulic fracturing chemicals and any dissolved solids that return from the wellbore, such as radioactive particles and benzene. Pennsylvania should also consider fluid treatment and management regulations akin to the provisions of RCRA because the components are hazardous wastes. Under the CWA, Pennsylvania has the ability to regulate discharges into its waterways and can address the significant

161. 25 PA. CODE § 102.4(b)(1) (2012).

162. *Id.* §§ 78.81–78.85.

163. *Hydraulic Fracturing: Pennsylvania Moves Forward With Regulations For Natural Gas Drilling, 'Fracking'*, HUFFINGTON POST (Oct. 12, 2010, 10:11 PM), http://www.huffingtonpost.com/2010/10/13/hydraulic-fracturing-penn_n_760788.html [hereinafter *Hydraulic Fracturing*].

164. Nicolle Bagnell & Ariel Nieland, *Stronger Gas Well Construction Standards are One Step Closer in Pennsylvania*, REEDSMITH ENVTL. L. RES. (Nov. 22, 2010), http://www.environmentallawresource.com/2010/11/articles/land-use/stronger-gas-well-construction-standards-are-one-step-closer-in-pennsylvania/.

165. 25 PA. CODE § 78.61.

166. *Id.* § 78.62(a)(6)–(7).

167. *See id.* §§ 78.62, 78.63 (detailing storage requirements).

TDS levels and other wastewater issues that the EPA has asked the state to investigate.

3. Proximity of Well Sites to Surface Waters

Pennsylvania does not take full advantage of its authority to regulate the location of wells in relation to other natural resources. Though Pennsylvania has setbacks of 200 feet from drinking water supplies that the property owner can waive,[168] New York has a 2000-foot setback that can only be overcome by a site-specific environmental review.[169] Pennsylvania should consider modifications to its setback provisions in light of the more stringent New York standard.

4. Information Collection and Reporting

The final area in which the state may consider increasing regulation is in information collection and reporting. Pennsylvania already has a reporting system for spills at drill sites,[170] but it could benefit from moving for further disclosures similar to those that normally apply in EPCRA to non-oil and gas substances. Pennsylvania has struggled to adequately track wastewater from fracking,[171] but legislation from 2010 now requires electronic tracking of wastewater, which may solve this issue.[172]

CONCLUSION

While Pennsylvania's regulations are becoming increasingly more protective of the environment in letter, it is important for PA DEP officials and elected officials at the local and state level to maintain credibility with stakeholders. Recent political developments indicate that shale-gas development in the Marcellus Shale may take precedence over protection of water resources. For example, a former energy executive was recently appointed to head the Department of Community and Economic Development and he was granted special authority to "expedite any permit or action pending in any agency

168. 58 PA. CONS. STAT. ANN. § 601.205(a) (West 2011); Wiseman, *supra* note 57, at 270.

169. Wiseman, *supra* note 57, at 270.

170. 25 PA CODE § 78.66 (2012).

171. The Associated Press, *Pennsylvania Seeks More Tests to Determine if Hydrofracking Contaminates Drinking Water*, SYRACUSE.COM (Apr. 7, 2011, 6:25 PM), http://www.syracuse.com/news/index.ssf/2011/04/pennsylvania_seeks_more_tests.html.

172. *Hydraulic Fracturing*, *supra* note 163.

where the creation of jobs may be impacted."[173] Such actions may lead to distrust of the PA DEP's commitment to protection of environmental quality in shale-gas producing regions.

As most of Pennsylvania sits atop the Marcellus Shale, the negative impacts of hydraulic fracturing have the potential to significantly damage the state's water resources. Because federal law fails to regulate hazardous fracking chemicals under RCRA, Pennsylvania must fully use the CWA, its own regulations, and common sense to address issues that arise as to water allocation and water quality. Nowhere will this be more important than in the Three Rivers region where there is no interstate water compact regulating water withdrawals or use of natural resources within the watershed.

In order to protect this watershed, Pennsylvania must first more stringently regulate discharge of wastewater into the Allegheny and Monongahela rivers under its CWA authority. Second, Pennsylvania should enact legislation to solidify the PA DEP's authority to regulate water withdrawals instead of allowing the fragile Clean Streams–Oil and Gas hybrid to serve as means of regulating water withdrawals for hydraulic fracturing. Third, elected officials and the PA DEP should avoid overtly political decisions that may erode public confidence that the PA DEP will protect Pennsylvania's water resources. These actions would likely improve Pennsylvania's ability to maintain the water quality of the Three Rivers region that it has worked hard to achieve.

173. Abrahm Lustgarten et al., *Pennsylvania Governor Gives Energy Executive Supreme Authority Over Environmental Permitting*, PROPUBLICA (Mar. 9, 2011, 11:50 PM), http://www.propublica.org/article/corbett-pa-energy-exec-authority-environment (internal quotation marks omitted).