DELAWARE RIVER BASIN COMMISSION

Proposed Amendments to the Administrative Manual and Special Regulations Regarding Natural Gas Development Activities; Additional Clarifying Amendments

PREAMBLE TO THE DRAFT RULE

I. Background

On September 13, 2017, the Commissioners by a Resolution for the Minutes directed the Executive Director to prepare and publish for public comment a revised set of draft regulations, to include: "(a) prohibitions relating to the production of natural gas utilizing horizontal drilling and hydraulic fracturing within the basin; (b) provisions for ensuring the safe and protective storage, treatment, disposal and/or discharge of wastewater within the basin associated with horizontal drilling and hydraulic fracturing for the production of natural gas where permitted; and (c) regulation of the inter-basin transfer of water and wastewater for purposes of natural gas development where permitted."

In accordance with the Commissioners' September 13 directive, the Commission is proposing amendments to its regulations and comprehensive plan to better provide for the planning, conservation, utilization, development, management and control of the basin's water resources in connection with the hydraulic fracturing of shale and other hydrocarbon bearing formations to produce oil and gas. The Commission proposes to prohibit high volume hydraulic fracturing within the basin to effectuate the comprehensive plan for the immediate and long term development and use of the water resources of the basin, and to conserve, preserve and protect the quality and quantity of the basin's water resources for uses in accordance with the comprehensive plan.

Through a series of policies and regulations establishing and amending its comprehensive plan, the Commission over the past half-century has established in-stream water quality standards throughout the basin, prohibited degradation of groundwater, and provided special protection to the non-tidal segment of the Delaware River to preserve its exceptionally high water quality and water supply values. As the agency through which the five signatory parties to the Compact collectively manage the basin's water resources on a regional basis, the Commission has taken these steps to meet public and private needs for, among other things, drinking water, recreation, power generation, and industrial activity, and to accommodate large out-of-basin diversions by the City of New York and the State of New Jersey that are authorized by the 1954 decree of the U.S. Supreme Court in the matter of *New Jersey v. New York*.[1]

Portions of Pennsylvania and New York comprising about 40 percent of the basin's geographic area are underlain by the Marcellus and Utica shales, geologic strata known to contain natural gas. Although the presence of commercially viable natural gas from these formations within the basin is not known, in regions of Pennsylvania west of the basin divide, oil and natural gas are extracted from the Marcellus and Utica formations by means of directional drilling and hydraulic fracturing using large volumes of water in a process referred to commonly in the region as "high volume hydraulic fracturing" (HVHF).[2] The South Newark basin formation, which underlies portions of Pennsylvania and New Jersey, may also contain oil and gas deposits capable of development by HVHF. All of the basin areas underlain by the Marcellus and Utica shales, with the exception of a small area of Schuylkill County, Pennsylvania, drain to waters the Commission has designated as "Special Protection Waters", due to their exceptionally high scenic, recreational, ecological, and/or water supply values. The Commission's water quality management policy objective for Special Protection Waters is "that there be no measurable change [in the quality of these waters] except toward natural conditions."[3]

During hydraulic fracturing, hydraulic fracturing fluid consisting primarily of water and recycled wastewater mixed with chemicals is injected through a well bore into the target rock formation under pressures great enough to fracture the rock. The fracturing fluid typically includes proppants (usually sand), which hold open the newly created fractures, allowing the gas to flow back through them and up the well to the surface. After a well is "stimulated" through hydraulic fracturing, much of the injected fracturing fluid, together with brines that were trapped within the target formation, is conveyed to the surface, where these fluids are collected and managed. The returned fluids, known as "flowback" and "produced water," contain chemicals used in the fracturing mixture, as well as salts, metals, radionuclides, and hydrocarbons from the target rock formation. As discussed in greater detail below, in the Marcellus region in Pennsylvania, the median quantity of water required to stimulate a natural gas well exceeds 4

[1] *See New Jersey v. New York,* 347 U.S. 995 (1954).

[2] *See generally,* New York State Department of Environmental Conservation, *Final Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program – Regulatory Program for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs,* May 2015 (hereinafter, NYS Final SGEIS). Available at: http://www.dec.ny.gov/energy/75370.html

[3] Delaware River Basin Water Code (hereinafter, "Water Code")(18 CFR Part 410), sec. 3.10.3 A.2.

million gallons for each fracturing event.[4] A single well may be fractured in multiple stages and/or multiple times,[5] and as many as twelve wells may be installed on a single well pad.[6] The volume of water and wastewater involved is thus significant.

The use of HVHF to extract oil and natural gas from tight shale formations presents risks, vulnerabilities and impacts to the quality and quantity of surface and ground water resources that have been documented extensively, including in comprehensive reports by the New York State Department of Environmental Conservation (NYSDEC)[7] and the United States Environmental Protection Agency (EPA)[8], among others. These reports identify the risks to water resources associated with each of the steps in the "hydraulic fracturing water cycle,"[9] as summarized below. At times, these steps or portions thereof may be identified by the Commission as separate projects. In addition, an EPA technical background document describes industry processes, pollutants generated, risks, and available treatment technologies for produced water from oil and gas extraction.[10] A significant number of data points in this document are provided for the Marcellus formation.

Water acquisition. The acquisition of water for use in HVHF may result in modifications to groundwater levels, surface water levels, and stream flows. The Susquehanna River Basin

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[4] James L. Richenderfer *et al.*, Water Use Associated with Natural Gas Development: An Assessment of Activities Managed by the Susquehanna River Basin Commission – July 2008 - December 2013, Pub. No. 299, April 2016 (hereinafter, "SRBC NG Water Use 2016"), p.39. Available at:
http://www.srbc.net/pubinfo/techdocs/NaturalGasReport/docs/SRBC_Full_Gas_Report_fs306397v1_20160408.pdf

[5] United States Environmental Protection Agency, *Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States,* Dec. 2016 (EPA-600-R-16-236Fa) (hereinafter, "EPA HF Study 2016"). Exec. Sum., p. 23, n.3 (explaining that in a multi-stage hydraulic fracturing operation, specific parts of the well are isolated and hydraulically fractured until the total desired length of the well has been hydraulically fractured.) Available at: https://www.epa.gov/hfstudy. *Also see,* 18 CFR 806.3 (SRBC regulations for review and approval of projects, defining "hydrocarbon development project" as including "all other activities and facilities associated with … the production, maintenance, operation, closure, plugging and restoration of [unconventional natural gas development] wells or drilling pad sites that require water for purposes including but not limited to, *re-stimulation* and/or *re-completion* of such wells …." (emphasis added)).

[6] *See e.g.,* Alex K. Manda et al., *Evolution of multi-well pad development and influence of well pads on environmental violations and wastewater volumes in the Marcellus shale (USA),* J. Environ. Manage, Sep. 1, 2014, 142:36-45. Available at https://www.ncbi.nlm.nih.gov/pubmed/24814546

[7] *See* NYS Final SGEIS 2016, *supra* n.1.

[8] *See* EPA HF Study 2016, *supra* n.5.

[9] The term "hydraulic fracturing water cycle" is used by the EPA to describe the five stages of this water-intensive activity: water acquisition, chemical mixing, well injection, produced water handling, wastewater disposal and reuse. EPA HF Study 2016, *Exec. Sum.*, pp. 7-9.
Extracted at: https://www.epa.gov/hfstudy/hydraulic-fracturing-water-cycle

[10] *See* United States Environmental Protection Agency, *Technical Development Document for the Effluent Limitations Guidelines and Standards for the Oil and Gas Extraction Point Source Category,* June 2016 (EPA-820-R-16-003) (hereinafter "EPA TDD 2016"). Available at:
https://www.epa.gov/sites/production/files/2016-06/documents/uog_oil-and-gas-extraction_tdd_2016.pdf

Commission (SRBC) has reported that for the period 2008 through 2013 an average of 4.3 million gallons of water were injected per fracturing event in natural gas wells within the Susquehanna basin.[11] During the same period, 84 percent of injected water was "fresh" water from surface water and groundwater sources, and the remaining 16 percent was recycled produced water or flowback water.[12] According to EPA, the median volume of water used per well fracturing event in Pennsylvania between January 2011 and February 2013 was 4.18 million gallons.[13] EPA further reports that in at least 10 percent of cases, the water use in Pennsylvania during the same period was over 6.6 million gallons per well.[14] EPA has reported that in the Marcellus formation in Pennsylvania, 82 to 90 percent of the base fluid used for hydraulic fracturing is fresh water that is naturally occurring and that the remaining base fluids (10 to 18 percent) are reused and recycled produced water.[15] Advances in horizontal drilling technology are leading to longer drill paths and the need for more fracturing fluid volumes for each path. According to SRBC, when the industry began lengthening its lateral well bores in 2013, the average amount of water used per fracturing event increased to approximately 5.1 to 6.5 million gallons per fracturing event.[16]

Withdrawals from surface and ground water in the amounts required for HVHF may adversely affect aquatic ecosystems and river channel and riparian resources downstream, including wetlands, and may diminish the quantity of water stored in an aquifer or a stream's capacity to assimilate pollutants. Because HVHF operations may significantly increase the volume of water withdrawn in a localized area, they may ultimately upset the balance between the demand on water resources and the availability of those resources for uses protected by the Commission's comprehensive plan, particularly during periods of low precipitation or drought.

Consumptive use. In contrast with most domestic and commercial water use, most water used for HVHF is used "consumptively," meaning it is not returned to the basin's usable ground or surface waters. According to the EPA, water accounts for 90 to 97 percent of all hydraulic fracturing fluids injected into a well for the purpose of extracting natural gas.[17] EPA reports further that produced water, or water that flows from and through oil and gas wells to the surface as a by-product of oil and gas production over a ten-year operations period, makes up only 10 to 30 percent of the fluid injected. Accordingly, EPA estimates that 70 to 90 percent of the water used in high volume hydraulic fracturing is permanently removed from the water cycle.[18] The SRBC's estimate is higher. SRBC reports that approximately 96 percent of water withdrawn by

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[11] SRBC NG Water Use 2016, p. 39.
[12] *Id.*
[13] EPA HF Study 2016, Exec. Sum., p. 11 (Table ES-1).
[14] *Id.*
[15] EPA TDD 2016, p. 43 (Table C-1).
[16] SRBC NG Water Use 2016, p. 43.
[17] EPA HF Study 2016, Exec. Sum., p. 10.
[18] *Id.,* p. 12 (Fig. ES-4(a)).

the natural gas industry is consumptively used in the hydraulic fracturing process and that the balance of the water is consumptively used for other activities at the drilling pads, such as well drilling, preparation of drilling muds and grout, dust control, maintenance operations, and site reclamation.[19] In contrast, the DRBC estimates that 90 percent of water withdrawn for domestic and commercial uses in the Delaware River Basin is returned to basin waters, either by infiltration into aquifers or by discharge to surface waters after treatment at a wastewater treatment facility.[20]

Chemical use. Although chemical additives generally make up the smallest proportion of the overall composition of hydraulic fracturing fluids, they pose a comparatively high risk to ground and surface water quality relative to proppants and base fluids.[21] Additives, which can be a single chemical or a mixture of chemicals, are combined with the base fluid to change its properties, including, for example, to adjust pH, increase fluid thickness, reduce friction, or limit bacterial growth. The EPA has identified 1,084 chemicals reported to have been added to hydraulic fracturing fluids between 2005 and 2013.[22] The choice of which additives to use depends on the characteristics of the targeted rock formation, and in some cases chemical information is considered Confidential Business Information and not disclosed by the fracturing operator.[23] Based upon EPA's analysis, the combination of activities and factors more likely than others to result in more frequent or more severe impacts to water resources are spills during the management of hydraulic fracturing fluids and chemicals that result in large volumes or high concentrations of chemicals reaching groundwater resources.[24] In May 2015, an EPA study compiled data on and characterized 457 hydraulic fracturing related spills that occurred between January 2006 and April 2012 in eleven states.[25] The study attributed these to equipment failure, human error, failure of container integrity, and other causes, including but not limited to well communication, weather and vandalism.[26] Storage, equipment, well or wellhead, hose or line, and "unknown" were among the identified sources.[27] Spills can affect both surface and groundwater resources, both locally and regionally, within the host state and in adjoining states.

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[19] SRBC NG Water Use 2016, p. 38.

[20] For comparison with climatically similar areas and the world, *see* Kimberly H. *Schaffer* and Donna L. Runkle, *Consumptive Water-Use Coefficients for the Great Lakes basin and Climatically Similar Areas,* U.S. Geological Survey Scientific Investigations Report 2007-5197, p. 13 (Fig. 7). Available at: https://pubs.usgs.gov/sir/2007/5197/

[21] EPA HF Study 2016, Exec. Sum., p.16

[22] *Id.* A comprehensive review of chemical additives is provided in EPA TDD 2016, pp. 43-47 (Sec. 1.2).

[23] EPA HF Study 2016, p. 5-20 (Text Box 5-2).

[24] *Id.,* Exec. Sum., p. 1.

[25] U.S. Environmental Protection Agency, *Review of State and Industry Spill Data: Characterization of Hydraulic Fracturing-Related Spills,* May 2015 (EPA/601/R-14/001) (hereinafter "EPA HF Spill Data 2015"), p. 1. Available at: https://www.epa.gov/hfstudy/review-state-and-industry-spill-data-characterization-hydraulic-fracturing-related-spills-1

[26] EPA HF Study 2016, p. 5-42

[27] *Id.*

Pollution from spills and from hydraulic fracturing has occurred in parts of Pennsylvania outside the basin where high volume hydraulic fracturing is occurring.[28]

Well drilling and construction. Well drilling, well construction and well stimulation associated with HVHF also carry risks for groundwater and surface water resources. These risks include turbidity or other disruptions in local ground water formations and local groundwater wells, and contamination of aquifers by fluids pumped into or flowing from rock formations penetrated by the drilling of the well, particularly in the event of a compromised well casing. Typically, the developable shale formations are vertically separated from potential freshwater aquifers by thousands of feet of sandstones and shales of moderate to low permeability. High-volume hydraulic fracturing is engineered to target the prospective hydrocarbon-producing zone. Although the induced fractures create a pathway to the intended wellbore, they typically do not create a discharge mechanism or pathway beyond the fractured zone where none existed before. However, because the well bore penetrates groundwater aquifers and can be a pathway for fluid movement to existing drinking water and other groundwater resources, the mechanical integrity of the well is an important factor that affects the frequency and severity of potential water resource impacts from pollutants. A well with insufficient mechanical integrity can increase the risk of impacts and allow unintended fluid movement, including into drinking water aquifers. Such defects can arise from inadequate well design or construction or can develop over the well's lifetime, including during hydraulic fracturing.[29] In particular, casing and cement can degrade over the life of the well because of exposure to corrosive chemicals, formation stresses, and operational stresses (e.g., pressure and temperature changes during hydraulic fracturing).[30] Gas migration can also potentially occur as a result of poor well construction (i.e., casing and cement problems), or through existing abandoned wells or faults, which may be intersected inadvertently by a new oil or natural gas well. The EPA examined these types of pathways for the migration of hydraulic fracturing fluids and liquids and/or gases that exist in the subsurface to affect the quality of subsurface drinking water resources and reported on failures and impacts to water resources in detail.[31]

Wastewater handling and disposal. "Produced water" (including "flowback" water) refers to any water or fluid returned to the surface through the production well as a waste product of hydraulic fracturing. This material may be stored in tanks or other containers on the pad site before it is transferred for off-site treatment and/or disposal. The composition of produced water depends on the composition of the injected hydraulic fracturing fluid and the composition of the

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[28] *See generally,* NYS Final SGEIS, Ch. X. Available at:
http://www.dec.ny.gov/docs/materials_minerals_pdf/fsgeis2015ch10.pdf
[29] EPA HF Study 2016, Exec. Sum., p. 24.
[30] *Id.*
[31] *Id.*, pp. 23-29. *Also see* Main Report, Ch. 6.

target formation. In the Marcellus region, produced water is generated in large quantities and often contains high concentrations of total dissolved solids (TDS or "salts") and constituents that may be harmful to human health and the environment. Produced water from HVHF in the Marcellus formation has been found to contain:[32]

- Salts, including chloride, bromide, sulfate, sodium, magnesium, and calcium;
- Metals, including barium, manganese, iron, and strontium;
- Naturally-occurring organic compounds, including benzene, toluene, ethylbenzene, xylenes(BTEX), and oil and grease;
- Radioactive materials, including radium; and
- Hydraulic fracturing chemicals and their chemical transformation products.

The disposal of produced water poses a significant risk to the water resources of the basin if the wastewater is not properly managed. The concentration of TDS in produced water can be high enough that if discharged untreated to surface water, the potential exists to adversely affect designated uses of surface water, including drinking water, aquatic life support, livestock watering, irrigation, and industrial use. Because produced water contains high TDS and dissolved inorganic constituents that most publicly owned treatment works and other municipal wastewater treatment facilities are not designed to remove, these constituents can be discharged untreated from such facilities; can disrupt treatment processes, for example by inhibiting biological treatment; can accumulate in biosolids (sewage sludge), limiting their beneficial use; and can facilitate the formation of harmful disinfection byproducts.[33] Where produced water has been discharged to domestic wastewater treatment facilities in the past, elevated concentrations of chloride and bromide have been documented in the receiving waters.[34] The discharge of bromide upstream of drinking water intakes has led in documented instances to the formation of carcinogenic disinfection by-products at drinking water utilities.[35]

The EPA since 1979 has required zero discharge of pollutants to waters of the United States from onshore oil and gas extraction wastewater. In 2016 EPA finalized a rule establishing pretreatment standards for discharges of wastewater from onshore unconventional oil and gas extraction facilities to municipal sewage treatment plants (also known as "publicly owned

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[32] *See generally,* EPA TDD 2016, pp. 59-81 (part C.3) for a comprehensive characterization of produced water that includes a significant number of data points for the Marcellus formation.

[33] United States Environmental Protection Agency, Effluent Limitations Guidelines and Standards for the Oil and Gas Extraction Point Source Category, Final Rule, 81 Fed. Reg. 41845, 41847c.

[34] William D. Burgos et al., *Watershed-Scale Impacts from Surface Water Disposal of Oil and Gas Wastewater in Western Pennsylvania.* Environ. Sci. Technol., 2017, 51 (15), pp. 8851–8860.
Available at: http://pubs.acs.org/doi/abs/10.1021/acs.est.7b01696

[35] Kimberly M. Parker et al., *Enhanced formation of disinfection byproducts in shale gas wastewater-impacted drinking water supplies.* Environ Sci Technol. 2014 Oct 7; 48 (19), pp. 11161-9.
Available at: http://pubs.acs.org/doi/abs/10.1021/es5028184

treatment works" or POTWs).[36] The recent EPA rule will protect POTWs from disruptions in their operations that can be caused by these wastewaters. However, the rule does not extend to commercially owned treatment works that primarily treat domestic and commercial wastewater, and it does not address the discharge to POTWs of produced water that has been partially treated at centralized waste treatment facilities. Thus, significant risks associated with the treatment and discharge of produced water remain outside the scope of current federal regulations.

Siting and Landscapes. Certain water resources in the basin have high water resource value because of their excellent water quality or their exceptional ability to perform water supply, ecological, recreational or other water-related functions. The Commission has classified certain of these waters as Special Protection Waters through provisions of its Water Code incorporated in the comprehensive plan.[37] The Water Code seeks to maintain or improve the condition of these water resources through regulatory requirements such as prevention of measurable change to existing water quality, evaluation of natural wastewater treatment system alternatives, conditions or limitations on wastewater treatment facilities and control of non-point sources.[38]

Many high value water resources are associated with and dependent on their surrounding landscapes. Special Protection Waters are located in the upper portion of the basin where forested headwater areas and riparian buffers slow the rate and volume of stormwater runoff, replenish groundwater that serves as a source of drinking water and sustains stream flow, and control the introduction of pollutants into streams. These landscape features are particularly effective at controlling non-point source pollution that may occur following precipitation events.

High volume hydraulic fracturing and the related alteration of landscapes required to support that activity pose risk to high value water resources. It is expected that practically all of the development and related disturbances from high volume hydraulic fracturing would occur in the drainage area of Special Protection Waters.[39] Approximately 70 percent of the basin area underlain by the Marcellus and Utica shales (largely in the drainage area of Special Protection Waters) is forested. The average total disturbance associated with a single well pad, including associated access roads and utility corridors, is estimated at 7.7 acres.[40] Off-site facilities such as gathering lines involve additional disturbances. These landscape changes will reduce forested areas and potentially vegetated buffers, increase non-point source pollution, diminish

[36] *Id.,* pp. 41485-41857.
[37] *See* DRBC Water Code section 3.10.3 A.2, 18 CFR Part 410.
[38] *Id.*
[39] *See* DRBC map at: http://www.nj.gov/drbc/library/documents/maps/SPW-MarcellusShale.pdf
[40] E.T. Slonecker *et al.*, Landscape Consequences of Natural Gas Extraction in Allegheny and Susquehanna Counties, Pennsylvania, 2004–2010; U.S. Department of the Interior U.S. Geological Survey, Open-File Report 2013–1025, p. 19 (Table 2) (converted to acres).

groundwater infiltration, and risk adversely affecting water quality and quantity in surface and groundwater. Because high volume hydraulic fracturing would most likely occur in headwater areas in the drainage area to Special Protection Waters, the risks of degrading water resources and impairing the effectuation of the comprehensive plan are of particular concern.

Uncertainty. The comprehensive EPA and New York DEC studies cited above report multiple instances of damage to water resources associated with all stages of the natural gas development process, and importantly, both sources emphasize the degree of uncertainty regarding potential future effects. The EPA report states:

> *"Cases of impacts were identified for all stages of the hydraulic fracturing water cycle. Identified impacts generally occurred near hydraulically fractured oil and gas production wells and ranged in severity, from temporary changes in water quality to contamination that made private drinking water wells unusable… However, significant data gaps and uncertainties in the available data prevented us from calculating or estimating the national frequency of impacts on drinking water resources from activities in the hydraulic fracturing water cycle. The data gaps and uncertainties described in this report also precluded a full characterization of the severity of impacts."*[41]

The New York State DEC study asserts:

> *"…a broad range of experts from academia, industry, environmental organizations, municipalities, and the medical and public health professions commented and/or provided their analyses of high-volume hydraulic fracturing. The comments referenced an increasing number of ongoing scientific studies across a wide range of professional disciplines. These studies and expert comments evidence that significant uncertainty remains regarding the level of risk to public health and the environment that would result from permitting high-volume hydraulic fracturing in New York, and regarding the degree of effectiveness of proposed mitigation measures. In fact, the uncertainty regarding the potential significant adverse environmental and public health impacts has been growing over time.*
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> *….*
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> *"Potential significant adverse impacts on water resources exist with regard to potential degradation of drinking water supplies; impacts to surface and underground water resources due to large water withdrawals for high-volume hydraulic fracturing; cumulative impacts; stormwater runoff; surface spills, leaks*

[41] EPA HF Study 2016, Exec. Sum., p. 2.

and pit or surface impoundment failures; groundwater impacts associated with well drilling and construction and seismic activity; [and] waste disposal…."[42]

Additional detail regarding damages to water resources and the risks, vulnerabilities and impacts to surface and ground water resources associated with HVHF can be found in the cited reports.

II. Related Statutory and Regulatory Provisions

The proposed rules regarding hydraulic fracturing arise from the following provisions, among others, of the Commission's organic statute, the Delaware River Basin Compact ("Compact"),[43] and determinations that have been codified in the Delaware River Basin Water Code and incorporated into the Commission's comprehensive plan:

- "The signatory parties [to the Compact] recognize the water and related resources of the Delaware River Basin as regional assets vested with local, state, and national interests, for which they have a joint responsibility."[44]

- Approximately 15 million people "… of the United States … [rely on water] from the Delaware River Basin … and the … economic development of the entire region and the health, safety, and general welfare of its population are and will continue to be vitally affected by the use, conservation, management, and control of the water and related resources of the Delaware River Basin."[45]

- "The commission may assume jurisdiction to control future pollution and abate existing pollution in the waters of the basin, whenever it determines after investigation and public hearing upon due notice that the effectuation of the comprehensive plan so requires."[46]

- "The waters of the Delaware River Basin are limited in quantity and the basin is frequently subject to drought warnings and drought declarations due to limited water supply storage and streamflow during dry periods. Therefore, it shall be the policy of the Commission to discourage the exportation of water from the Delaware River Basin."[47]

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[42] NYS Final SGEIS 2016, pp. 1, 13.

[43] United States Public Law 87-328, Approved Sept. 27, 1961, 75 Statutes at Large 688; 53 Delaware Laws, Ch. 71, Approved May 26, 1961; New Jersey Laws of 1961, Ch. 13, Approved May 1, 1961; New York Laws of 1961, Ch. 148, Approved March 17, 1961; Pennsylvania Acts of 1961, Act. No. 268, Approved July 7, 1961.

[44] *Id.*, Part I, 1st Whereas clause.

[45] *Id.,* 8th Whereas clause.

[46] *Id.,* § 5.2.

[47] Water Code, § 2.30.2.

- "[T]he basin waters have limited assimilative capacity and limited capacity to accept conservative substances without significant impacts. Accordingly, it also shall be the policy of the Commission to discourage the importation of wastewater into the Delaware River Basin that would significantly reduce the assimilative capacity of the receiving stream on the basis that the ability of Delaware River Basin streams to accept wastewater discharges should be reserved for users within the basin."[48]

- "It is the policy of the Commission that there be no measurable change in existing water quality except towards natural conditions in waters considered by the Commission to have exceptionally high scenic, recreational, ecological, and/or water supply values. Waters with exceptional values may be classified by the Commission as either Outstanding basin Waters or Significant Resource Waters."[49]

- "It is the policy of the Commission to give no credit toward meeting wastewater treatment requirements for wastewater imported into the Delaware basin."[50]

- "The underground water resources of the basin shall be used, conserved, developed, managed, and controlled in view of the need of present and future generations, and in view of the resources available to them. To that end, interference, impairment, penetration, or artificial recharge shall be subject to review and evaluation under the Compact."[51]

- No substances or properties which are in harmful or toxic concentrations or that produce color, taste, or odor of the water shall be permitted or induced by the activities of man to become ground water."[52]

- "[T]he Commission may establish requirements, conditions, or prohibitions which, in its judgment, are necessary to protect ground water quality."[53]

- "The Commission has determined that allocations of the waste assimilative capacity of the Delaware River Estuary are necessary to maintain stream quality objectives in Zones 2, 3, 4 and 5 for the following pollutants: (a) acute toxicity; and (b) chronic toxicity."[54]

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[48] *Id*.
[49] *Id.,* § 3.10.3. A.2.
[50] *Id.,* § 2.30.6.
[51] *Id.*
[52] *Id.,* § 3.40.5 B.1.
[53] *Id.,* § 3.40.5 B.3.
[54] DRBC Resolution No. 2000-4, "Be it resolved" par. 4.

- "The Commission [has determined] that allocations of the waste assimilative capacity of the Delaware River Estuary are necessary to maintain stream quality objectives in Zones 2 and 3 for the following pollutants: (a) 1, 2 dichloroethane; (b) tetrachloroethene" [55]

III. Summary of Proposed Rules

Prohibition. Section 5.2 of the Compact authorizes the Commission to "assume jurisdiction to control future pollution … in the waters of the basin, whenever it determines after investigation and public hearing upon due notice that the effectuation of the comprehensive plan so requires." It further authorizes the Commission to control pollution from industrial or other waste originating within a basin state so that the pollution does not "injuriously affect the waters of the basin as contemplated by the comprehensive plan." The Commission may also adopt rules, regulations and standards to control future pollution. Considering the totality of the risks that HVHF poses to basin water resources, the Commission proposes in Section 440.3(b) of the draft rule to determine that controlling pollution by prohibiting high volume hydraulic fracturing in the basin is required to effectuate the comprehensive plan, avoid injury to the waters of the basin as contemplated by the comprehensive plan and protect the public health and preserve the waters of the basin for uses in accordance with the comprehensive plan.

Water exports. The transfer of surface water, groundwater, treated wastewater or mine drainage water, at any rate or volume, for utilization in hydraulic fracturing to produce oil and gas outside the Delaware River Basin is proposed to require Commission approval. Currently, exports of water from the basin of less than the daily average quantity of 100,000 gallons are deemed to have no substantial effect on the basin's water resources and are thus not reviewed by the Commission under section 3.8 of the Compact. The Commission has a longstanding policy of discouraging exportations of water on the grounds that the availability of water to meet in-basin needs is limited and low-flow and drought conditions are frequent. Unlike regulated withdrawals for domestic, commercial and industrial water supplies, withdrawals of large quantities of water for hydraulic fracturing to produce oil and gas have the potential, if unregulated, to occur through de-centralized, periodic and transient means and thus to adversely affect headwater streams and minimum flows of surface and groundwater, and to impair uses protected by the Commission's comprehensive plan. The proposed rule will make all proposed exports of water for oil and gas extraction subject to the requirement that alternatives involving no exportation be analyzed and that the water resource, economic and social impacts of the proposal be evaluated.

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[55] *Id.,* "Be it resolved" par. 1.

Wastewater. As set forth above, the data available on produced water (including flowback) from hydraulically fractured wells in the Marcellus formation indicate that this waste stream is unlike other industrial and domestic waste streams treated and discharged in the Delaware River Basin, and that it poses significant risks to human health and the environment if improperly handled. Under the proposed rules, the "produced water" from the hydrocarbon-bearing strata during oil and gas extraction is broadly defined to include untreated produced water, diluted produced water, and produced water mixed with other wastes. The rule provides that this material may not be transferred to, treated by or discharged from or to a new or existing wastewater treatment facility located within the Delaware River Basin, at any volume or rate, except in accordance with an approval in the form of a docket issued by the Commission to the owner or operator of the wastewater treatment facility or in accordance with a state permit issued pursuant to a duly adopted administrative agreement between the Commission and the host state. The rule further provides that produced water may not be treated within the basin except at a centralized waste treatment facility (CWT) as that term is defined by the EPA in 40 CFR part 437 and may not be discharged within the basin without treatment at a CWT. Because current EPA regulations governing treatment by CWTs do not include limitations for pollutants commonly found in produced water, such as total dissolved solids, barium, bromide, radium and strontium,[56] the proposed rule also places conditions on the treatment and discharge of wastewater or effluent resulting from the treatment of produced water by a CWT ("CWT wastewater") before the CWT wastewater can be discharged to basin waters or to another treatment facility within the basin.

The Commission already has in place a policy to discourage the importation of wastewater into the basin due to the limited capacity of the basin's waters to assimilate waste. Proposals to import produced water and CWT wastewater into the basin will be subject to this policy and to the requirements that alternatives involving no importation be analyzed and that the water resource, economic and social impacts of the proposal be evaluated.

Under the proposed rules, projects involving the treatment and discharge of produced water within the basin must meet the more stringent of applicable federal, state and DRBC requirements. Additional effluent limitations are proposed to apply to such projects for TDS, whole effluent toxicity, and a set of "pollutants of concern" identified on the basis of produced water characterizations provided by EPA in a 2016 technical document.[57] The majority of the

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[56] United States Environmental Protection Agency, Final 2014 Effluent Guidelines Program Plan, July 2015 (EPA-821-R-15-002), p. 5-4 (sec. 5.3.2). Available at: https://www.epa.gov/sites/production/files/2015-09/documents/final-2014-effluent-guidelines-program-plan_july-2015.pdf. A detailed EPA study of the CWT industry focused on facilities accepting oil and gas extraction wastewaters is ongoing. *See* Preliminary 2016 Effluent Guidelines Program Plan, June 2016 (EPA-821-R-16-001), p. 6-1 (sec. 6.1).

[57] *See* EPA TDD 2016, pp. 59-81 (Part C.3).

EPA's primary and secondary drinking water standards are also proposed as treatment levels for produced water discharged to a receiving waterbody designated for use as a public water supply. Treatability studies will be required to ensure that pollutant loads from natural gas wastewater are thoroughly characterized and that treatment ensures these pollutants are effectively reduced or eliminated, such that applicable effluent limits, stream quality objectives, protected uses, and in the case of Special Protection Waters, the "no measurable change" objective, are attained. Because the proposed rule requires treatment to "background concentrations" for pollutants of concern in many instances, the Commission is simultaneously publishing draft guidance on acceptable methods for determining background concentrations of these pollutants.

Other changes. Revisions to the Commission's thresholds for review set forth at 18 CFR 401.35 are proposed to establish that certain activities relating to hydraulic fracturing in hydrocarbon-bearing formations are deemed to constitute projects having a substantial effect on water resources of the basin and are thus subject to review under Section 3.8 of the Compact. These include: the importation, treatment, or discharge to basin land or water of "produced water" as defined by the rule; and the exportation of water from the basin for uses related to hydraulic fracturing. Although certain additional activities and facilities on a well pad site could be separately identified by the Commission as projects, in light of the proposed prohibition, no changes to existing rules are proposed in this regard at this time. Minor changes are concurrently proposed to existing thresholds for the Commission's review of leachate discharges and wetlands.

To provide for appropriate fees to cover the cost of reviews of new classes of projects deemed to require the Commission's approval, changes are also proposed to section 401.43 (regulatory program fees).

IV. Executive Director Determinations

The final regulations relating to natural gas development when adopted will supersede and replace the Executive Director's Determinations issued on May 19, 2009, June 14, 2010 and July 23, 2010.