

18 CFR Parts 410 and 440

**Importations of Water into and Exportations of Water from the Delaware River Basin and
Discharges of Wastewater from High Volume Hydraulic Fracturing and Related Activities**

Comment and Response Document

December 7, 2022



Delaware River Basin Commission

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LIST OF ACRONYMS AND ABBREVIATIONS

Acronym	Definition
API	American Petroleum Institute
BTEX	Benzene, ethylbenzene, toluene and xylene
CAS	Chemical Abstracts Service
CDC	Centers for Disease Control and Prevention
C.F.R.	Code of Federal Regulations
CO ₂	Carbon Dioxide
CWT	Centralized waste treatment
DBP	Disinfection byproduct
DRB	Delaware River Basin
DCS	Damascus Citizens for Sustainability
DRBC	Delaware River Basin Commission
DRN	Delaware Riverkeeper Network
dSGEIS	Draft Supplement Generic Environmental Impact Statement (2009)
EDC	Endocrine disrupting chemical
EIA	U.S. Energy Information Administration
EPA	Environmental Protection Agency
EPT	The EPT index is the number of taxa in the insect orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies)
GHG	Greenhouse gas
GLD	Gas leak drainage
HVHF	High volume hydraulic fracturing
IPCC	Intergovernmental Panel on Climate Change
LWV	League of Women Voters
MG	Million gallons per month
MSC	Marcellus Shale Coalition
NJDOH	New Jersey Department of Health
NPDES	National Pollutant Discharge Elimination System
NRDC	Natural Resources Defense Council
NYC	New York City
NYSDEC	New York State Department of Environmental Conservation
OGW	Oil and gas wastewater
PA	Pennsylvania
PADEP	Pennsylvania Department of Environmental Protection
PADEP BOGM	PADEP Bureau of Oil and Gas Management
PCBs	Polychlorinated biphenyls
PSR	Physicians for Social Responsibility

Acronym	Definition
PubMed	Searchable Database of the US National Library of Medicine, National Institutes of Health
SRBC	Susquehanna River Basin Commission
TDS	Total dissolved solids
TENORM	Technologically Enhanced Naturally Occurring Radioactive Material
THMs	Trihalomethanes
U.S.C.	United States Code
UDS&RR	Upper Delaware Scenic and Recreational River
US or U.S.	United States (of America)
USGS	United States Geological Survey
VOC	Volatile organic compound

NOTE ON TERMINOLOGY

The term “HVHF wastewater” is used in this Comment and Response Document as shorthand for the term “Wastewater from HVHF and HVHF-related activities,” which is defined in the final regulations, at 18 C.F.R. 440.2, as shown below:

Wastewater from HVHF and HVHF-related activities is:

- (1) Any wastewater, brine, or sludge containing chemicals, naturally occurring radioactive materials, heavy metals or other contaminants that have been used for or generated by high volume hydraulic fracturing or HVHF-related activities;
- (2) Leachate from solid wastes associated with HVHF-related activities, except if the solid wastes were lawfully disposed of in a landfill within the Basin prior to the effective date of this rule; and
- (3) Any products, co-products, byproducts or waste products resulting from the treatment, processing or modification of the wastewater described in paragraphs (1) and (2) of this definition.

Section 440.2 defines “HVHF-related activities” as follows:

HVHF-related activities are:

- (1) Construction of an oil or natural gas production well that is to be stimulated using HVHF as defined in this section;
- (2) Chemical mixing or storage of proppant, chemicals and other additives to make fracturing fluid; and
- (3) Management of wastewater from hydraulic fracturing, including storage, disposal, treatment, or reuse in hydraulic fracturing operations or other uses.

1. INTRODUCTION

1.1 Background

The Delaware River Basin Commission (the “Commission” or “DRBC”) is a federal-interstate compact agency formed by concurrent legislation of Delaware, New Jersey, New York, Pennsylvania, and the United States in 1961¹ to manage the water resources of the Delaware River Basin (“Basin”) without regard to political boundaries.² [The Commissioners](#) are, *ex officio*, the governors of the Basin states³ and the Division Engineer, North Atlantic Division, United States Army Corps of Engineers, who represents the United States.⁴

By Resolution No. 91-9 on June 19, 1991, the Commissioners amended the Commission’s Comprehensive Plan by the addition of policies and regulations relating to transfers of water into and out of the Basin. These provisions were later codified in the [Delaware River Basin Water Code](#) (the “Water Code”).⁵

The Commission on [November 30, 2017 proposed regulations](#) (the “2017 draft rule”) that in part concerned inter-Basin transfers of water and wastewater associated with high volume hydraulic fracturing (“HVHF”) and that addressed the treatment and discharge of wastewater generated by HVHF. Concurrently with adoption of its final rule by [Resolution No. 2021-01](#) on February 25, 2021, prohibiting HVHF in hydrocarbon bearing rock formations in the Basin, the Commission withdrew from consideration those provisions of the 2017 draft rule that concerned the exportation of water to support HVHF and the importation, treatment, and discharge of “produced water” and “CWT wastewater” as defined therein.⁶

By a [Resolution for the Minutes on February 25, 2021](#), the Commissioners directed the Executive Director to prepare and publish for public comment a set of amendments to the Comprehensive Plan and DRBC regulations that would update the Commission’s policies and provisions concerning importation and exportation of water and wastewater from and into the Basin. The Resolution also authorized the Executive Director “to include such other proposed amendments . . . as [the Executive Director, in consultation with the Commissioners] deem necessary or appropriate.”

In accordance with the Commissioners’ February 25, 2021 directive, the Commission in October 2021 published for public comment proposed amendments to its Comprehensive Plan and

¹ Pub. L. No. 87-328, 75 Stat. 688, Approved Sept. 27, 1961; 53 Del. Laws ch. 71, Approved May 26, 1961; 1961 N.J. Laws ch. 13, Approved May 1, 1961; 1961 N.Y. Laws ch. 148, Approved Mar. 17, 1961; 1961 Pa. Laws Act 268, Approved July 7, 1961 (the “Compact”).

² *Id.* § 1.3(e).

³ *Id.* § 2.2.

⁴ Water Resources Development Act of 2007, § 5019(a).

⁵ Water Code, § 2.30 (prior to amendment by the final rules). The Water Code has been incorporated by reference into the Code of Federal Regulations at 18 C.F.R. § 410.1.

⁶ 83 Fed. Reg. 1589, 1591 (defining “produced water” as “any water or fluid returned to the surface through the production well as a waste product of hydraulic fracturing,” and defining “CWT wastewater” as “wastewater or effluent resulting from the treatment of produced water by a centralized waste treatment facility (“CWT”)”).

regulations to better provide for the planning, conservation, utilization, development, management and control of the Basin's water resources in connection with: the importation of water, including wastewater, into the Basin; the exportation of water, including wastewater, from the Basin; and the discharge of wastewater from HVHF and HVHF-related activities ("HVHF wastewater").* The final rules amend the Water Code by clarifying the circumstances in which exportations of water, including wastewater, from the Basin and importations of water, including wastewater, into the Basin are considered by the Commission and the factors to be used in evaluating whether such proposed imports and exports of water may be approved.⁷ To effectuate the Comprehensive Plan for the immediate and long-term development and use of the water resources of the Basin, the final rules also prohibit the discharge of HVHF wastewater to waters or land within the Basin.⁸ The final rule includes amendments to Article 4 of the Commission's Water Quality Regulations⁹ (the "Water Quality Regulations") to facilitate the alignment of certain Basin state regulations and discharge permits with the Commission's Special Regulations by incorporating into the Water Quality Regulations the prohibition on the discharge of wastewater from HVHF and related activities.¹⁰

The October 2021 proposed rule amendments, Notice of Proposed Rulemaking, and a link to the comments received on the proposal can be found on the Commission's website at:

https://www.state.nj.us/drbc/meetings/proposed/notice_import-export-rules.html.

1.2 Public Input Purpose and Process

Multiple opportunities for public input on this rulemaking were provided during a 124-day comment period that ran from October 28, 2021 through February 28, 2022. Written comments were accepted throughout the comment period through an on-line comment intake system. An exception process was provided for those who lacked access to the on-line system or were otherwise unable to use it. The Commission received no requests for exceptions.

Opportunities for oral comment included five virtual public hearings at the dates and times listed below.

- Hearing #1: December 8, 2021 – 2:30 p.m.
- Hearing #2: December 8, 2021 – 6:30 p.m.
- Hearing #3: December 15, 2021 – 1:00 p.m.
- Hearing #4: December 15, 2021 – 4:00 p.m.
- Hearing #5: February 3, 2022 – 1:30 p.m.

* See also Note on Terminology in front matter (p. iv).

⁷ See Water Code § 2.30 (as amended by the final rules).

⁸ See 18 C.F.R. § 440.4.

⁹ See Water Quality Regulations § 4.50 (as amended by the final rules). The Water Quality Regulations have been incorporated by reference into the Code of Federal Regulations at 18 C.F.R. § 410.1.

¹⁰ The Basin states have promulgated regulations incorporating the Water Quality Regulations as state requirements.

Enhanced opportunities for written comment and for oral comment in connection with the final public hearing on February 3, 2022 are described below:

- Real-time English-to-Spanish and Spanish-to-English professional translation was provided on a pilot basis. Hearing attendees could choose to participate in the virtual hearing in either English or Spanish.
- Individuals without convenient access to a computer or the internet could join the virtual hearing by phone using a new toll-free number.
- DRBC's website was improved by the addition of an interactive language translation widget capable of translating web-based formatted text on any of DRBC's web pages from English to over 100 different languages.
- The Commission's rulemaking notice and draft rules were published on the DRBC website in Spanish, and a process was established for requesting certified translations of all rulemaking documents into additional languages.

The Commission received 2,388 written "submissions" through its online comment system. These submissions are available for review and download at:

<https://hearing.drbc.commentinput.com/?id=x2K8A>

In many cases, a single written "submission" included two or more "comments" by different individuals or organizations. Some submissions consisted of written petitions with multiple signers. In many cases, similar or identical comments were submitted by multiple commenters using form letters or template language provided by others. Commenters were not limited to a single submission, and some commenters offered two or more submissions. The 2,388 figure represents the number of individual written submissions the Commission received during the comment period without regard to the number of comments within a submission, the number of signers to a submission or a comment, or the number of submitters making a joint submission. Within this comment and response document ("CRD"), issues raised by multiple commenters are described as such. In evaluating the comments, the staff and Commissioners evaluated and gave resulting weight to the substance and scientific support for a comment rather than the number of times it was submitted.

The Commission also received 73 oral comments during its five public hearings and evaluated these in the same manner as the evaluation of written comments. Every person who wished to speak at each of the five hearings was afforded an opportunity to do so. Transcripts of the public hearings are available for review on the DRBC web site at:

- [Hearing #1: 12/08/2021 Transcript](#)
- [Hearing #2: 12/08/ 2021 Transcript](#)
- [Hearing #3: 12/15/ 2021 Transcript](#)
- [Hearing #4: 12/15/ 2021 Transcript](#)
- [Hearing #5: 02/03/2022 Transcript](#)

The Commissioners, in consultation with the DRBC staff and staff of their respective agencies, carefully reviewed and considered all of the duly submitted public comments before voting to adopt final rules and incorporate them into the Comprehensive Plan.

1.3 Organization of Comments and Responses

This CRD is generally organized by proposed rule section. In some cases, a single comment concerned multiple rule sections. In such cases, a response may be repeated, cross-referenced to another section, or addressed in a general summary response. In many instances, similar or identical comments were submitted by multiple individuals and organizations. The Commission staff reviewed all the comments and then distilled those with similar themes into “statements of concern.” Each statement of concern is a representative quoted or paraphrased version of one or more comments on a shared theme. The Commission has responded to each statement of concern. The process of screening, grouping, paraphrasing and organizing comments for response is depicted in Figure 1.

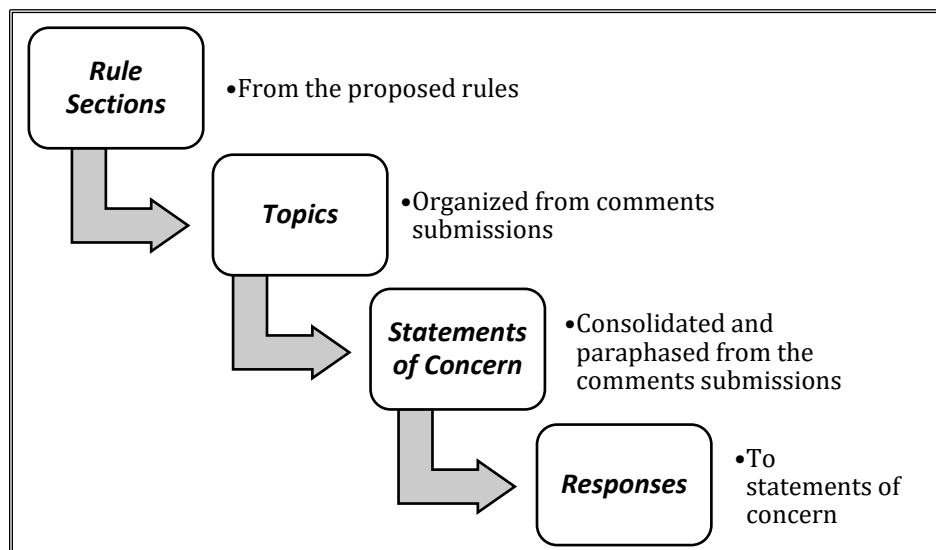


Figure 1: Process for organizing comment submissions and responses

The Commission also received comments on subjects outside the scope of the rules, and in some cases, outside the scope of the Commission’s authority as defined by the Delaware River Basin Compact. To provide a complete and comprehensive view of the comments received, the staff developed statements of concern for these comments. In some cases, responses to these out-of-scope submissions are provided; however, in other cases the Commission simply notes that the comments are beyond the scope of the proposed action.

Footnotes to statements of concern (designated by “SC-” followed by a number) within this CRD are footnotes that appeared in the original comments (although the format of these notes may differ from that in the original comments). Footnotes to the Commission’s responses (designated by “R-” followed by a number) are to authorities relied on by the Commission or references furnished by it for the benefit of readers. The “References” table at the end of this CRD includes only those sources cited in the Commission’s responses, not those referenced solely by commenters.

2. RESPONSE TO COMMENTS – AUTHORITY

STATEMENT OF CONCERN (SC-1)

Many commenters suggested that the Commission has the authority and should exercise it to (i) expand the scope of the proposed regulations to prohibit any and all importation, transportation, storage, and treatment of wastewater from high volume hydraulic fracturing (“HVHF”) and HVHF-related activities (in accordance with the “Note on Terminology,” such wastewater is hereinafter referred to as “HVHF wastewater”) within the Delaware River Basin, and (ii) expand the proposed regulations to prohibit any and all exportations of water or wastewater to support hydraulic fracturing outside the Basin. Some commenters averred that “the DRBC has the authority to protect our waters from the impacts of the harmful, toxic, and forever chemicals—and all the unknown chemicals—in fracking wastewater” by expanding the scope of its regulations to prohibit treatment, storage, underground injection, placement in landfills, or road spreading or other “beneficial uses” of HVHF wastewater.

Commenters suggested that “[t]he Commission has the authority to—and should revise its regulations to—specifically prohibit those projects that would consequently discharge fracking wastewater into the Basin that may not otherwise be considered a discharge.”

One commenter was “shocked and appalled [th]at the Delaware River Basin Commission has the authority to vote on allowing the possible contamination and/or withdrawal of our potable water supply and the public’s water supply.”

RESPONSE (R-1)

This response focuses on the relationship between the final regulation and the Commission’s Compact-based authority. Other sections of this document explain the Commission’s view that its final rules on importations of water into the Basin, exportations of water from the Basin, and discharges of HVHF wastewater to land or waters of the Basin constitute a regulatory response proportionate to the risks to the Basin’s water resources posed by the regulated activities. *See* Sections 3.2 Water and Wastewater Exportation, 3.3 Water and Wastewater Importations, 4.2.1 Potential Risks to Water Resources, and 4.2.2 Potential Impacts to Water Resources and Their Uses.

Importantly, the final rules are grounded in the authorities conferred on the Commission by the [Delaware River Basin Compact \(the “Compact”\)](#), a federal-interstate compact enacted in 1961 concurrently by the Commission’s four member states and the United States, approved by Congress pursuant to Article 1, Section 10, Clause 3 of the United States Constitution and enacted by Congress as federal law.

The Commission’s final rules are based on the authority granted to the Commission by the following sections of the Compact, either individually or in combination: Section 3.3—Allocation, Diversions and Releases; Sections 3.2(a) and 13.1—Comprehensive Plan; Section 4.1—Water Supply—Generally; Section 4.2—Water Supply—Storage and Release of Waters; Section 5.2—Pollution Control—Policy and Standards; Section 14.2—Regulations; and Enforcement; and Sections 3.6(b) and (h)—General Powers.

Authority for the Regulations

The Compact grants the Commission broad authority to “make and enforce reasonable rules and regulations for the effectuation, application and enforcement of the Compact” (§ 14.2). The Commission may also “establish standards of planning, design and operation of all projects and facilities in the Basin which affect its water resources” (§ 3.6(b)); and it may “have and exercise all powers necessary or convenient to carry out its express powers” (§ 3.6(h)). To complement these general rulemaking provisions, Section 5.2 confers authority on the Commission to adopt rules, regulations and standards to control pollution.

The Commission’s authority regarding exportations of water from the Basin is rooted in part in its power to equitably apportion the waters of the Basin. In its Decree in [New Jersey v. New York, 347 U.S. 995 \(1954\) \(the “Decree”\)](#), the U.S. Supreme Court equitably apportioned the Basin’s waters based on conditions existing in 1954. To avoid the future need for one or more of the Decree Parties to return to the Court to modify the Decree as conditions in the Basin change, the Compact grants the Commission “the power from time to time as need appears, in accordance with the doctrine of equitable apportionment, to allocate the waters of the basin to and among the states signatory to this compact and to and among their respective political subdivisions, and to impose conditions, obligations and release requirements related thereto.” (§ 3.3).¹¹

Consistent with the principles underlying the doctrine of equitable apportionment, *see, e.g., Mississippi v. Tennessee*, 142 S.Ct. 31 (2021); *Florida v. Georgia*, 138 S.Ct. 2502 (2018); *New Jersey v. New York*, 347 U.S. 995 (1954), the Commission has considered the rights and needs of the states, including municipalities and other water users within their jurisdictions, to make reasonable use of the Basin’s shared water resources. As stated in Section 2.30.2 of the Water Code and discussed in Section 3.2 of this CRD, the Basin’s water resources are limited and subject to shortages, particularly in dry periods or when otherwise stressed. The regulations implement Section 3.3 of the Compact by allowing exportations of water from the Basin only after an evaluation of factors that address need and impacts on the Basin’s water resources and community, and only when required to serve straddled and adjacent public water systems; or on a temporary, short-term, or emergency basis; or in the case of wastewater, subject to geographic limitations similar to those for exports of water generally or when exported for special treatment or disposal.

Other sections of the Compact likewise support the exportation provisions of the regulations. Section 4.1 grants the Commission power to develop, implement and effectuate plans (and projects) for the use of the waters of the Basin for domestic, municipal, agricultural and industrial water supply. The regulations implement the Commission’s plans to conserve the waters of the Basin by allowing exportation of water only under certain conditions, as described above. *See also*, Compact § 3.1 (requiring the Commission to adopt and promote uniform and coordinated policies for water conservation, control, use and management in the Basin). In addition, during periods when the

¹¹ The Compact requires the Commission to obtain the unanimous consent of the parties to the Decree for any allocation adversely affecting the diversions, compensating releases, rights, conditions, obligations and provisions for the administration thereof as provided in the Decree. (§ 3.3(a)). Here, the Commission’s regulations have no adverse effect on these terms of the Decree.

Commission is releasing water from storage to augment flow, Section 4.2(b) likewise authorizes limitations on the diversion of any water of the Basin.

The Commission's regulations also effectuate Sections 3.2(a) and 13.1 of the Compact, which instruct the Commission to develop a comprehensive plan for the immediate and long-range development and use of the water resources of the Basin. The exportation regulations limiting the use of Basin water comprise part of the Comprehensive Plan and manifest the Commission's exercise of its authority to conserve the waters of the Basin. Promoting water conservation enables the Commission to effectuate a Comprehensive Plan that satisfies other objectives of the Compact, including, among other things, maintaining the diversions and compensating releases set forth in the Decree as modified by the Commission (Compact § 3.5), meeting water supply needs (Compact § 4.1), promoting sound practices of watershed management and maintaining and improving fish and wildlife habitats (Compact §§ 7.1 and 7.3), providing for the development of water related sports and recreational facilities (Compact § 8.1) and developing hydroelectric power (Compact § 9.1).

The Commission's authority regarding pollution control provides a further basis for regulation of importations and exportations of water and discharges of wastewater. Section 5.2 of the Compact grants the Commission authority to control future pollution and abate existing pollution pursuant to the following standard of control: "pollution . . . shall not injuriously affect the waters of the basin as contemplated by the Comprehensive Plan." This article further provides in relevant part that the Commission may "classify the waters of the Basin and establish standards of treatment of sewage, industrial or other waste" and may "adopt and from time to time amend and repeal rules, regulations and standards to control such future pollution and abate existing pollution . . . as may be required to protect the public health or to preserve the waters of the Basin for uses in accordance with the comprehensive plan" (*Id.*). Exportation of water may decrease the assimilative capacity of the withdrawal source and hydraulically connected surface waters and ground waters, and increase the concentration of pollutants. Importation of wastewater may adversely affect the receiving waters in the event of a discharge. Discharges of HVHF wastewater pose particular, heightened risks associated with that waste stream because they may increase concentrations of the toxic, radioactive and conventional pollutants in the receiving waters and render them unfit for other uses identified in the Comprehensive Plan. The Commission's prohibition on the discharge of HVHF wastewater to waters or land within the Basin is narrowly tailored to accomplish the purposes articulated in Section 5.2.

The Commission's Geographic Jurisdiction

Many commenters stated that the Commission should prohibit any exportation of water or wastewater that would support hydraulic fracturing outside of the Delaware River Basin. However, the Compact provides expressly that the Commission “shall have, exercise and discharge its functions, powers and duties *within the limits of the basin.*” (§ 2.7) (Emphasis added). Exceptions to this geographical restriction are narrow. The Commission may exercise its discretion to act outside the Basin in relevant part “whenever such action may be necessary or convenient *to effectuate its powers or duties within the basin . . .*” and “only upon the consent of the state in which it proposes to act.” *Id.* (Emphasis added). Reinforcing the notion that the Commission’s focus is water management *within* the Basin, Section 3.1, “Purpose and Policy,” of Article 3 of the Compact, “Powers and Duties of the Commission,” provides that the Commission “shall adopt and promote uniform and coordinated policies for water conservation, control, use and management *in the basin.*” (Emphasis added).

In accordance with the authorities conferred on the Commission by the Compact, under the final rule regarding exportation the Commission will consider various factors including, among others, the sponsor’s planned use for the water and any resulting benefits, Water Code § 2.30.3 A.8, and the availability of alternatives. Water Code § 2.30.3 A.9. Once a project sponsor demonstrates need to utilize Basin water to serve a straddled or adjacent public water system, the Commission will evaluate proposals primarily on the basis of their effects on the health and safety of the *Basin community*, including on water availability; aquatic ecosystems; salinity concentrations; water uses protected by the Comprehensive Plan; DRBC regulations and docket approvals; pass-by or instream flow requirements; and the provisions of the Decree. The information reviewed by the Commission to date does not demonstrate that a categorical prohibition on any out-of-Basin exportation of Basin water for HVHF (or for hydraulic fracturing more broadly) without regard to the other considerations set forth in the regulations is necessary to achieve the purposes of the Compact.

For additional detail on the Commission’s authority to adopt regulations, *see* Section 2.1.1, *Authority*, of the Commission’s *Comment and Response Document* adopted concurrently with the final regulations prohibiting HVHF within the Basin (the “February 2021 CRD”).

3. RESPONSE TO COMMENTS – SECTION 2.30 DRBC

WATER CODE

3.1 Water Code Section 2.30 Definitions

STATEMENT OF CONCERN (SC-2)

Commenters suggested that the definition of “Exportation” in proposed Section 2.30.1 D. of the Water Code should be revised by the deletions shown in strikethrough in the following:

“Exportation” means the conveyance, transfer or diversion of Basin water from a source within the Delaware River Basin to a location outside the Basin ~~without return~~

~~of such water to the Basin.~~ Exportations from the Basin of consumer goods or foods that have been manufactured, bottled, packaged, or processed using Basin water are not considered “exportations” for purposes of this rule.

Commenters suggest that the removal of “without return of such water to the Basin” would close a loophole under which the oil and gas industry could otherwise take Basin water out of the Basin for use in HVHF and return the resulting HVHF wastewater to the Basin, “without any regulation or oversight by DRBC.”

RESPONSE (R-2)

The definition of “Exportation” (Section 2.30.1 E. of the Water Code in the final rule) was not revised. The commenters are concerned that if water is returned to the Basin (as HVHF wastewater), then it is not “exported” under DRBC rules, and hypothetical transfers out and into the Basin by the oil and gas industry will evade review. Under the final regulations at Section 440.4, however, even if water has been exported, water that comprises HVHF wastewater cannot be discharged to waters or land within the Basin. Thus, HVHF wastewater is unlikely to be transported into the Basin after the effective date of the final rule, and the likelihood of the hypothetical events about which the commenters express concern is remote.

The Commission’s prohibition on the discharge of HVHF wastewater to land or waters of the Basin also makes it unlikely that operators will be transporting HVHF wastewater into the Basin or storing it in the Basin. Please see Section 4.2.1.5, Transport, Leaks and Spills, for a discussion of oil and gas operators’ HVHF wastewater transportation and disposal practices.

STATEMENT OF CONCERN (SC-3)

Commenters suggested that the definition of “Importation” in proposed Section 2.30.1 E. of the Water Code should be revised by the deletions shown in strikethrough in the following:

“Importation” means the conveyance, transfer, or diversion of water, including wastewater, into the Delaware River Basin from a source outside the Basin, ~~resulting in a discharge of the imported water to land or water within the Basin, with or without prior treatment.~~

Commenters’ objective in removing the discharge requirement from the definition of “importation” is to prohibit pollution that may occur “through means other than an actual discharge to water [or] land,” such as air emissions, reuse and recycling, storage, and transportation.

RESPONSE (R-3)

The definition of “Importation” (Section 2.30.1 F. of the Water Code in the final rule) was not revised because the proposed change would result in an overly broad restriction that is not needed to achieve the purposes of the Compact. For discussions of the risks and impacts and the Commission’s role in connection with air emissions, reuse and recycling, storage, and transportation, see Sections 4.2.1.2,

Air Pollution and Air Deposition, 4.2.1.5, Transport, Leaks and Spills, and 4.2.1.7, Waste Storage and Recycling, below.

STATEMENT OF CONCERN (SC-4)

Commenters stated that the rules were unclear as to how nonpublic water systems or industrial water withdrawal systems are affected by the definition of “public water system.”

RESPONSE (R-4)

As amended, Section 2.30.1 G. of the Water Code, concerning importations and exportations of water from the Basin, provides:

“Public water system” means a system primarily for the provision to the public of piped water for human consumption if such system has at least fifteen service connections or regularly serves at least twenty-five individuals. A “public water system” may be publicly or privately owned.

The term “public water system” appears in the proposed amended text of Section 2.30.1 in two other definitions— “Adjacent public water system” and “Straddled public water system”—and in two substantive provisions of the Water Code amendments—2.30.2 C. and 2.30.3 A.9. Section 2.30.2 C. states that “a proposed new exportation of Basin water that is subject to review under the Compact and implementing regulations . . . may be approved by the Commission after consideration of the factors set forth at Section 2.30.3 below, if: 1. the sponsor demonstrates that the exportation of Basin water is required to serve a straddled or adjacent public water system; . . .” Section 2.30.3 A.9. provides that in evaluating exportations of water from the Basin, the Commission’s review will consider, among other factors:

the availability to the sponsor of alternatives to the exportation of Basin water and whether these alternatives have been diligently pursued, including without limitation . . . conservation measures undertaken by the sponsor or a public water system in the service area where the sponsor is located to forestall the need for a transfer of Basin water . . . [.]

The effect of the definition of “public water system” in each of these instances and in all of them collectively is to limit exportations of water to effectuate purposes of the Compact and the Comprehensive Plan. In particular, any proposed export to a water system that does not meet the definition of a “public water system” (nonpublic, industrial, or otherwise) is ineligible for the Commission’s review and approval under the proposed and final rule unless it falls within one of two other eligible classifications, i.e., it is required on a temporary, short-term, or emergency basis in accordance with Section 2.30.2 C.2, or it is an eligible exportation of wastewater pursuant to Section 2.30.2 C.3.

As set forth in a discussion of the Commission’s authority in R-1 of this CRD, provisions of Section 2.30 of the Water Code limiting the use of Basin water comprise part of the Comprehensive Plan and manifest the Commission’s exercise of its authority to conserve the waters of the Basin. Promoting water conservation enables the Commission to effectuate a Comprehensive Plan that satisfies other

objectives of the Compact, including, among other things, maintaining the diversions and compensating releases set forth in the Decree as modified by the Commission (Compact § 3.5), meeting water supply needs (Compact § 4.1), promoting sound practices of watershed management and maintaining and improving fish and wildlife habitats (Compact §§ 7.1 and 7.3), providing for the development of water related sports and recreational facilities (Compact § 8.1) and developing hydroelectric power (Compact § 9.1).

STATEMENT OF CONCERN (SC-5)

Several commenters stated that the definition of “wastewater” in Section 2.30 of the Water Code should be modified by the additions and deletions shown by underscore and strikethrough in the following:

“Wastewater” means water that is stored, transported, or discharged after use, and will not be reused in an industrial or commercial process. This definition includes, ~~including~~, but is not limited to, any water for which a National Pollutant Discharge Elimination System (NPDES) permit under the federal Clean Water Act or any state or DRBC approval is required before the water can lawfully be discharged to waters or land within the Basin.

RESPONSE (R-5)

The Commission has considered the effect of the proposed change on its policies and proposed rules concerning both exportations and importations of wastewater. It has concluded that the commenters’ proposed change would not achieve purposes of the Compact. However, it also has concluded that its proposed language at Section 2.30.2 C.3. concerning exportations of wastewater was overly broad. As explained below, that language is modified in the final rule to better align with longstanding conservation and water quality objectives included in the Comprehensive Plan.

Exportation concerns. The Commission’s proposed rule included “wastewater” as a class of Basin water that may be approved by the Commission for exportation from the Basin subject to consideration of the factors set forth at Section 2.30.3. The commenter’s proposal would narrow the categories of wastewater eligible for exportation under Section 2.30.2 C. of the amended regulation.

As the Commission explained in its FAQ document published on December 7, 2021, because water and wastewater service areas often straddle basin boundaries, it is not uncommon for wastewater generated in one basin to be disposed of in another. Imports and exports of water and wastewater occur routinely around the Basin boundary in this manner. The Commission’s purpose in making exportations of wastewater eligible for review and approval was to ensure that straddled and adjacent systems, including for both sewerred and hauled septage, could continue to operate, and if necessary, expand, normally.

However, the Commission has concluded that the language it originally proposed at Section 2.30.2 C.3 of the Water Code was overly broad. Authorizing the Commission to evaluate and, subject to consideration of the factors at Section 2.30.3., to approve *any* exportation of wastewater risks undercutting the conservation objectives served by limiting exportations of Basin water in Sections 2.30.2. C.1. and 2.

Accordingly, under the final rule, the text of Section 2.30.2 C. is revised to read as follows (additions appear in bold face, and deletions in strikethrough):

- C. A proposed new exportation of Basin water that is subject to review under the Compact and implementing regulations, including any proposed increase in the rate or volume of an existing exportation, may be approved by the Commission after consideration of the factors set forth at Section 2.30.3 below, if:
 - 1. the sponsor demonstrates that the exportation of Basin water is required to serve a straddled or adjacent public water system;
 - 2. the sponsor demonstrates that the exportation of Basin water is required **to meet public health and safety needs** on a temporary, short-term, or emergency basis ~~to meet public health and safety needs~~; or
 - 3. the sponsor is proposing an exportation of wastewater **and demonstrates either (i) that the wastewater is being conveyed to a straddled or adjacent public wastewater collection system; or (ii) that the wastewater may not lawfully be discharged to a public wastewater collection system and is being exported for treatment, disposal or both at a waste management facility that has all required state and federal approvals to lawfully receive it.**

In order to support these revisions to Section 2.30.2 C. of the Water Code, and to simplify the definition of “adjacent” public water systems and public wastewater collection systems, the following changes to Section 2.30.1 Definitions, were also adopted in the final rule:

- A. “Adjacent public water system” means a public water system **(as defined herein)** located outside of the Delaware River Basin that ~~either: (1) is interconnected with a public water system located entirely inside the Basin or with a “straddled public water system” (as defined herein); or that (2)~~ has a service area directly bordering the service area of a public water system located ~~entirely~~ **in whole or in part** within the Basin ~~or that straddles the Basin boundary.~~
- B. **“Adjacent public wastewater collection system” means a public wastewater collection system (as defined herein) located outside the Delaware River Basin that has a service area directly bordering the service area of a public wastewater collection system located in whole or in part within the Basin.**
- ~~C.~~ “Basin water” (also, “waters of the Basin”) means water in, on, under or above the ground within the Delaware River Basin. “Basin water” includes wastewater.
- ~~D.~~ “Delaware River Basin” (or “Basin”) has the meaning assigned to it by Section 1.2(a) of the *Delaware River Basin Compact* – the area of drainage into the Delaware River and its tributaries, including Delaware Bay.
- ~~E.~~ “Exportation” means the conveyance, transfer, or diversion of Basin water from a source within the Delaware River Basin to a location outside the

Basin without return of such water to the Basin. Exportations from the Basin of consumer goods or foods that have been manufactured, bottled, packaged, or processed using Basin water are not considered “exportations” for purposes of this rule.

- FE. “Importation” means the conveyance, transfer, or diversion of water, including wastewater, into the Delaware River Basin from a source outside the Basin, resulting in a discharge of the imported water to land or water within the Basin, with or without prior treatment.
- GF. “Public water system” means a system primarily for the provision to the public of piped water for human consumption, if such system has at least fifteen service connections or regularly serves at least twenty-five individuals. A “public water system” may be publicly or privately owned.
- H. **“Public wastewater collection system” means a system with all required state and federal approvals that serves more than 250 people or conveys more than 25,000 gallons of wastewater per day and is primarily for the collection and conveyance of domestic sewage from private, commercial, institutional, or industrial sources, to a treatment system with all necessary state and federal approvals. A “public wastewater collection system” may be publicly or privately owned.**
- IG. “Straddled public water system” means a public water system that serves an area partially within and partially outside of the Delaware River Basin.
- J. **“Straddled public wastewater collection system” means a public wastewater collection system that serves an area partially within and partially outside of the Delaware River Basin.**
- KH. “Wastewater” means water that is stored, transported or discharged after use, including, but not limited to, any water for which a National Pollutant Discharge Elimination System (NPDES) permit under the federal Clean Water Act or any state or DRBC approval is required before the water can lawfully be discharged to waters or land within the Basin.

The final rule thus authorizes the Commission, after consideration of the factors set forth in Section 2.30.3, to consider and approve an exportation of wastewater from the Basin under circumstances that align with the Commission’s policies for water conservation and pollution prevention adopted pursuant to the Compact and incorporated into the Comprehensive Plan and other implementing regulations.

Importation concerns. The Commission also considered the commenters’ proposal in relation to the proposed rules regarding importation. As proposed, and as adopted in Section 2.30 of the Water Code, the rule provides:

“Importation” means the conveyance, transfer, or diversion of water, including wastewater, into the Delaware River Basin from a source outside

the Basin, resulting in a discharge of the imported water to land or water within the Basin, with or without prior treatment.

By Resolution No. 91-9 in 1991, the Commission added to the Water Code and the Comprehensive Plan the following concerning importations of wastewater:

[T]he Basin waters have limited assimilative capacity and limited capacity to accept conservative substances without significant impacts. Accordingly, it . . . 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.

The proposed Water Code amendments include at Section 2.30.2 D. a refined version of this policy that preserves the purpose of the original – limiting importations of wastewater as necessary to avoid impairment of Basin waters. It provides:

Basin waters have limited capacity to assimilate pollutants without significant impacts to the health and safety of Basin residents, the health and functioning of aquatic ecosystems in the Basin, and the effectuation of the Comprehensive Plan. Accordingly, it is the policy of the Commission to discourage, limit, or condition the importation of wastewater into the Delaware River Basin as necessary to avoid impairment of Basin waters. A proposed new importation of water or wastewater, including any proposed increase in the rate or volume of an existing importation, shall be reviewed by the Commission consistent with the factors set forth at Section 2.30.3 below.

As articulated in the final rule, the policy remains focused on potential impacts to Basin waters that may result from discharges to land or water within the basin. The Commission’s evaluation of the factors set forth in Section 2.30.3 B. will result in the imposition of conditions or limits on a proposed importation of wastewater as appropriate to protect the waters of the Basin, regardless of whether the discharge is preceded by reuse in an industrial or commercial process. Accordingly, the proposed change to the definition of “wastewater” is not needed based on concerns regarding importations of wastewater.

3.2 Water and Wastewater Exportation

STATEMENT OF CONCERN (SC-6)

The Delaware Riverkeeper Network (DRN) and others commented that Section 2.30 of the Water Code should be amended to provide that no new exportation of Basin water will be approved where the proposed exportation will result in the permanent loss of water to the hydrologic cycle, or where the purpose of the proposed exportation is to replace water that was consumptively used by the HVHF industry. DRN offered that placing such a condition on exportations falls within the Commission’s authority for the protection and preservation of the Basin’s water resources.

RESPONSE (R-6)

Most water transferred from the Basin is not returned to it after use. Such transfers are exportations that have an effect similar to consumptive uses of the Basin's water. The Commission has long recognized that Basin water supply objectives and flow management operations can be significantly impacted by consumptive uses. These uses may impact downstream water availability and the management of salinity in the Delaware Estuary, where public water supply intakes for the City of Philadelphia and a large New Jersey purveyor, among others, are located, and may impact mandatory compensating releases from New York City's Delaware River Basin reservoirs. February 2021 CRD, R-31, p. 61.

For this reason, among others, the Commission in 1991 adopted Water Code Section 2.30.2—Policy of Protection and Preservation, which states:

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.

The proposed and final rule includes an expanded articulation of this longstanding policy, as follows, at new Section 2.30.2 A:

The waters of the Delaware River Basin are limited in quantity, and the Basin is frequently subject to drought warnings, drought declarations, and drought operations due to limited water supply storage and streamflow during dry periods. In addition, portions of the Basin have been delineated by the Commission as groundwater protected areas due to water shortages. Therefore, it is the policy of the Commission to promote the conservation and preservation of water and related natural resources, including aquatic ecosystems, and effectuate the Comprehensive Plan and the uses of the water resources of the Basin identified therein, by discouraging, limiting, or placing conditions on the exportation of Basin water as may be required to protect the health and safety of Basin residents, aquatic ecosystems and the uses of water identified in the Compact and Comprehensive Plan.

Consistent with this more detailed policy statement, under the final rules, exportations may be approved by the Commission only after consideration of certain factors set forth at Section 2.30.3 of the Water Code, and only if the sponsor: 1) demonstrates that the exportation of Basin water is required to serve a straddled or adjacent public water system; 2) demonstrates that the exportation of Basin water is required to meet public health and safety needs on a temporary, short-term, or emergency basis; or 3) proposes an exportation of wastewater to a straddled or adjacent public wastewater collection system.

In combination with these limitations, the Commission routinely structures withdrawals so that potential risks to water resources are minimized through, for example, restrictions such as pass-by

flow requirements, interruptible service and consumptive use make up (*see* February 2021 CRD, R-29, p. 60).

The final regulations thus manifest the Commission's exercise of its authority to conserve the waters of the Basin and to preserve them for uses in accordance with the Comprehensive Plan. The information reviewed by the Commission to date does not demonstrate that a categorical prohibition on any out-of-Basin use of Basin water without regard to the other considerations set forth in the regulations is necessary to achieve these or other purposes of the Compact.

Please refer to Section 2.0 of this CRD for a more detailed discussion of the Authority of the Commission.

STATEMENT OF CONCERN (SC-7)

Several commenters, including DRN and the Pennsylvania Council of Trout Unlimited, suggested that the volume of water used for hydraulic fracturing in shale formations has grown in recent years and that water exported from the Basin for hydraulic fracturing:

- does not return to the Basin and is thus a depletive use.
- threatens or interferes with available water supplies.
- depletes aquifers and other groundwater, and in turn reduces hydrologic contributions to wetlands, springs, and waterways.
- changes natural groundwater flows and can move pollution plumes in unexpected directions.
- changes water quality and related habitat such as reduced oxygen and increased temperature.
- changes the rate and volume of flow and stream morphology impacting existing uses and Special Protection Waters.
- lowers water levels, impacting aquatic habitats and wildlife that depend upon aquatic habitats.
- lowers surface water levels, impacting streams and near-stream recreation (such as camps).

RESPONSE (R-7)

The Commission agrees that a transfer of water out of the Basin is depletive and consumptive whenever, as is often the case, the exported water is not returned to the Basin after it is used. Please see Responses R-5 and R-6 above for the Commission's response to this concern.

The Commission also acknowledges that certain exports and withdrawals have the potential to result in the other impacts enumerated by the commenters. The amendments to the Water Code at Sections 2.30.2 C. (establishing geographic and need-based limitations on exportation) and 2.30.3 A. (establishing factors to be considered in evaluating proposed exports) are designed to ensure that the Basin's waters are conserved to meet in-Basin uses established by the Comprehensive Plan. These provisions will work together with existing measures routinely used by the Commission to

minimize the risk to water resources posed by withdrawals, including restrictions such as pass-by flow requirements, interruptible service, and consumptive use make up requirements (*see* February 2021 CRD, R-29, p. 60).

The potential streamflow and water quantity impacts of water use for high volume hydraulic fracturing are discussed at length in Section 2.3.2.1 of the February 2021 CRD. Among other things, that discussion compares the total volume of water used for hydraulic fracturing in the Susquehanna River Basin to total water uses and total consumptive uses in the Delaware River Basin. The Commission’s conclusions from that section state in relevant part:

On the basis of data for HVHF within the Susquehanna River Basin, the total water used for hydraulic fracturing activities is not large compared to water use by other sectors in the Delaware River Basin. However, consumptive use of such large quantities of water and permanent removal of the water from the hydrologic cycle is unique to this industry.

Although the likelihood of impacts due to water use [i.e., impacts on streamflows and on ground- and surface water availability] associated with HVHF if permitted is relatively high, the severity of the impacts relative to other potential impacts described in this document [i.e., those related to water quality] is relatively low, provided that adequate regulations and best practices are employed.

As noted above, to implement its conservation policies and to preserve the Basin’s waters for uses in accordance with the Comprehensive Plan, the Commission is limiting exportations of water based on geography and demonstrations of need. When withdrawals are approved—whether for purposes of exportation or for use within the Basin—best practices are employed to minimize the risk of adverse impacts on waters of the Basin. Moreover, to date, water supplies outside the Basin have been adequate to meet hydraulic fracturing needs outside the Basin. No requests or applications for water exportation to support hydraulic fracturing activities outside the Basin are currently pending before the Commission. Accordingly, the adverse impacts the commenters describe are unlikely to occur as a result of withdrawals generally, and even less likely to occur as a result of withdrawals to serve HVHF.

STATEMENT OF CONCERN (SC-8)

Many commenters objected to the possibility of water being exported from the Basin for use by the oil and gas industry. Concerns were raised that:

- the industry’s need for more water would motivate it to “raid” and “exploit” the Delaware River Basin.
- the water should not be used for private profit and specifically profits for the oil and gas industry.
- the exportation of water will create opportunities for hydraulic fracturing outside the Basin.

- the growth in hydraulic fracturing outside the Basin will impact climate change and cause environmental harms.
- water should not be exported for natural gas to be exported to China.

RESPONSE (R-8)

The creation of opportunities for hydraulic fracturing outside the Basin is not an objective of the proposed or final rules and is not an expected outcome of these rules. As the responses in this CRD attempt to make clear, the Commission's focus is to conserve and protect the Basin's water resources. The preceding responses at R-6 and R-7 explain how the final rules accomplish these over-arching purposes.

The risks and impacts of HVHF on water resources of the Basin are comprehensively addressed in the February 2021 CRD. By prohibiting HVHF within the Basin, the Commission's rulemaking finalized in February 2021 substantially reduced those risks. The Commission's final rule prohibiting discharges of wastewater from HVHF and HVHF-related activities to waters or land within the Basin further reduces the risk to the Basin's water resources posed by waste generated by HVHF and HVHF-related activities conducted elsewhere. As to exportations of water, the final rule allows them only to straddled or adjacent public water systems that have demonstrated need (§ 2.30.2 C.2) and to straddled or adjacent public wastewater collection systems (§ 2.30.2 C.3(i)), unless the water is needed to address short-term public health and safety needs (§ 2.30.2 C.2), or (in the case of wastewater) requires special treatment, disposal or both at a state-licensed facility that may lawfully receive it (§ 2.30.2 C.3(ii)). Section 13.1 of the Compact and the Commission's Comprehensive Plan recognize that public and private projects and facilities may be required for the optimum planning, development, conservation, utilization, management and control of the water resources of the Basin. The final rule does not favor or disfavor water use "for private profit," nor is the large-scale export of Basin water for HVHF an expected outcome of the final rule.

The concern about the potential for water exported from the Basin to be used to support U.S. exportation of natural gas to China is not within the scope of the Commission's authority or its proposed or final rules. The Commission's jurisdiction is to manage the water resources of the Basin, not to determine the destination of natural gas produced outside the Basin. According to the United States Energy Information Administration, in 2021, approximately 89 percent of the natural gas produced in the U.S. was consumed domestically. As of 2021, the United States consumed 30.28 trillion cubic feet (Tcf) of natural gas while, at the same time, exported roughly 6.65 Tcf. Exports of natural gas from the U.S. exceeded imports for the first time in 2017.¹² Of the total amount of natural gas exported by the United States in 2021, less than 7 percent went to China.¹³

¹² See EIA, Natural gas explained: Natural gas imports and exports (Last updated May 12, 2022), accessed at: <https://www.eia.gov/energyexplained/natural-gas/imports-and-exports.php> (data as of July 2022, preliminary data for 2021) (hereinafter, "EIA, 2022a").

¹³ See *id.*; As of 2021, China imports more liquefied natural gas than any other country (May 2, 2022), accessed at: <https://www.eia.gov/todayinenergy/detail.php?id=52258#>.

STATEMENT OF CONCERN (SC-9)

Several commenters stated that wastewater could be exported under the rules and wastewater could be used for hydraulic fracturing. The same commenters stated that wastewater is also water and objected to wastewater being permitted to be exported. The DRN commented that “The allowance of the exportation of wastewater is short-sighted, lacks environmental integrity, and shows disregard for neighboring watersheds.”

RESPONSE (R-9)

The Commission agrees that wastewater is a category of water. Please see Response R-5 for a discussion of changes to proposed Section 2.30.2 C.3 of the Water Code, concerning the exportation of wastewater, to better align this provision with the objectives of the Comprehensive Plan and other regulations.

DRN’s statement that with respect to exportation the proposed rule shows a “disregard for neighboring watersheds” suggests that the Commission has authority to protect water resources outside the Delaware River Basin. The Commission does not have that specific authority. Nevertheless, federal, state, and local laws (and in some instances rules promulgated by another interstate commission) are applicable within jurisdictions that may receive (import), use and dispose of wastewater from the Delaware Basin or other river basins.

STATEMENT OF CONCERN (SC-10)

Several commenters objected to allowing the exportation of Basin water to adjacent or straddled public water systems because those systems could sell water for use in connection with hydraulic fracturing. Another commenter urged the Commission to “rethink the change” to its longstanding policy of discouraging the exportation of Basin water.

RESPONSE (R-10)

The amended regulations continue to discourage the exportation of Basin water to conserve the waters of the Basin for uses in accordance with the Comprehensive Plan as follows:

- The Commission’s longstanding policy of discouraging the exportation of Basin water is being retained, and the amended Water Code provisions articulate this policy with greater clarity and provide with greater specificity for its implementation.
- Under Section 2.30 of the Water Code as amended, Basin water can be exported only when it is required to serve a straddled or adjacent public water system; on a temporary, short-term, or emergency basis to meet public health and safety needs; or under limited geographic or other circumstances when the exported water is wastewater (*see* R-5 for a detailed discussion of the revision to Section 2.30.2 C.3 concerning exportations of wastewater). An application for exportation of water to serve HVHF activities will not meet these thresholds.
- Before approving an exportation, the Commission must consider specific factors that include, among others: 1) the sponsor’s planned use for the water and any resulting

public benefits; 2) the availability to the sponsor of alternatives to the exportation of Basin water; and 3) whether these alternatives have been diligently pursued, including consideration of the sponsor's uses of water outside the sponsor's service area.

- DRBC dockets allocating water include a condition that states, "The docket holder is permitted to provide the water approved in this docket to the areas included in Section A.3. Area Served of this docket. Any expansion beyond those included in Section A.3. Area Served is subject to DRBC review and approval in accordance with Section 3.8 of the Compact."
- As discussed in R-7, past practice indicates that sufficient water resources exist outside the Basin to serve HVHF projects where permitted.

STATEMENT OF CONCERN (SC-11)

Several commenters objected to a suggested potential "loophole" whereby exporting water on a "temporary, short-term, or emergency basis to meet public health and safety needs" is undefined and could allow water to be used for hydraulic fracturing.

RESPONSE (R-11)

The Commission does not agree that allowing the exportation of water on a "temporary, short-term, or emergency basis to meet public health and safety needs" is a loophole that will allow water to be used for hydraulic fracturing. The Commission does not consider water needed for high volume hydraulic fracturing to meet the criteria of a "public health and safety need" under any foreseeable circumstances. No additional definition of "public health or safety need" is required. The Commission must retain its discretion to export water to meet emergency public needs. To make clearer that the demonstration of a "public health or safety need" applies to all exports proposed in reliance on this provision, the Commission is revising the wording slightly. The final rule at Section 2.30.2 C. 2. of the Water Code reads:

the sponsor demonstrates that the exportation of Basin water is required to meet public health and safety needs on a temporary, short-term or emergency basis; or . . .

STATEMENT OF CONCERN (SC-12)

Several commenters objected to the possibility that water could be exported without any required conditions if the volume is under DRBC's threshold of a 100,000 gallons per day average withdrawal during any calendar month or under 10,000 gallons per day average withdrawal in DRBC's Southeastern Pennsylvania Ground Water Protected Area.

RESPONSE (R-12)

The Commission previously determined and has established by its Rules of Practice and Procedure ([18 C.F.R. Part 401](#)) that "[t]he diversion or transfer of water from the Delaware River Basin (exportation) whenever the design capacity is less than a daily average rate of 100,000 gallons" (18

C.F.R. 401.35(a)(16)) is “deemed not to have a substantial effect on the water resources of the Basin and is not required to be submitted under Section 3.8 of the Compact” (18 C.F.R. 401.35(a)) (intro paragraph). This determination applies to all exportations of water for any purposes. The proposed rule and final rule include no changes to Section 401.35.

3.3 Water and Wastewater Importation

Most of the substantive comments that were submitted concerning the importation of wastewater were not specifically related to proposed amendments in Water Code Section 2.30, which contain policies for all importations and exportations. Rather, most called for a blanket prohibition on the importation of HVHF wastewater (which would necessitate a modification of the Commission’s definition of “importation,” which requires a discharge of either treated or untreated wastewater). Such comments are addressed in Section 4.2 of this CRD, focused on the Commission’s Special Regulations at 18 CFR Part 440.

3.4 Water Code Section 2.30, Generally

STATEMENT OF CONCERN (SC-13)

The Sierra Club objected to proposed Section 2.30.2 E. of the Water Code, which exempts from Section 2.30 of the Water Code “importations and exportations of water, including wastewater, that existed prior to enactment of the Compact or that were approved by the DRBC prior to” the date of adoption of the final regulations. The Sierra Club suggested that the Commission make the final regulations retroactive to capture any existing, ongoing transfers.

RESPONSE (R-13)

The Commission has not revised Section 2.30.2 E. of the Water Code as the commenter suggests. Applying the final Water Code Section 2.30 regulations only to new and expanded projects simultaneously conserves the waters of the Basin and supports the water uses protected by the Comprehensive Plan, while not changing rules applicable to current importers and exporters that have relied on the Commission approvals they have received. As the Commission made clear in its Notice of Proposed Rulemaking, the new regulations will apply to any proposed expansion of an existing importation or exportation.

4. RESPONSES TO COMMENTS – SPECIAL REGULATIONS AT 18 C.F.R. PART 440

4.1 Comments related to the absence of a prohibition on exportation of Basin water to support HVHF

STATEMENT OF CONCERN (SC-14)

Numerous individuals and organizations submitted comments suggesting that water and wastewater from the Delaware River Basin should not be exported for uses related to hydraulic fracturing. Many of the comments were general in nature and objected to water being used for any purposes related to hydraulic fracturing. The DRN and others suggested that any proposed new exportation of Basin water to be used for HVHF or HVHF-related activities, or to replace a water supply diminished by HVHF or HVHF-related activities, be prohibited. A representative comment opposing the exportation of water (a version of which was submitted multiple times) follows:

The export of water for use in fracking outside of a watershed inflicts irreparable harm in multiple ways: It deprives springs, tributaries, groundwater and the Delaware River of critical flows, quantity and quality; it induces fracking in locations where it may not occur due to water shortages in overdrawn streams; it induces more fracking, which damages public health and the environment; and it increases the emissions of the powerful greenhouse gas methane, worsening the climate crisis.

The DRN specifically, and others more generally, called for the Commission to prohibit: any exportation resulting in the permanent loss of water to the hydrologic cycle; any exportation the purpose of which is to replace water that was consumptively used by HVHF outside of the Basin and any exportations that serves the HVHF industry.

RESPONSE (R-14)

As described in R-1 above, the final rules are grounded in the authorities conferred on the Commission by the Delaware River Basin Compact (the “Compact”), a federal-interstate compact enacted in 1961 concurrently by the Commission’s four member states and the United States. In accordance with Sections 1.3 (Purpose and Findings) and 13. 1 (Comprehensive Plan) of the Compact, DRBC is amending its Comprehensive Plan and regulations to better provide for the planning, conservation, utilization, development, management, and control of the Basin’s water resources. While many of the comments relating to exportation focused on hydraulic fracturing as an end use of water exported from the Basin, the Commission’s rules are focused on impacts to water resources within the Basin, consistent with its Compact authorities, including Section 2.7 of the Compact, providing that the Commission “shall have, exercise and discharge its functions, powers and duties within the limits of the basin . . .” as discussed above in Section 2.

Potential harm to the Basin’s water resources associated with water withdrawals and consumptive uses of water for HVHF are discussed in Section 3.2, at R-7, above. The issue of “inducing” hydraulic fracturing elsewhere is addressed in the same section at R-8 and R-9 Comments related to climate change impacts associated with HVHF and related activities outside the Delaware River Basin are addressed in Section 5.3 below. The final rule does not include a prohibition on the exportation of Basin water for uses related to hydraulic fracturing because, as noted in R-1, the information reviewed by the Commission to date does not demonstrate that such a categorical prohibition without regard to the other considerations and limitations set forth in the regulations is necessary to achieve the purposes of the Compact.

4.2 Comments related to the absence of a prohibition on the importation of HVHF wastewater

STATEMENT OF CONCERN (SC-15)

The following comments are representative of many critical of the proposed rule for being “inconsistent” with prior DRBC rulemaking, allegedly failing to address recognized risks, and falling short of a “complete ban” on the importation of HVHF wastewater into the Basin (comments not in quotation marks are paraphrased; footnotes are from the original comments):

DRN made the following assertions:

- “In this Proposed Rulemaking, the Commission must act on its previous conclusion regarding HVHF-related activities¹⁴ and also prohibit those activities as defined in proposed § 440.2. To do otherwise would result in an arbitrary and capricious decision falling short of the Commission’s obligations under the Compact.”
- “Without a prohibition on HVHF-related activities within the Basin, the Proposed Rulemaking undermines the Commission’s objectives by focusing exclusively on prohibiting intentional “discharge” of HVHF wastewater accepted into the Basin.¹⁵ The Commission was created, in large part, for the purpose of controlling pollution within the Basin, and was granted multiple powers to exercise that control beyond point source discharges.¹⁶ This limited and narrow prohibition runs counter to the Commission’s findings and determinations in Resolution No.

¹⁴ DRBC, Res. No. 2021-01 (Feb. 25, 2021), available at:

https://www.nj.gov/drbc/library/documents/Res2021-01_HVHF.pdf (“high volume hydraulic fracturing *and related activities* pose significant, immediate and long-term risks to the development, conservation, utilization, management, and preservation of the water resources of the Delaware River Basin and to Special Protection Waters of the Basin, considered by the Commission to have exceptionally high scenic, recreational, ecological, and/or water supply values.”) (Emphasis by commenters.)

¹⁵ See Proposed § 440.4. Commenters noted that, “Although ‘discharge’ is not defined in the regulations, based on the context of environmental regulation and pollution control, it is likely to be interpreted in the context of the federal Clean Water Act, 33 U.S.C. § 1362(12)(A) (‘any addition of any pollutant . . . from any point source’).”

¹⁶ Commenters noted that the Commission’s purpose may be broader than the scope of 33 U.S.C. § 1311. “(The federal Clean Water Act prohibits only ‘the discharge of any pollutant by any person.’)

2021-01, which were based on the extensive record created during the Commission’s HVHF Rulemaking process.”

- “As the Commission has acknowledged, ‘[t]he potential for contamination of water resources from spills [was] an important factor underlying the Commission’s decision’ to prohibit HVHF in the Basin.¹⁷ This risk is completely unaddressed in proposed § 440.4, which prohibits only the *intentional* discharge of HVHF wastewater in the Basin. In February 2021, the Commission concluded that “the collection, storage, handling, transport, treatment, discharge, and disposal of wastewater from high volume hydraulic fracturing activities presents significant risks, vulnerabilities and impacts to the water resources of the Delaware River Basin.”¹⁸ Nothing in the Proposed Rulemaking addresses the threat from storage, handling, transport, treatment, or disposal.”
- “Many of the risks [noted in the February 2021 CRD] are not addressed in the Proposed Rulemaking—specifically spills, leaks, and other releases, inadequate treatment, air emissions, improper storage or disposal, and reuse for roadway de-icing or dust control.”¹⁹
- “The Commission has recognized that “regulation is not capable of preventing adverse effects or injury to water resources from HVHF-related spills and releases of chemicals and hydraulic fracturing wastewater”—which is why it found the total ban of HVHF within the watershed necessary.²⁰ The Commission has also concluded that regulatory approaches that may be acceptable in other jurisdictions are not necessarily sufficient to protect the water resources of the Basin.²¹ As a result, the Commission should not rely here on state or federal regulatory programs to prevent the hazards associated with HVHF-related activities. Instead, a complete ban on HVHF-related activities within the Basin is required to effectuate the Commission’s 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.”²²
- “By prohibiting all HVHF-related activities including the acceptance of HVHF wastewater within the Basin, the Commission would greatly reduce the risk that HVHF wastewater being

¹⁷ DRBC, February 2021 CRD, available at:

https://www.nj.gov/drbc/library/documents/CRD_HVHFrulemaking.pdf.

¹⁸ *Id.* at 127.

¹⁹ See *id.* at 156, 183–84, 210. Commenters noted that, “Although the FAQ document provided along with the Proposed Rulemaking states that ‘[l]and application of HVHF wastewater by road spreading would constitute a prohibited discharge’ under the Proposed Rulemaking, in Pennsylvania and other states, the HVHF industry is creating consumer products from HVHF wastewater and selling it to the public. See also Glen Hendrix, *The Fracking Industry Is Selling Radioactive Waste Brine to the Public as a Road Deicer and Pool Treatment*, medium.com (Jan. 27, 2020), available at:

<https://medium.com/age-of-awareness/the-fracking-industry-is-selling-radioactive-waste-brine-to-the-public-as-a-road-deicer-and-pool-ba77a0f67e1d>.”

²⁰ DRBC, February 2021 CRD at 92, 179, 206, 226, 264.

²¹ See *id.* at 260 (“The Commission respects Pennsylvania’s choices for the area of the Commonwealth outside the Delaware River Basin. For its part, in light of the geology of the Basin and the likelihood and severity of potential adverse water resource impacts, the Commission has determined that the risks to water resources posed by HVHF—however well regulated—are not acceptable within the Basin, a shared resource that provides the water supply for more than 13 million people in four states.”).

²² See 18 C.F.R. § 440.1(a).

stored, treated, transported, reused, or disposed of within the Basin will spill and endanger water resources.”

- “The robust scientific and technical analysis undertaken by the Commission for its HVHF Rulemaking requires that HVHF-related activities must be prohibited in the Basin.”

Other commenters expressed the following (paraphrased) concerns:

- Like the high volume hydraulic fracturing operations prohibited by DRBC regulations, the storage and injection of wastewater from high volume hydraulic fracturing and HVHF-related activities are fraught with problems and have a high risk of resulting in water pollution, such that they pose significant, immediate and long-term risks to the Basin's water resources.
- The importation of hazardous wastewater from high volume hydraulic fracturing and related activities places residents at higher risk of exposure to harmful substances.
- The risks to drinking water supplies from handling HVHF wastewater are severe and likely to be irremediable. Wastewater resulting from high volume hydraulic fracturing and HVHF-related activities contains salts, metals, and organic compounds from bedrock formations, along with chemical compounds that were introduced as additives. Many of these chemicals are toxic and some are carcinogenic with known adverse health impacts associated with ingestion or other exposure.
- If the DRBC allows HVHF wastewater to be imported into the Basin, it would be allowing radioactive wastewater to be imported and deposited here, posing an unacceptable threat to human health and all life within the Delaware River Watershed.
- Prohibiting the importation of HVHF wastewater is necessary because of the highly water-soluble nature of the toxics and contaminants in the wastewater and because the spills, accidents, and dumping that inevitably occur can negatively impact human health. The lack of cradle to grave tracking of oil and gas waste combined with unreliable industry self-reporting also add to public health risks.

RESPONSE (R-15)

The Commission agrees that discharges of HVHF wastewater pose particular, heightened risks associated with that waste stream because they may increase concentrations of the toxic, radioactive and conventional pollutants in the receiving waters and render them unfit for other uses identified in the Comprehensive Plan. As the above comments recognize, the risks and impacts of HVHF on water resources of the Basin are comprehensively described in the February 2021 CRD.

Although not acknowledged by the commenters, by prohibiting HVHF within the Basin, the Commission’s rulemaking finalized in February 2021 substantially reduced those risks. The Commission’s further prohibition on the discharge of HVHF wastewater to waters or land within the Basin is narrowly tailored to accomplish the purposes articulated in Section 5.2 of the Compact, including to ensure that “pollution . . . shall not injuriously affect the waters of the basin as contemplated by the Comprehensive Plan.” Contrary to the suggestion of a commenter, this prohibition is not limited to intentional discharges.

More detailed responses to comments on risks to water resources of the Basin from the storage, transport, processing, treatment, recycling, road spreading and injection of HVHF wastewater and from spills, leaks, landfill leachate, air emissions, and chemical disclosure/ non-disclosure associated with HVHF wastewater are addressed in Section 4.2.1 Potential Risks to Water Resources, below.

More detailed responses to other comments on impacts to drinking water, aquatic life, and human health are presented in Section 4.2.2 Potential Impacts to Water Resources and Their Uses.

STATEMENT OF CONCERN (SC-16)

While many commenters expressed concern that the proposed rules do not go far enough and that a “full ban” on HVHF-related activities is necessary, many also expressed support for the proposed discharge prohibition. Representative examples follow:

- “Catskill Mountainkeeper submits these comments in strong support of the draft regulations banning the discharge of wastewater from high volume hydraulic fracturing (HVHF) and HVHF- related activities to waters or land within the Delaware River Basin, including the discharge or dumping on roads (road dumping) of HVHF-wastewater or products or co-products made from that wastewater.”
- “The proposed ban on discharge to water or land is an absolute necessity that Delaware Riverkeeper Network fully supports.”
- “Given the known risks of fracking wastewater on water quality, we [NRDC] strongly support the Commission’s proposal to ban the disposal of fracking wastewater in the region.”

RESPONSE (R-16)

The DRBC acknowledges and affirms those comments highlighting the Commission’s responsibility to manage the water resources of the Basin. The Commission appreciates the support expressed by many commenters for the discharge prohibition as an appropriate component of regulations to meet this responsibility.

STATEMENT OF CONCERN (SC-17)

Comments representative of those critical of the proposed prohibition on discharges of wastewater from HVHF or HVHF-related activities to waters or land within the Basin follow:

- “We can have all the necessary controls in place to make sure the use of natural resources is environmentally acceptable. Indeed, the resource companies have improved very substantially over the last decade, and the number of serious infractions is way down. We need the natural gas for heating, cooking, and electricity. So let's work together to produce the gas in an environmentally friendly way, rather than simply say ‘no way, no how.’”
- “We were disappointed to see both the 2017 proposal and then a final rulemaking, released on February 25, 2021, formally prohibiting HVHF in the Basin. We continue to believe that the prohibition is unnecessary and, in many ways, duplicative and/or conflicting with Pennsylvania Department of Environmental Protection (“DEP”) oil and natural gas

regulations and is not responsive to a legislative mandate or based on clearly demonstrated need. API has similar concerns of duplication, conflict, and need regarding this most recent proposal.”

RESPONSE (R-17)

The regulation published for public notice and comment did not propose to modify the prohibition on HVHF in the Basin adopted by the Commissioners on February 25, 2021. Although the DRBC recognizes and appreciates industry’s efforts to develop unconventional gas resources safely, for the reasons described in this CRD and in the Commission’s February 25, 2021 Comment Response Document, we disagree that the prohibition on HVHF in the Basin or the regulations adopted in the current rulemaking are unnecessary. The regulations adopted in 2021 prohibiting HVHF in hydrocarbon-bearing formations in the Basin and those proposed in 2021 and now finalized concerning discharges of wastewater from HVHF and HVHF-related activities are grounded in current and accurate information about the potential risks to the Basin’s water resources posed by HVHF and discharges of HVHF wastewater. For details, please see Section 4.2.1 Potential Risks to Water Resources and Section 4.2.2 Potential Impacts to Water Resources and Their Uses, below, and the February 2021 CRD.

4.2.1 Potential Risks to Water Resources

4.2.1.1 Withdrawals and Diversions

STATEMENT OF CONCERN (SC-18)

Commenters suggested that exports of water from the Basin for HVHF would impact the Basin water resources as paraphrased in the following sample comments:

- The withdrawal and export of water from groundwater robs aquifers that feed water supply wells, reduces and disrupts natural groundwater flows, and potentially destroys essential hydrologic connections with wetlands and other water dependent systems. This harms water quality, degrades and diminishes aquifers, streams, aquatic life and flora and fauna, and threatens the safety of drinking water supplies.
- Water withdrawals from water bodies have a cascade of degrading effects on stream life and quality that can be exacerbated by complete water loss or depletive use.
- The life in a stream or river is adapted to its habitat based on its seasonal fluctuation, oxygen and nutrients in the water, its rate of flow and resulting rippling effects, the temperature and depth of the water, the benthic creatures that provide the base of the food web and define the biodiversity of a stream, and many other elements that are sensitive to water withdrawals and depletion.
- DRBC has an obligation to prohibit exportation of water that will result in a loss to the Basin (consumptive uses).

RESPONSE (R-18)

Responses to this set of concerns are provided in Section 3.2. above, at R-7 and R-8.

4.2.1.2 Air Pollution and Air Deposition

STATEMENT OF CONCERN (SC-19)

Representative paraphrased comments expressing concern about air pollution from HVHF activities and related impacts to human health are paraphrased below (footnotes are from the original comments):

- Commenters pointed to a 2014 report by the Natural Resources Defense Council (NRDC) finding that air pollution accompanies gas well development, including in the Marcellus Shale. The NRDC investigators determined that air pollutants are released during at least 15 different parts of the oil and gas development process.²³ Others, citing a 2021 report by the NRDC, asserted that hydraulic fracturing has resulted in dangerous levels of toxic air pollution, and that hydraulic fracturing sites “release a toxic stew of air pollution that includes chemicals that can cause severe headaches, asthma symptoms, childhood leukemia, cardiac problems, and birth defects.”²⁴
- Commenters said that hydraulic fracturing emits particulate matter and ground-level ozone, two of six “criteria air pollutants” regulated by the EPA because of their harmful effects on health and the environment.²⁵ They pointed to a 2014 report published by the NRDC that presented evidence of the harmful effects of hydraulic fracturing on air quality and public health.²⁶ NRDC’s investigators found that the hydraulic fracturing process emits airborne pollutants that are known to cause cancer and harm the nervous, respiratory, and immune systems.
- Commenters referred to a 2014 study, also cited in the 2014 NRDC report noted above, which found that mothers who lived near many oil and gas wells were 30 percent more likely to have babies with heart defects.²⁷ The commenters said that preliminary results from a study in Pennsylvania also showed impacts among newborns, including an increased incidence of low birth weights, that could be linked to air pollution from hydraulic fracturing.²⁸ The

²³ Tanja Srebrotnjak and Miriam Rotkin-Ellman, NRDC, Fracking Fumes: Air Pollution from Hydraulic Fracturing Threatens Public Health and Communities, December 2014. Available at: <https://www.nrdc.org/sites/default/files/fracking-air-pollution-IB.pdf>.

²⁴ NRDC, Reduce Fracking Health Hazards, accessed at: <https://www.nrdc.org/issues/reduce-fracking-health-hazards>.

²⁵ See, e.g., EPA, Criteria Air Pollutants, accessed at: <https://www.epa.gov/criteria-air-pollutants>.

²⁶ Tanja Srebrotnjak and Miriam Rotkin-Ellman, NRDC, Fracking Fumes: Air Pollution from Hydraulic Fracturing Threatens Public Health and Communities (2014), accessed at: <https://www.nrdc.org/sites/default/files/fracking-air-pollution-IB.pdf>.

²⁷ L.M. McKenzie et al., Birth Outcomes and Maternal Residential Proximity to Natural Gas Development in Rural Colorado, *Envtl. Health Perspectives*, 122:4, 412–17 (Apr. 2014), accessed at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3984231/pdf/ehp.1306722.pdf>.

²⁸ J.L. Adgate et al., Potential Public Health Hazards, Exposures and Health Effects from Unconventional Natural Gas Development, *Envtl. Sci. & Tech.*, 48:15, 8307–20 (Feb. 24, 2014).

commenters noted that researchers who looked at air pollution levels near hydraulic fracturing sites in Colorado also found an increased risk of chronic and sub-chronic effects mainly stemming from oil and gas related pollutants, which can harm the respiratory and neurological systems and lead to such symptoms as shortness of breath, nosebleeds, headaches, dizziness, and chest tightness.²⁹

- Some commenters were concerned that DRBC does not review air emissions, creating “a blind spot” in its reviews and oversight. They reasoned that pollutants released to the air fall back to earth, depositing on surface water, vegetation, and soils, and contaminating the water, even if they are not directly “discharged” to water or land. The commenters state that air deposition is as threatening as direct discharges to the health of water resources.

RESPONSE (R-19)

The U.S. Environmental Protection Agency and the states regulate air quality and air emissions under the federal Clean Air Act and respective state air quality statutes and implementing regulations. When fulfilling its water resources mandate, the DRBC has not done so, and it is not now proposing to replicate or supplement those programs.

The Commission’s 2021 final rule prohibiting HVHF in the Delaware River Basin has the effect of precluding the development of HVHF wells within the Basin, and thus preventing their associated air emissions and any resulting deposition to water resources. By this separate rulemaking, the Commission is prohibiting the discharge of treated or untreated wastewater from HVHF and HVHF-related activities to the Basin’s land and waters. These measures together substantially reduce the risk to water resources of the Basin posed by HVHF wastewater generated elsewhere, without replicating federal and state programs or reaching beyond the Commission’s geographic jurisdiction under the Delaware River Basin Compact.

As explained further in Section 4.2.1.5 Transport, Leaks and Spills, below, because the volume of HVHF wastewater imported into the Basin is anticipated to be low, the air emissions associated with such wastewater, and the impacts to water resources that may result, are likewise anticipated to be low.

For Commission responses to concerns about air pollution resulting from HVHF activities, submitted as comments on our 2017 proposed rule, please see Section 2.7.1 Air Emissions of the February 2021 CRD.

STATEMENT OF CONCERN (SC-20)

Representative paraphrased comments critical of the proposed rule because it would allow HVHF-wastewater to be imported, stored and treated in the Basin by means that do not involve a discharge to Basin waters, follow:

²⁹ Wyo. Dep’t of Health, Associations of Short-Term Exposure to Ozone and Respiratory Outpatient Clinic Visits — Sublette County, Wyoming, 2008–2011 (Mar. 1, 2013), accessed at: <https://fossil.energy.gov/app/DocketIndex/docket/DownloadFile/162>.

- Commenters expressed concern that if allowed into the Basin, “toxic and radioactive” hydraulic fracturing wastewater could pollute the Basin environment if processed by incineration, thermal oxidation, air-drying systems, or other waste processing or storage systems that do not generate immediate discharges to water and land but nevertheless allow emissions to air or to ultimately to water via air deposition.
- Commenters asserted that pollution emitted into the air by burning, thermal oxidation, evaporation or air-drying of HVHF wastewater is as much a source of water contamination³⁰ as discharges of such wastewater, and that these airborne contaminants themselves constitute an importation of hydraulic fracturing pollution that endangers human health and the environment.
- Citing the February 2021 CRD, commenters pointed out that, “although the Commission does not directly regulate air emissions, the Commission has considered air deposition in its development of total maximum daily loads (TMDLs) pursuant to Article 4 of its Water Code and Water Quality Regulations, and in the development of strategies for implementing these TMDLs as appropriate.”³¹
- Commenters, including Damascus Citizens for Sustainability (DCS) and the Sierra Club, among others, observed that Elcon Recycling Services (“Elcon”) tried to get approvals for a hazardous waste processing plant that would use thermal oxidation to treat the waste and that the plant could have included hydraulic fracturing wastewater in the waste stream because no permit would have disallowed it. The commenters’ further observations included: that Elcon decided not to discharge wastewater to the river and to instead rely on a system that only discharged to air; technical analysis revealed that approximately 39 tons of air pollution would be emitted, affecting the air quality within a 30-mile radius; that the Philadelphia Water Department opposed the project due to potential pollution; that the air pollution would have direct environmental and public health impacts but without a water discharge, the permitting was left to the PA Department of Environmental Protection which has not been a good guardian of the environment allowing extensive contamination of air and water in PA; and that if this project had not been stopped by the public, hydraulic fracturing wastewater could have entered the Basin and contaminated the watershed's air, water, soils, vegetation and communities.
- Commenters asserted that “no-discharge” thermal oxidation hazardous waste treatment can form more toxic by-products than does incineration of hazardous waste due to low or moderate temperature processing; that toxic byproducts are formed during various phases of the treatment process and released.³²

³⁰ Falabella, J.B., Air – Water Partitioning of Volatile Organic Compounds and Greenhouse Gases in the Presence of Salts; a Thesis Presented to the Academic Faculty of Georgia Institute of Technology, (Aug. 2007), accessed at:

https://smartech.gatech.edu/bitstream/handle/1853/16221/Falabella_James_Benjamin_200708_PhD.pdf.

³¹ DRBC, February 2021 CRD, p. 319.

³² Stephania A. Cormier, Slawo Lomnicki, Wayne Backes, and Barry Dellinger, “Origin and Health Impacts of Emissions of Toxic By-Products and Fine Particles from Combustion and Thermal Treatment of Hazardous Wastes and Materials,” *Env’tl Health Perspectives*, 114:6, 810–17 (June 2006), accessed at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1480527/>.

- Commenters were also concerned that radioactive materials are taken up by microorganisms in the riverbed and, sometimes, directly from the water into the gills of species such as catfish, and that even with low concentrations of radioactive materials in surface water, they can bioaccumulate and create serious problems, impacting fish and aquatic organisms throughout the food web and human health.
- Some commenters said that selenium in the emissions from thermal oxidation creates a serious toxicity problem, and that selenious acid is formed when selenium oxides are dissolved in water, and that the acid is extremely toxic to all types of aquatic creatures. There was expressed concern that selenium is a known constituent in wastewater produced by hydraulic fracturing, and that human health effects of air pollution that can be caused by thermal oxidation of hazardous waste include decreased lung function, inflammatory responses, diminished lung function and lung function growth in children, increased cardiovascular events, genotoxicity, and reproductive effects.
- Commenters were concerned that despite the known impacts of thermal oxidation and combustion described above, very little study has been done about the health effects of thermal oxidation and combustion of hazardous wastes.
- Commenters expressed concern that although much attention is paid to contribution to priority air pollutants (i.e., ozone, volatile organic compounds (VOCs), and nitrogen oxides (NOx)), combustion and thermal processes also produce chronically toxic products of incomplete combustion (PICs). They stressed that the greenhouse gas carbon dioxide is a product of complete combustion of carbon, and the ozone promoter NOx is a product of complete combustion of nitrogen; that chronically toxic organic pollutants, such as benzene, polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs), acrylonitrile, and methyl bromide, are products of incomplete combustion of carbon, carbon and chlorine, carbon and nitrogen, and carbon and bromine compounds, respectively; and that another concern is the formation of large, complex molecules known as polycyclic aromatic hydrocarbons (PAHs), which are carcinogenic.³³ They note that the presence of PFAS in at least some wastes complicates the situation because incineration of PFAS has generally not been successful, so these materials need to be separated out before incineration.
- Commenters made numerous statements about radium and selenium, which are constituents commonly found in wastewater produced by hydraulic fracturing.³⁴ The commenters stated that exposure to high levels of radium-226 and radium-228 can cause cancer and that low-level exposures are also highly dangerous to humans.
- A commenter was concerned that air permits issued by the states will result in polluting air emissions that deposit on surface water, vegetation, and soils, contaminating the watershed and its water, even if they aren't directly "discharged to water or land" and that this pollution threatens public health as people breathe in dangerous pollutants and that by reducing the

³³ H. Sabbah et al, *Exploring the Role of PAHs in the Formation of Soot: Pyrene Dimerization*, Physical Chemistry Letters. 1:19, 2962–67 (Sept. 20, 2010).

³⁴ EPA, Technical Development Document for the Effluent Limitations Guidelines and Standards for the Oil and Gas Extraction Point Source Category (June 2016), accessed at: https://www.epa.gov/sites/default/files/2016-06/documents/uog_oil-and-gas-extraction_tdd_2016.pdf.

quality of water and other environmental media, it also endangers our watershed's health, including ecosystems, habitats, species and important recreational and economic values.³⁵

- A commenter requested that the Commission "Please consider whether evaporation of hydraulic fracturing wastewater could damage the air quality of the Basin."

RESPONSE (R-20)

As stated in R-19 above, the U.S. Environmental Protection Agency and the states regulate air quality and air emissions under the federal Clean Air Act and respective state air quality statutes and implementing regulations. The DRBC has not done so, and it is not now proposing to replicate those programs.

The Commission's 2021 final rule prohibiting HVHF in the Delaware River Basin has the effect of precluding the development of HVHF wells within the Basin, and thus preventing their associated air emissions and any ensuing deposition to water resources. By this separate rulemaking, the Commission is prohibiting the discharge of treated or untreated wastewater from HVHF and HVHF-related activities to the Basin's land and waters. These measures together substantially reduce the cumulative risk to water resources of the Basin from all sources, including any HVHF wastewater imported into the Basin, without replicating federal and state air pollution programs or reaching beyond the Commission's geographic jurisdiction under the Delaware River Basin Compact.

The commenter correctly notes that the Commission measured air deposition in the context of its development of total maximum daily loads (TMDLs) for polychlorinated biphenyls (PCBs) in the Delaware River Estuary. Air sources of PCBs within the Basin were also identified by Estuary dischargers in the course of the trackdown work they performed as part of their DRBC-mandated pollutant minimization plans (PMPs) to implement the TMDLs. Once air sources of PCBs were identified, however, state regulators and the DRBC worked cooperatively with dischargers to eliminate those sources under state and federal laws. The Compact authorizes the Commission to utilize or employ the agencies of the signatory parties where feasible and advantageous. Compact, §§ 1.5, 3.9(b).

The risks posed by particular pollutants present in HVHF wastewater are addressed in Section 4.2.1.3 R-21 of this CRD, below. The comments about storage of HVHF wastewater are addressed in Section 4.2.1.7 of this CRD.

4.2.1.3 Waste characterization / toxicity / radioactivity

STATEMENT OF CONCERN (SC-21)

Many commenters expressed concern about the characteristics of HVHF wastewater, its toxicity and radioactivity, and the risk of pollution that could result from allowing its importation into the

³⁵ Government of Canada, "Air pollution: effects on soil and water," (July 17, 2013), accessed at: <https://www.canada.ca/en/environment-climate-change/services/air-pollution/quality-environment-economy/ecosystem/effects-soil-water.html>.

Delaware River Basin. (Representative comments are paraphrased, and citations within original comments have been omitted.)

- Commenters averred that HVHF wastewater consists of hydraulic fracturing fluid (a mixture of water, sand, and chemical additives) and naturally occurring constituents (such as radioactive elements) that are picked up from the target formation and returned to the surface. They expressed concern that even when the wastewater undergoes treatment, certain chemical additives may either persist in treated effluent or react with the chlorine used to treat wastewater and form potentially dangerous chemical byproducts.
- Commenters were concerned that the hazardous properties of the wastewater are not recognized by regulators, which allow the waste to be handled, transported, and disposed of through less restrictive processes than would be required for contaminants classified as hazardous waste.
- Citing authorities not included here, commenters averred that oil and gas liquid waste contains carcinogens, endocrine disrupting chemicals, heavy metals, poisonous hydrocarbons, radioactivity, and toxic “BTEX” materials (benzene, toluene, ethylbenzene, and xylenes), and has an extremely high salt content. They stated that it was recently revealed that highly toxic per- and polyfluoroalkyl substances (“PFAS”) have been used in the fluids used in hydraulic fracturing in Pennsylvania and elsewhere, and that in its national study of hydraulic fracturing and drinking water, EPA identified 1,606 chemicals in hydraulic fracturing fluid or drilling wastewater, including 1,084 identified in hydraulic fracturing fluid and 599 identified in wastewater, yet only 173 had toxicity values from sources that met EPA’s standards for conducting risk assessments.
- Other commenters stated that HVHF wastewater contains toxic contaminants like selenium, thallium, radium, and ammonium, all of which are dangerous to human health and the environment.
- Another concern voiced by commenters is that HVHF wastewater contains variable and unpredictable amounts of TENORM (Technologically Enhanced Naturally Occurring Radioactive Material) and that the wastewater should therefore not be disposed of in the environment.
- Some commenters pointed out that conventional and unconventional oil and gas wastewaters have organic and inorganic constituents that are similar, but that wastewaters from unconventional oil and gas development may also include chemicals from the HVHF process that could be potentially more toxic than the formation-specific constituents.
- Commenters were concerned that no testing is required for the presence of dangerous constituents in HVHF wastewater. They stated that New York’s 2009 DSGEIS identified 154 of these dangerous parameters in Marcellus shale wastewater, that many are hazardous, some have known harmful health impacts, and that some are carcinogenic.
- Commenters were also concerned that Marcellus Shale is known to have extremely high levels of radioactivity, with samples of produced waters showing combined concentrations of radium 226 and 228 as high as 28,500 picocuries per liter, compared to an EPA drinking water standard of maximum 5 picocuries per liter. They noted that average levels of

radioactivity in drilling waste are lower, but that, given the vast volumes involved, the cumulative effect can be significant.

- Commenters expressed concerns were that exposure to high levels of radium-226 and radium-228 can cause cancer and studies show low levels are also highly dangerous.
- One commenter stated that HVHF wastewater has been found to contain the pesticide atrazine; 1,4-dioxane, an organic compound that is irritating to the eyes and respiratory tract; toluene, which at low exposure has health effects like confusion, weakness, and loss of vision and hearing; and polycyclic aromatic hydrocarbons, which have been linked to skin, lung, bladder, liver and stomach cancers.
- Commenters cited studies showing that disinfection by-products (DBPs) can form when hydraulic fracturing wastewater effluent mixes with halides during drinking water treatment, and that brominated and iodinated DBPs are known to increase the risk of bladder cancer. They noted that DBPs are a drinking water hazard because of the propensity for the brominated DBPs to form trihalomethanes and haloacetic acid, which can cause cancer.
- A commenter cited to a publication by Concerned Health Professionals of New York for an extensive list of human health impacts linked to the industrial processes and wastes from hydraulic fracturing.

RESPONSE (R-21)

The Commission recognizes that wastewater from high volume hydraulic fracturing or HVHF-related activities contains substances that are toxic and substances that are radioactive, that the toxicity of many of the substances is unknown, that the identity of some HVHF chemicals is not disclosed, and that many of the substances are not monitored in the environment.

The Commission also recognizes that research published only recently provides additional evidence of the breadth of HVHF wastewater toxicity. An example is a 2020 paper prepared by several U.S. universities³⁶ that synthesizes a body of work examining toxic effects of exposure to 23 chemicals found in HVHF wastewater. The paper highlights the substantial effects on mammals and amphibians resulting from developmental exposure to HVHF wastewater and the need to examine human and animal health in regions of unconventional oil and gas development. Other recent examples of this important research include papers by: O'Dell et al., (2021)³⁷ suggesting that exposure results in alteration of the adult immune system; Aghababaei, et al. (2021)³⁸ finding acute mammalian toxicity

³⁶ Nagel, S.C., et al., Developmental exposure to a mixture of unconventional oil and gas chemicals: A review of experimental effects on adult health, behavior, and disease, *Molecular Cell Endocrinology*, 513 (Aug. 1, 2020), accessed at:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7539678/pdf/nihms-1631826.pdf>.

³⁷ O'Dell, C.T., et al., Exposure to a mixture of 23 chemicals associated with unconventional oil and gas operations alters immune response to challenge in adult mice, *Journal of Immunotoxicology* 18:1, 105–17 (Dec. 2021), accessed at:

<https://www.tandfonline.com/doi/full/10.1080/1547691X.2021.1965677>.

³⁸ Aghababaei, M., et al., Toxicity of hydraulic fracturing wastewater from black shale natural-gas wells influenced by well maturity and chemical additives, *Env'tl Sci.: Processes & Impacts.*, 4 (Apr. 8, 2021).

and thiol reactivity; and Lu et al. (2021),³⁹ showing toxicity of suspended sediment in HVHF wastewater to larval zebrafish.

The Commission also acknowledges the limits of the federal and state regulations being implemented to manage oil and gas wastes, the risks of accidents, spills, leaks, and illegal discharges involving HVHF wastewater, and the history of such discharges resulting in documented impacts to water resources that include sources of drinking water, as well as to aquatic life and human health in regions of shale gas production. The Commission took into consideration these and other factors, including the characteristics of HVHF wastewater, in its decision to prohibit HVHF in the Basin in 2021 and in its decision by the current rulemaking to prohibit discharges of HVHF wastewater to waters and land within the Basin.

The Commission has no pending requests to import HVHF wastewater. Because the Commission is prohibiting HVHF in hydrocarbon bearing formations in the Basin and discharges of HVHF wastewater within the Basin, the Commission anticipates that only low volumes of HVHF wastewater will be transported, stored, treated, processed, or reused within the Basin and that the amount and severity of any spills, leaks, or other releases and resulting impacts to the Basin's water resources from such activities will likely be sufficiently low so as not to injuriously affect the waters of the Basin as contemplated by the Comprehensive Plan.

The Commission's responses to comments regarding chemical disclosure are provided in Section 4.2.1.4 below. Its responses to comments on impacts to water resources and human health are presented in Section 4.2.2.3 below. For additional detail about the Commission's review and evaluation of HVHF wastewater characteristics, please also see the February 2021 CRD, Section 2.3.2.2 Pollution from Spills.

STATEMENT OF CONCERN (SC-22)

Many commenters expressed concerns about per- and polyfluoroalkyl substances (PFAS) that may be present in HVHF wastewater and the potential for PFAS releases in the Delaware River Basin and impacts to drinking water quality and human health.

Representative paraphrased comments regarding PFAS include the following (all footnotes are from the original comments unless otherwise noted):

- Commenters noted that in 2021 the public discovered that the EPA had approved the use of Per- and polyfluoroalkyl substances (PFAS) in hydraulic fracturing.⁴⁰ They stated that it was

³⁹Lu, Y., et al., Suspended solids-associated toxicity of hydraulic fracturing flowback and produced water on early life stages of zebrafish (*Danio rerio*), *Env'tl Pollution*, 287 (Oct. 15, 2021).

⁴⁰Horwitt, D., J.D., Fracking with "Forever Chemicals," PSR (July 2021), accessed at: <https://www.psr.org/wp-content/uploads/2021/07/fracking-with-forever-chemicals.pdf>.

recently revealed that PFAS have been used in fluids used in hydraulic fracturing in Pennsylvania and elsewhere.⁴¹

- Commenters observed that PFAS are known as “forever chemicals” because they do not break down in the environment and they accumulate over time to become highly toxic. The commenters were concerned that PFAS could be present in HVHF wastewater that may be transported and stored within the Basin under DRBC’s proposed rule.
- Commenters said that the EPA has published research showing PFAS are linked to cancer, liver, endocrine, and immune problems, and impact on fetuses and breastfeeding babies [U.S. EPA, 2016],⁴² and that the EPA has issued a drinking water health advisory for PFOA, PFOS, and other PFAS substances based on the same concerns.
- One commenter stated: “Maybe you folks know of a new treatment protocol for the removal of all chemicals, including the forever family of PFAS, PFOA, which we now know can be found in frack liquids. If so, you might want to share it with the long-suffering residents of Bucks and Montgomery counties who have been burdened with living with poisoned water for too many years.”
- Another commenter stated: “If nothing that has been discovered before about the magnitude of harms caused by fracking activities, including wastewater disposal, has convinced the Commission to ban all fracking related activity within the Basin, the revelation of the use of toxic forever chemical PFAS in fracking alone should lead to an immediate moratorium on all fracking-related activities, including the importing of fracking wastewater.”

RESPONSE (R-22)

The Commission acknowledges that PFAS may be present in HVHF wastewater, that these chemicals are toxic, and that they present treatability challenges. Many PFAS do not break down in the environment (CDC, 2022). They remain in the human body for many years after exposure ends, cause multiple types of toxicity, and may cause adverse human health effects at low exposures. Exposures to even low levels of PFAS in drinking water can be greater than exposures through food and consumer products (NJDOH, 2022).⁴³ Thus, the human health risk from PFAS is distinct from that associated with other persistent, bioaccumulative and toxic (“PBT”) contaminants, such as PCBs and dioxins, which have low water solubility (Post et al., 2017). PFAS are a concern to the Commission.

⁴¹ Philadelphia Inquirer Editorial Board, Fracking’s use of EPA-approved toxic chemicals shows again that regulators prioritize industry over health, Philadelphia Inquirer Editorial Opinion (July 15, 2021), accessed at: <https://www.inquirer.com/opinion/editorials/fracking-epa-pfas-forever-chemicals-water-pennsylvania-20210716.html>.

⁴² EPA, Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States (Dec. 2016) at ES-45–ES-46, 9-1. (The Commission notes that the cited EPA report does not mention PFOA or PFAS, but acknowledges the accuracy of the commenter’s information as reflected on the EPA’s “Drinking Water Health Advisories for PFOA and PFOS” website, accessed at: <https://www.epa.gov/sdwa/drinking-water-health-advisories-pfoa-and-pfos>.)

⁴³ See also N.J. Dep’t of Env’tl. Prot., Frequently Asked Questions (FAQ): PFAS in Drinking Water, available at: <https://www.nj.gov/dep/pfas/docs/faq-pfas-in-drinking-water.pdf>.

The Commission has no pending requests to import HVHF wastewater. The Commission anticipates that only low volumes of HVHF wastewater will be transported, stored, treated, processed, or reused within the Basin and that the amount and severity of any spills, leaks, or other releases and resulting impacts to the Basin's water resources from such activities will likely be sufficiently low so as not to injuriously affect the waters of the Basin as contemplated by the Comprehensive Plan.

STATEMENT OF CONCERN (SC-23)

The American Petroleum Institute (API) claims that PFAS in HVHF wastewater are exaggerated stating:

- that PFAS is not widely used in fracturing fluids, and that API members will continue to review available data and analyses to better understand and mitigate the use of these chemicals across the upstream segment.
- that the recent report by Physicians for Social Responsibility (PSR) entitled "Fracking with Forever Chemicals" was "greatly flawed". API cited key findings of a report by its consultant, allegedly disproving the findings of the PSR report.

RESPONSE (R-23)

PADEP has advised the Commission that very few unconventional gas wells in Pennsylvania were completed using HVHF fluids containing PFAS. However, as described in the previous response, the potential presence of PFAS in HVHF wastewater remains a concern to the Commission and contributes to the totality of the risks to water resources of the Basin posed by potential discharges of HVHF wastewater. The Commission took these risks into consideration in deciding to prohibit the discharge of HVHF wastewater to waters and land within the Basin.

However, as noted in the previous response and in other sections of this CRD, the likelihood of impacts to the Basin's water resources resulting from spills, leaks, or other releases of HVHF wastewater from are in the Commission's view effectively reduced by the rules prohibiting HVHF and the discharge wastewater from HVHF and HVHF-related activities to land or waters within the Basin.

4.2.1.4 Chemical Disclosures

STATEMENT OF CONCERN (SC-24)

Paraphrased comments asserting that concerns about chemical disclosure are unwarranted follow:

- The American Petroleum Institute (API) asserted that the controversy over disclosure is focused on the approximately 0.5% of hydraulic fracturing fluid that consists of additives that are formulated to improve the performance of the hydraulic fracturing operation. API contended that substances that are most commonly found in this 0.5% of hydraulic fracturing fluid systems are also commonly found in food, cosmetics, detergents, and other household products.
- The API maintained that while there are narrow instances where companies use existing laws and regulations to protect as proprietary certain constituents in their hydraulic fracturing

fluid systems, they are generally protecting specific ingredients within additives that commonly represent less than a thousandth of a percent (0.001%) of the total hydraulic fracturing fluid volume.

- The API further contended that even in narrow circumstances where precise chemical identification is not publicly released, the industry typically provides chemical category information that allows the public to identify the class and function of the chemical, and states require that the precise identity of these ingredients be disclosed to regulators (and, if necessary, to physicians and emergency responders) when the information is needed. Moreover, API asserted, materials safety data sheets, which contain safety, health, and environmental information for all ingredients (including those denoted as proprietary), are always available onsite for the substances used in the hydraulic fracturing process.
- The API also noted that companies in a variety of industries avail themselves of the benefits of trade secret protection for exactly the same reasons as oil and gas service companies.

Comments representative of those expressing concern about chemical disclosure follow:

- A commenter stated that there are no uniform requirements for the disclosure of chemicals used in hydraulic fracturing operations, resulting in the largely unknown nature of the chemicals' potential impact on health and the environment.
- A commenter asserted that the June 2020 report of the PA Grand Jury investigation into the unconventional oil and gas industry found among other things that while the industry must disclose trade secret chemicals to the DEP, the public and first responders lack access to this information. The commenter expressed concern that keeping these proprietary chemicals secret leaves firefighters and Hazmat teams incapable of effectively or safely responding to emergencies at unconventional gas well or spill sites.
- One commenter was concerned that if there is a wastewater spill, the fire department responders could be exposed to unknown carcinogens or other dangerous chemicals.
- Many commenters were concerned that quantities of undisclosed chemicals used during hydraulic fracturing operations on private or public lands can volatilize into the air from tanks and wastewater impoundments and contribute to air pollution.⁴⁴
- DRN commented, "What makes information even more hidden, if the trade secret claims are asserted by the chemical manufacturers themselves, is that Pennsylvania law appears to allow complete secrecy. An exemption for chemical manufacturers that relieves them of reporting to drillers or other entities the complete ingredients in their formulas leaves a huge knowledge gap that keeps the public, regulators such as DEP, emergency personnel and first responders, health professionals, and even the drillers themselves in the dark."

⁴⁴ NRDC, Fracking Fumes: Air Pollution from Hydraulic Fracturing Threatens Public Health and Communities (Dec. 2014), accessed at: <https://www.nrdc.org/resources/fracking-fumes-air-pollutionfracking-threatens-public-health-and-communities>.

- DRN also provided this quote from the “Keystone Secrets” report by The Partnership for Policy Integrity: “When companies drill unconventional gas wells and designate a chemical as a trade secret, Pennsylvania requires that they must provide the public with a rough idea of what chemical was used by disclosing the chemical’s “chemical family or similar description associated with the chemical.” The federal Toxic Substances Control Act has a similar provision. However, these disclosures are inadequate because even chemicals within the same family can have very different toxicities and health effects.”
- DRN provided this quote from an EPA report: “...non-disclosure of fracking chemical identities may leave people unknowingly exposed to harmful substances. Between 2003 and 2014, the EPA identified health concerns about 109 of 126 new chemicals proposed for use in oil and gas drilling and fracking. The chemicals’ manufacturers submitted information about the chemicals for review under a program that requires EPA to screen and regulate new chemicals for health and environmental impacts before they are used commercially. Despite concerns by EPA scientists about the chemicals’ health effects, EPA approved most of the 109 chemicals for use, and 62 were later used in or likely used in oil and gas wells. Manufacturers took advantage of trade secret protections that are permitted by federal law to conceal 41 of the 62 chemicals’ identities.”⁴⁵
- DRN stated that the amount of secret chemical use in oil and gas wells is likely much greater than publicly disclosed because of regulatory exemptions that don’t require reports or readily accessible records of all chemicals used in drilling and hydraulic fracturing.
- The League of Women Voters (LWV) asserted that no protocol for completely removing and destroying all the substances found in hydraulic fracturing wastewater has yet been published and that while such an operation is theoretically possible, it would first require reversal of laws that currently shield the oil and chemical industries from disclosing all chemicals used in hydraulic fracturing operations, so that they can be identified. They further claimed that this, coupled with the time-consuming and potentially prohibitively expensive breakthroughs required to neutralize the adverse effects of such toxic chemical, suggests that a complete protocol for handling these wastes will not become available in the near future.
- Many commenters were concerned that we don't know what is in this “toxic mix” of wastewater because many of the constituents are either hidden from the public as "secrets" or they are not properly tested or assessed by agencies for toxic properties. They said “How can the waste be stored in a manner that is safe for public health and the environment when we don't even know what is in it and its hazardous properties are ignored? Commissioners, you must ban the import of fracking wastewater to prevent the harm that would be done if it were allowed to be imported and stored here.”

⁴⁵ Horwitt, D., J.D., Partnership for Policy Integrity, Keystone Secrets: Records Show Widespread Use of Secret Fracking Chemicals Is a Looming Risk for Delaware River Basin, Pennsylvania Communities,4–5 (Sept. 11, 2018), accessed at: <https://www.pfpi.net/wp-content/uploads/2018/09/PASecretFrackingChemicalsReportPFPI9.10.2018.pdf>.

RESPONSE (R-24)

As stated in the February 2021 CRD and in this document, the Commission acknowledges the risks to water resources posed by HVHF and HVHF-related processes. The Commonwealth of Pennsylvania manages these risks in part through a detailed statute and regulations focused on protecting water resources and public health while preserving commercial interests that include the interest of chemical manufacturers in protecting trade secrets. In some instances, the responses to these risks may be influenced by the timing of access to protected proprietary chemical identity information. In February 2021, the Commission determined that no set of regulations, however extensive, can adequately control the totality of the risks, vulnerabilities, impacts, and uncertainties, including those surrounding chemical disclosure or nondisclosure, which would accompany HVHF and related activities in the Basin. A similar determination with regard to discharges of HVHF wastewater underlies the rule that is the subject of this CRD. The Commission has no pending requests to import HVHF wastewater. Because the Commission is prohibiting HVHF in hydrocarbon bearing formations in the Basin and discharges of HVHF wastewater within the Basin, the Commission anticipates that only low volumes of HVHF wastewater will be transported, stored, treated, processed, or reused within the Basin and that the amount and severity of any spills, leaks, or other releases and resulting impacts to the Basin's water resources from such activities will likely be sufficiently low so as not to injuriously affect the waters of the Basin as contemplated by the DRBC Comprehensive Plan.

Please see the Commission's February 2021 CRD, Section 2.6.2 Chemical Disclosure, for additional responses to concerns about HVHF chemical disclosure.

4.2.1.5 Transport, Leaks and Spills

STATEMENT OF CONCERN (SC-25)

Many commenters expressed concern that the proposed rules would allow HVHF wastewater to be transported into and within the Basin, resulting in impacts to water resources from leaks, spills, accidents, and illegal dumping. Representative comments are paraphrased or quoted below:

- Commenters expressed concern that the transport of hydraulic fracturing wastewater into or through the Basin for processing, storage, reuse or other purposes would threaten the release of dangerous pollution from tankers, containers, rail cars or other modes of mobile transport.
- Commenters maintained that transportation of hazardous waste within the Basin exposes Basin communities and the environment to the risk of contamination should there be a spill to water or land as a result of an accident, sabotage or intentional unpermitted release.
- Citing one or more government reports, commenters said that hydraulic fracturing fluid can spill into surface water bodies at every stage before, during, and after the hydraulic fracturing process—during transportation of the hydraulic fracturing fluid to the well site, during storage and handling of the fluid at drill sites, and afterwards, when hydraulic fracturing

wastewater is being trucked from well pads for treatment and disposal.⁴⁶ They noted that spills or releases can result from tank ruptures, piping failures, equipment or surface impoundment failures, overfills, vandalism, accidents (including vehicle collisions), ground fires, drilling and production equipment defects, or improper operations and that spilled, leaked, or released fluids could flow to a surface water body or infiltrate the ground, reaching subsurface soils and aquifers.⁴⁷

- A commenter cited EPA (without naming the specific publication) for the proposition that spills have occurred wherever transport of hydraulic fracturing wastewater has occurred. Specifically, commenters attributed to EPA the finding that between May 2009 and April 2013, eight spills of hydraulic fracturing wastewater ranging from more than 4,000 gallons to more than 57,000 gallons reached surface water resources in Pennsylvania and that these spills were reported to have resulted in local impacts to environmental receptors, requiring remediation and monitoring. The commenter asserted that the number of reported spills is likely to be only a subset of actual spills. The commenter cited a news report to the effect that legal action in Pennsylvania alleging long-term illegal dumping raised questions about the difficulty of detecting this behavior and quantifying it on a regional basis.⁴⁸
- Environment New Jersey cited a 2015 letter from the Philadelphia Water Department (PWD) to the PADEP, objecting to the application by Elcon Recycling Services, LLC to construct and operate a zero-discharge hazardous waste processing facility in Falls Township, Bucks County, PA on the Delaware River, in part on grounds that there would be a substantial risk of drinking water contamination from release of hazardous waste during transport to or from the facility.⁴⁹
- Another commenter cited a Canadian journal article reporting that in the province of Alberta, Canada, an estimated 2,500 hydraulic fracturing wastewater spills occurred from 2005 to 2012, with more than 113 of those spills entering directly into freshwater lakes and streams.⁵⁰
- Commenters relying on diverse published sources pointed to mounting evidence of the adverse impact of hydraulic fracturing operations and waste transport on water quality. Acknowledging that analytical data on water impacts is often unavailable or incomplete, they

⁴⁶ NYSDEC, Final Supplemental Generic Environmental Impact Statement of Regulatory Program for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs (May 2015), accessed at: <https://www.dec.ny.gov/energy/75370.html>.

⁴⁷ *Id.*

⁴⁸ Jonathan D. Silver, Pittsburgh Post-Gazette, State Charges Local Company for Dumping Wastewater and Sludge (Mar. 18, 2011), accessed at: <http://www.post-gazette.com/pg/11077/1132812-454.stm>. Kaitlynn Riely, Pittsburgh Post-Gazette, Greene County Man Pleads Guilty to Illegally Dumping Liquid Waste, Pittsburgh Post-Gazette (Feb. 11, 2012), accessed at: <https://www.post-gazette.com/news/environment/2012/02/11/Greene-County-man-pleads-guilty-to-illegally-dumping-liquid-waste/stories/201202110485>.

⁴⁹ Philadelphia Water Dep't, Comment to PADEP on Elcon Recycling Services, LLC Phase I Criteria Siting Permit application (Oct. 14, 2015), accessed at: <https://water.phila.gov/pool/files/elcon-falls-twp-permit-comments.pdf>.

⁵⁰ D. S. Alessi et al., Comparative Analysis of Hydraulic Fracturing Wastewater Practices in Unconventional Shale Development, Water Sourcing, Treatment, and Disposal Practices. 42 Can. Wat. Resour. J. 105 (2016).

asserted that adequate information exists to conclude that hydraulic fracturing activities and waste transport can adversely affect groundwater, surface water, and drinking water supplies.^{51, 52, 53}

RESPONSE (R-25)

The Commission acknowledges the risks posed by the transport of HVHF wastewater, including the possibility of spills, leaks, and other releases, and the impacts to water resources that can result from such releases. These risks and impacts are described in detail in the Commission's February 2021 CRD, Section 2.3.2.2 Pollution from Spills and Section 2.3.3 Significant Impacts to Water Resources and their Uses. The Commission based its decision in 2021 to approve a final rule prohibiting HVHF within the Basin in part on evidence of spills associated with HVHF production activity outside the Delaware River Basin in northeastern Pennsylvania.

The Commission also recognizes that the risks of impacts to water resources in a region from the release of HVHF wastewater are strongly related to the volume of HVHF wastewater present in the region. If the volume of wastewater being transported through a region is high, then the probability of spills is correspondingly high. If the volume is low, then the probability of spills is correspondingly low. The volume of HVHF wastewater in active shale-gas production areas is high, because large volumes of wastewater are generated from many gas wells and must be stored, transported and disposed of. In areas outside active production areas, the volume of wastewater present is lower. EPA has reported, in reference to oil and gas wastewater transport, that "generally, operators will not be inclined to transport waste more than 50 to 75 miles unless no other alternatives are available."⁵⁴ In Pennsylvania, the average distance of transport from the location of HVHF wastewater generation to the location of its destination declined steadily from 95 miles in 2012 to 23 miles in 2017.⁵⁵

A comparison of the volume of oil and gas wastewater generated in Pennsylvania with the volume imported to New York, where HVHF is prohibited, is instructive. A comprehensive 2019 study of Pennsylvania's oil and gas waste management conducted by SPE Healthy Energy, Stanford University, UC Berkeley, and Lawrence Berkeley National Laboratory, provides the basis for this comparison.⁵⁶ During the years 2010-2017, the volumes of oil and gas wastewater imported from Pennsylvania to

⁵¹ PSR, Concerned Health Professionals of NY, Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking (Unconventional Gas and Oil Extraction), Fifth Edition (Mar. 2018).

⁵² Hays, J. and Shonkoff, S., Toward an Understanding of the Environmental and Public Health Impacts of Unconventional Natural Gas Development: A Categorical Assessment of the Peer-Reviewed Scientific Literature, 2009-2015, PLOS ONE 11:4 (Apr. 20, 2016), accessed at: <https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0154164&type=printable>.

⁵³ Myers, T., Potential Contaminant Pathways from Hydraulically Fractured Shale to Aquifers., Groundwater, National Ground Water Association (Apr. 17, 2012).

⁵⁴ EPA, Management of Exploration, Development and Production Wastes: Factors Informing a Decision on the Need for Regulatory Action, (Apr. 2019), accessed at: https://www.epa.gov/sites/default/files/2019-04/documents/management_of_exploration_development_and_production_wastes_4-23-19.pdf.

⁵⁵ Hill et al., Temporal and spatial trends of conventional and unconventional oil and gas waste management in Pennsylvania, 1991-2017. *Sci. of the Total Env't*, 674, 623-36, 631, Table 5, 634 (Apr. 2, 2019), accessed at: <https://doi.org/10.1016/j.scitotenv.2019.03.475>.

⁵⁶ *Id.*

the State of New York averaged about 7.3 thousand barrels per year. In comparison, during the same period, 7.8 *millions* of barrels per year of oil and gas wastewater were generated in northeastern Pennsylvania's Tioga, Bradford, and Susquehanna counties where shale-gas is intensively produced along the New York-Pennsylvania border.⁵⁷ In other words, New York State imported the equivalent of less than 0.1% of the oil and gas wastewater volume generated in these three adjacent Pennsylvania counties during the 2010-2017 study period. The probability of spills of imported oil and gas wastewater was thus far lower in New York during this period than the probability of spills of oil and gas wastewater in the bordering shale-gas production counties in northeastern Pennsylvania.

Data on spills of oil and gas wastewater during truck transport demonstrate that spill events were more frequent in the northeastern Pennsylvania counties with active shale gas production than in adjacent counties in New York, where shale gas production was (and continues to be) prohibited. The number of spills occurring in two adjacent regions of similar area were compared: Tioga, Bradford, and Susquehanna Counties in Pennsylvania and Steuben, Chemung, Tioga, and Broome Counties, New York. Both regions occupy about 3,100 square miles. According to the spills databases maintained by Pennsylvania Departments that track spill events, between 2008 and 2020 there were eight spills of oil and gas brine, flowback or HVHF fluid being transported on roads in Pennsylvania's Tioga, Bradford, and Susquehanna Counties.⁵⁸ In contrast, according to a comparable database maintained by the New York State Department of Environmental Conservation,⁵⁹ during the same period, only one such spill occurred in the adjacent New York counties of Steuben, Chemung, Tioga, and Broome. (Under New York law, solid and liquid HVHF wastes from Pennsylvania were allowed to be imported for disposal at New York landfills or by other means until August, 3, 2020, when New York classified oil and gas waste, including but not limited to drilling fluids and produced waters, as hazardous wastes subject to all pertinent hazardous waste regulations.) This data provides further evidence that the probability of roadway spills of HVHF wastewater in areas where HVHF is prohibited is lower than in nearby areas where HVHF is permitted.

The comparatively higher probability of HVHF wastewater transport spills in active shale-gas production areas relative to the low probability of such spills outside shale-gas production areas is also evidenced by data on spills from oil and gas fluid transport in different areas within Pennsylvania. According to the spills databases maintained by Pennsylvania departments that track spill events, between 2008 and 2021, 50 spills of oil and gas brine, flowback or HVHF fluid occurred during transport of these materials in Pennsylvania. Twenty-eight (28) of these occurred during highway transport and 22 during pipeline transport. All 50 of these spills occurred in Pennsylvania counties where shale gas is produced. None of the spills occurred within the portion of Pennsylvania counties located within the Delaware River Basin, where shale gas is not produced, or in any other Pennsylvania counties where shale gas is not produced.⁶⁰ The data on oil and gas wastewater volumes and spills demonstrate that the probability of impacts from transport-related spills has

⁵⁷ Id.

⁵⁸ PADEP, 2022. Spills databases provided to DRBC on April 28, 2022.

⁵⁹ NYSDEC, 2022. Spills database provided to DRBC on June 8, 2022.

⁶⁰ PADEP, 2022, *supra* note 58.

been, and will remain, lower in the Delaware River Basin than in HVHF production areas of Pennsylvania.

Because the Commission has prohibited HVHF within the Delaware River Basin and is also prohibiting the discharge of treated or untreated HVHF wastewater to land or waters within the Basin, it anticipates that only low volumes of HVHF wastewater will be transported to or through the Basin. The number of probable spills of HVHF wastewater during transport within the Basin and the related potential for adverse impacts on the Basin's water resources resulting from such spills are in the Commission's view reduced by these measures sufficiently to protect the water resources of the Basin.

STATEMENT OF CONCERN (SC-26)

Citing to its own report, the NRDC asserted that the transport of produced water to and from the hydraulic fracturing site hundreds of times per well has significant potential to pollute water bodies.⁶¹ They further alleged that the greatest risk pathway for water contamination occurs not at the hydraulic fracturing site, but where produced water is transported, including in areas where hydraulic fracturing itself is prohibited.⁶²

RESPONSE (R-26)

The Commission disagrees with the proposition that the risk of impacts to water resources from the transportation of HVHF wastewater is as high in regions where HVHF is prohibited as in areas where natural gas production using HVHF is permitted. As described in the previous response, the presence of HVHF wastewater, and thus the risk of impacts from HVHF wastewater releases in a region, is strongly related to the volume of HVHF wastewater generated in the region. Because the Commission prohibited the use of HVHF in hydrocarbon bearing formations in the Basin in 2021 and is now prohibiting the discharge of HVHF wastewater within the Basin, the Commission anticipates that only low volumes of HVHF wastewater will be transported to or across the Basin. In the view of the Commission, the number of spills and releases of HVHF wastewater within the Basin and the risk to water resources from such events are thus effectively reduced.

STATEMENT OF CONCERN (SC-27)

Some commenters said that the transportation of hydraulic fracturing wastewater also emits pollutants to the air that are subsequently deposited on land, soil, vegetation, or surface water and/or are breathed in by people and animals; and that this occurs from mobile emissions of carbon and air pollutants from engines as well as off-gassing from container tanks being used for transport.

⁶¹ See, e.g., NRDC, *In Fracking's Wake: New Rules are Needed to Protect Our Health and Environment from Contaminated Wastewater* (May 2012), accessed at: <https://www.nrdc.org/sites/default/files/Fracking-Wastewater-FullReport.pdf>.

⁶² *Id.*

RESPONSE (R-27)

As explained at R-19 and R-25 of this CRD, above, because the Commission in 2021 prohibited HVHF in the Delaware River Basin and with the present rulemaking is prohibiting the discharge of HVHF wastewater within the Basin, the volume of HVHF wastewater imported into the Basin is anticipated to be low. The air emissions within the Basin associated with transport of such wastewater are likewise expected to be low, as are the impacts to water resources that could potentially ensue. As the Commission also states in R-19 above, the U.S. Environmental Protection Agency (EPA) and the states regulate air quality and air emissions under the federal Clean Air Act and respective state air quality acts and implementing regulations. The DRBC has not done so, and it is not now proposing to replicate or supplement those programs.

Please also see the Commission's February 2021 CRD, at R-112.

STATEMENT OF CONCERN (SC-28)

Comments representative of those expressing other concerns about truck transport of HVHF wastewater into and within the Delaware River Basin follow:

- Commenters said that transport of HVHF wastewater will most likely be by trucks and that studies have shown that the presence of these trucks creates safety issues and increased fatalities. The commenters alleged that increased truck traffic increases the number of accidents in which trucks are involved⁶³ (even if trucks carrying HVHF wastewater are not always involved in these accidents), and likewise, increases the chances of major spills. They noted that leaks from trucks transporting HVHF wastewater can occur, whether or not in connection with accidents. Allegedly, drivers transporting HVHF wastewater may open their tank spigots slightly as they drive down back roads or may pull up to streams and drain their tanks into them. While such acts would be illegal, the commenters aver that DRBC lacks enforcement power and that the Pennsylvania Department of Environmental Protection (PA DEP) lacks the personnel to control such practices.
- Commenters expressed a concern that illegal and intentional dumping of hazardous hydraulic fracturing wastewater by trucking contractors could increase in the DRB if the importation of HVHF wastewater into the Basin is not prohibited. They recalled that a 2009 fish kill in Dunkard Creek in southwestern Pennsylvania was linked to illegal dumping of hydraulic fracturing wastewater. A trucking contractor in the region was charged by Pennsylvania's Office of Attorney General in 2011 with disposing of hydraulic fracturing wastewater and other liquid wastes during 2003-2009, by dumping them into a disused mine shaft connected to the Creek, where a resulting bloom of golden algae produced a toxin that

⁶³ Muehlenbachs, L., et al., *The Accident Externality from Trucking*, Resources for the Future (Sept. 2017 (rev. Jan. 2021)), accessed at: https://media.rff.org/documents/RFF-Report-Accident-Externality-Trucking_uhY6Lvg.pdf.

killed 160 species of fish and other aquatic life forms.⁶⁴ The commenter averred that Dunkard Creek became a saline, toxic, sterile stream for 38 miles and that such outcomes in the DRB must be prevented.

- Commenters averred that in addition to increasing traffic accidents, transportation of HVHF wastewater by truck adds air pollution, wear and tear on roadways, traffic congestion, and climate impacts, and that additional impacts occur related to transfer stations and stream obstructions.
- Some commenters stated that vehicles transporting toxic and radioactive hydraulic fracturing waste byproducts increase the risk of human and animal exposure to toxicants by contributing to contamination of water, air, soil and farmland when accidents, leaks, and spills occur. Commenters averred that not only could surface waters, residential areas, school properties and cropland be contaminated by spills but also that radioactive particles and other contaminants may become airborne as trucks and passenger vehicles travel along roads and can be tracked on tires; and that rain and snowmelt carrying radioactive materials and other pollutants can run off of road surfaces and migrate onto nearby properties, including farms, and into streams, ponds and irrigation systems, or leach into soil and seep into groundwater. The commenters said these numerous pathways of exposure pose increased risk for human and livestock inhalation and ingestion of highly radioactive materials and carcinogenic and endocrine disrupting chemicals.
- A commenter recounted that in 2010, a truck carrying oil and gas wastewater overturned in the small Ohio town of Barnesville and spilled 5,000 gallons of its wastewater load into a stream only a few hundred yards from where the stream runs into a drinking water reservoir.⁶⁵
- Citing a New York City DEP report, a commenter noted that, based on its review of the risk of spills generated from truck trips alone, New York City concluded in its 2009 report that “acute spill scenarios are realistic and should be expected.”⁶⁶
- Citing an EPA report, a commenter asserted that the chances of an accident during transportation of hydraulic fracturing waste have been assessed by EPA, using available

⁶⁴See, e.g., San Deigo Tribune, Pa. man, company accused of dumping gas wastewater (Mar. 17, 2011), accessed at: <https://www.sandiegouniontribune.com/sdut-pa-man-company-accused-of-dumping-gas-wastewater-2011mar17-story.html>;

Federmn, A., What Killed Dunkard Creek?, Earth Island Journal, accessed at:

<https://www.earthisland.org/journal/index.php/magazine/entry/what-killed-dunkard-creek/>;

Barrett, S., Tentative settlement reached in Dunkard Creek fish kill, Greene County Messenger (Aug. 6, 2015 (updated Jan. 6, 2016)), accessed at:

https://www.heraldstandard.com/gcm/news/local_news/tentative-settlement-reached-in-dunkard-creek-fish-kill/article_83f5c33f-535d-527f-9475-8b5526142da0.html.

⁶⁵ Mall, A., Drinking Water Reservoir Contaminated by Oil and Gas Wastewater in Ohio, NRDC Expert Blog (Mar. 11, 2016), accessed at: <https://www.nrdc.org/experts/amy-mall/drinking-water-reservoir-contaminated-oil-and-gaswastewater-ohio>.

⁶⁶ NYCDEP, Final Impact Assessment Report: Impact Assessment of Natural Gas Production in the New York City Water Supply Watershed (Dec. 22, 2009), 37, accessed at: <https://www.nj.gov/drbc/library/documents/dockets/stone-energy/NYCDEP-FinalImpactAssessmentReportTOC.pdf>.

information on estimated volumes, disposal distances, truck sizes, and accident rates. EPA found that the total travel distance by trucks ranges from about 9,600 miles to 22,000 miles per well and that each truck is assumed to carry 5,440 gallons of waste.⁶⁷ It assumed 3.4 percent of accidents involving these vehicles were truck crashes and that 28 crashes occurred per 100 million miles travelled. Although the results predict a relatively low number of expected releases, if any one of them involves a spill that reaches groundwater, surface water or drinking water resources, the commenter maintained, it can seriously impact the chemical composition of the receiving water.

- Commenters including Environment New Jersey noted that EPA has also concluded that studies show the likelihood of spills increases as the volume of wastewater and number of trips increase,⁶⁸ and that EPA also found that the likelihood of accidents is increased because the federal government has created a special loophole for the industry: Federal Motor Carrier Safety Administration (FMCSA) regulations require oil/gas industry drivers to take only 24 hours off for every 60 hours of driving, compared to 34 hours off for other drivers. The commenters contend that at least some transported oil and gas wastewater will leak, spill, or migrate into water supplies during transport and handling at a processing, storage or re-use facility.
- Commenters expressed concern that waste from the oil and gas industry is exempt from being classified as hazardous, and therefore is not subject to regulations imposing special safety and handling requirements, including appropriate labeling of trucks and tracking of the waste.

RESPONSE (R-28)

The Commission acknowledges the risks described by commenters regarding truck transport of HVHF wastewater. Research has shown the reality of these risks: in three regions of active natural gas production in Texas, for example, the number of roadway crashes of commercial vehicles in rural areas from 2006 through 2013 was shown to be strongly correlated with the number of horizontal wells drilled in the region.⁶⁹ The Commission has concluded based on this and other information that in regions of active shale gas production, where large volumes of HVHF wastewater are present and routinely transported by truck, the risk of crashes resulting in spills is substantial and constitutes one of the reasons why the Commission has prohibited HVHF in the Delaware River Basin.

⁶⁷ EPA, Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States, (Dec. 2016), accessed at: <https://cfpub.epa.gov/ncea/hfstudy/recordisplay.cfm?deid=332990>.

⁶⁸ EPA, Detailed Study of the Centralized Waste Treatment Point Source Category for Facilities Managing Oil and Gas Extraction Wastes (May 2018), accessed at: https://www.epa.gov/sites/default/files/2018-05/documents/cwt-study_may-2018.pdf.

⁶⁹ Quiroga, C., and Tsapakis, I., Oil and Gas Energy Developments and Changes in Crash Trends in Texas, Final Report, Texas A&M Transportation Institute (Oct. 2015), accessed at: <https://static.tti.tamu.edu/tti.tamu.edu/documents/PRC-15-35-F.pdf>.

However, the Commission also recognizes that the probability of spills resulting from HVHF wastewater transport in active shale-gas production areas is higher than in areas where shale-gas is not produced, as evidenced in the data on spills discussed at R-26 above.

Because the Commission has prohibited the use of HVHF in hydrocarbon-bearing rock formations within the Basin and is prohibiting the discharge of HVHF wastewater (broadly defined to include products, co-products, byproducts or waste products from the treatment, processing or modification of HVHF wastewater) to waters or land within the Basin, the volumes of HVHF wastewater trucked into or through the Basin are expected to be low, and the likelihood of inadvertent or intentional releases with impacts to water resources, commensurately low.

Please also see Section 2.7.8 Miscellaneous, R-123, of the February 2021 CRD for related content.

STATEMENT OF CONCERN (SC-29)

Comments representative of those expressing concern about conveyance of HVHF wastewater into and within the Delaware River Basin by means other than truck transport follow:

- Commenters expressed concern about the potential use of pipelines to carry the HVHF wastewater into and/or out of the watershed and the adverse impacts they believe would result. Some objected that “DRBC has not taken full jurisdiction of pipeline projects” under current regulations, “despite the public’s insistence that they must.”
- Citing news and journal coverage, commenters said that in 2015, a four-inch pipeline operated by Summit Midstream Partners LP burst north of Williston, North Dakota, leaking almost 3 million gallons of saltwater brine, a byproduct of hydraulic fracturing.⁷⁰ The hydraulic fracturing brine spilled into Blacktail Creek, which flows into the Missouri River, the drinking water source for Williston.⁷¹ Later that month, officials found chloride concentrations in the creek to be as high as 92,000 mg/L, much higher than normal concentrations of about 10 to 20 mg/L.⁷² In samples taken a year later, soil and sediment downstream of the spill site had radium concentrations up to 100 times greater than in samples taken upstream.⁷³

⁷⁰ R. Jacobson, Fracking Brine Leak In North Dakota Reaches Missouri River, Prompts State Democrats to Call For More Regulation, PBS News Hour (Jan. 26, 2015), accessed at: <https://www.pbs.org/newshour/nation/fracking-brine-leak-north-dakota-reaches-missouri-river-prompts-state-democrats-call-regulation>.

⁷¹ *Id.*

⁷² K. Valentine, Nearly 3 Million Gallons Of Drilling Waste Spill From North Dakota Pipeline, Think Progress, (Jan. 22, 2015), accessed at: <https://archive.thinkprogress.org/nearly-3-million-gallons-of-drilling-waste-spill-from-north-dakota-pipeline-3690ea16c937/>.

⁷³ D. Lockwood, Toxic Chemicals From Fracking Wastewater Spills Can Persist For Years, Chemical & Engineering News, (May 20, 2016), accessed at: <https://cen.acs.org/articles/94/web/2016/05/Toxic-chemicals-fracking-wastewater-spills.html>.

- Another commenter noted that efforts are currently underway to begin transporting hydraulic fracturing waste by barge, which would pose additional risks to waterways.⁷⁴

RESPONSE (R-29)

The Commission acknowledges the potential impacts to water resources that could result from spills associated with pipeline and barge transport of HVHF wastewater. The Commission is not aware of any current or proposed barge transport of HVHF wastewater within the Basin. Any storage container used to transfer HVHF wastewater to and from a barge within the Pennsylvania portion of the Basin would need to comply with the storage requirements provided in 25 Pa. Code Chapter 299 – Storage and Transportation of Waste.

The Commission also recognizes that the probability of spills from HVHF wastewater pipelines is substantially higher in active shale-gas production areas than in areas where shale-gas is not produced. The data on spills from oil and gas fluid transport in Pennsylvania discussed at R-25, above, supports the Commission’s view. As discussed in that response, Pennsylvania databases that track spill events show that between 2008 and 2021, 22 spills occurred from pipelines transporting oil and gas brine, flowback or HVHF fluid in the Commonwealth.⁷⁵ All 22 of these pipeline spills occurred in Pennsylvania counties where shale gas is produced from unconventional wells, and none occurred within the Pennsylvania counties of the Delaware River Basin where shale-gas is not produced from unconventional wells, or in any other Pennsylvania counties where shale-gas is not produced from unconventional wells.

Because the Commission has prohibited the use of HVHF in hydrocarbon-bearing rock formations within the Basin and is prohibiting the discharge of HVHF wastewater (broadly defined to include products, co-products, byproducts or waste products from the treatment, processing or modification of HVHF wastewater) to waters or land within the Basin, little if any use of pipelines to convey HVHF wastewater within the Basin is anticipated, and the likelihood of spills from such pipelines is significantly reduced.

⁷⁴ K. Marusic, Should oil and gas companies be exempt from Pennsylvania’s hazardous waste laws?, *Envtl. Health News* (Oct. 6, 2021), accessed at:

<https://www.ehn.org/radioactive-waste-oil-and-gas-2655217995.html>

⁷⁵ PADEP, 2022, *supra* note 58. In developing this CRD, PADEP noted that pipelines on a permitted waste facility are required to be doubled-walled with leak detection procedures in place. However, once the pipeline is offsite, including between two permitted waste facilities, construction is typically reduced to single-walled pipelines.

4.2.1.6 Stormwater Runoff

STATEMENT OF CONCERN (SC-30)

Paraphrased comment representative of those expressing concern about stormwater runoff from sites where HVHF wastewater is processed, treated, stored, or transported follow:

- Commenters expressed concern that stormwater runoff from the storage, use and reuse, and related transport of HVHF wastewater poses a contamination risk to the Basin's water resources.
- Commenters averred that the use and reuse of hydraulic fracturing wastewater increases the opportunity for releases of pollutants to the land, air and water. They noted in particular that stormwater runoff from facilities that process, store, transfer, or handle wastewater generated by hydraulic fracturing can carry pollution into the surface water and ground water, resulting in immediate impacts and impacts arising in the future, which may persist in the long term.
- Other commenters said that if DRBC allows HVHF wastewater to be imported to the Basin for storage, processing, or reuse, including in non-HVHF activities, hydraulic fracturing wastewater and the pollutants it contains will be released to the environment through indirect discharges that do not trigger the requirement for a NPDES permit or fall under a General Permit, escaping close regulatory scrutiny. The commenters said that stormwater runoff can transport to surface water pollutants that are deposited to the land and vegetation by air, or that are inadvertently discharged to land directly by spills and leaks.
- Commenters stressed that contamination of a surface water source may occur not only due to activity at a natural gas wellhead but also due to activity related to fluid storage and transportation or industrial reuses that are not in proximity to a wellhead.⁷⁶
- Some commenters said that allowing the storage, transport and possible reuse of HVHF wastewater within the Basin will result in releases of HVHF contaminants to the Basin's waters through spills and the erosion of soils contaminated by spills that occur at facilities where HVHF water is transferred, stored or used, and from pipelines or other conveyances of HVHF wastewater.
- Many commenters opined that, "The construction, operation, and maintenance of a fracking wastewater storage project or processing facility that has no direct discharge to water or land, can still expose surface and groundwater, air, fish and wildlife, and people to fracking-related pollution. However, without DRBC permitting that involves a direct discharge, the project may not be reviewed or monitored by DRBC. It is important to realize that if a project is not under DRBC jurisdiction, the regulations of the state where the project is located will apply."

⁷⁶ DRN, Unsafe & Unsustainable: Experts Review the Center for Sustainable Shale Development's Performance Standards for Shale Gas Development, (2014) 14, accessed at: https://www.delawariverkeeper.org/sites/default/files/resources/Reports/DRN_Report_Unsafe%2BUnsustainable_fr.pdf.

- Commenters maintained that “A major flaw in current DRBC policy and regulations is that the states each have their own stormwater regulations, implementing the NPDES-2 nonpoint source pollution prevention program based on their own interpretations of the federal Clean Water Act. There is no unified stormwater best management practice manual or regulatory regime at the DRBC level that would ensure strict adherence to, for instance, the Special Protection Waters program mandate of ‘no measurable change’ in the outstanding water quality of the anti-degradation waters of the Delaware River Basin.”
- Commenters stated, “Stormwater runoff can transfer pollution from fracking wastewater from a closed loop system, a storage site, or other handling facility that was supposed to be a no-discharge project. This cannot be tolerated. [DRBC] banned fracking within the watershed. You must now ban the pollution produced by fracking by prohibiting its toxic and radioactive wastewater from entering the watershed where it can be used, reused, processed, stored, or disposed of.”

RESPONSE (R-30)

The Commission acknowledges that stormwater runoff is a pathway by which contaminants from spills or leaks at facilities that store, process, treat, reuse, or transport HVHF wastewater may reach and impact water resources.

Because the Commission is prohibiting HVHF in hydrocarbon bearing formations in the Basin and discharges of HVHF wastewater within the Basin, the Commission anticipates that only low volumes of HVHF wastewater will be transported, stored, treated, processed, or reused within the Basin and that the amount and severity of any spills, leaks, or other releases and resulting impacts to the Basin’s water resources from such activities will likely be sufficiently low so as not to injuriously affect the waters of the Basin as contemplated by the DRBC Comprehensive Plan.

Please also see related responses at Section 4.2.1.5 Transport, Leaks and Spills and Section 4.2.1.7 Wastewater Storage and Recycling.

4.2.1.7 Waste Storage and Recycling

STATEMENT OF CONCERN (SC- 31)

Comments representative of those expressing concern about storage of HVHF wastewater within the Delaware River Basin follow:

- Many commenters pointed out that the draft regulations would allow for the storage of HVHF wastewater in the Delaware River Basin and maintained that as large quantities of toxic and radioactive wastewater come into the Basin to be stored, the likelihood increases that spills and leaks of toxic materials from the containers will occur, while transloading of wastewater into and out of containers further increases that likelihood.
- Commenters also asserted, without citing authorities, that existing storage capacity is insufficient for the volume of hydraulic fracturing wastewater generated, and that the industry is in desperate need of more.

- Commenters expressed concern that regardless of how this material is stored, whether in holding tanks, landfills, lagoons, lined pits, pipelines, or by other means, the containers will corrode, break down and eventually leak into the environment, which will impact the air, water, soil, our food, public health, and the health of all life forms in the Basin.
- Some commenters expressed concern that as radioactive elements in HVHF wastewater are stored, radioactive properties can build up in tanks, liners, piping, and residual material in the storage vessel. The commenters maintained that there is no requirement for sampling of such tanks, units, or other infrastructure over time, and that the sampling of the fluids may not accurately represent the level of radioactivity embodied in the units, impoundment liners, or other related components of the storage system.
- Citing the Commission’s February 2021 CRD, some commenters claimed that, given the “highly mobile and decentralized nature of unconventional oil and gas operations,” prohibiting all HVHF-related activities within the Basin will prevent the widespread “storage and use of hazardous substances throughout the landscape” and multiple vehicular trips carrying HVHF fluids in and out of the Basin.⁷⁷ The commenters asserted that without a total prohibition, these sorts of cross-basin operations would pose the same threats the Commission sought to prevent with its 2021 prohibition on HVHF.

RESPONSE (R-31)

The Commission acknowledges the risks posed by the storage of HVHF wastewater, including the potential for spills, leaks, and other releases and ensuing impacts to water resources that can result from such releases. These risks and impacts are described in detail in the Commission’s February 2021 CRD, at Section 2.3.2.2 Pollution from Spills and Section 2.3.3 Significant Impacts to Water Resources and their Uses, respectively. The storage of HVHF waste is regulated under detailed state and federal programs that support effectuation of the Commission’s Comprehensive Plan (*see, e.g.*, 25 Pa. Code Chapter 78a – Oil and Gas Wells or 25 Pa. Code Chapter 299 – Storage and Transportation of Waste). Duplication of these programs is not practicable or necessary.

Because the Commission has prohibited HVHF within the Basin and by this rulemaking is prohibiting the discharge of HVHF wastewater to waters and land within the Basin, the Commission expects demand for HVHF wastewater storage facilities within the Basin to be low and the probability of releases or spills related to storage of HVHF wastewater to be commensurately low. As noted in Section 4.2.1.5 Transport, Leaks and Spills, operators are disinclined to transport HVHF wastewater over long distances. Although in Pennsylvania the average distance of HVHF wastewater transport declined steadily from 95 miles in 2012 to 23 miles in 2017, the Commission expects operators will be unlikely to transport HVHF wastewater into the Basin (including its Pennsylvania portions) and store the wastewater in the Basin because the discharge of HVHF wastewater in the Basin is prohibited. Please see Response R-25, in Section 4.2.1.5 Transport, Leaks and Spills, above, for further discussion of Pennsylvania spill data highlighting the comparatively high probability of HVHF wastewater transport spills in active shale-gas production areas relative to the low probability of such spills outside shale-gas production areas in the Commonwealth.

⁷⁷ See DRBC, February 2021 CRD, at 67. (Citations to other portions of comment omitted.)

STATEMENT OF CONCERN (SC-32)

Comments representative of those expressing concern about the adequacy of existing regulations applicable to the storage of HVHF wastes follow:

- Commenters expressed concern that Pennsylvania general permit WMGR123, issued in 2021 with an expiration date of 2031, allows “temporary” storage that can extend for years and even for the length of the permit. The commenters maintained that unless storage of the HVHF waste is eliminated by prohibiting its import into the Delaware River Basin, the tanks containing waste will corrode and leak; the surface impoundments lined with plastic will leak; the trucks or pipes bringing in the waste will leak; and wastes will be deliberately dumped, all causing lasting contamination.
- Commenters stated that there is no requirement limiting the size or capacity of storage units, which are being built in enormous sizes today.
- Commenters claimed that under PA General Permit WMGR123, testing of waste fluids from HVHF is less frequent, and fewer parameters are tested for, increasing the likelihood that pollutants will go unidentified and undetected, compounding containment and cleanup problems should there be a release to the environment, and making air emissions unknowable. One or more commenters added, “You can’t test to see what is polluting your water supply without that information.”
- Commenters said that in the other Basin states, New York, New Jersey and Delaware, the handling of waste (including open pits, and other storage aspects) differs, but regulatory rules are often not clear, and enforcement is unreliable.
- Citing information on the Delaware River Frack Ban Coalition website,⁷⁸ DCS and Environment New Jersey, among others, stated that industry exemptions from disclosing the identity of components of their produced waters makes attempts to regulate the adequacy of wastewater storage containers (e.g., materials, construction, and maintenance standards for corrosion and leak prevention) effectively impossible.
- Commenters expressed concern that caverns, which may be used for storage of liquids under state regulations, are not adequately regulated. Some asserted that there is no requirement that vapors and emissions from storage vessels be treated or filtered to remove contaminants, including methane, noting that PADEP air regulations address only certain types of fugitive emissions and only when volume thresholds are met.
- Citing a peer-reviewed journal article, a commenter pointed out that a research team at the University of Missouri traced a spike in endocrine-disrupting activity in a West Virginia stream to an upstream facility that stores hydraulic fracturing wastewater. The commenter related that the study found that levels detected downstream of the waste facility were above levels known to create adverse health effects and alter the development of fish, amphibians,

⁷⁸ See Delaware River Frack Ban Coalition, Watershed Wednesdays #5 & #7 (Jan. 12, 2022, & Jan. 26, 2022, respectively), accessed at: <https://sites.google.com/view/delawareriverfrackban/>.

and other aquatic organisms, and that endocrine-disrupting compounds were not found to be elevated in upstream sections of the creek.⁷⁹

RESPONSE (R-32)

The Commission acknowledges spills from HVHF wastewater storage facilities have occurred, and some spills have resulted in impacts to water resources and aquatic life. A decade of experience has shown that in regions where shale-gas is produced, while state regulation includes measures to prevent spills or leaks from containers that store HVHF wastewater,⁸⁰ regulation alone is not capable of preventing all adverse effects or injury to water resources from HVHF-related spills and releases of chemicals and hydraulic fracturing wastewater. In regions of active shale-gas production where large volumes of HVHF wastewater are present and stored, the risks are substantial and constitute one of the reasons why the Commission prohibited HVHF in the Delaware River Basin by a final rule adopted in February 2021.

However, the Commission also recognizes, as described in detail at Response R-25 above, that the probability of such spills is higher in areas of active shale-gas production and comparatively lower in areas where shale-gas is not produced. Because the Commission has prohibited the use of HVHF in hydrocarbon-bearing rock formations within the Basin and is prohibiting the discharge of HVHF wastewater (broadly defined to include products, co-products, byproducts or waste products from the treatment, processing or modification of HVHF wastewater) to waters or land within the Basin, the volumes of HVHF wastewater stored within the Basin are expected to be low, and the likelihood of spills and resultant impacts to water resources, to be commensurately low. The Commission's regulatory response is in the Commission's view proportional to the risk and potential impact on water resources of the Basin from spill events, given the reduced likelihood that such events will occur in the absence of HVHF wells and permitted HVHF wastewater discharges.

With respect to vapors emitted from storage vessels, as required by the EPA, PADEP is in the process of finalizing air quality regulations to control harmful volatile organic compound ("VOC") emissions, while simultaneously controlling methane as a co-benefit, from five specific categories of air emission sources used by the oil and gas industry. These source categories include storage vessels. These air quality regulations would require storage vessels with an annual potential to emit of 2.7 tons per year of VOC emissions to control VOC emissions by at least 95 percent.

Although the Commission has received comments criticizing the sufficiency of state regulations regarding storage of HVHF wastewater, the prohibitions on both use of HVHF and discharge of HVHF wastewater in the Basin eliminate any need for more stringent regulation of HVHF wastewater storage in the Basin than existing state-wide regulations already provide. It is thus reasonable to rely

⁷⁹ Testimony of Sandra Steingraber, Co-founder, Concerned Health Professionals of New York, Senior Scientist, Science and Environmental Health Network (Dec. 8, 2021) (citing Kassotis, C.D., et al., Endocrine disrupting activities of surface water associated with West Virginia oil and gas industry wastewater disposal site, *Sci. of the Total Env't* (July 2016), 557-58, accessed at: https://hero.epa.gov/hero/index.cfm/reference/details/reference_id/3317634.

⁸⁰ For example, in the Pennsylvania portion of the Basin, PA General Permit WMGR123 requires storage tanks to be constructed with secondary containment units and other safeguards to prevent leaks from the storage structure from entering the environment.

on statewide programs administered by experienced state environmental agencies to control the remaining risks to water resources. Please see Section 5.2 Coordination with Other Regulators, below, for responses to other comments regarding the adequacy of existing regulations.

STATEMENT OF CONCERN (SC-33)

Representative paraphrased comments asserting that regulatory oversight of HVHF wastewater recycling is inadequate follow:

- Many commenters asserted that the Commission must prohibit uses of hydraulic fracturing wastewater, including any “beneficial reuse,” that could impair the quality of Basin waters. Some averred that there is no such thing as “beneficial reuse” of hydraulic fracturing wastewater.
- Commenters opined that the regulation of beneficial use or reuse in Pennsylvania is inadequate.
- A statement submitted by multiple commenters read, “Without prohibiting HVHF-related activities and acceptance of wastewater produced by HVHF in the Basin, the use and reuse of this wastewater will be allowed and DRBC may not review or docket these projects if they do not involve a discharge or a withdrawal, leaving these projects outside of the DRBC’s jurisdiction. Without review for compliance with the DRBC’s Comprehensive Plan, there is no means to assure that projects meet the anti-degradation policies, water quality standards, and improvement programs that DRBC implements in its management of the water resources of the basin.”
- Commenters asserted that reuses of wastewater produced by HVHF that could occur without DRBC review and oversight include: for cooling in manufacturing and by utilities; in construction such as cement making; as boiler feed water; in processing aggregate; in industrial processing; in treating acidic hazardous wastes such as water from mines; and as an ingredient in other products, such as road salts and pool salts, deemed “beneficial uses” under state regulations.
- Citing an NRDC report, some commenters stated that cyclic reuse of HVHF wastewater in the hydraulic fracturing of new HVHF wells eventually produces a highly concentrated residual waste that can be toxic and radioactive.⁸¹ This waste could be imported into the Delaware River Basin for processing, disposal, storage or reuse under the proposed rules.
- Some commenters stated that HVHF wastewater is minimally controlled, analyzed or monitored, and they pointed out that under the proposed rule, absent a planned discharge to water or land within the Basin, each state’s regulatory system will apply once this material enters the watershed.

⁸¹ Hammer, R. & VanBriesen, J., Ph.D., PE, In Fracking’s Wake: New Rules are Needed to Protect Our Health and Environment from Contaminated Wastewater, NRDC (May 2012), 79, accessed at: <https://www.nrdc.org/sites/default/files/Fracking-Wastewater-FullReport.pdf> (citations to other portions of comment omitted).

RESPONSE (R-33)

The Commission has prohibited the use of HVHF in hydrocarbon-bearing rock formations within the Basin and is prohibiting the discharge of HVHF wastewater (broadly defined to include products, co-products, byproducts or waste products from the treatment, processing or modification of HVHF wastewater) to waters or land within the Basin. Accordingly, any recycling or reuse of HVHF wastewater within the Basin may occur only if no discharge of the reused wastewater is involved.

Examples of recycling or reuse of HVHF wastewater offered by commenters included: for cooling in manufacturing and by utilities; in construction such as cement making; as boiler feed water; in processing aggregate; in industrial processing; in treating acidic hazardous wastes such as water from mines; and as an ingredient in other products, such as road salts and pool salts, deemed “beneficial uses” under state regulations. Notably, road spreading of HVHF wastewater for dust suppression or deicing is prohibited under the final regulations. *See* Response R-38 in Section 4.2.1.9, Road Spreading, and Response R-49 in Section 4.3, Section 440.2—Definitions, for a more detailed discussion of this topic. The use of acid mine drainage as a source of water for hydraulic fracturing has been discussed in the academic literature as a means of removing radioactive elements from HVHF wastewater.⁸² This use in theory remains available for hydraulic fracturing within the Basin that does not constitute “high volume hydraulic fracturing” as defined at 18 C.F.R. § 440.2, and thus is not prohibited by DRBC’s regulations at 18 C.F.R. 440.3(b). But the use of HVHF wastewater to “treat” acid mine drainage in the Basin would likely entail discharges that are prohibited under the proposed and final rule.

Commenters are correct that the final regulations do not categorically prohibit in-Basin recycling or reuse of HVHF wastewater where no discharge to Basin land or water occurs. In the absence of local sources of HVHF wastewater and some means of legally discharging this material, the described reuses of HVHF wastewater within the Basin are expected to be few and the associated risks and impacts to water resources minimal. For additional discussion of leaks and spills, *see* Section 4.2.1.5, *Transport, Leaks and Spills*, within this CRD. Air emission and deposition appear to be the other pollution pathway of concern to commenters in connection with reused or recycled HVHF wastewater. For a discussion of this topic, please *see* Section 4.2.1.2, *Air Pollution and Air Deposition*.

As noted in Response R-38 in Section 4.2.1.9 of this CRD, the Commission will continue to coordinate with the Commonwealth to review the scientific evidence regarding harm to water resources caused by road spreading of oil and gas production brines and may in the future consider whether additional regulation of the practice of applying conventional drilling brines to roadways is needed in the Basin. The Commission may likewise in the future review and consider additional evidence of adverse impacts on water resources associated with reuses of HVHF solid and liquid wastes in commercial products, but it has not seen evidence to date warranting DRBC regulation in this area. Please see Section 5.2 Coordination with Other Co-regulators, below, for related discussion.

⁸² *See* State Impact Pennsylvania, Study finds acid mine drainage reduces radioactivity in fracking wastewater (Jan. 13, 2014) (citing Kondash, A.J., et al., Radium and Barium Removal through Blending Hydraulic Fracturing Fluids with Acid Mine Drainage, *Env’tl Sci. & Tech.* (Dec. 24, 2013)), accessed at: <https://stateimpact.npr.org/pennsylvania/2014/01/13/study-finds-acid-mine-drainage-reduces-radioactivity-in-fracking-wastewater/>.

STATEMENT OF CONCERN (SC-34)

Paraphrased comments representative of those expressing concern about pollution resulting from HVHF wastewater recycling follow:

- Commenters expressed concern that beneficial reuses of wastewater release pollution to the air, soil or water, and degradation of products that contain the reused waste will also result in pollution.
- Commenters also expressed concern that the demand for reused HVHF wastewater has plummeted with the lack of new oil and gas well starts, creating a glut of wastewater that is more expensive to dispose of when it must be transported to injection wells or industrial treatment plants. They are concerned that the need for new HVHF wastewater storage and disposal locations will cause operators to look to the Delaware Basin for storage and reuse opportunities.
- Citing an EPA website, some commenters, including the group Citizens for Pennsylvania's Future (PennFuture), stated that additional "beneficial uses" of HVHF wastewater may include fire control, equipment washing, and land spreading for irrigation. Additionally, wastewater facilities can produce sludge, which can in turn be used as "fertilizer" and spread on land. This sludge could include varying levels of radium and barium if produced water passes through the treatment facility.⁸³ The commenters asserted that all these activities run the risk of causing HVHF wastewater to be released into waters of the Basin.

RESPONSE (R-34)

Few instances of HVHF wastewater recycling within the Basin are expected. Under the proposed and final rule, and as noted in R-33, R-32, R-29 above and elsewhere in this CRD, recycling or reuse of HVHF wastewater within the Basin may occur only if no discharge of the wastewater to land or waters of the Basin is involved. In the absence of local sources of HVHF wastewater under the prohibition on HVHF adopted by the Commission in 2021, and in the absence of a means to lawfully inject or otherwise dispose of HVHF wastewater in the Basin under the new rule, such instances are expected to be few. The final rule significantly reduces the potential for pollution of the Basin's water resources resulting from the discharge to water or land of stored, transported, recycled, or modified HVHF wastewater.

Responses to comments regarding the storage of HVHF wastewater are set forth at R-31 and R-32 above.

STATEMENT OF CONCERN (SC-35)

The Marcellus Shale Coalition asserted that: "... The Commission has trampled on constitutionally protected private property rights and ignored sound science and our industry's leadership in water recycling and reuse technology. Pioneered in Pennsylvania, 93 percent of water used by the

⁸³ EPA, Radiation Protection, TENORM: Oil and Gas Production Wastes, accessed at: <https://www.epa.gov/radiation/tenorm-oil-and-gas-production-wastes>.

Commonwealth's unconventional natural gas industry is recycled dramatically reducing the need for freshwater withdrawals.”

RESPONSE (R-35)

The February 2021 CRD at Section 2.6.10. contains the Commission’s refutation of the commenter’s assertions with respect to property rights. Because companies performing HVHF activities outside the Basin have alternative sources of water and disposal locations, any economic impact on these companies from the importation and exportation regulations is minimal. The assertion that the Commission has ignored sound science is false. Rather, the Commission conducted an extensive scientific and technical investigation, and based its decisions on the results of that investigation.

The Commission acknowledges that recycling HVHF wastewater for reuse in HVHF reduces the demand for freshwater withdrawals that might otherwise be needed to support HVHF activities. Nevertheless, consumptive uses and exportation of water from the Basin may impair the uses protected by the Comprehensive Plan and impair the Commission’s conservation responsibilities unless managed in accordance with the Commission’s regulations.

4.2.1.8 Landfill Leachate

STATEMENT OF CONCERN (SC-36)

Some commenters expressed concerns about the potential for impacts to water resources and their uses from the disposal of HVHF wastes in landfills and the subsequent release of landfill leachate containing HVHF contaminants.

Representative paraphrased comments on this topic follow:

- Commenters stated that drill cuttings from HVHF well boreholes contain bromine; toxic metals and metalloids, including cadmium, chromium, copper, manganese and arsenic; and radioactive materials, including radium, thorium and uranium. They said that landfills accepting drill cuttings could produce leachate (rainwater that has percolated through the landfill) that is heavily contaminated with radioactive materials that cannot be effectively treated by the sewage treatment plants to which they are taken. Citing a published report, they asserted that radioactivity can build up to high levels in a landfill after the radioactive material is covered, because radon generated by radioactive decay is trapped beneath the cover of soil and other waste.⁸⁴
- Citing a news report by the Allegheny Front, a commenter stated that loopholes in federal and state laws have resulted in oil and gas waste going to landfills that cannot properly contain the radioactivity, salts, and other dangerous toxins that are in the waste, and these

⁸⁴ Nelson, A.W., et al., Understanding the radioactive ingrowth and decay of naturally occurring radioactive materials in the environment: an analysis of produced fluids from the Marcellus Shale, *Envtl. Health Perspectives* (July 2015), accessed at: <https://ehp.niehs.nih.gov/doi/full/10.1289/ehp.1408855>.

constituents end up in highly polluted landfill leachate.⁸⁵ Citing other news reports and a published report,⁸⁶ the commenters averred that the waste has polluted waterways, contaminated drinking water, harmed fish and wildlife, and impaired the public's access to fishable and swimmable waters.

- PSR commented that an investigative team at the Public Herald (PH) found that the Pennsylvania Department of Environmental Protection (DEP) is limiting the amount of TENORM disposed of in Pennsylvania landfills only by limiting the amount of waste a landfill can receive. According to the PH team, the DEP is not tracking the amount of TENORM leaving the landfill, including by conveyance to water treatment facilities in the form of leachate; DEP is instead treating the transaction between landfill and treatment plant as private.
- The LWV, citing a published report, stated EPA and PADEP allowed leachate from landfills accepting radioactive hydraulic fracturing waste to be conveyed to fourteen (14) Pennsylvania sewage plants for treatment and discharge to waters of the Commonwealth.⁸⁷
- DRN asserted that the proposed regulations do not prohibit disposal of HVHF wastes in landfills, and that the Commission has stated that it will “review discharges of treated [landfill] leachate when such discharges meet the thresholds set forth in DRBC’s Rule of Practice and Procedure (“RPP”).”⁸⁸ The commenter further asserted that, given the obstacles posed by the hydraulic fracturing industry’s use of unidentified chemicals, there is a chance that leachate may contaminate water resources despite the Commission’s oversight.
- Citing a published report, a commenter noted that if landfill leachate leaks directly into waterbodies near the landfills or is released into streams after undergoing ineffective treatment at sewage plants, the radium present will be found in the downstream sediments where it persists for years.⁸⁹ They expressed concern that micro-organisms in the sediment

⁸⁵ Frazier, R., DEP Fines Landfill Near Pittsburgh for Problems Tied to Fracking Waste, Allegheny Front (Feb. 21, 2020), accessed at:

http://go.pardot.com/e/176172/oblems-tied-to-fracking-waste-/x4sqw/278450588?h=q1kB50DEowt7PG886EezI9xud2IZUEC3tPpotM_fGU4.

⁸⁶ Marusic, K., Should oil and gas companies be exempt from Pennsylvania’s hazardous waste laws? Env’tl. Health News (Oct. 6, 2021), accessed at:

http://go.pardot.com/e/176172/te-oil-and-gas-2655217995-html/x4sqy/278450588?h=q1kB50DEowt7PG886EezI9xud2IZUEC3tPpotM_fGU4;

Marusic, K., Fracking chemicals dumped in the Allegheny River a decade ago are still showing up in mussels: Study, Env’tl. Health News (Sept. 5, 2018), accessed at:

http://go.pardot.com/e/176172/hwater-mussels-2602333500-html/x4sr1/278450588?h=q1kB50DEowt7PG886EezI9xud2IZUEC3tPpotM_fGU4;

Geeza, T.J., et al., Accumulation of Marcellus Formation Oil and Gas Wastewater Metals in Freshwater Mussel Shells, Env’tl. Sci. & Tech. (Sept. 1, 2018).

⁸⁷ Nelson, A.W., et al., Understanding the radioactive ingrowth and decay of naturally occurring radioactive materials in the environment: an analysis of produced fluids from the Marcellus Shale, Env’tl. Health Perspectives (July 2015), accessed at:

<https://ehp.niehs.nih.gov/doi/full/10.1289/ehp.1408855>.

⁸⁸ See DRBC, February 2021 CRD at 327 (citing 18 C.F.R. §§ 401.35(a)(5), 401.35(b)(8)).

⁸⁹ Lauer, N., et al., Sources of Radium Accumulation in Stream Sediments Near Disposal Sites in Pennsylvania: Implications for Disposal of Conventional Oil and Gas Wastewater, Env’tl. Sci. & Tech., (Jan. 4, 2018) accessed at: <https://nicholas.duke.edu/news/radioactivity-oil-and-gas-wastewater-persists-pennsylvania-stream-sediments>.

will ingest the radium, along with the organic matter in the sediment, allowing radium to enter the food chain, and that this will impact the largest and most iconic birds, fish and mammals found in the Delaware River, Estuary and Bay, as well as the fish and marine mammals in the nearby waters of the Atlantic Ocean.

- A commenter expressed concern that although the state requires landfills to obtain permits before accepting solid waste containing radioactive material, there is no required sampling or standard applicable to the amount of radioactive material found in landfill leachate.⁹⁰ The commenter opined that the Commission cannot rely on federal or state regulators to protect Basin communities from exposure to radioactive materials via hydraulic fracturing wastewater; rather, the Commission must take the initiative to put such protections in place.

RESPONSE (R-36)

The Commission acknowledges that toxins and radioactive materials have been detected in leachate from landfills that accepted HVHF wastes and that such leachates can present treatment and disposal challenges. Under the proposed and final rule, discharges of HVHF wastewater to waters and land within the Basin are prohibited. Thus, to the extent a landfill in the past accepted HVHF waste containing “wastewater from HVHF and HVHF-related activities” as defined in the rule, it may no longer do so under the rule. The rule also expressly defines HVHF wastewater to include leachate from solid wastes associated with HVHF-related activities, except those wastes lawfully disposed of in a landfill within the Basin prior to the effective date of the rule. Accordingly, leachate from a landfill that accepts solid waste from HVHF activities after the effective date of the rule *cannot be discharged to Basin waters, even after treatment*. The risks to the Basin’s water resources, aquatic life, and human health from the discharge of landfill leachate that has been contaminated by HVHF waste are in the Commission’s view effectively reduced by the new regulation.

The Commission notes that the U.S. Environmental Protection Agency and the states regulate the construction and operation of landfills under the federal Resource Conservation and Recovery Act (RCRA) and in Pennsylvania, the Solid Waste Management Act (Act 97 of 1980) and implementing regulations. Chapter 78a – Unconventional Oil and Gas Wells of Title 25 of the Pennsylvania regulatory code includes detailed regulations applicable to the storage and disposal of HVHF wastes. For example, in Pennsylvania, a TENORM disposal protocol uses readings from monitors located at the gate of every landfill in Pennsylvania to calculate the radioactive content attributable to TENORM of each waste load that enters the landfill. The protocol is designed to ensure that a landfill’s operations do not expose the public or workers to levels of radioactivity above thresholds set by the U.S. Nuclear Regulatory Commission and the federal Occupational Safety and Health

⁹⁰ 25 Pa. Code § 288.201(h)(2) (denoting TENORM as a material that cannot be disposed of at a landfill without approval from the Pennsylvania Department of Environmental Protection); 25 Pa. Code § 288.456(a)(2) (providing leachate treatment requirements for Class I landfills); 25 Pa. Code § 288.556(a)(2) (providing leachate treatment requirements for Class II landfills).

Administration.⁹¹ The DRBC has not, and is not now, proposing to replicate or supplement these programs.

The Commission's discussion in its February 2021 CRD of concerns related to the discharge of treated leachate from landfills that accept HVHF wastes is superseded by the current rulemaking.

STATEMENT OF CONCERN (SC-37)

Paraphrased comments representative of those recommending more far-reaching Commission action to eliminate impacts of landfill leachate containing HVHF contaminants follow:

- Penn Future commented that while the Commission has specifically included "leachate from solid wastes associated with HVHF-related activities" in the proposed definition of wastewater, it specifically excepts situations where those solid wastes were "lawfully disposed of in a landfill within the Basin prior to the effective date of this rule." Penn Future averred that this does not go far enough to protect the Basin's water resources from the toxic, harmful, radioactive, and forever chemicals that will enter and contaminate the leachate from solid wastes placed in landfills after the promulgation of these rules, and that the Commission has a duty to protect the Basin's water resources from threats such as this,⁹² and therefore must prohibit the placement of solid wastes from hydraulic fracturing to and in landfills within the Basin.
- A commenter asserted that the Commission should prohibit any importation of radioactive drill cuttings and leachate taken from landfills into the Basin. The commenter was concerned that if the radioactive drill cuttings and leachate are transferred to municipal waste disposal facilities in the Basin, more contamination of these areas will occur. The commenter asserted that the radioactive drill cuttings and leachate should not be discharged into waterways from "treatment" facilities with downstream drinking water intakes, resulting in devastating impacts on human health, wildlife, all life forms, the environment, and agriculture. The commenter further asserted that New York State currently imports both drill cuttings and liquid waste from oil and gas wells in Pennsylvania—with all the air, water, and soil impacts.

RESPONSE (R-37)

Please see the Commission's response at R-36 above. By prohibiting the discharge to Basin waters of any leachate from a landfill that accepts solid waste from HVHF activities *after the effective date of the rule*, the Commission is in its view effectively reducing the risk of harm to the Basin's water resources, aquatic life, and human health associated with the discharge of landfill leachate that may have been in contact with HVHF waste. The Commission expects that landfills that discharge treated

⁹¹ See, e.g., PADEP, Bureau of Radiation Protection and Bureau of Waste Management, 250-3100-001, Guidance Document on Radioactivity Monitoring at Solid Waste Processing and Disposal Facilities (June 11, 2022), accessed at: <https://www.depgreenport.state.pa.us/elibrary/GetFolder?FolderID=365834>.

⁹² Water Code § 3.1.1, incorporated by reference into the Code of Federal Regulations at 18 CFR § 410.1 ("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.").

leachate within the Basin or that send leachate to wastewater treatment plants within the Basin for treatment and discharge will end the practice of accepting HVHF wastes or will refrain from ever accepting such wastes upon adoption of the new rule. The Commission cannot reasonably prohibit the discharge to Basin waters of leachate from landfills that may have lawfully accepted HVHF drilling wastes prior to the effective date of the rule.

The Commission notes that PADEP has commenced a study that evaluates the radium concentration of the leachate from all landfills in the Commonwealth regardless of whether a landfill has historically received oil- and gas-derived wastes. This study is currently ongoing.

The Commission further notes that on August 3, 2020, the State of New York adopted a law that makes oil and gas waste, including but not limited to drilling fluids and produced waters, subject to the same reporting requirements and special treatment as hazardous wastes under New York law, ensuring that disposal of these wastes takes place only at facilities that can safely manage it. *See* N.Y. Evtl. Conservation Law § 27-0903. Please see R-25 of this CRD, above, regarding the importation of HVHF wastes by the State of New York prior to enactment of the 2020 statute.

4.2.1.9 Road Spreading

STATEMENT OF CONCERN (SC-38)

Some commenters expressed concerns about the potential for impacts to water resources from the spreading of HVHF wastewater on roadways for ice control and dust suppression. Representative comments (paraphrased except where direct quotations are indicated) follow:

- Commenters expressed concern that polluted HVHF wastewater has already made its way into the Pennsylvania environment, including by means of spreading on roadways, due to regulatory loopholes.
- Commenters averred that Pennsylvania permits road spreading, land application, and the disposal of hydraulic fracturing wastewater to surface waters without regard to its TENORM (radioactivity) content.⁹³
- One commenter described spreading of hydraulic fracturing wastewater on roads as “a[n] environmental travesty” that “continues to put residents like myself . . . at grave risk.”
- Another stated that hydraulic fracturing wastewater was allowed by Pennsylvania, New York and possibly other states “to be placed on our roads and highways . . . as a means of “getting rid of it.”
- Others were concerned that HVHF waste is used in products sold at hardware stores and spread on local roads as a deicer.

⁹³ *See* 25 Pa. Code §§ 78a.70–70a (governing road spreading); 25 Pa. Code § 78a.63 & ch. 291 (governing land spreading of residual waste from hydraulic fracturing operations); 25 Pa. Code § 78a.60 (providing discharge requirements for hydraulic fracturing wastewater); 25 Pa. Code § 93.7 (providing list of water quality criteria applicable to Pennsylvania surface waters that does not include a criterion for radioactivity or radioactive material).

- Referencing a May 2021 blog post by the PA Environment Digest, and citing a section of the post on "Relevant Studies," the League of Women Voters alleged the practice of spreading oil and gas wastewater on roadways in Pennsylvania continued even after the state made it illegal in 2018. The commenter charged that even if DRBC were to disallow the practice within the Delaware Basin, it has proposed no way to enforce such a rule.
- A commenter on behalf of Berks Gas Truth recognized that road spreading of conventional oil and gas wastewater is not relevant to the proposed regulations, but nevertheless, submitted a report by the Better Path Coalition⁹⁴ "in hopes that you will review it to see how incompetently our DEP is dealing with drilling wastewater."
- The Better Path Coalition's report dated December 2021 contains the following assertions, among others, about the spreading of conventional oil and gas wastewater on roads in Pennsylvania:
 - that in 2018, the PADEP "halted . . . the practice of spreading [oil and gas drilling] wastewater as a dust suppressant and deicer on Pennsylvania roadways, in response to a 2017 Environmental Hearing Board appeal."
 - that "conventional gas drillers spread 54,327 barrels or 2,281,747 gallons of . . . drilling wastewater on Pennsylvania roads between 2018, when the Department of Environmental Protection (DEP) declared the moratorium, and the end of 2020 [and that] [a]nother arm of the agency, the Bureau of Waste Management, provides drillers the loophole that has allowed them to keep spreading the waste."
 - that the so-called "Coproduct Determination Loophole" allows owners of a waste product to determine whether or not it can be beneficially used in place of a commercially available product.
 - that "[a]ccording to Oil and Gas Waste Reports from 2018 through 2020, at least 29 owners presumably determined for themselves that the wastewater was on par with commercial dust suppressants and deicers and used that as justification for continued road spreading."
 - that a Pennsylvania State University (Penn State) study that looked at the efficacy of road spreading with drilling wastewater found it to be far less effective than commercial products and, in some cases, worse than using no treatment.⁹⁵
 - that a growing body of research has found oil and gas wastewater to pose a threat to aquatic life and human health due to its toxic, radioactive contents.

⁹⁴ Better Path Coalition, The moratorium morass: How the halt to road spreading toxic oil & gas wastewater made Pennsylvania less safe, (Dec. 2021), accessed at: https://breatheproject.org/reports_and_studies/the-moratorium-morass-how-the-halt-to-road-spreading-toxic-oil-gas-wastewater-made-pa-less-safe/.

⁹⁵ Stallworth, A.M., et al, 2021, Efficacy of oil and gas produced water as a dust suppressant. Science of The Total Environment, 799 (10), (December 10, 2021). <https://www.sciencedirect.com/science/article/abs/pii/S004896972104420X>

- that drillers’ self-determinations under the coproduct determination program are “an inconsistent mess of reliance on old data, irrelevant supporting documentation, and a lack of evidence of any thorough analysis.”
 - that decades-old problems with the management and tracking of oil and gas wastewater spread on Pennsylvania’s roads have made it impossible to know where it has been spread and in what quantities, and reliance by drillers on the coproduct determination program has worsened these problems.
 - in conclusion, that “DEP is not willing or able to clean up the messes you’ll create if you approve the regulations” and that the Commission must “reject the proposed regs and give us the full fracking ban everyone now and future generations deserves.”
- Catskill Mountainkeeper submitted a 2018 report by hydrogeologist Paul Rubin of HydroQuest, which includes as an addendum a November 2011 letter from Mr. Rubin to the PADEP Bureau of Waste Management on behalf of HydroQuest, DRN, and DCS, opposing the renewal of WMGR064, a waste management general permit authorizing oil and gas brine spreading on Pennsylvania roadways for dust suppression and de-icing.⁹⁶
- The primary HydroQuest submission (2018 report) includes data demonstrating that concentrations of contaminants in brines from non-shale formations may equal or exceed those in brines from the Marcellus and other shale formations. For example, “The high percentage of oil saturation present in Bradford Group produced waters may make its contaminant potential greater than those from the Marcellus Shale.” (pp. 11, 15).
 - HydroQuest also asserts that the hazard to surface and ground water resources posed by road spreading of production brines has been described in the literature for some time: “This waste disposal technique jeopardizes the water quality of surface and groundwater resources and ignores treatment considerations (e.g., Baudendistel et al., 2015; Geza et al., 2013; Hum et al., 2005; Hussain et al., 2014; Lawrence et al., 1993 & 1995; Sookdeo, 2003; Balch et al., 2014; Silva et al., 2017; Oetjen et al., 2017).
 - HydroQuest’s 2011 letter states in part, “Whether brine contaminants are applied on dry days, wet days, 50 or 200 feet from streams or houses, or in one concentration or another is largely irrelevant. The hydrology is simple and straight forward. Under wet hydrologic conditions, and with repeated applications, whether today, tomorrow, or in two months – the contaminants **will move** into our waterways, reservoirs, and aquifers (i.e., toward our drinking water supplies). Once significant precipitation occurs, brines will then be mobilized and transported away from source areas.” (emphasis in original) (Addendum 2, p. 4).

⁹⁶ According to PADEP staff, WMGR064 was issued in 2000 (prior to the surge in Marcellus shale drilling activity that began in 2008). WMGR064 expired in September 2010. The HydroQuest comment was submitted as PADEP considered renewing or reissuing WMGR064. In response to substantial public comment opposing renewal, the permit remained expired.

RESPONSE (R-38)

Most of the comments received, including the Better Path and HydroQuest reports submitted by commenters, were directed at road-spreading of brines from conventional natural gas wells, an activity that is not addressed by the draft DRBC rule but which has been suspended in the Commonwealth by the Pennsylvania Department of Environmental Protection. By regulation, Pennsylvania banned the practice of road spreading of HVHF (“unconventional” in Pennsylvania terms) wastewater in 2016.⁹⁷

The Commission acknowledges that road spreading of wastewater from conventional HVHF activities in Pennsylvania has occurred in the past and that such practices present risks to water resources.

The risks and resulting impacts of spreading oil and gas wastewater on roadways are described in detail at Section 2.3.2 Significant Risks to Water Resources and Section 2.3.3 Significant Impacts to Water Resources and their Uses, respectively, of the February 2021 CRD.

Research on the impacts of road spreading continues. Findings of a new study released by Penn State University on May 26, 2022 further demonstrate the potential adverse impacts on water resources that may result from road spreading of oil and gas wastewaters.⁹⁸ The researchers conducted a series of laboratory-scale experiments to evaluate the environmental impacts of several substances used as dust suppressants on roadways, including *conventional* oil and gas produced waters. Results showed that after application of oil and gas wastewater to the laboratory-scale roadways, runoff from simulated rainfall events contained concentrations of barium, strontium, lithium, iron, and manganese that exceed human-health based criteria and levels of radioactive radium that exceed industrial discharge standards.⁹⁹

The Commission’s final regulations at 18 C.F.R. Part 440 (the “Discharge Prohibition”) prohibit the discharge of HVHF wastewater to waters or land within the Basin. The rule thus prohibits road spreading of HVHF wastewater within the Basin. Such wastewater is broadly defined to include any products, co-products, byproducts or waste products resulting from the treatment, processing or modification of HVHF wastewater. However, prohibiting the discharge of brines from *conventional* drilling on land or waters of the Basin is beyond the scope of the Commission’s proposed rule, published in November 2021, and thus could not be considered for inclusion in the final rule. The Commission has reviewed the reports of The Better Path and HydroQuest and is aware that the PADEP is currently investigating the issues they highlight and considering the latest findings of the Penn State research team.

⁹⁷ See 25 Pa. Code §§ 78a.70 (“Production brines from unconventional wells may not be used for dust suppression and road stabilization.”) and 78.70.a (“Production brines from unconventional wells may not be used for pre-wetting, anti-icing and de-icing.”).

⁹⁸ Burgos, W., Ph.D., et al., Evaluation of Environmental Impacts from Dust Suppressants Used on Gravel Roads (May 26, 2022), accessed at: https://files.dep.state.pa.us/OilGas/BOGM/BOGMPortalFiles/PADEP_Final_Brine_Report.pdf.

⁹⁹ Id.

The Commission will continue to coordinate with the Commonwealth to review the scientific evidence regarding harm to water resources caused by road spreading of oil and gas production brines. The Commission may in the future consider whether additional regulation of the practice of applying conventional drilling brines to roadways is needed in the Basin.

4.2.1.10 Well Injection

STATEMENT OF CONCERN (SC-39)

Representative paraphrased examples from commenters concerned about HVHF waste injection and contamination of groundwater resources:

- Some commenters were concerned that if the Proposed Rulemaking were to be finalized, hydraulic fracturing wastewater would likely be permitted to be accepted into the Basin and not “discharged” to land or water but rather “disposed” of in a landfill, cavern or underground injection well. Citing the February 2021 CRD, they claimed that the proposed regulations do not clearly prohibit storage or disposal of HVHF wastewater via underground injection wells, as disposal could be characterized as a method of “containing” the contamination rather than an intentional “discharge.”¹⁰⁰
- Some commenters asserted that injection wells are possible, depending on how “disposal to water or land” is defined, which is unclear. Citing a 2016 study of an injection facility in West Virginia, they noted that injection of wastewater risks the migration of untreated wastewater to aquifers and surface water through leaks from the injection well and spills and accidental releases while being handled and that injection wells are causing earthquakes in Ohio and Oklahoma and in other locations and are not leak-proof, exposing groundwater and aquifers to contamination.¹⁰¹
- Commenters cited the findings of the study that included sampling in June 2014 of water in a tributary of Wolf Creek in West Virginia downstream from an injection disposal facility. They noted that results showed elevated conductivity (416 $\mu\text{S}/\text{cm}$) compared to background waters upstream (74 $\mu\text{S}/\text{cm}$). There were also elevated TDS, Ba, Br, Sr, Cl, Li and Na concentrations, while sediments downstream from the facility were enriched in Ra and had high bioavailable Fe (III) concentrations relative to upstream sediments.¹⁰²
- “Here on the Ohio side of the Ohio River Basin we have witnessed excessive brine (fracking) waste being shipped from fracking wells in our state as well as from WV and PA, both of which have stricter regulations on fracking waste than OH. Our county (Washington) has the highest

¹⁰⁰ DRBC, February 2021 CRD, p. 67.

¹⁰¹ Akob, D.M., et al., Wastewater Disposal from Unconventional Oil and Gas Development Degrades Stream Quality at a West Virginia Injection Facility, *Envtl. Sci. & Tech.* 50 (May 9, 2016), 5517–5525, accessed at: <https://pubs.acs.org/doi/pdf/10.1021/acs.est.6b00428>.

¹⁰² Partnership for Policy Integrity, Toxic Secrets: Companies Exploit Weak US Chemical Rules to Hide Fracking Risks (Apr. 7, 2016), accessed at: <http://www.pfpi.net/toxic-secrets-companies-exploit-weak-us-chemical-rules-to-hide-fracking-risks>. (The Commission notes that the cited article is unrelated to the substance of the comment, but suspects the correct citation would be to Akob, D.M., et al., *supra* note 100.)

amount (per barrel) of fracking waste and is among the top two in number of injection wells in the state. Not only have there been spills and leaks in our county, which have threatened drinking-water aquifers, but these injection wells, where brine waste is put in the ground under high pressure, have damaged oil and gas production wells.”

RESPONSE (R-39)

The Commission acknowledges that the discharge of HVHF wastewater to the land via deep well injection presents risks to water resources. These risks were part of the justification for the Commission’s decision in 2021 to prohibit HVHF in the Delaware River Basin and for its current rulemaking, which provides that “[n]o person may discharge wastewater from high volume hydraulic fracturing or HVHF-related activities to waters or land within the Basin.” The Commission intends by this provision to prohibit the injection of HVHF wastewater into deep wells within the Basin.

If, as a commenter avers, the language used in the Commission’s February 2021 CRD can be read to mean that the Commission deems underground injection of HVHF wastewater to be a method of “containing” HVHF wastewater and not as a “discharge” of such wastewater, this response is intended to eliminate any ambiguity on that point.

Please see the Commission’s February 2021 CRD, Section 2.7.6 Underground Injection Wells for Disposal of HVHF Wastewater, for related content, including references to peer-reviewed science showing impacts to surface and groundwater resources linked to deep well injection of HVHF wastewater.

STATEMENT OF CONCERN (SC-40)

Paraphrased comments representative of those expressing concerns about depletion of groundwater as a result of deep well injection follow:

- Citing a 2018 publication, a commenter asserted that groundwater in the U.S. is being depleted not only by excessive withdrawals, but due to injection, and potentially contamination, from the oil and gas industry in areas of deep fresh and brackish groundwater.¹⁰³
- Many commenters noted that disposal by deep well injection results in water being permanently removed from the hydrologic cycle.

RESPONSE (R-40)

The Commission agrees that the discharge of HVHF wastewater through deep well injection is depletive and permanently removes water from the hydrologic cycle. By prohibiting the discharge to land or waters of the Basin of wastewater from high volume hydraulic fracturing and HVHF related activities, the Commission is prohibiting the disposal of HVHF wastewater by deep will injection

¹⁰³ Ferguson, G. et al., Competition for shrinking window of low salinity Groundwater, *Envntl. Research Letters* (Nov. 14, 2018), accessed at: <https://iopscience.iop.org/article/10.1088/1748-9326/aae6d8>.

within the Basin. In addition, because the Commission prohibited HVHF in hydrocarbon-bearing rock formations in the Basin, the discharge prohibition in practice affects only HVHF wastewater produced during HVHF activities outside the Basin.

4.2.2 Potential Impacts to Water Resources and Their Uses

4.2.2.1 Impacts to Drinking Water

STATEMENT OF CONCERN (SC-41)

The following paraphrased comments are representative of many expressing concern that allowing the importation of HVHF wastewater into the Delaware River Basin could impact sources of drinking water in the Basin:

- Many commenters expressed concern that the proposed regulations would allow HVHF wastewater to be imported into the Delaware River Basin and would threaten sources of drinking water for millions in the region.
- PSR commented that HVHF wastewater is highly toxic, noting that in addition to its high salinity and levels of radium 226 and 228, it may contain any of more than 100 known carcinogenic or endocrine disrupting substances used or generated by the hydraulic fracturing process, including the “forever chemicals” and known carcinogens PFAS and PFOA. Because the majority of the chemicals used in HVHF fluid have not been studied for human toxicity, PSR averred, they must be presumed to be dangerous.
- DRN expressed concern that the proposed regulations prohibit the importation of wastewater produced by HVHF only when an associated discharge to land or water is proposed. They said pathways for HVHF pollution would nevertheless exist through wastewater processing systems that don’t strictly “discharge to water or land” and that other pathways could include leaks and spills resulting from storage, handling, transport, and “beneficial use,” including road spreading, of this material. DRN averred that stormwater runoff could convey inadvertently released HVHF wastewater into sources of drinking water.
- DRN also said that exemptions for the oil and gas industry from federal and state environmental laws and regulations could apply to facilities within the Basin that undertake to treat, store, transfer, or otherwise handle HVHF wastewater, and called the potential risks to drinking water “untenable.”
- A commenter stated that the municipal water purification systems for drinking water withdrawn from the river are designed to remove harmful microorganisms (pathogens) and particulate matter but cannot remove the compounds used in hydraulic fracturing fluids, and further, that the hydraulic fracturing industry has a history of not disclosing all the components in their hydraulic fracturing fluids, making it impracticable to detect their presence in drinking water.
- Citing a 2015 report, PSR asserted that analysis of discharged effluents from three brine treatment sites in Pennsylvania and a spill site in West Virginia show elevated levels of halides (iodide up to 28 mg/L) and ammonium (12 to 106 mg/L) that mimic the composition

of oil and gas wastewater (OGW) and mix conservatively in downstream surface waters. They were concerned that bromide, iodide, and ammonium in surface waters can promote the formation of toxic brominated-, iodinated-, and nitrogen disinfection byproducts during chlorination at downstream drinking water treatment plants. They pointed to findings of the study indicating that discharge and accidental spills of OGW to waterways pose risks to human health.¹⁰⁴

RESPONSE (R-41)

The Commission's February 2021 CRD, at Section 2.3.3 Significant Impacts to Water Resources and their Uses, describes in detail the risks that HVHF and related activities pose to groundwater and surface water sources used for public and private drinking water. These water supply sources are vulnerable to releases of chemicals and highly contaminated fluids from spills and accidents; migration of fluids including gases; inadequate wastewater treatment; improper wastewater storage or disposal; wastewater reuse on roadways; and other related activities and events. The Commission also acknowledges that the potential presence of PFAS in HVHF wastewater and the potential formation of disinfection byproducts downstream from centralized waste treatment facilities (CWTs) treating HVHF wastewater are legitimate concerns when the likelihood of HVHF wastewater releases to the environment (treated or untreated) is high. The risks associated with human exposure to PFAS in drinking water are described at R-22 and R-23 above.

However, the Commission also recognizes, based on data and information described at length in Response R-25 of this CRD and throughout Section 4.2.1 Potential Risks to Water Resources, above, that the risks of these impacts are lower in areas where HVHF is prohibited than in areas of active HVHF shale-gas development. Because the Commission has prohibited HVHF within the Delaware River Basin and is also prohibiting the discharge of treated or untreated HVHF wastewater within the Basin, it anticipates that only low volumes of HVHF wastewater will be transported to or through the Basin, or stored, processed, or recycled within the Basin. The likelihood of HVHF wastewater releases within the Basin and the corresponding risk of impacts to the Basin's drinking water resources resulting from such releases are in the Commission's view effectively reduced by these measures.

4.2.2.2 Impacts to Aquatic Life

STATEMENT OF CONCERN (SC-42)

Comments representative of those expressing concern that importing HVHF wastewater into the Delaware River Basin may impact water quality and aquatic life follow:

- Commenters expressed concern that HVHF wastewater is highly saline, contains toxic chemicals and substances, and is radioactive. They asserted that if it is brought into the Basin, it will be released to the environment and will negatively impact habitats, diversity, and

¹⁰⁴ Harkness, J.S., et al., Iodide, Bromide, and Ammonium in Hydraulic Fracturing and Oil and Gas Wastewaters: Environmental Implications *Envtl. Sci. & Tech.*, 3 (Jan. 14, 2015), 49.

trophic levels of the aquatic ecosystems, impairing water quality and harming aquatic life, from microorganisms up through predatory fish and bird species. They averred that sport and commercial oyster, clam, and mussel fisheries that make up part of the region's human food chain would be contaminated.

- Commenters said that proof that controls on the toxic pollution from HVHF wastewater are ineffective can be found in the many studies and reports examining the impacts of hydraulic fracturing-related spills and leaks on water resources, the longevity of the contaminants in sediments, soil, and streams, and the adverse health effects in humans, fish and aquatic life.
- Commenters cited examples of such impacts, including a relatively small spill into Acorn Creek in Kentucky that "killed virtually all aquatic wildlife" in a significant portion of the creek, and a spike in endocrine-disrupting activity in a West Virginia stream that was traced by a University of Missouri research team to an upstream facility that stores hydraulic fracturing wastewater. In the latter case, the commenters noted, levels detected downstream of the wastewater storage facility were above levels known to create adverse health effects and alter the development of fish, amphibians, and other aquatic organisms.¹⁰⁵

RESPONSE (R-42)

The Commission's February 2021 CRD at Section 2.3.3 Significant Impacts to Water Resources and their Uses describes in detail the risks that HVHF and related activities pose to surface water quality and aquatic life. Surface waters are vulnerable to releases of chemicals and highly contaminated fluids from spills and accidents; migration of fluids including gases; inadequate wastewater treatment; improper wastewater storage or disposal; wastewater reuse on roadways; and other related activities. The Commission also acknowledges that peer-reviewed research published in 2021 shows further evidence of HVHF wastewater toxicity, exposure risks, and persistent environmental impacts, and documents changes to water quality across some regions where shale gas is developed in the U.S.¹⁰⁶

However, the Commission also recognizes, based on data and information described at length in Response R-25 of this CRD and throughout Section 4.2.1 Potential Risks to Water Resources, above, that the risks of these impacts are lower in areas where HVHF is prohibited than in areas of active HVHF shale-gas development. Because the Commission has prohibited HVHF within the Delaware River Basin and is also prohibiting the discharge of treated or untreated HVHF wastewater within the Basin, it anticipates that only low volumes of HVHF wastewater will be transported to or through

¹⁰⁵ Kassotis, C. D., et al., Endocrine disrupting activities of surface water associated with West Virginia oil and gas industry wastewater disposal site, *Sci. of the Total Env't*, 557-558 (July 1, 2016), 901–10.

¹⁰⁶ Aghababaei et al., *supra* note 38. 2021; Bain et al., Oil and gas wastewater as road treatment: radioactive material exposure implications at the residential lot and block scale, *Envtl. Research Communications*, 3 (Nov. 18, 2021), accessed at:

<https://iopscience.iop.org/article/10.1088/2515-7620/ac35be/pdf>; Bonetti et al., Large-sample evidence on the impact of unconventional oil and gas development on surface waters, *Sci.* 373:6557 (Aug. 20, 2021), 896–902; Cozzarelli et al., *Sci. of the Total Env't*, 755:1 (Feb. 10, 2021), accessed at:

<https://www.sciencedirect.com/science/article/pii/S0048969720364391>; Lu, et al., 2021, *supra* note 39; O'Dell et al., 2021, *supra* note 37; Vandenburg, et al., Endocrine disrupting chemicals: strategies to protect present and future generations, *Expert Review of Endocrinology & Metabolism*, 16:3 (May 11, 2021).

the Basin, or stored, processed, or recycled within the Basin. The likelihood of HVHF wastewater releases within the Basin and the corresponding risk of impacts to the Basin's water resources and aquatic life resulting from such releases are in the Commission's view effectively reduced by these measures.

STATEMENT OF CONCERN (SC-43)

Paraphrased comments representative of those expressing concern that the exportation of water from the Delaware River Basin for HVHF activities may impact water quality and aquatic life follow:

- Citing a 2004 report by the Instream Flow Council, many commenters asserted that the export of water from the DRB is a depletive use that can have far-reaching adverse environmental impacts on the water resources of the Basin, and that the impacts of water withdrawals from streams are not adequately regulated by most agencies.¹⁰⁷
- DNR expressed concern that these impacts include diminishment of groundwater, aquifers, wetlands, seeps, springs, streams, and the main stem river, and sedimentation from truck traffic, all of which may have cascading ecologic and hydrologic impacts, including harm to water quality, benthic and aquatic life, and other wildlife.
- DNR also commented that exportations of water for HVHF would result in the degradation of aquatic habitat qualities, including reduced oxygen, temperature changes, changes in rate and volume of flow, and changes to stream morphology, that may reduce or eliminate existing uses and produce measurable change to waters classified by the Commission as Special Protection Waters.
- Citing reports by the Instream Flow Council and the NYSDEC, many commenters claimed that the loss of flow in waterways results in a cascade of degrading impacts that can harm in-stream habitats, disrupt species' life cycles, reduce biodiversity, and destroy ecological flow regimes.¹⁰⁸

RESPONSE (R-43)

The Commission does not agree that the final regulations will result in an increased rate of depletive water uses or water loss generally in the Basin. The Commission in R-6 and R-7 above explains to the contrary, how the final rules at Section 2.30 of the Water Code will support conservation and preservation of the Basin's water resources by limiting exportations of water from the Basin

¹⁰⁷ Annear, T., et al., *Instream Flows for Riverine Resource Stewardship*, Revised Edition, Instream Flow Council (2004), 178.

¹⁰⁸ "Potential impacts that should be evaluated due to decreased flow include loss of habitat, direct impacts on sensitive life stages, loss of mobility for aquatic organisms, thermal impacts, decreased dissolved oxygen, impacts on wetland hydrology, impacts on recreation and fishing, and decreased quantity of water available for public water supply. Any new flow-related permit conditions should give priority to the best usage of domestic and municipal water supply." Extracted from: NYSDEC, Division of Water Technical and Operational Guidance Series, *Incorporation of Flow-Related Conditions in Water Withdrawal Permits*, (Apr. 12, 2017), accessed at: https://www.dec.ny.gov/docs/water_pdf/flowtogsfinal.pdf.

generally. Under the final rule, proposed exportations are eligible for consideration by the Commission only if the sponsor demonstrates the exportation is required to serve a straddled or adjacent public water system, that the exportation is required to meet public health and safety needs on a short-term or emergency basis, or that the water consists of wastewater that may not lawfully be discharged to a public wastewater collection system and is being exported for treatment, disposal or both at a waste management facility that has all required state and federal approvals to lawfully receive it. Potential exportations must satisfy additional criteria, including those designed to protect aquatic species. The Commission's final rule is designed to ensure that exportations of water from the Basin do not result in the impacts to surface water and aquatic life described in the comments, and that the waters of the Basin are conserved and preserved for current and future uses in accordance with the Comprehensive Plan.

STATEMENT OF CONCERN (SC-44)

Commenters said that by providing Delaware Basin water to the natural gas industry, the draft regulations will encourage more hydraulic fracturing, which will result in the release of more methane to the atmosphere and contribute to climate change, which in turn will affect river flows, temperature, seasonal variability, reservoir levels, the concentration of pollutants in both ground and surface water, the habitats, health and diversity of flora and fauna, recreation, economic values, and human health.

RESPONSE (R-44)

While the Commission and Commission staff share significant concerns about climate change and its impact upon the water cycle, for the reasons set forth in R-6 and R-7 above, and as noted in R-8, the Commission does not agree that the proposed rule supports additional high volume hydraulic fracturing or thereby contributes to climate change and its attendant impacts. Please also see Responses R-57 and R-58 in Section 5.3 Climate Change below, for additional discussion of this topic.

4.2.2.3 Impacts to Human Health

STATEMENT OF CONCERN (SC-45)

Many commenters expressed concerns about the impacts on human health of exposure to HVHF and related activities.¹⁰⁹ One commenter asked, “Has DRBC identified human health and environmental toxicities associated with this wastewater?”

¹⁰⁹ While some comments cited scientific studies of human health impacts specifically related to exposure to wastewater from high volume hydraulic fracturing and HVHF-related activities, other commenters cited scientific studies of human health impacts that are related to exposure to HVHF activity generally, without identifying the specific HVHF activity that is or may be the source of the exposure. The rules amending Section 2.30 of the Water Code relate only to the importation of water, including wastewater, into the Basin, and the exportation of water, including wastewater, from the Basin. The rules amending the Commission’s Special Regulations at Part 440 prohibit the discharge of HVHF wastewater. In considering and addressing these

RESPONSE (R-45)

The Commission's February 2021 CRD at Section 2.3.2 Significant Risks to Water Resources, Section 2.3.3 Significant Impacts to Water Resources and Their Uses, and Section 2.6.1 Public Health, recognizes the human health impacts associated with HVHF wastewater that have been documented in the scientific and public health literature. The potential human health impacts in the Basin from exposure to HVHF wastewater are substantially reduced by the prohibition adopted by the Commission in February 2021 prohibiting HVHF in hydrocarbon-bearing rock formations in the Basin and the prohibition on the discharge of wastewater from HVHF and HVHF related activities to the land and waters of the Basin adopted in this rulemaking.

STATEMENT OF CONCERN (SC-46)

Many commenters expressed concerns about the toxicity and radioactivity of HVHF wastewater and specific effects of exposure to HVHF wastewater on human health. Paraphrased comments representative of these follow:

- Commenters noted that in Resolution No. 2021-01, adopting the Commission's final rule prohibiting HVHF in hydrocarbon-bearing formations in the Basin (in language repeated in the final rule), the Commission determined that "[c]ontrolling future pollution by prohibiting high volume hydraulic fracturing in the Basin is required to effectuate the Commission's Comprehensive Plan, avoid injury to the waters of the Basin as contemplated by the Comprehensive Plan and protect the public health"
- Many commenters expressed concern that the proposed regulations would allow toxic hydraulic fracturing wastewater to be imported into the Basin, threatening human health in the region.
- Commenters asserted that, according to the EPA, there are more than 1,000 known chemicals used in hydraulic fracturing, of which many have serious and well-documented public health impacts, and many more are considered "proprietary" and have not been disclosed.
- PSR commented that HVHF wastewater is highly toxic, noting that in addition to its high salinity and levels of radium 226 and 228, it may contain any of more than 100 known carcinogenic or endocrine disrupting substances used or generated by the hydraulic fracturing process, including the "forever chemicals" and known carcinogens PFAS and PFOA. Because the majority of the chemicals used in HVHF fluid have not been studied for human toxicity, PSR averred, they must be presumed to be dangerous.
- DRN stated that PFAS are called "forever chemicals" because they never biodegrade and they persist indefinitely in the environment; and they are highly water soluble and bioaccumulative. Citing state websites, DRN noted that PFAS accumulate in the natural world (including in fish and wildlife, hence the "Do Not Eat" fish consumption advisory issued by

comments, the Commission notes the respective scopes of the activity or activities under investigation within the studies cited with regard to the HVHF activity or activities under investigation.

PADEP due to PFAS in the Neshaminy Creek¹¹⁰ and New Jersey's recent fish consumption advisories covering PFAS statewide¹¹¹) and in the human body, are highly toxic even in very tiny doses, and are linked to several diseases and adverse health conditions, including cancers. The commenter further stated that the fetus, infants, children, women of childbearing age, and immune compromised individuals are the most vulnerable to PFAS health damages.

- Commenters expressed concern that hydraulic fracturing wastewater contains or can cause the formation of chemicals such as disinfection byproducts, including brominated trihalomethanes (THMs), which are harmful to the environment and human health, and that: the presence of such chemicals has been correlated with increased diseases and infirmities such as birth defects, bladder and other cancers; that certain chemicals found in wastewater are also known to disrupt the endocrine system with potential health consequences such as spontaneous abortions, fetal death and irregular fertility cycles; and that these chemicals can interfere with both human and animal reproduction and may have long-term consequences for agriculture and food production, especially when such chemicals begin to enter the food chain at or near the affected areas of discharge.
- Commenters were concerned that HVHF wastewater contains toxic heavy metals, hydrocarbons/volatile organic compounds (VOCs), radioactive elements and high levels of salt (which adds to corrosiveness). They noted that VOCs, including ethylbenzene, toluene and xylene, cause liver, kidney and brain toxicity; disrupt endocrine systems, and are carcinogenic and teratogenic. They expressed concern that these chemicals not only can cause cancer and disrupt the endocrine system, but also may affect the nervous, immune and cardiovascular systems, defense sensory organisms and the respiratory system.
- A commenter stated that HVHF wastewater has been found to contain the pesticide atrazine; 1,4-dioxane, an organic compound that is irritating to the eyes and respiratory tract; toluene, which at low exposure has health effects like confusion, weakness, and loss of vision and hearing; polycyclic aromatic hydrocarbons, which have been linked to skin, lung, bladder, liver and stomach cancers; and that over 1,000 toxic chemicals have been found in HVHF wastewater.
- Citing a 2018 report by the Partnership for Policy Integrity, many commenters stated that wastewater is one of the top three materials spilled in hydraulic fracturing activities, including during transportation of wastewater, and that health effects associated with chronic oral exposure to these chemicals include carcinogenicity, neurotoxicity, immune system effects, changes in body weight, changes in blood chemistry, liver and kidney toxicity, and reproductive and developmental toxicity.¹¹²

¹¹⁰PADEP, Neshaminy Creek Fish Advisory, accessed at:

<https://www.dep.pa.gov/About/Regional/SoutheastRegion/Community%20Information/Pages/Neshaminy-Creek-Fish-Advisory.aspx>.

¹¹¹NJDEP, Fish Smart Eat Smart NJ (Aug. 26, 2021), accessed at: <https://www.nj.gov/dep/dsr/njmainfish.htm>.

¹¹²Horwitt, D., J.D., Keystone Secrets: Records Show Widespread Use of Secret Fracking Chemicals Is a Looming Risk for Delaware River Basin, Pennsylvania Communities, Partnership for Policy Integrity (Sept. 11, 2018), 4, accessed at:

<https://www.pfpi.net/wp-content/uploads/2018/09/PASecretFrackingChemicalsReportPFPI9.10.2018.pdf>.

- Commenters quoted a peer-reviewed journal article published in 2011 that examined chemicals in hydraulic fracturing waste, for the statement: "The technology to recover natural gas depends on undisclosed types and amounts of toxic chemicals. A list of 944 products containing 632 chemicals used during natural gas operations was compiled. Literature searches were conducted to determine potential health effects of the 353 chemicals identified by Chemical Abstract Service (CAS) numbers. More than 75% of the chemicals could affect the skin, eyes, and other sensory organs, and the respiratory and gastrointestinal systems. Approximately 40-50% could affect the brain/nervous system, immune and cardiovascular systems, and the kidneys; 37% could affect the endocrine system; and 25% could cause cancer and mutations. These results indicate that many chemicals used during the fracturing and drilling stages of gas operations may have long-term health effects that are not immediately expressed."¹¹³
- A commenter cited findings of a group called The Endocrine Disruption Exchange (TEDX), referenced in the report "Hydraulic Fracturing and Your Health: Water Contamination" by PSR.¹¹⁴ TEDX "examined the toxicity of 353 chemicals used in fracking and found that 25 percent can cause cancer and mutations; 37 percent affect the endocrine system; 40 to 50 percent affect the brain, kidneys, and nervous, immune, and cardiovascular systems; and more than 75 percent affect other organs and organ systems."
- The commenter opined that the additional substances entrained in HVHF wastewater are the kinds that "everyone would rather leave undisturbed deep underground where they come from." They were concerned that these substances include radioactive and highly carcinogenic substances like: radon and radium (radioactive elements for which long-term exposure via ingestion or inhalation increases the risk of developing lymphoma, leukemia and aplastic anemia, and which can increase the risk of cancer in all tissues and organs.); arsenic (which can cause partial paralysis, blindness, and cancer of the bladder, lungs, skin, kidney, nasal passages, liver, and prostate); strontium (linked to bone cancer, cancer of the soft tissue near the bone, and leukemia); and methane, ethane, and propane (which may cause rapid breathing, rapid heart rate, clumsiness, emotional upset and fatigue, and at greater exposure, may cause vomiting, collapse, convulsions, coma and death).
- Commenters concerned that the contaminants found in hydraulic fracturing fluid and hydraulic fracturing wastewater pose significant health and environmental risks noted that the EPA found in its 2016 report on hydraulic fracturing and drinking water that 1,606 chemicals were associated with hydraulic fracturing, including 599 chemicals that had been detected in wastewater.¹¹⁵ The commenters noted that the agency found high-quality information on health effects for only 173 of these chemicals, and the available information was troubling. They further noted that EPA found that health effects associated with chronic oral exposure to these chemicals include carcinogenicity, neurotoxicity, immune system

¹¹³ Colborn, T. et al., Natural Gas Operations from a Public Health Perspective, *Int'l Journal of Human and Ecological Risk Assessment*, 17 (Jun. 8, 2010), 1039–56.

¹¹⁴ PSR, Hydraulic Fracturing and Your Health: Water Contamination, accessed at: <https://www.psr.org/wp-content/uploads/2018/09/fracking-and-water-contamination.pdf> (citing T. Colborn et al., *supra* note 112).

¹¹⁵ EPA, Hydraulic fracturing for oil and gas: impacts from the hydraulic fracturing water cycle on drinking water resources in the United States (Dec. 2016), 9-1, accessed at: <https://cfpub.epa.gov/ncea/hfstudy/recordisplay.cfm?deid=332990>.

effects, changes in body weight, changes in blood chemistry, liver and kidney toxicity, and reproductive and developmental toxicity¹¹⁶ and that some of the chemicals with these toxic effects, such as benzene, were found in both hydraulic fracturing chemicals and wastewater,¹¹⁷ while others such as radium, were found only in wastewater.¹¹⁸

- DCS stated that “The Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking,”¹¹⁹ developed and periodically updated by the Concerned Health Professionals of New York contains a massive list of human health impacts of hydraulic fracturing, including both from the various industrial processes involved and the resulting waste.¹²⁰

RESPONSE (R-46)

The Commission acknowledges that HVHF wastewater contains substances that are toxic or radioactive, that the toxicity of many of the substances is unknown, and that the identities of some substances are not disclosed. The Commission is aware of the wide range of impacts to human health that can result from exposure to chemicals and radiation present in HVHF wastewater. These are among the concerns weighed by the Commission in reaching its decision to prohibit HVHF in the Basin in 2021, and to prohibit the discharge of HVHF wastewater by this rulemaking.

As described in more detail in Response R-25, the Commission also recognizes that the risks of impacts to human health from exposure to contaminants present in HVHF wastewater are lower in areas where HVHF is prohibited than in areas of active HVHF shale-gas development. Because the Commission has prohibited HVHF in hydrocarbon bearing formations in the Basin and is now prohibiting discharges of HVHF wastewater within the Basin, the Commission anticipates that only low volumes of HVHF wastewater will be transported, stored, treated, processed, or reused within the Basin, and that the likelihood of impacts to the Basin’s water resources resulting from spills, leaks, or other releases from such activities will be low.

Please see the Commission’s February 2021 CRD at Section 2.3.3 Significant Impacts to Water Resources and Their Uses and Section 2.6.1 Public Health for additional discussion of these concerns, including in particular, regarding the formation of disinfection byproducts (DBPs) in drinking water as a result of HVHF wastewater discharges, and the impacts of DBPs on human health.

¹¹⁶ *Id.*

¹¹⁷ *Id.* at Table G-1e. Available qualitative cancer classifications for chemicals reported to be used in hydraulic fracturing fluids (noting that chemicals in italics including benzene were found in both hydraulic fracturing fluids and wastewater).

¹¹⁸ *Id.* at Table G-2a. Chemicals reported to be detected in produced water, with available chronic oral RfVs, OSFs, and qualitative cancer classifications from United States federal sources.

¹¹⁹ Concerned Health Professionals of NY, *Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking and Associated Gas and Oil Infrastructure*, Seventh Edition (Dec. 2020), accessed at:

<https://www.psr.org/wp-content/uploads/2020/12/fracking-science-compendium-7.pdf> (the Commission notes the Eighth Edition of this Compendium (Apr. 2022) is accessible at:

<https://concernedhealthny.org/wp-content/uploads/2022/04/CHPNY-Compendium-8-FINAL.pdf>).

¹²⁰ *Id.*

Also see above, Sections 4.2.1.3 Waste characterization/ toxicity/ radioactivity; and 4.2.1.4 Chemical Disclosure for additional content regarding chemical disclosure and concerns about toxicity, radioactivity, and PFAS in HVHF wastewater.

STATEMENT OF CONCERN (SC-47)

Many commenters expressed concerns about the potential for human health impacts on people living near HVHF-related activities, and many cited published studies or anecdotal evidence showing an association between proximity to HVHF activity and human health impacts.

Paraphrased and quoted comments representative of those expressing concern about the potential for human health impacts on people living near HVHF-related activities follow:

- Citing an article published in Rolling Stone magazine, a commenter was concerned that no requirement currently exists for properly testing HVHF wastewater, or the people or machinery that come into contact with it at any stage of the hydraulic fracturing process, for radioactivity, or for any of the other highly toxic substances it may contain, and that people living near hydraulic fracturing wells or disposal sites, or near the waters into which these wastewaters are discharged, are getting sick and even dying.¹²¹
- A commenter cautioned that, “Unintended consequence of injection in East Texas were many reports of birth defects from people down the roads from those injection wells, and I witnessed that firsthand. It was absolutely sad and terrifying, but nonetheless allowed to happen.”
- A commenter stated, “As an obstetrician and maternal fetal medicine physician I am very concerned about fracking activities. Studies have shown an association between fracking activities and pregnancy harms, including decreased birthweight and preterm birth. Additionally, a number of chemicals used in fracking and found in fracking wastewater are “endocrine disrupting compounds” (EDCs), which can impact the development of fetal boys’ genitalia and cause other health harms.”¹²²
- A commenter stated: “I have personally seen the damage caused by fracking in Demick [sic], PA where literally hundreds of wells have been drilled. There were unusually high cases of asthma, unexplained nosebleeds, and cancer.”

¹²¹ See Nobel, J., America’s Radioactive Secret, Rolling Stone Magazine (Jan. 21, 2020), accessed at: <https://www.rollingstone.com/politics/politics-features/oil-gas-fracking-radioactive-investigation-937389/>.

¹²² Casey, J.A., et al., Unconventional natural gas development and birth outcomes in Pennsylvania, USA, *Epidemiology*, 27:2 (Mar. 2016), 163–72, accessed at:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4738074/pdf/nihms-728721.pdf>;

Stacy, S.L., et al., Perinatal outcomes and unconventional natural gas operations in Southwest Pennsylvania, *PLOS One*, 10:6 (Jun. 3, 2015), accessed at:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4454655/pdf/pone.0126425.pdf>.

RESPONSE (R-47)

Under the Commission’s regulation finalized in 2021 prohibiting HVHF in hydrocarbon-bearing formations in the Basin and the current rulemaking prohibiting the discharge of HVHF wastewater to land or waters within the Basin, Basin residents will not reside in proximity to HVHF wells or HVHF wastewater discharge sites, including injection wells. In the Commission’s view, the risk to Basin residents of exposure to HVHF wastewater is sufficiently reduced by these measures to minimize human health impacts.

STATEMENT OF CONCERN (SC-48)

A comment representative of many expressing concern about the impacts on human health of exposure to air pollution from thermal oxidation, a potential treatment for HVHF wastewater, follows:

- “Human health effects of air pollution that can be caused by thermal oxidation of hazardous waste include decreased lung function, inflammatory responses, diminished lung function and lung function growth in children, increased cardiovascular events, genotoxicity, and reproductive effects. Despite these known impacts, very little study has been done about the health effects of thermal oxidation and combustion of hazardous wastes. It is wrong to use people as guinea pigs by blindly exposing them to toxins.”

RESPONSE (R-48)

Because the Commission has prohibited HVHF in hydrocarbon bearing formations in the Basin and is now prohibiting discharges of HVHF wastewater within the Basin, the Commission anticipates that only low volumes of HVHF wastewater will be transported, stored, treated, processed, or reused within the Basin, and that the likelihood of impacts on human health from exposure to HVHF wastewater associated with these activities is thus effectively reduced. Comments regarding thermal oxidation of HVHF waste are also discussed above, in Section 4.2.1.2 Air Pollution and Air Deposition of this CRD.

4.3 Section 440.2 – Definitions

STATEMENT OF CONCERN (SC-49)

Paraphrased comments representative of those concerning the meaning of “discharge” in proposed new Section 440.4 of the Commission’s Special Regulations at 18 C.F.R Part 440 follow:

- Commenters opined that the word “discharge” should be defined for purposes of Section 440.4 and that the definition should expressly include discharges to disposal wells, caverns, and landfills.
- NRDC asked the Commission to define the term "discharge" to encompass "spilling, leaking, pumping, pouring, spreading, spraying, emitting, emptying, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of

barrels, containers, and other closed receptacles containing any hazardous substance or pollutant or contaminant)," which would make it similar in scope to the definition of "release" in the federal Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA").

- Commenters also suggested that the rule should, but as drafted does not, prohibit air emissions of pollutants at processing facilities and the reuse of HVHF wastewater in manufacturing, as cooling water for power plants, and in refineries or other systems lacking a permitted "discharge".
- Commenters objected that the rule would allow the storage and transfer of wastewater within the watershed and that it does not prohibit "beneficial uses" of HVHF wastewater, including the integration of such wastewater into construction materials and other commercial products.

RESPONSE (R-49)

In the Commission's view, the meaning of Section 440.4 was clear in the rule as proposed. However, the inclusion of a definition of "discharge" in combination with the definitions of "Wastewater from HVHF and HVHF-related activities" and "HVHF-related activities" undoubtedly makes the meaning and intent of the rules more explicit. The Commission has included in the final rule the following new definition:

Discharge of wastewater from HVHF and HVHF-related activities is an intentional or unintentional action or omission resulting in the releasing, spilling, leaking, pumping, pouring, emitting, emptying, spreading, spraying, injecting, leaching, dumping, or disposing of such wastewater to waters or land within the Basin, and including the abandonment or discarding of barrels, containers, and other receptacles containing such wastewater.

The new definition makes clearer that activities about which many commenters expressed concern are prohibited by the final rule. These include, among other things:

- discharge of HVHF wastewater to waters or land within the Basin;
- road spreading of HVHF wastewater (*see* Section 4.2.1.9, Response R-38 of this CRD for a discussion of road spreading);
- injection of HVHF wastewater into deep wells within the Basin (*see* discussion in Section 4.2.1.10 of this CRD);
- disposal of HVHF wastewater in Basin landfills;
- discharge of leachate from any landfill in the Basin that accepts HVHF waste after the effective date of the final regulations, including after treatment at an onsite or off-site leachate or wastewater treatment plant (*see* discussion in Section 4.2.1.8 of this CRD); and
- spills and leaks during transport, transfer, or storage of HVHF wastewater within the Basin if not fully captured by a containment system in place throughout the duration of

the spill or leak and thereafter promptly removed or remediated (*see* Section 4.2.1.5 above concerning transport, leaks and spills, and Section 4.2.1.7 concerning waste storage and recycling).

The final rule does not:

- regulate air emissions from HVHF activities (see Section 4.2.1.2 for a discussion of air emissions and air deposition);
- categorically prohibit the transfer of HVHF wastewater into the Basin when no resulting discharge is proposed; or
- regulate the transportation and storage of HVHF materials, which are regulated under detailed state and federal programs focused on these activities.

Notably, PADEP has confirmed that with one exception,¹²³ no beneficial use permits are currently in effect or pending that include the use of HVHF wastewater as a construction material or commercial product, or as an ingredient in the manufacturing of a construction material or commercial product. The Commission has not proposed and is not at this time considering rules of this kind.

STATEMENT OF CONCERN (SC-50)

Commenters suggested that the definition of “high volume hydraulic fracturing” should be deleted and replaced with a definition that includes all “hydraulic fracturing.”

RESPONSE (R-50)

The Commission has evaluated and made a determination only about the risks and impacts to water resources of the Basin associated with high volume hydraulic fracturing (HVHF) and HVHF wastewater. Based on findings set forth at length in the Commission’s February 2021 CRD, the Commission has prohibited HVHF within the Basin and is now prohibiting the discharge of wastewater from HVHF and HVHF-related activities. Activities that do not meet the definitions in Section 440.2 of the Commission’s Special Regulations at 25 C.F.R. Part 440 are not covered by these prohibitions. The Commission’s Notice of Proposed Rulemaking and draft rule addressed HVHF, not other hydraulic fracturing. The definition of high volume hydraulic fracturing has not been replaced or revised.

STATEMENT OF CONCERN (SC-51)

A commenter stated that waste from hydraulic fracturing is not defined as hazardous waste in some jurisdictions.

¹²³ The sole exception is General Permit WMGR123, which authorizes the treatment, storage and transfer of oil and gas liquid waste for beneficial use in the hydraulic fracturing of additional oil and gas wells. Because HVHF in hydrocarbon-bearing rock formations is not permitted in the Delaware River Basin (*see* 18 C.F.R. 440.3(b)), these uses are expected to be rare within the Basin.

RESPONSE (R-51)

The Commission has not proposed and is not now adopting any system for classifying solid wastes as “hazardous” or “non-hazardous.” The prohibition on discharges to land or waters of the Basin of wastewater from high volume hydraulic fracturing and HVHF-related activities will nevertheless avoid injury to waters of the Basin from HVHF wastewater, protect the public health, and preserve the waters of the Basin for uses in accordance with the Commission’s Comprehensive Plan.

STATEMENT OF CONCERN (SC-52)

PennFuture suggested that the Commission should clarify the definition of "Fracking Wastewater" to specifically include produced water and flowback water.

RESPONSE (R-52)

The term “fracking wastewater” did not appear in the proposed rule and is not used in the final rule. The term “wastewater from HVHF and HVHF-related activities,” as adopted, is defined at Section 440.2 as:

(1) Any wastewater, brine, or sludge containing chemicals, naturally occurring radioactive materials, heavy metals or other contaminants that have been used for or generated by high volume hydraulic fracturing or HVHF-related activities; (2) Leachate from solid wastes associated with HVHF-related activities, except if the solid wastes were lawfully disposed of in a landfill within the Basin prior to the effective date of this rule; and (3) Any products, co-products, byproducts or waste products resulting from the treatment, processing or modification of the wastewater described in paragraphs (1) and (2) of this definition.”

Part (1) of the definition was revised slightly from the proposed version for clarity. This definition, both as proposed and as now adopted, clearly encompasses “produced water” and “flowback water,” both of which constitute “any wastewater, brine . . . or other contaminants that have been used for or generated by high volume hydraulic fracturing or HVHF-related activities.”

STATEMENT OF CONCERN (SC-53)

Commenters acknowledged that the Commission has specifically included in the proposed definition of wastewater, “leachate from solid wastes associated with HVHF-related activities,” but they objected to the express exclusion of solid wastes “lawfully disposed of in a landfill within the Basin prior to the effective date of this rule.” The commenters averred this falls short of protecting the Basin's water resources from “the toxic, harmful, radioactive, and forever chemicals” that will continue to contaminate leachate from landfills that accepted solid wastes from HVHF prior to the effective date of the rules.

RESPONSE (R-53)

Landfill operators who lawfully accepted HVHF wastes prior to the effective date of the rule have reasonably relied on federal and state laws pertaining to disposal of these wastes and the management of landfill leachate. By prohibiting discharges to Basin waters or land of leachate from landfills that accept HVHF solid waste *after* the rule becomes effective, the Commission is substantially reducing the risk of adverse impacts on the Basin's water resources from this practice without unnecessarily burdening owners and operators of solid waste facilities who reasonably relied on government approvals.

STATEMENT OF CONCERN (SC-54)

The NRDC proposed:

- that the term "waters" in the phrase "waters or land within the Basin" in new Section 440.4 of the Commission's Special Regulations at 18 C.F.R. Part 440 be replaced with the term "Basin water," as defined in the proposed version of Section 2.30.1 of the Water Code.
- that the term "waters . . . in the basin" should be expanded to include "both surface and groundwater bodies, part or all of which are located in the basin."
- that the prohibition in new Section 440.4 be expanded to encompass discharging *and storing* wastewater from hydraulic fracturing and related activities.

RESPONSE (R-54)

The commenter seeks to broaden the prohibition effected by Section 440.4(b). It is unclear how the commenter's first suggestion would accomplish this purpose. The suggestion has not been accepted.

The commenter's second suggestion would expand the meaning of "waters . . . in the Basin" (a phrase that does not appear in the proposed or final regulations) to expressly include groundwater that may migrate beyond the Basin's boundary, a boundary that is defined by surface water drainage divides. The Commission acknowledges that groundwater may migrate beyond the boundaries of surface drainages. If the receiving body of a prohibited discharge is groundwater within the Basin, the discharge is prohibited by the regulation. The DRBC has authority to regulate activity in the Susquehanna River Basin or in other regions outside the Delaware River Basin only when "such action may be necessary or convenient to effectuate its powers or duties within the Basin . . . and only upon the consent of the state in which it proposes to act." Compact, § 2.7. The commenter has not suggested, and the Commission has not found, that these conditions for exercising the Commission's power outside the Basin are satisfied.

The storage of HVHF wastewater is not prohibited for reasons discussed in Section 4.2.1.7 of this CRD.

5. RESPONSES TO COMMENTS – OTHER

5.1 Section 4.5 of the Water Quality Regulations

There were no specific comments on the proposed revisions to Section 4.5 of the Water Quality Regulations.

5.2 Coordination with other Regulators

STATEMENT OF CONCERN (SC-55)

Quoted and paraphrased comments representative of those critical of the proposed rule on grounds that the DRBC—either alone or in cooperation with PADEP or other co-regulators—lacks the ability to effectively implement the proposed rule follow:

- “The Commission will have no control over [PA]DEP’s awarding [10-year general permits for the processing and beneficial use of oil and gas liquid waste]. I urge the Commission to have a conversation with the Pennsylvania DEP to understand these permits and what is at risk for the Basin should waste be imported to the Basin under these permits.”
- “If hydraulic fracking were permitted in the Pennsylvania area of the Basin, the staffing, management, inspection resources for the activity would be in PaDEP-Office of Oil and Gas Management (OGM.) This Department, and particularly OGM, are insufficiently staffed for the task. This Department is not sufficiently funded by Pennsylvania (there is no natural gas severance tax as is done in other major natural gas producing states) and Pennsylvania taxpayers are not going to pay for this overhead expense. Therefore, if fracking activity were allowed, DRBC would not have a viable collaborator to oversight of fracking activity in PA.”
- “Pennsylvania does not require an individual NPDES permit for gas well sites. While the DRBC’s draft regulations do not apply to gas extraction wells, which are banned in the watershed, the lax regulatory approach to stormwater runoff from oil and gas sites speaks volumes about the Commonwealth’s approach to fracking-related activities. This lax regulatory approach is what will rule should fracking wastewater and its stormwater runoff pollution potential be allowed by the import and handling of this waste here.”
- “DRBC has not taken full jurisdiction of pipeline projects in its review of such projects under current regulations, despite the public’s insistence that they must.”
- A commenter said the DRBC should coordinate with PADEP to minimize any harmful impacts of wastewater from high volume hydraulic fracturing and HVHF-related activities imported into the Basin.
- A commenter recommended that a nationwide “cradle-to-grave waste tracking program” be instituted by PADEP and other federal and state oil and gas regulatory agencies to provide detailed information on where waste ends up. One commenter recommended an alternative tracking program that would identify trucks, barges, and possibly other vehicles with

placards, indicating that they are transporting wastewater from high volume hydraulic fracturing and HVHF-related activities.

- A commenter averred that under the proposed regulations, Basin state policies governing reuse of wastewater from high volume hydraulic fracturing and HVHF-related activities would govern how reuse occurs because many beneficial reuses do not involve discharge to water or land.
- A commenter opined that the DRBC cannot rely on PADEP to protect the Basin from exposure to radioactive materials in wastewater from high volume hydraulic fracturing and HVHF-related activities because PADEP permits road spreading, land application, and the disposal of hydraulic fracturing wastewater to surface waters; and in addition, Pennsylvania does not require sampling and does not impose limitations on the amount of radioactive material in landfill leachate discharged by landfills that accept HVHF wastewater.
- A commenter said that if hydraulic fracturing were permitted in the Pennsylvania portion of the Basin, the DRBC would find it difficult to coordinate with PADEP's Office of Oil and Gas Management due to PADEP staffing and funding issues.

RESPONSE (R-55)

The proposed and final rules are grounded in the authority conferred on DRBC by its organic statute, the Delaware River Basin Compact. The Commission recognizes the concurrent authorities and oversight of its member states and the United States, and appreciates the protection to water resources and the environment afforded by such authorities and each member's continued commitment to coordinated management of the Basin's water resources with and through the DRBC. The Commission will continue to coordinate with its members to address risks and impacts to the water resources of the Basin. Any comments regarding specific member state and federal authorities and regulations not specifically related to the present rulemaking should be directed to the appropriate member agencies as well.

Comments relating to risks from transportation of HVHF wastewater discharge of HVHF wastewater, and to importation of HVHF wastewater, are addressed elsewhere in this Comment and Response Document. Comments regarding the hypothetical coordination with PADEP if HVHF or the discharge of HVHF wastewater were allowed in the Basin are rendered moot by the prohibition on HVHF activities in hydrocarbon-bearing rock formations adopted by the Commission in February, 2021 and the prohibition of the discharge of HVHF wastewater to waters or land within the Basin adopted in this rulemaking.

STATEMENT OF CONCERN (SC-56)

The American Petroleum Institute stated that the proposed regulations are "unnecessary and, in many ways, duplicative and/or conflicting with Pennsylvania Department of Environmental Protection[] oil and natural gas regulations."

RESPONSE (R-56)

The American Petroleum Institute’s comment echoes a comment it made on the Commission’s proposed rule prohibiting high volume hydraulic fracturing within the Basin, which was finalized in February 2021. About that earlier proposal, API said the regulations were “unnecessary and, in many ways, duplicative and/or conflicting with Pennsylvania Department of Environmental Protection[] oil and natural gas regulations.” Based on an extensive scientific and technical analysis, the Commission, at the time, concluded that in light of the Basin’s specific setting and circumstances, applicable regulations of the PADEP would not be adequate to protect the water resources of the Basin from the impacts of HVHF and related activities. DRBC Resolution No. 2021-01 and the February 2021 CRD lay out in detail the scientific and policy bases for the Commission’s decision to prohibit HVHF in the Basin. The Commission’s Response R-2, in Section 2.1.2 (page 30) of the February 2021 CRD, discusses the relationship between the Commission’s final rule and the rules of its member state and federal agencies.

Response R-2 of the February 2021 CRD is equally applicable here. Based upon its technical and scientific evaluation, the Commission has similarly determined that controlling future pollution by prohibiting discharges of wastewater from hydraulic fracturing and HVHF-related activities is necessary to 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, which are limited in quantity and capacity to assimilate pollutants, for uses in accordance with the Comprehensive Plan.

5.3 Climate Change

STATEMENT OF CONCERN (SC-57)

Several organizations raised concern about the potential for additional fossil fuel development using hydraulic fracturing, and the impact of the proposed rules on continued fossil fuel use and climate change. Their comments included both short statements and detailed reference-driven information. Representative comments are paraphrased as follows:

- Providing a dumping ground for the hydraulic fracturing industry for their toxic waste and giving them water from the Delaware River Basin will induce more hydraulic fracturing and more of the greenhouse gas emissions that drive the climate catastrophe.
- DRBC is exacerbating climate change with the proposed regulations because they give the industry the two things it needs—more water for hydraulic fracturing and more places to dump its waste.
- LNG (methane gas) has 86 times more greenhouse gas potency than CO₂. The planet is going to continue to warm unless we substantially cut methane emissions.
- Climate change will have impacts on the water cycle, including from sea level rise, water shortages, water quality impairment, reductions in snowpack, and increased flooding, that will impact people and communities throughout the Delaware River Basin.
- The only method of mitigating the grave threats to public health and the climate is a complete and comprehensive prohibition on hydraulic fracturing.

RESPONSE (R-57)

The Commission appreciates the comments related to climate change generally and acknowledges the potential for impacts to the water resources of the Delaware River Basin in particular. Most comments on this issue highlighted natural gas as a regional and national energy source, and the role of natural gas, a principal component of which is methane, in contributing to global warming. While the Commissioners and DRBC staff share the commenters' concerns about climate change and its impacts on the water cycle, as discussed in this CRD, the Commission does not agree that the proposed rule supports the development of additional high volume hydraulic fracturing, or that it is the Commission's goal to discourage HVHF activities outside the Basin absent a showing that limiting such activities is required for the effectuation of the Comprehensive Plan or otherwise authorized by the Compact.

The DRBC is actively evaluating the impacts of climate change on the Basin's water resources and the resource management strategies that must be considered in response. Temporal, spatial and quantitative changes in precipitation, evapotranspiration and snowpack, and corollary effects on drought, flooding, and streamflow Basin-wide, as well as saltwater excursion in the Delaware River Estuary are among the observed and anticipated shifts as the result of a warming climate. DRBC is also examining sea level rise and its related effects. To assess impacts on the Basin's water resources and the management approaches available to address these effects, Commission staff are using regional climate projections and models based upon the representative concentration pathways for the cumulative measurement of human emissions of greenhouse gases ("GHG") from all sources, adopted by the 2013 Intergovernmental Panel on Climate Change ("IPCC").

In 2019 the Commission established an Advisory Committee on Climate Change ("ACCC"). The Commission along with DRBC staff and with input from the ACCC and the public, will continue to examine policy, regulation, science, and planning directions as needed to adapt to water resource related climate impacts. In accordance with the authority conferred on the Commission by the Compact, the February 2021 regulations that prohibited HVHF in the Delaware River Basin and these rules prohibiting the discharge of HVHF wastewater into the Basin will be incorporated in and will effectuate the Comprehensive Plan for the planning, development, conservation, utilization, management, and control of the water resources of the Basin to meet present and future needs.

STATEMENT OF CONCERN (SC-58)

Comments submitted by the American Petroleum Institute (API) concerning climate are paraphrased below:

- The oil and natural gas industry is focused on achieving economy-wide emissions reductions, while maintaining America's global energy leadership and providing affordable, reliable energy to the American people.
- API's climate action framework represents industry's commitment to produce cleaner energy and lower greenhouse gas emissions consistent with the goals of the Paris Agreement by: accelerating technology and innovation to reduce emissions; mitigating emissions from operations (including direct regulation of methane) to accelerate environmental progress; endorsing a Carbon Price Policy at the federal level, to drive market-based solutions;

advancing cleaner fuels to provide lower-carbon choices; and driving climate reporting to provide consistency and transparency.

- Environmental justice is supported by balancing economic benefits that have helped fuel growth and prosperity, and common-sense regulations to manage potential environmental and health related risks.

RESPONSE (R-58)

The Commission agrees with the consensus among scientists that climate change is influenced by anthropogenic forces¹²⁴ through the combustion of fossil fuels and the emission of greenhouse gases that are associated with the energy sector and other sources. Although the Commission recognizes the importance of energy policy, including industry contributions to mitigate climate impacts, the Commission does not set energy policy for the nation, the region, or our member states. In accordance with the authority conferred on the Commission by the Compact, any proposed rules related to high volume hydraulic fracturing and related activities are limited to addressing the planning, development, conservation, utilization, management, and control of the water resources of the Basin to meet present and future needs.

5.4 Fossil Fuels

STATEMENT OF CONCERN (SC-59)

Several comments were provided about renewable energy and fossil fuels that can be paraphrased as follows:

- Fossil fuels should be left in the ground.
- Fossil fuels should be eliminated.
- Investment in and support for renewable energy sources (wind, solar, others) should be accelerated.
- Clean energy should be the goal to keep air and water clean, to create jobs in the energy sector and to create energy independence.

Some of the commenters suggested that the proposed rules support additional hydraulic fracturing and fossil fuel development.

RESPONSE (R-59)

As discussed in this CRD, the Commission does not agree that the proposed rule supports additional high volume hydraulic fracturing. Although the Commission recognizes the importance of energy

¹²⁴ Hegerl, G.C., et al., Climate Change 2007: The Physical Science Basis, Chapter 9: Understanding and Attributing Climate Change (Jun. 2007), accessed at: <https://www.ipcc.ch/site/assets/uploads/2018/02/ar4-wg1-chapter9-1.pdf>.

conservation and renewable energy sources to any long-term national, regional, or state energy policy, the Commission does not set energy policy for the nation, the region, or our member states. In accordance with the authority conferred on the Commission by the Compact, any proposed rules related to high volume hydraulic fracturing and related activities are limited to addressing the planning, development, conservation, utilization, management, and control of the water resources of the Basin to meet present and future needs.

5.5 Oil and Gas Industry

STATEMENT OF CONCERN (SC-60)

Several individuals and organizations submitted negative comments and accusations about the oil and gas industry and stated or implied that the rules would favor the industry's hydraulic fracturing needs.

RESPONSE (R-60)

As stated in this CRD, the Commission does not agree that these rules favor industry or its needs for hydraulic fracturing. The risks and potential impacts of HVHF on the water resources of the Delaware River Basin have been comprehensively addressed in the February 2021 CRD and this document. The commenters' statements about the oil and gas industry do not address the Commission's proposed rules, and the Commission has no response to them.

STATEMENT OF CONCERN (SC-61)

The American Petroleum Institute (API) commented that many statements about the oil and natural gas industry's behavior and operations made by participants in the Commission's public hearings on the rulemaking were "either grossly exaggerated or flat-out incorrect." API wished to "correct the record." The API's comment included a brief history of the Resource Conservation and Recovery Act ("RCRA"), its amendment process, and recent decisions of the U.S. Environmental Protection Agency on the current state of exploration and production ("E&P") waste management. The information provided on RCRA did not reference the DRBC rulemaking.

RESPONSE (R-61)

The Commission acknowledges the responsible regulatory oversight by its member states and the federal government and appreciates each member's continued commitment to coordinated oversight of the Basin's water resources. Responses to other comments regarding the federal government and Basin member states' regulatory oversight are presented in Section 5.2. Coordination with Other Regulators. This rulemaking is based on the scientific and technical review and evaluation performed by Commission staff and not on statements by members of the public disputed by industry where the accuracy of the statements could not be verified.

5.6 Economic Impacts

STATEMENT OF CONCERN (SC-62)

Several individuals and organizations suggested that the rules will promote additional hydraulic fracturing activities and thereby cause significant economic harm to the region because of fossil fuel induced climate change.

RESPONSE (R-62)

The creation of opportunities for hydraulic fracturing outside the Basin is not an objective of the proposed or final rules and is not an expected outcome of these rules. As the responses in this CRD emphasize, the Commission's focus is to conserve and protect the Basin's water resources. To advance these purposes, the proposed and final rule limits the importation into and exportation from the Basin of water, including wastewater. As discussed in Section 5.3 above, the Commissioners and Commission staff share concerns expressed by many commenters about climate change and its impact upon the hydrologic cycle and the region's economy. For a discussion of the ways in which the Commission is addressing those concerns, please see Response R-57 above.

STATEMENT OF CONCERN (SC-63)

Referencing a 2011 study by the University of Delaware,¹²⁵ several commenters suggested that the impact of the proposed rules would result in harm to the economic value of the water resources of the Basin.

RESPONSE (R-63)

In the view of the Commission, the economy of the region and the quality of life available to its residents depends upon the availability of abundant water of suitable quality to support human activities and a diverse ecosystem. By adopting regulations in February, 2021 prohibiting HVHF in the Basin and by prohibiting the discharge of HVHF wastewater by the current rulemaking, the Commission has provided substantial protection for the water resources of the Basin from injury related to high volume hydraulic fracturing.

Please see Sections 2, 3 and 4 above for discussion of how the final rule addresses particular risks and impacts to water resources posed by or resulting from HVHF. Based on data and information described in Section 4.2.1.5 Transport, Leaks, and Spills, Response R-25, the Commission has concluded that the risks of impacts to water resources are significantly lower in areas where HVHF is prohibited than in areas of active HVHF shale-gas development. As such, the proposed and final rule will do much to prevent adverse impacts to the economic value of the Basin's water resources and to the region's economy.

¹²⁵ Kauffman, G.J., Socioeconomic Value of the Delaware River Basin in Delaware, New Jersey, New York, and Pennsylvania, University of Delaware (Oct. 11, 2011), 26, accessed at: <https://www.nj.gov/drbc/library/documents/SocioeconomicValueDRB-UDEL-FinalRpt.pdf>.

A more detailed review of the University of Delaware study assumptions is provided in the February 2021 CRD at Section 2.6.6 (beginning on page 294).

STATEMENT OF CONCERN (SC-64)

The API stated that DRBC has a responsibility to consider economics in its decision making and that the hydraulic fracturing industry drives employment, opportunity, and economic growth. It provided a link to its July 2021 analysis of the impact of the oil and natural gas industry on the U.S. economy. One commenter asserted that the fossil fuel industry has provided billions of people with a higher standard of living around the world.

RESPONSE (R-64)

The Commissioners received numerous comments concerning economic impacts and have considered those comments. In addition to the responses noted in this section, Section 2.6.6 of the February 2021 CRD fully considers and addresses the economic issues raised by API and others. API's July 2021 analysis, which does not take into consideration the costs attributable to the industry's impacts on water resources, other water-dependent industries, or human health, does not alter the Commission's 2021 analysis. Because HVHF has proceeded outside the Basin without any significant discharge of HVHF wastewater to the land or waters of the Basin, DRBC does not anticipate that the prohibition on discharge of HVHF wastewater that is the subject of this rulemaking will have a major economic impact.

5.7 Susquehanna River Basin

STATEMENT OF CONCERN (SC-65)

One commenter suggested that the Susquehanna River Basin and the Susquehanna River have been destroyed by the hydraulic fracturing industry and that no additional water withdrawals should be allowed.

RESPONSE (R-65)

The DRBC has no authority to regulate activity in the Susquehanna River Basin or in other regions outside the Delaware River Basin except where "such action may be necessary or convenient to effectuate its powers or duties within the Basin. . . and only upon the consent of the state in which it proposes to act." Compact, § 2.7. The Commenter has not suggested, and the Commission has not found, that these conditions for exercising the Commission's power outside the Basin are satisfied.

STATEMENT OF CONCERN (SC-66)

Commenters suggested that the industry is "pushing" DRBC to accept hydraulic fracturing waste because, the commenters aver, the industry has run out of space for storage and disposal in the

Susquehanna River Basin, and the Delaware River Basin is a proximate and “especially attractive” location.

RESPONSE (R-66)

As suggested in the comments and as noted in the February 2021 CRD (page 129), the average volume of fluid used per hydraulic fracturing event has increased significantly to accommodate the expanding depth and length of directional drilling. Over time, industry has extended the horizontal lateral portion of unconventional natural gas wells further through the targeted shale formation and has deepened wells to reach the Utica Shale formation. As a result, the quantity of flowback and produced water returned to the surface overall (not simply per well) is expected to increase in Pennsylvania. However, as also noted in the February 2021 CRD, about 87-90 percent of produced water from HVHF was recycled and reused. Yoxtheimer (2014) reported an 87 percent recycle rate and a 10 percent disposal rate at regulated underground injection wells. While HVHF wastewater volumes may increase in the Susquehanna River Basin, part of the increase is expected to be mitigated by continued use of industry recycling efforts.

Because the Commission has prohibited HVHF within the Delaware River Basin and is also prohibiting the discharge of treated or untreated HVHF wastewater within the Basin, the Basin is not an “especially attractive” location for storage and disposal of hydraulic fracturing waste. As described in R-25 above, the frequency of transportation of HVHF wastewater is lower in areas where HVHF is not conducted. The Commission anticipates that only low volumes of HVHF wastewater will be transported to or through the Basin, or stored, processed, or recycled within the Basin.

The assertion that the industry has “pushed” the DRBC to accept wastewater from HVHF in the Basin is unsupported by any evidence. Industry’s comments on this rulemaking and the Commission’s rulemaking completed in February 2021 indicate no such purpose. Nor has the Commission received any communications from industry representatives that suggest it. The Commission is unaware of HVHF wastewater storage in the Basin to date, notwithstanding that there has never been a moratorium on the importation of HVHF wastewater into the Basin. The Commissioners’ May 5, 2010 Resolution for the Minutes (sometimes referred to as a “*de facto* moratorium” on in-Basin HVHF activity) was silent concerning importations of HVHF wastewater. With the exception of some early inquiries by industry or by Basin wastewater treatment facility operators regarding the possibility of treating and discharging HVHF wastewater at the outset of the HVHF boom (none of which resulted in a DRBC approval), the Commission has received no further inquiries about the importation of HVHF wastewater for use, treatment or discharge, activities that under the current DRBC regulations at Section 2.30.1 of the Water Code and Section 2.3.5(a)(18) (18 C.F.R. 401.35(a)(18)) of the Rules of Practice and Procedure require Commission approval.

STATEMENT OF CONCERN (SC-67)

The Marcellus Shale Coalition (MSC) commented that “while the DRBC Commissioners advance priorities of environmental extremists, a decade of evidence from the Susquehanna River Basin demonstrates that safe, responsible natural gas development has no detrimental effect on water quality or quantity.”

RESPONSE (R-67)

The Commission disagrees. Commission [Resolution No. 2021-01](#), adopting the Commission's prohibition on HVHF within the Basin, sets forth the Commission's findings, based on "more than a decade of experience with high volume hydraulic fracturing outside the Delaware River Basin," that "despite the dissemination of industry best practices and government regulation, high volume hydraulic fracturing and related activities have adversely impacted surface water and groundwater resources, including sources of drinking water, and have harmed aquatic life in some regions where these activities have been performed." The scientific and technical data and information on which the Commission relied are described at length in the February 2021 CRD. Those data and information document impacts on water resources in the Susquehanna River Basin and in other regions in which HVHF is performed.

The Marcellus Shale Coalition and others often point to studies published by the SRBC to claim that natural gas development has had no impact on water quality. The February 2021 CRD (starting at page 268) contains an extensive analysis that refutes this claim. The conclusions of that analysis include that:

- The SRBC data do not include adequate indicator parameters related to the impacts from high volume hydraulic fracturing.
- The SRBC data do not comprehensively, conclusively, or definitively address the question of long-term impacts to water resources.
- The SRBC has recognized its study limitations and the need for more work. One of the SRBC reports most cited by the MSC and others, states, "Water quality trends will be re-examined when there are 10 years of continuous data at each station. The extended timeframe will allow for more robust analysis of the data, and also allow additional supplemental data, such as discrete water chemistry samples, to be collected in each watershed."
- A 2016 report by the USGS and the Northeast Midwest Institute (USGS/NEMWI), entitled "Water data to answer urgent water policy questions: monitoring design, available data and filling data gaps for determining whether shale gas development activities contaminate surface water or groundwater in the Susquehanna River Basin," examined the SRBC's and other monitoring programs. Significant findings by the study team included that: "The existing surface water quality data in the Susquehanna River Basin are insufficient to detect water-quality change related to shale gas development. . . ." and "The publicly available groundwater quality data in the Susquehanna River Basin are not sufficient to detect whether shale gas development is contaminating groundwater, and the available data are not adequate to serve as the foundation of a new monitoring program."

5.8 Wild and Scenic Rivers

STATEMENT OF CONCERN (SC-68)

Concerns representative of those referencing the Wild and Scenic Rivers Act are paraphrased below:

- Congressionally designated wild and scenic rivers in the Delaware River Basin have ecological resources and water quality as key attributes of the river that must be “protected and enhanced.”
- The importation of toxic wastes conflicts with the DRBC’s role in the administration of the national Wild and Scenic Rivers Act by not eliminating or diminishing pollution risks to the river.
- The exportation of water from the Delaware River Basin conflicts with the national Wild and Scenic Rivers Act.
- Please protect the designated wild and scenic lands and rivers from hydraulic fracturing waste and hydraulic fracturing risk.
- The consumptive loss of exported water has economic impacts on the source watershed. Impacts can be on the community, habitat, ecosystem and to the Delaware Wild and Scenic River (including its aesthetic and recreational values). Impacts can be permanent or long-lived, impacting us today and future generations.
- Unlike most U.S. rivers, the Delaware, a Wild and Scenic River and a National Estuary recognized by Congress, is clean enough to support many of the most vulnerable shellfish and insect species, ones that require clean water, along with the fish, bird, and mammal species that depend on them.

RESPONSE (R-68)

In 1968, Congress passed the Wild and Scenic Rivers Act, which declared it:

to be the policy of the United States that certain selected rivers of the Nation, which with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free- flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations.

Between 1978 and 2006, portions of the Delaware River and some of its tributaries have been designated by the federal government as parts of the National Wild and Scenic Rivers System. During this time, between 1992 and 2008, the Commission designated most of the main stem river from the Upper Delaware River region to Trenton, New Jersey as “Outstanding Basin Waters” or “Significant Resource Waters” under its Special Protection Waters program. For additional information regarding the Delaware River Basin’s Wild and Scenic River designations and its relationship to the

Commission's regulations and Special Protection Waters program, *see* Section 2.3.4.2, *National Wild and Scenic Rivers Program* (R-73), of the February 2021 CRD.¹²⁶

Although the federal government administers the Wild and Scenic program, when Congress created the program in 1968, it envisioned a cooperative system that would rely on the combined efforts of state, local, and federal governments, along with individual citizens and non-governmental organizations. The system was intended to be flexible enough to provide a means for communities to protect their rivers in a way that is sensitive to the needs and concerns of the people who live, work, and recreate along the rivers.

DRBC is a federal-interstate compact agency, not a federal agency. The Commission's water quality programs—in particular, its Special Protection Waters program—protects the Delaware River's Wild and Scenic designations by protecting water quality, one of the natural resource values that served as a basis for these congressional Wild and Scenic designations.

Because the Commission has prohibited HVHF within the Delaware River Basin and is also prohibiting the discharge of treated or untreated HVHF wastewater within the Basin, it anticipates that only low volumes of HVHF wastewater will be transported to or through, or stored, processed, or recycled within the Basin. The data and information on which the Commission bases this understanding are set forth in Response R-26 in Section 4.2.1.5, above. The risk of HVHF wastewater releases within the Basin and the likelihood of impacts to the Basin's Wild and Scenic rivers resulting from such releases are in the Commission's view effectively reduced by the Commission's HVHF prohibitions.

The Commission's final rules on exportation of Basin waters limit exportations from the Basin to instances where the sponsor: 1) demonstrates that the exportation of Basin water is required to serve a straddled or adjacent public water system; 2) demonstrates that the exportation of Basin water is required to meet public health and safety needs on a temporary, short-term, or emergency basis; or 3) is proposing an exportation of wastewater to a straddled or adjacent public wastewater collection system. If the required demonstration is made, the Commission may approve an exportation only after it has evaluated a suite of factors designed to ensure no harm to the Basin's water resources or the health and safety of the Basin community. Additional discussion in Responses R-5, R-6, R-7, R-8 and R-10 in Section 3.2 above, of how the final rules protect Basin waters from the potential adverse impacts of withdrawals and exportations, is also relevant to protection of the Basin's Special Protection Waters.

¹²⁶ *See* February 2021 CRD at235–37.

5.9 Enforcement

STATEMENT OF CONCERN (SC-69)

Many commenters expressed concerns about whether the proposed regulations could be enforced and, even if so, whether enforcement would adequately protect the Basin's water resources from contamination by HVHF wastewater.

Representative paraphrased comments follow:

- The Commission does not have any enforcement capabilities and Pennsylvania has a bad record of enforcement on matters like oil and gas spills and leaks.
- Because storage of wastewater from high volume hydraulic fracturing and HVHF-related activities would not be prohibited by the proposed regulations and would be overseen by the Basin states, the DRBC would not be able to enforce its regulation if there were truck and pipe spills or leaks from storage containers.
- The lack of DRBC being able to enforce its regulations coupled with the chemicals in hydraulic fracturing waste known to cause persistent harm over long periods of time is particularly concerning.
- It is not clear from the proposed prohibition on the discharge of wastewater from high volume hydraulic fracturing and HVHF-related activities how that prohibition will be enforced.
- Allowing wastewater from high volume hydraulic fracturing and HVHF-related activities into the Basin increases the risks of leaks, spills, or other possible incidental or illicit discharges, for which there is no preventative enforcement.
- There is no clear mechanism to enforce the discharge prohibition. For example, a truck carrying wastewater from high volume hydraulic fracturing or HVHF-related activities could "drive onto a little-traveled road at night, pull over to a stream and drain the wastewater into it."
- Basin state enforcement of regulations regarding waste handling is unreliable.
- The federal and state agencies responsible for enforcement of environmental laws are underfunded and understaffed. Under these conditions, permissive regulations are ineffective due to inadequate enforcement, so a full prohibition on all hydraulic fracturing-related activities is necessary.

RESPONSE (R-69)

The final regulations at 18 C.F.R. 440.4 prohibit the discharge of HVHF wastewater to waters or land within the Basin. Given this full prohibition on discharges of HVHF wastewater, the need for compliance and enforcement measures to enforce the prohibition at wastewater treatment facilities should be minimal.

Because the Commission has prohibited HVHF within the Delaware River Basin and is also prohibiting the discharge of treated or untreated HVHF wastewater within the Basin, it anticipates that only low volumes of HVHF wastewater will be transported to or through, or stored, processed, or recycled within the Basin. The risks and impacts from spills to Basin waters from these activities are expected to be commensurately low. (The data and information on which the Commission bases this understanding are set forth in R-25 in Section 4.2.1.5, above.) If not contained, spills and leaks during transport, transfer, or storage of HVHF wastewater within the Basin would constitute prohibited discharges under the Commission’s final rule.

Illegal discharges of HVHF wastewater, like illegal discharges of other waste, may from time to time occur. Section 14.17 of the Compact and the Commission’s Rules of Practice and Procedure codified at 18 C.F.R. Part 401, Subpart G, provide the Commission with the ability to assess penalties for non-compliance. The Commission will work within its authority and in coordination with its member states, which have active and comprehensive compliance and enforcement programs, to ensure compliance and address any violations of its new rules.

For related discussion, also see Section 4.2.1.5 above concerning transport, leaks and spills, and Section 4.2.1.7 concerning waste storage and recycling.

5.10 Public Input Process

STATEMENT OF CONCERN (SC-70)

Berks Gas Truth, Catskill Mountainkeeper, Clean Air Council, Clean Water Action, DCS, DRN, Food & Water Watch, NRDC, and others submitted comments and requests seeking additional and more inclusive opportunities for public input and to provide a “a fair, equitable, and easy-to-access public input process.” These included requests for DRBC to:

- extend the public comment period from 90 days to 180 days.
- provide 4 to 6 days of hearings in addition to the original four hearings scheduled in 2021, in part to accommodate people too busy in December 2021 due to holidays, travel, family commitments, college finals, and COVID stress, to attend the four December 2021 virtual hearings.
- make the hearings hybrid (both virtual and in-person) and conduct them throughout the watershed.
- provide opportunities for verbal testimony that would not require a computer.
- provide more avenues for submitting written comments, beyond the web form, including: e-mail, fax, U.S. mail, and hand delivery.
- provide the rules and supporting information to the public in Spanish.

RESPONSE (R-70)

Originally, four hearings were scheduled on the proposed rule, and all four were conducted virtually in December 2021. In response to public feedback, in January 2022, the Commission invited individuals and organizations throughout the Basin to attend an additional public hearing on February 3, 2022. The following additional measures were implemented to expand opportunities for public participation in the Commission's rulemaking process:

- The public hearing on February 3, 2022, included enhanced language access, consisting of real-time English-to-Spanish and Spanish-to-English professional translation, on a pilot basis. Attendees could choose to participate in the virtual hearing in either English or Spanish.
- The February 3, 2022, public hearing was also held virtually; however, individuals who may not have had access to a computer or the internet could join the virtual hearing by phone using a new toll-free number.
- The DRBC upgraded its website to provide an interactive language translation widget that can translate web-based formatted text on any of DRBC's web pages from English to over 100 different languages.
- The DRBC posted certified translated copies of the draft rules and rulemaking notice in Spanish on its website and established a process for requesting certified translation of documents related to the rulemaking into additional languages.

On November 16, 2021, the DRBC announced an extension through February 28, 2022 of the original January 28, 2022 deadline for the submission of written public comment. As a result, the comment period on the proposed regulations ran for a total of 124 days.

While the commenters suggested that the demand for hearings was significant and that 4 to 6 more hearings should be added, actual demand did not appear to support this request. Only 73 speakers provided comments over the 5 scheduled hearings—about 15 speakers per hearing on average. Sixty-three (63) individuals who registered to speak at the hearings did not show up. There was ample opportunity to speak at each hearing and no apparent demand for 4 to 6 more hearings on this matter. In addition, the request that the additional hearing be in-person or both in-person and virtual, was not advisable during the pandemic, and the virtual hearing format (which included a toll-free phone-in option) provided significantly more inclusive opportunity for comment than an in-person hearing requiring attendees to travel.

The Commission did not change the requested on-line intake system to allow e-mail, fax, U.S. mail, and hand delivery. Internet access is near-universal and the on-line intake system was convenient, easy to use, and allowed commenters to easily submit supporting attachments as needed. The on-line system has been used successfully by the Commission for several years for comment intake on rulemakings and project reviews. It is recognized that not everyone has access to the internet, and as discussed in R-73 below, the Commission established a simple process for individuals to request and receive an exception to use of the online system. No exceptions were requested during the process.

STATEMENT OF CONCERN (SC-71)

The commenters identified in SC-70 also objected to the DRBC requiring prior approval to receive an exception from use of the web-based comment collection system. These commenters suggested that the process was unduly cumbersome and posed an unfair roadblock to the submission of written comments.

RESPONSE (R-71)

The DRBC clarified during the comment period that requests for exceptions from use of the web-based comment system could be submitted simultaneously with comments—eliminating the apparent need for two steps. The request explaining why the commenter was unable to use the web-based system, together with the accompanying comment, were to be sent to the Commission Secretary, DRBC, P.O. Box 7360, West Trenton, NJ 08628. The DRBC also committed to accommodating all reasonable exception requests. The Commission received no requests for exceptions.

STATEMENT OF CONCERN (SC-72)

The commenters identified in SC-70 also stated that DRBC did not perform enough outreach to inform hard-to-reach communities of the proposed regulations and that “the job of notifying people is typically left to advocacy groups who are currently challenged to do the kind of in-person organizing they have not been able to do during the pandemic.”

RESPONSE (R-72)

While the DRBC and interested parties routinely use social media and other on-line communications to share notices about rulemakings and public hearings, for the February 3, 2022 hearing the DRBC conducted additional community outreach. Through contacts with NGOs, social service groups, local media, and local, state and federal legislative offices, DRBC staff researched, identified and informed harder-to-reach communities with significant Spanish-language speakers in each Basin state, as well as rural communities in the upper Basin.

STATEMENT OF CONCERN (SC-73)

After attending the hearings in December 2021, some commenters complained that:

- They and others found the instructions for registering to speak at the virtual hearings confusing and had a difficult time registering, and that “some frustrated registrants were not able to testify due to these insufficient instructions.” One stated, “It is unfair to assume that everyone joining the hearing is familiar with zoom, evite, or other internet platforms or that people have unfettered access to a computer, smart phone, or other device needed to join the hearing session.”
- The public should have been notified prior to the last two sessions that they might have an opportunity to speak at these hearings if time permitted, even if they had not registered.

- The time clock was too controlling.
- The atmosphere was “closed” and “controlled.”
- There was no camera access and no view of who else was attending the hearings.
- There was no chat feature.
- There was only one “call-out” for speakers and if they were not ready, they missed their turn.

RESPONSE (R-73)

In any public comment process, some participants may become confused by the instructions for the hearings. However, the DRBC’s instructions were reasonably clear, and interested parties from diverse communities were able to navigate them to a successful result. In addition, commenters had alternatives to participating in the public hearings via the Zoom platform. First, speakers could have dialed in to the public hearings by phone, avoiding the need to use the Zoom platform if they were unfamiliar or uncomfortable with it or did not have access to the internet. Second, the Commission provided a 124-day period for written comment and made clear that written comments and oral comments receive equal consideration. To increase participation opportunities, the Commission provided a toll-free number for the February 2022 hearing.

In an effort to expand opportunities for input, the hearing officer made certain day-of decisions to allow unregistered individuals to provide comment at a hearing based upon the number of preregistered commenters for the hearing, the remaining time available, and the availability of additional hearings. The expanded opportunity was not provided on the first day of hearings because ample capacity to speak on the second day of hearings remained available. The hearing officer explained the procedure for the expanded opportunity to hearing attendees on the occasions when the opportunity was offered. The Commission did not rescind any commenter’s opportunity to comment. DRBC disputes that preregistered commenters were called only once, causing them to miss their turn. The hearing transcripts show that the hearing officer routinely called preregistered speakers at least one additional time if they did not respond when first called. As noted previously, in many instances, individuals who registered to provide comment did not attend the hearing. The record shows that the Commission provided reasonable notice of the hearing opportunities and that its efforts to communicate its procedures both in advance of and during each hearing went well beyond the required written notices.

In response to complaints about the “controlling nature of the hearing” and “no access to chat,” the Commission reminds commenters that the purpose of holding public hearings on actions under consideration by the Commission is to obtain public input that will inform the Commissioners’ decision. The Commission recognizes that virtual formats do not afford the same opportunities for interest-based groups to organize or demonstrate as in-person proceedings do. However, ample opportunity for such activities is available in forums the participants create. As the Commission has experienced, the use of chat features and camera access during virtual proceedings creates opportunities for disruption, including “Zoom-bombing.” For this rulemaking, the participants were asked to follow reasonable rules to ensure orderly provision of comment on the proposed regulations, the hearings’ intended purpose.

STATEMENT OF CONCERN (SC-74)

One commenter stated: “I would like to thank you for the opportunity to speak and for the efforts you made to provide Spanish language interpretation for this [February 2022] hearing. Might I suggest that as you refine this process, it would make sense to offer instructions on how to access Spanish translation in Spanish rather than English.”

RESPONSE (R-74)

The Commission thanks the commenter for this feedback. We note that the translation widget added to the Commission’s website made possible the translation of the posted instructions into any one of over 100 languages, including Spanish. However, we are working continually to improve our communications and outreach, especially as we employ new technologies. We will be mindful of this issue in the future.

5.11 Pennsylvania Constitution

STATEMENT OF CONCERN (SC-75)

Several commenters expressed concerns about the consistency of the proposed regulations with the Environmental Rights Amendment to the Pennsylvania Constitution. A number asserted that the the Commission’s proposed regulation would violate the rights guaranteed by the Environmental Rights Amendment. A statement submitted by multiple commenters reads:

In Pennsylvania, residents are guaranteed the right to clean air and pure water by Article 1, Section 27 [of the Pennsylvania Constitution (the Environmental Rights Amendment)]. The DRBC, as a trustee of these resources, has an obligation to uphold these rights and protections.

RESPONSE (R-75)

Article I, § 27 of the Pennsylvania Constitution (the “Environmental Rights Amendment”) recognizes and protects Pennsylvania citizens’ “right to clean air, pure water and to the preservation of the natural, scenic, historical and esthetic values of the environment.” The Pennsylvania Supreme Court has affirmed this right. *See, e.g., Pennsylvania Env’tl Def. Fund v. Commonwealth*, 161 A. 3d 911 (Pa. 2017); *Robinson Twp. v. Commonwealth*, 83 A. 3d 901 (Pa. 2013); *Yaw et al. v. Del. River Basin Comm’n*, Case No. 21-2315 (3d Cir. 2022).

Although the Environmental Rights Amendment and the Compact have overlapping goals, as a federal-interstate compact agency, the Commission is not bound by, nor is it empowered to carry out, state constitutional provisions. While the Commission believes its regulations are consistent with the Environmental Rights Amendment, the Commission has acted pursuant to the authority granted by the Compact, not pursuant to the Pennsylvania Constitution. The Pennsylvania Commissioner has concluded that the Commission’s regulations, together with applicable Pennsylvania and federal laws, are consistent with and ensure the protections provided in the Pennsylvania Constitution. The

Pennsylvania Commissioner votes in a manner consistent with the Commissioner’s obligations under Article 1, Section 27.

5.12 Other Miscellaneous Comments

STATEMENT OF CONCERN (SC-76)

One commenter was critical of the proposed rule for being too lax regarding allowable importations of water, even when the imported water is not derived from HVHF or HVHF-related activities, suggesting that only natural precipitation runoff should be allowed to enter the Basin due to the potential adverse impacts of contaminated wastewater.

RESPONSE (R-76)

The Commission’s Comprehensive Plan and Water Code have long recognized that, “the Basin waters have limited assimilative capacity and limited capacity to accept conservative substances without significant impacts.”

Since 1991, the Comprehensive Plan and the Water Code have provided that “it . . . 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.” Water Code § 2.30.2 (prior to amendment by the final rule).

The final rule, at Section 2.30.2 D, expands on this provision. It includes in part a requirement that any “proposed new importation of water or wastewater, including any proposed increase in the rate or volume of an existing importation, shall be reviewed by the Commission consistent with the factors set forth at Section 2.30.3 below.” Those factors include, among others, the effects of the proposed importation on aquatic ecosystems, water quality and waste assimilative capacity in the receiving streams (§§ 2.30.3 B.3.d. and B.3.e.), and the effect of the importation on the health and safety of the Basin community (§ 2.30.3 B.1). They further require the Commission to consider “alternatives that avoid an importation of water.” § 2.30.3 B.3. (intro par.). Accordingly, the final rule ensures that proposed importations will be carefully evaluated to ensure they do not adversely affect the Basin’s water resources or the health and safety of Basin water users.

The proposed restriction on importations would be impracticable. Because water and wastewater service areas often straddle basin boundaries, it is not uncommon for wastewater generated in one basin to be disposed of in another, and imports and exports of wastewater occur routinely around the Basin boundary. The final rule protects these existing transfers. It allows for new and expanded transfers only after careful evaluation and the imposition of protective conditions, if and as needed.

STATEMENT OF CONCERN (SC-77)

A commenter stated that the proposed regulations “would gut the earlier ban and make it completely ineffective.”

RESPONSE (R-77)

The Commission rejects this assertion. The final regulations will not render the Commission’s 2021 prohibition on high volume hydraulic fracturing within the Basin ineffective. Rather, the amendments to DRBC’s regulations on importation and exportation and the prohibition on discharges of HVHF wastewater provide additional protection from potential injury to the waters of the Basin that might otherwise result from high volume hydraulic fracturing and HVHF-related activities, complementing the HVHF prohibition.

STATEMENT OF CONCERN (SC-78)

A commenter stated that the damage to human health caused by the burning of fossil fuels incommensurately impacts those living in poverty, who are disproportionately people of color. The Environmental Justice Center of Chestnut Hill United Church commented that “health costs” related to fossil fuels “are incommensurately borne by those living in poverty.” The Environmental Justice Center urged the Commission to expand its regulations to not enable “fracking or any actions that support fracking, such as discharge or importation of wastewater in or beyond the Basin.”

RESPONSE (R-78)

As described in the February 2021 CRD, the Commission recognizes the environmental injustices that can be caused by high volume hydraulic fracturing.¹²⁷ The Commission believes its prohibition on HVHF within the Basin, finalized in 2021, and the final regulations prohibiting discharges of HVHF wastewater to waters or land within the Basin will assist in reducing pollution and contamination that could otherwise disproportionately affect disadvantaged communities. As discussed in Section 2 above, and in R-65 above, the Commission does not have authority to regulate activities beyond the Basin boundary. *See Compact*, § 2.7. With respect to the development of fossil fuels generally, please see R-59 above. Also see R-62 above concerning climate change.

STATEMENT OF CONCERN (SC-79)

Many commenters requested that the Commission keep the Basin free from pollutants, high volume hydraulic fracturing-related or otherwise, without expressing whether they support or are critical of the proposed regulations.

The Commission received numerous comments that did not explicitly support, oppose, or suggest changes to the proposed regulations, but generally asked the Commission to protect the Basin. For example, commenters offered the following, among other similar submissions:

- “We need your support to protect the Delaware River from the effects of fracking discharges.”
- Please keep the Delaware Water Basin pure. Keep it free from any and all pollutants. Take responsibility for the health of this planet.”

¹²⁷ DRBC, February 2021 CRD, R-94, pp. 296–97.

- “Please keep the water pure and wild.”
- “Water is too important to life to mess up—let’s keep the water pollution-free!”
- “Our waters are important we must protect our water and river now.”
- “Protect water from fracking. Water is life.”

RESPONSE (R-79)

- The Commission received numerous comments including those listed in SC-79 that did not explicitly state whether the commenter was supportive of, or opposed to, the proposed regulations, but generally asked the Commission to protect the Basin.

The Commission appreciates the passion exhibited by the commenters regarding this rulemaking and the Commission’s work.

STATEMENT OF CONCERN (SC-80)

Several individuals provided general comments that suggested that hydraulic fracturing be prohibited in the Delaware River Basin. Others suggested that hydraulic fracturing be prohibited everywhere and stopped in places where it is currently permitted. A representative sample of these comments is provided below.

- “Please ban any fracking in NY/NJ/PA.”
- “Fracking must end.”
- “Categorically ban fracking in the Delaware River Watershed.”
- “Banning all fracking would be the safe and prudent thing to do.”
- “Please do not allow High Volume Hydraulic Fracturing anywhere near the Delaware River Basin.”
- “Stop fracking our area.”
- “I urge you without reservation to ban fracking in the Delaware river watershed.”
- “No fracking should ever be allowed in the Delaware River Basin or anywhere.”
- “Fracking must be banned everywhere.”

RESPONSE (R-80)

High volume hydraulic fracturing is already prohibited in the Delaware River Basin and is not a subject of this rulemaking. After an extensive rulemaking process, on February 25, 2021, the Commission found and determined that:

- HVHF poses significant, immediate and long-term risks to the development, conservation, utilization, management and preservation of the water resources of the Delaware River

Basin and to Special Protection Waters of the Basin, considered by the Commission to have exceptionally high scenic, recreational, ecological and/or water supply values.

- Controlling future pollution by prohibiting such activity 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.

The Commission has no authority to prohibit HVHF activity outside the Delaware River Basin.

STATEMENT OF CONCERN (SC-81)

One commenter made the following statement: “Quit funding Russia by buying natural gas from them when we have all the resources here [sic] on our own [sic] soil. I support exploration of our own resources so we can put this country back in control on a global platform.”

RESPONSE (R-81)

While the comment is not pertinent to this rulemaking, the Commission notes that according to the EIA, the last time the U.S. imported any hydrocarbon gas liquids into the United States from Russia was in October 2019 (about 7 thousand barrels). Prior to that the U.S. imported 247 and 246 thousand barrels from Russia in March 2014 and June 2015, respectively.¹²⁸ In 2021, the United States exported natural gas to 41 countries.¹²⁹ Beginning in March 2022, the U.S. banned the importation of Russian oil, liquefied natural gas, and coal to the United States.¹³⁰

STATEMENT OF CONCERN (SC-82)

DRBC received comments from several individuals on topics not related to the proposed rules, including statements concerning:

- a former U.S. President;
- the project to expand the Port of Wilmington;
- bills being considered by the Pennsylvania General Assembly;
- public school water inspection;
- the “Bentsen Amendment;”

¹²⁸ EIA, Petroleum & Other Liquids: U.S. Imports by County of Origin – Russia (July 5, 2022), accessed at: https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=M_EPL0_IM0_NUS-NRS_1&f=M.

¹²⁹ EIA, 2022a, *supra* note 12.

¹³⁰ United States White House Statements and Releases, Fact Sheet: United States Bans Imports of Russian Oil, Liquefied Natural Gas, and Coal (Mar. 8, 2022), accessed at: <https://www.whitehouse.gov/briefing-room/statements-releases/2022/03/08/fact-sheet-united-states-bans-imports-of-russian-oil-liquefied-natural-gas-and-coal/>.

- the Americans with Disabilities Act; and
- water bottlers.

RESPONSE (R-82)

As the Commission explained in its [Notice of Proposed Rulemaking](#): “Comments on matters not within the scope of the proposed rules may not be considered.” The Commission will not respond to submissions on the above topics, which are beyond the scope of the present rulemaking or unrelated to it.

REFERENCES

This “References” table includes only those sources cited in the Commission’s responses, not those referenced by commenters.

Aghababaei, M., Luek, J.L., Ziemkeiwicz, P.F., Mouser, P.J., (2021). Toxicity of hydraulic fracturing wastewater from black shale natural-gas wells influenced by well maturity and chemical additives. *Environmental Science: Processes and Impacts*. 4(2021).

<https://pubs.rsc.org/en/content/articlelanding/2021/em/d1em00023c/unauth>

Bain, D.J., Cantlay, T, Garman, B., and Stolz, J.F., (2021). Oil and gas wastewater as road treatment: radioactive material exposure implications at the residential lot and block scale. *Environ. Res. Commun.* (2021) 115008. <https://iopscience.iop.org/article/10.1088/2515-7620/ac35be>

Bonetti, P., Leuz, C., and Michelon, G. (2021). Large-sample evidence on the impact of unconventional oil and gas development on surface waters. *Science* 373, 896-902.

<https://www.science.org/doi/10.1126/science.aaz2185>

Burgos, W., Ph.D., Warner, N., Ph.D., Liu, X., Ph.D., Chase, E., Kearney, A., Farnan, J., Eck, A., Ismail, H., Ph.D. (2022). Evaluation of Environmental Impacts from Fust Suppressants Used on Gravel Roads. Presented to PADEP.

[https://files.dep.state.pa.us/OilGas/BOGM/BOGMPortalFiles/PADEP_Final_Brine_Report.p](https://files.dep.state.pa.us/OilGas/BOGM/BOGMPortalFiles/PADEP_Final_Brine_Report.pdf)

[df](https://files.dep.state.pa.us/OilGas/BOGM/BOGMPortalFiles/PADEP_Final_Brine_Report.pdf) CDC (Centers for Disease Control and Prevention). (2022). Per- and Polyfluorinated Substances (PFAS) Factsheet. https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Cozzarelli, I.M., Kent, D.B., Briggs, M., Benthem, A., Skalak, K.J., Mumford, A.C., Jaeschke, J., Farag, A., Lane, Jr., J.W., Akob, D.M. (2021). Geochemical and geophysical indicators of oil and gas wastewater can trace potential exposure pathways following releases to surface waters. *Science of the Total Environment* 755(2021).

<https://www.sciencedirect.com/science/article/pii/S0048969720364391>

Delaware River Basin Commission, 2021. Comment and Response Document: Proposed Amendments to the Administrative Manual and Special Regulations Regarding High Volume Hydraulic Fracturing Activities; Additional Clarifying Amendments. February 25, 2021.

https://www.state.nj.us/drbc/library/documents/CRD_HVHFrulemaking.pdf

Delaware River Basin Commission, 2022. Basin Information. Last modified: January 12, 2022.

<https://www.state.nj.us/drbc/basin/>

Hegerl, G.C., F. W. Zwiers, P. Braconnot, N.P. Gillett, Y. Luo, J.A. Marengo Orsini, N. Nicholls, J.E. Penner and P.A. Stott, 2007: Understanding and Attributing Climate Change. In: *Climate Change 2007: The Physical Science Basis*. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen,

- M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
<https://www.ipcc.ch/site/assets/uploads/2018/02/ar4-wg1-chapter9-1.pdf>
- Hill, L.L., Czolowski, E.D., DiGiulio, D., Shonkoff, S.B.C., (2019). Temporal and spatial trends of conventional and unconventional oil and gas waste management in Pennsylvania, 1991–2017. *Science of the Total Environment*, 674(2019) 623-636.
<https://doi.org/10.1016/j.scitotenv.2019.03.475>
- Lu, Y., Zhang, Y., Zhong, C., Martin, J.W., Alessi, D.S., Goslus, G.G., Ren, Y., and He, Y. (2021). Suspended solids-associated toxicity of hydraulic fracturing flowback and produced water on early life stages of zebrafish (*Danio rerio*). *Environmental Pollution* 287(15 October, 2021).
<https://doi.org/10.1016/j.envpol.2021.117614>
- Nagel, S.C., Kassotis, C.D., Vandenberg, L.N., Lawrence, B.P., Robert, J., and Balise, V.D., (2020). Developmental exposure to a mixture of unconventional oil and gas chemicals: A review of experimental effects on adult health, behavior, and disease. *Molecular Cell Endocrinology*, August 1, 2020. 2020. [doi:10.1016/j.mce.2020.110722](https://doi.org/10.1016/j.mce.2020.110722)
- NJDEP (New Jersey Department of Environmental Protection). Frequently Asked Questions (FAQ): PFAS in Drinking Water. (Accessed November 23, 2022.)
<https://www.nj.gov/dep/pfas/docs/faq-pfas-in-drinking-water.pdf>
- NJDOH (New Jersey Department of Health). (2022). Drinking Water Facts: Per- and Polyfluoroalkyl Substances (PFAS) in Drinking Water. Consumer, Environmental and Occupational Health Service-Environmental and Occupational Health Surveillance Program.
https://www.nj.gov/health/ceohs/documents/pfas_drinking%20water.pdf
- NYSDEC (New York State Department of Environmental Conservation). (2022). Spills database provided to DRBC on June 8, 2022.
- O’Dell, C.T., Boule, L.A., Robert, J., Georas, S.N., Eliseeva, S., and Lawrence, B.P. (2021). Exposure to a mixture of 23 chemicals associated with unconventional oil and gas operations alters immune response to challenge in adult mice. *J. of Immunotoxicology* 18(1), p. 105-117.
<https://doi.org/10.1080/1547691X.2021.1965677>
- PADEP, 2022. Spills databases provided to DRBC on April 28, 2022.
- PADEP. Bureau of Radiation Protection and Bureau of Waste Management. (2022). 250-3100-001. Guidance Document on Radioactivity Monitoring at Solid Waste Processing and Disposal Facilities.
<https://www.depgreenport.state.pa.us/elibrary/GetFolder?FolderID=365834>.
- Post, G.B., Gleason, J.A., and Cooper, K.R. (2017). Key scientific issues in developing drinking water guidelines for perfluoroalkyl acids: Contaminants of emerging concern. *PLOS Biology*, December 20, 2017, p. 1-12. <https://doi.org/10.1371/journal.pbio.2002855>

- Pribanic, J.B., 2019. Investigation: Clorox Selling Pool Salt Made from Fracking Wastewater, Public Herald (Feb. 11, 2019, updated May 29, 2020). <https://publicherald.org/clorox-selling-pool-salt-made-from-fracking-wastewater/>
- Quiroga, C., and Tsapakis, I. 2015. Oil and Gas Energy Developments and Changes in Crash Trends in Texas, Final Report. Texas A&M Transportation Institute, PRC 15-35 F. 88 p. <https://static.tti.tamu.edu/tti.tamu.edu/documents/PRC-15-35-F.pdf>
- State Impact Pennsylvania. (2014). National Public Radio, Study finds acid mine drainage reduces radioactivity in fracking wastewater (Jan. 3, 2014). <https://stateimpact.npr.org/pennsylvania/2014/01/13/study-finds-acid-mine-drainage-reduces-radioactivity-in-fracking-wastewater/>
- U.S. Energy Information Administration, 2022a. Natural gas explained: Natural gas imports and exports. Last updated May 12, 2022. <https://www.eia.gov/energyexplained/natural-gas/imports-and-exports.php>
- U.S. Energy Information Administration, 2022b. Petroleum & Other Liquids: U.S. Imports by County of Origin – Russia. July 5, 2022. https://www.eia.gov/dnav/pet/PET_MOVE_IMPCUS_D_NUS_NRS_MBBL_M.htm
- U.S. Energy Information Administration, 2022c. Today in Energy: As of 2021, China imports more liquefied natural gas than any other country. May 2, 2022. <https://www.eia.gov/todayinenergy/detail.php?id=52258#>
- U.S. Environmental Protection Agency, 2006a. Industrial Stormwater, Fact Sheet Series; Sector E: Glass, Clay, Cement, Concrete, and Gypsum Product Manufacturing (2006). https://www.epa.gov/sites/default/files/2015-10/documents/sector_e_glass.pdf
- U.S. Environmental Protection Agency, 2006b. National Emission Standards for Hazardous Air Pollutants for Industrial Process Cooling Towers. 71 Federal Register 17729 (Apr. 7, 2006). <https://www.govinfo.gov/content/pkg/FR-2006-04-07/pdf/06-3316.pdf>
- U.S. Environmental Protection Agency, 2016. Web Archive – Outdoor Air – Industry, Business, and Home: Industrial, Commercial, and Institutional (ICI) Boilers – Additional Information (Feb. 21, 2016). https://archive.epa.gov/airquality/community/web/html/boilers_addl_info.html
- U.S. Environmental Protection Agency, 2019. Management of Exploration, Development and Production Wastes: Factors Informing a Decision on the Need for Regulatory Action. April 2019. https://www.epa.gov/sites/default/files/2019-04/documents/management_of_exploration_development_and_production_wastes_4-23-19.pdf
- U.S. Geological Survey, 2019. Delaware River Basin Focus Area Study. February 28, 2019. <https://www.usgs.gov/mission-areas/water-resources/science/delaware-river-basin-focus-area->

[study#:~:text=The%20Delaware%20River%20Basin%20covers,is%20approximately%207.3%20million%20people](#)

U.S. White House Statements and Releases, 2022. Fact Sheet: United States Bans Imports of Russian Oil, Liquefied Natural Gas, and Coal. March 8, 2022. <https://www.whitehouse.gov/briefing-room/statements-releases/2022/03/08/fact-sheet-united-states-bans-imports-of-russian-oil-liquefied-natural-gas-and-coal/>

Vandenberg, L.N., (2021). Endocrine disrupting chemicals: strategies to protect present and future generations. *Expert Review of Endocrinology & Metabolism*, 16(3). <https://doi.org/10.1080/17446651.2021.1917991>

APPENDIX-1 RESOLUTION NO. 2022 – 04