UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Effluent Limitations Guidelines	)	
and Standards for the Oil and Gas	)	**Docket No. EPA-HQ-OW-2014-0598**
Extraction Point Source Category	)	
Proposed Rule: 80 Fed. Reg. 18,557	)	*Via regulations.gov and email*
(April 7, 2015)	)	*July 17, 2015*

I. Introduction and Summary

On behalf of the undersigned organizations, Clean Water Action and the Environmental Integrity Project (EIP), (collectively, Commenters) appreciate this opportunity to submit comments on the Environmental Protection Agency's (EPA or Agency) proposed Effluent Limitations Guidelines and Standards for the Oil and Gas Extraction Point Source Category, 80 Fed. Reg. 18,557 (hereafter Proposed Rule). Commenters strongly support EPA's efforts to prevent discharge of unconventional oil and gas (UOG) wastewater to publicly owned treatments works (POTWs). The proposed rule would close a potentially harmful gap in the regulation of UOG discharges by requiring a zero-discharge effluent limitation for new and existing UOG sources. This rule is necessary to prevent UOG facilities from discharging untreatable and harmful wastewater to POTWs. EPA has made the correct decision by proposing a zero-discharge limitation and should maintain this position for the purpose of protecting human and environmental health.

II. Legal Background

A. EPA's Proposed Zero-Discharge Limitation for Indirect UOG Wastewater Discharge to POTWs Satisfies the Requirements of the Clean Water Act

At the heart of the Clean Water Act (CWA) is the requirement for EPA to set effluent limitation guidelines (ELGs) for pollutants released by various categories of industry. ELGs are pollutant limitations based on the technology that is economically feasible and available to a particular industry to achieve the greatest reduction in pollutants possible. Under the CWA, in setting ELGs for conventional, unconventional, and toxic pollutants, EPA shall prescribe different levels of control, including Best Practicable Control Technology Currently Available (BPT), Best Conventional Pollutant Control Technology (BCT), Best Available Technology Economically Achievable (BAT), and New Source Performance Standards (NSPS) for direct dischargers that discharge directly from the facility into a waterway of the United States. In determining the BPT for a particular category of facilities, EPA first considers whether the BPT limitation is technologically and economically feasible. BAT is a more stringent limitation applicable to unconventional and toxic pollutants. For both BPT and BAT, EPA considers the following factors in addition to the cost and the availability of the technology:

(1) cost of achieving BAT effluent reductions,
(2) the age of the equipment and facilities involved,

(3) the process employed,
(4) potential process changes,
(5) non-water quality environmental impacts (including energy impacts), and
(6) any other factors as the Administrator may deem appropriate.[1]

For any new source that is constructed after ELG regulations have come into effect, the CWA prescribes NSPS to regulate the discharge of pollutants. New sources are subject to more stringent limitations on pollutants that reflect the ability of the best available technology for that industry.[2] In setting NSPS, EPA considers the same factors as it does in determining BAT.

The CWA also authorizes EPA to establish pretreatment standards for existing sources (PSES) and for new sources (PSNS) that are discharged through a POTW instead of direct discharges from the source.[3] UOG wastewater discharge to POTWs is subject to either PSES or PSNS because it is an indirect discharge that requires pretreatment. Pretreatment is necessary for industrial dischargers because POTWs are designed to treat domestic waste and cannot adequately treat the wastewaters of industrial sources that contain chemicals, metals, naturally radioactive materials (NORM), and high concentrations of total dissolved solids (TDS). These pollutants compromise the integrity of water systems. To prevent these pollutants from entering U.S. waters, the CWA requires facilities to pretreat these discharges before sending them to POTWs so that they achieve the same level of pollution reduction as a direct discharge. The factors considered by EPA in setting PSES and PSNS are the same as for BAT and NSPS because they are analogous standards.

In the Proposed Rule, EPA seeks to subject indirect discharges to POTWs from UOG facilities to PSES and PSNS control levels that require zero discharge of pollutants. Because PSES are analogous to BPT and BAT, EPA considered the same factors for determining PSES of zero discharge. Similarly, EPA considered the same factors in promulgating PSNS because NSPS and PSNS are analogous standards. EPA has applied the appropriate control standards based on the industrial category of UOG facilities and has considered the appropriate factors in setting the ELG.

B. EPA Properly Considered the Factors Required by the Clean Water Act in Proposing a Zero-Discharge Limitation for PSES and PSNS.

EPA properly considered the factors required by the CWA in proposing the zero-discharge limitation for PSES and PSNS for discharge from UOG facilities to POTWs. As explained in the Proposed Rule, EPA looked at the availability and cost of the technology in its cost–benefit analysis and determined that there would be no compliance cost or financial benefit to the industry because the current industry

[1] 33 U.S.C. § 304(b)(2)(B).
[2] 33 U.S.C. § 306.
[3] 33 U.S.C. § 307(b), (c).

practice is not to discharge to POTWs.[4] Therefore, the Proposed Rule will not result in any cost-incurring change to current practice.

Because the Proposed Rule reflects current industry practice, detailed analysis and consideration of the other factors like the age of facilities, the process involved, potential process changes, and non-water quality impacts are moot because the rule imposes no change from the industry's current practice. While those in opposition to the Proposed Rule may attempt to argue that EPA did not conduct a proper analysis of all of the required factors because it did not address each factor in depth, any such argument must fail. While EPA may not *ignore* any one factor, EPA is not required to weigh all factors equally and has considerable discretion in considering these factors for determining ELGs.[5] EPA's consideration of the required factors was adequate to establish a zero-discharge limitation.

III. Discussion

A. A Zero-Discharge Effluent Limitation is Consistent with the Purpose and Requirements of the Clean Water Act and Legal Precedent

The core objective of the CWA is to eliminate the discharge of pollutants to the waters of the United States. The CWA seeks to restore the chemical, physical, and biological integrity of the waters of the United States and the only way to do that is to ensure that pollutants entering our waterways are limited to the furthest extent technologically and economically possible.[6] A zero-discharge limitation for new and existing facilities discharging to POTWs is in line with the CWA's objective. ELGs are to be based on available technology. As EPA has demonstrated, the technology facilitating zero discharge for UOG facilities exists and is economically feasible. For this reason, this available zero-discharge technology should be utilized to minimize the discharge of UOG pollutants to the furthest extent possible. Any numerical limitation other than zero would permit UOG facilities to increase the amount of pollutants discharged from the current amount discharged, which is zero. Such an increase would be a counterintuitive to the core purpose of the CWA and put public health and the environment at risk of exposure to harmful pollutants.

The Proposed Rule would set a zero-discharge limitation for existing and new pretreatment sources. This effluent limitation would match the effluent limitation for direct UOG discharges. Setting similar discharge standards for direct and indirect discharges from UOG facilities is in line with the pollution reduction objectives of the CWA and with the statutory requirements of the CWA. Section 307(b)(1) of the Act states that pretreatment standards "shall be established to prevent the discharge of any pollutant through [POTWs], which pollutant interferes with, passes through, or otherwise is

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[4] *See* Effluent Limitations Guidelines and Standards for the Oil and Gas Extraction Point Source Category, 80 Fed. Reg. 18,557, 18,560 (Apr. 7, 2015) [hereafter Proposed Rule].
[5] *See Texas Oil & Gas Ass'n v. EPA*, 161 F.3d 923, 934 (9th Cir. 1998); *BP Exploration & Oil, Inc. v. EPA*, 66 F.3d 784, 803 (6th Cir. 1995).
[6] 33 U.S.C. § 101(a).

incompatible with such works."[7] As described in greater detail in Part III.C, there is well-supported evidence that UOG wastewater pollutants interfere with, pass through, and are incompatible with POTWs. The Act's main exception to these pretreatment standards is in the instance where a POTW can treat the pollutants such that the discharge from the POTW does not violate the effluent limitation or standard applicable to non-POTW sources (i.e., direct discharges).[8] In other words, whether the discharge goes through a POTW or is direct from a source, it should be subject to the same effluent limitation. By setting a zero-discharge standard, EPA is taking into account the characteristics of UOG wastewater and the zero-discharge standard for direct discharges and therefore is properly adhering to this statutory requirement.

In addition to this statutory authority, indirect discharges to POTWs from UOG sources should also be zero discharge because the BPT for direct discharges from unconventional oil and gas operations requires zero discharge.[9] To comply with the CWA and ensure that that all discharges from the same industry category, direct or indirect, are subject to the same effluent limitation, EPA must require zero discharge. Other subcategories of the oil industry also require similar limitation levels for direct and indirect sources. The ELGs for the oil extraction industry in the Coastal Extraction category require zero discharge for both direct and indirect discharges.[10]

This similarity in discharge levels is supported by several examples of ELGs in other industries. Both the ink formulating industry and the paint formulating industry have zero-discharge ELGs for existing and new direct sources and a zero-discharge requirement for indirect discharge to POTWs from existing and new sources.[11] Other industries with ELGs that require numerical limitations other than zero discharge require the same levels or very similar levels for direct and indirect pretreatment.[12] EPA is correct in continuing this precedent of setting ELGs for PSES and PSNS at the same level as direct discharges, as many POTWs do not have the ability to treat industrial discharge and the pollutants present in UOG discharge must be prevented from entering U.S. waterways.

EPA has also followed legal precedent by setting the ELG as zero discharge. In *NRDC v. EPA*, the Third Circuit found a statutory requirement under section 307(b)(1) to "require pretreatment for indirect

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[7] *See* 33 U.S.C. § 1317(b)(1).
[8] *Id.*
[9] *See* Proposed Rule, 80 Fed. Reg. at 18,572.
[10] *See* 40 C.F.R. §§ 435.43-435.47 (setting the ELGs for produced water, drilling fluids, and produced sand at no discharge).
[11] *See* 40 C.F.R. §§ 446.12-446.16, 447.12-447.16 (setting the ELG at zero discharge for both direct and indirect discharge for the subcategory of Oil-Base Solvent Wash Paint and Oil-Base Solvent Ink Wash, respectively).
[12] *See* 40 C.F.R. §§ 464.13-464.16 (setting the ELG for copper, lead, and zinc at the same levels for direct and indirect discharges in the Aluminum Casting Category of the Metal Molding and Casting Industry), 471.12-471.15 (setting the ELGs for direct and indirect discharges at the same or very similar levels for the Lead-Bismuth Forming category of the Non-Ferrous Metals Forming and Metal Powders Point Source industry).

dischargers analogous to the BAT standards for direct discharge."[13] The court explained that indirect dischargers and direct dischargers are to be held to the same standard to ensure that discharge which is preventable by the best available technology did not occur whether it was directly from a source or through a POTW.[14] The court also provided a compelling reason for holding that discharges should be held to strict similar limitations: "a single discharge of a toxic pollutant can do irreparable damage to the ecology of a body of water, killing fish and other life forms." [15]

B. Current UOG Wastewater Pretreatment Regulations are Inadequate

EPA's Proposed Rule to require zero discharge to POTWs from UOG facilities is necessary to fill the gap in federal and state law. The federal regulations for UOG facilities currently address only direct discharges and leave indirect discharges to be covered by the National Pretreatment Program.[16] The National Pretreatment Program is insufficient because UOG wastewaters are not among the categorical prohibitions and do not require zero discharge from these facilities. At the state level, few state governments regulate UOG discharge to POTWs, and no state requires zero discharge of UOG wastewater to POTWs.[17]

Those opposing the Proposed Rule may argue that the National Pretreatment Program is sufficient to prevent UOG wastewater from being discharged to POTWs, and therefore the Proposed Rule is an unnecessary use of Agency time and resources. This is incorrect because, as mentioned, UOG wastewaters are not among the categorical prohibitions and zero discharge is not the required standard. While the objective of the program is to prevent discharges that would cause pass through or interference with the POTW, the POTW must first determine that a particular discharge will cause pass through or interference. Additionally, the National Pretreatment Program puts an affirmative responsibility on the POTW to issue Industrial User (IU) permits (when it is delegated the authority to do so). To issue an IU permit, the POTW must survey the IUs subject to the National Pretreatment Program, determine if the IU's discharge would cause interference or pass through, evaluate their own ability to treat the discharge, and then implement a system to control the discharge. This process puts a significant burden on POTWs which is relieved by the Proposed Rule and prevents POTWs from having to process IU requests to accept UOG wastewater. The Proposed Rule also replaces a cumbersome, inefficient process with a clear, precise rule that UOG discharges are not to be treated by POTWs. This is the most efficient way to ensure these pollutants do not enter U.S. water bodies.

Those opposing a zero-discharge standard may also assert that UOG wastewater discharges to POTWs are regulated by the states. However, state regulation is not adequate. No states require zero

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[13] *Natural Res. Def. Council v. EPA*, 790 F.2d 289, 294 (3d Cir. 1986).
[14] *Id.* at 295.
[15] *Id.* at 305.
[16] *See* 40 C.F.R. § 403.1 et seq.
[17] *See*, *e.g.*, EPA, *EPA Technical Development Document for Proposed Effluent Limitation Guidelines and Standards for Oil and Gas Extraction* 9-10 (Mar. 2015) [hereafter *TDD*].

discharge for UOG wastewater, and this is the standard that is necessary to prevent harmful wastewaters from passing through POTWs into waters of the United States.[18]

While industry currently disposes of most of its wastewater via underground injection, there is a possibility with the ever–expanding UOG industry that this may no longer be the industry's preferred option in the future, and these facilities will again send wastewater to POTWs. Without EPA's Proposed Rule codifying current industry practice and mandating that UOG facilities not discharge wastewater to POTWs, these facilities will be free to resume the practice.

C. A Zero-Discharge Limitation is Necessary to Prevent the Harmful Discharge of Pollutants to Water Resources

1. EPA's Technical Development Document and Additional Sources Demonstrate that UOG Wastewater Constituents are Unsuitable for Discharge to POTWs

Understanding the volume and composition of UOG wastewater is essential for assessing effective treatment processes and whether any discharge to POTWs is appropriate. Chapter C of EPA's *Technical Development Document for Proposed Effluent Guidelines and Standards for Oil and Gas Extraction* (TDD) contains EPA's findings and conclusions regarding UOG wastewater volume and characteristics, which provide ample and well-supported evidence that zero discharge is the appropriate standard for the discharge of UOG wastewater to POTWs. Additional studies and research not included in the TDD add further weight in support of this zero-discharge standard.

In Chapter C of the TDD, EPA identified drilling and produced water as the major sources of pollutants in UOG wastewater. Drilling wastewater is "the liquid waste stream separated from recovered drilling fluid (mud) and drill cuttings during the drilling process."[19] Produced water includes both flowback and long-term produced water, and encompasses formation water, injection water, and any chemicals added downhole or during the oil/water separation process.[20] The composition of produced water and rate at which it returns to the surface varies during the lifetime of a well, and between and within formations.

According to EPA's review of data sources—which included state and federal agency databases, journal articles and technical papers, technical references, and calls, site visits, and meetings with industry—the main contaminants of concern in UOG wastewater include total dissolved solids (TDS), barium, sodium, and chloride, given that POTWs are not effective at removing these contaminants.[21] The TDD lists POTW removal capabilities for TDS, sodium, chloride, and barium at 8 percent, 3 percent, 57 percent, and 16 percent, respectively.[22] EPA's analysis and review of scientific literature additionally demonstrates that

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[18] *See id.* at 9-10.
[19] *TDD*, *supra* note 17, at 37.
[20] *Id*.
[21] *Id.* at 38, 105 Tbl. D-8.
[22] *Id.* at 105, Tbl. D-8.

UOG wastewaters can contain other contaminants at levels greater than drinking water maximum contaminant levels (MCLs) or greater than typical untreated domestic wastewater.[23] Those contaminants include heavy metals, organic chemicals, radionuclides, and chemicals added to hydraulic fracturing fluids. Produced water can also contain degradation products and byproducts from chemical reactions occurring downhole.[24]

Looking specifically at chemical additives to hydraulic fracturing fluids, the TDD states that "chemical additives in total typically make up less than 0.5 percent of the total fracturing fluid by mass," citing a 2009 report by the Ground Water Protection Council (GWPC) and ALL Consulting. However, it is worth noting that this report specifically states that the percent by mass of additives ranges from 0.5 percent up to 2 percent.[25]

In addition to the information and research EPA presents in the TDD, there are a number of other publications and data sources that either were not included in the TDD or have been released since 2014 Please see Appendix A for additional UOG produced water characterization data.[26] These sources provide additional support for a zero-discharge standard. For example, some biocides used in hydraulic fracturing fluids can present challenges at POTWs like promoting antimicrobial resistance and sorption to sludge.[27] However, studies specifically examining the presence of biocides in flowback water are limited.

Several scientific studies examine the need to "tailor" treatment of oil and gas extraction wastewater due to its variable content, and many studies express the need for more advanced treatment processes that are not found at POTWs. The degree of treatment needed depends on the influent and the desired quality of water after treatment. POTWs cannot tailor treatment (other than through dilution) and they do not operate advanced treatment systems.[28]

A 2014 study by Aida M. Farag et al. addressed the environmental impacts of salts from produced waters on aquatic resources. The study specifically focused on sodium chloride and sodium

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[23] *Id.* at 57-73, 103 Tbl. D-7; *see also* Noura Abualfaraj et al., *Characterization of Marcellus Shale Flowback Water*, Envtl. Eng'g Sci. 514-24 (2014).

[24] *See, e.g.,* William T. Stringfellow et al., *Physical, chemical, and biological characteristics of compounds used in hydraulic fracturing*. 275 J. Hazardous Materials 37-54 (2014); *see also* Noura Abualfaraj et al., *supra* note 23, at 514-24; Yaal Lester et al., *Characterization of Hydraulic Fracturing Flowback Water in Colorado: Implications for Water Treatment,* 512-513 Science of the Total Env't 637-44 (2015)

[25] *See TDD*, *supra* note 17, at 40-41; Ground Water Prot. Council & ALL Consulting, *Modern Shale Gas Development in the United States: A Primer* (2009); *see also* EPA, *Analysis of Hydraulic Fracturing Fluid Data from the FracFocus Chemical Disclosure Registry 1.0* at 37 (2015) (stating that EPA's findings were consistent with the 2009 report by GWPC and ALL Consulting).

[26] *See also* Appendix A.

[27] *See* Geneveve A. Kahrilas et al., *Biocides in Hydraulic Fracturing Fluids: A Critical Review of Their Usage, Mobility, Degradation, and Toxicity*, 49 Envtl. Science & Tech. 16-32 (2015).

[28] *See*, *e.g.*, Lester et al., *supra* note 24, at 637-44; Bryan D. Coday et al., *The sweet spot of forward osmosis: Treatment of produced water, drilling wastewater, and other complex and difficult liquid streams*, Desalination, Jan. 15, 2015, at 23-35.

bicarbonate. The study found that *Ceriodaphnia dubia* has an acute 48-hour LC50 (i.e., the toxicity of the surrounding medium that will kill half the studied population) of 1040 mg NaCl/liter. By comparison, EPA's acute water quality criterion for the protection of aquatic life is 860 mg chloride/liter, and the chronic criterion is 230 mg chloride/liter. The study also observed chronic toxicity to *C. dubia* at much lower concentrations (132 and 117 mg NaCl/liter) in very soft water.[29] A final source in support of the zero-discharge standard is a statement by the industry itself:

> A recent study, authored by researchers from Stanford and Duke University and titled Enhanced Formation of Disinfection Byproducts in Shale Gas Wastewater-Impacted Drinking Water Supplies, essentially rehashes what industry and regulators have known for years: that wastewater from fracking should not be treated at water treatment facilities and released into river waters. That's exactly why Marcellus producers stopped using such treatment facilities back in 2011.[30]

The statement is from the Independent Petroleum Association of America's public relations website, Energy In Depth, which offers industry perspectives and opinions on studies, rulemakings, and other current events.[31]

2. EPA's Technical Development Document and Additional Sources Demonstrate That POTWs are Not Capable of Handling and Processing UOG Wastewater

In addition to the ample supporting data EPA provides on the constituents in UOG wastewater, the TDD also contains significant evidence regarding the capability of POTWs to handle and process UOG wastewater. The TDD and additional sources demonstrate that POTWs are not currently capable of handling UOG wastewater, given that they are unable to remove certain constituents from UOG wastewater, the handling of UOG wastewater results in overall reduced POTW efficiency, and the handling of UOG wastewater results in the generation of harmful disinfection byproducts (DBPs).

In Chapter D of the TDD, EPA reviewed thirteen case studies of POTWs that have accepted UOG wastewater in the past (2011 or earlier), either directly from an O&G operator or from a centralized waste treatment facility that had accepted UOG wastewater. In reviewing the thirteen case studies, EPA found that high levels of TDS present in UOG wastewater can disrupt POTW operations and increase pollutant loads in receiving streams.[32] The case studies clearly demonstrated that POTWs are not equipped to remove TDS, with minimal (e.g., 8 percent) to no TDS removal.[33] EPA also found that POTWs are also "not designed to treat high concentrations of TDS, radioactive constituents, metals,

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[29] *See* Aida M. Farag et al., *A review of environmental impacts of salts from produced waters on aquatic resources*, 126 Int'l J. Coal Geology 157-161 (2014).
[30] Energy In Depth, Report on Fracking Wastewater Ignores Standard Procedures in Pennsylvania, Oct. 7, 2014, http://energyindepth.org/marcellus/report-on-fracking-wastewater-ignores-standard-procedures-in-pennsylvania/ (last visited July 14, 2015).
[31] *See* Energy In Depth, About EID, http://energyindepth.org/about/ (last visited July 14, 2015).
[32] *See TDD*, *supra* note 17, at 112-13.
[33] *Id.* at 105 Tbl. D-8.

chlorides, sulfates, and other dissolved inorganic constituents in UOG extraction wastewater." [34] Concentrations of TDS and chlorides in the POTWs' effluent were much higher when the POTWs accepted unconventional and/or conventional oil and gas wastewater. These concentrations only returned to acceptable levels when the POTWs ceased accepting the oil and gas wastewater. In studies measuring the concentration in both the influent and effluent, concentrations of TDS and chlorides generally stayed the same, indicating the facility was unable to treat for these constituents.[35]

In addition to the case studies showing POTWs were unable to remove TDS and chlorides, EPA also reviewed cases in which the POTWs' overall waste treatment became less effective through their acceptance of oil and gas wastewater. Specifically, total suspended solids (TSS) and biochemical oxygen demand (BOD5) are key parameters that POTWs must control, and a spike in these constituents in the aftermath of processing oil and gas wastewater indicates a reduction in POTW efficiency.[36] Many of the POTWs reviewed in the TDD exceeded their permit limits for TSS (e.g., up to 27 in Johnstown, PA), and returned to compliance once UOG wastewater was no longer accepted.[37] Other POTWs reported the wastewater interfered with biological treatments, reduced the diversity in microorganisms needed for effective treatment, and increased their generation of sludge.[38]

In addition to EPA's review of POTW case studies, a study by Kimberly M. Parker et al. cites reports of increased bromide concentrations in surfaces waters around POTWs and CWTs receiving wastewater from O&G operations, such as a rise from 72 ug/l pre-2003 (i.e., before major shale gas development) to 300 ug/l after 2009.[39]

EPA also specifically examined a third peril of POTWs' acceptance of oil and gas wastewater: the generation of DBPs.[40] That is, while the disinfection of water is a vital part of POTWs' role in producing drinkable water and preventing waterborne diseases, certain methods of disinfection, such as chlorination, chloramination, and ozonation, can create toxic and carcinogenic byproducts when they interact with certain constituents in oil and gas wastewater. EPA currently regulates four trihalomethanes, a type of DBP, with an MCL of 80 ug/l: chloroform, bromodichloromethane, dibromochloromethane, and bromoform.

EPA reviewed literature discussing DBPs and explored bromide and chloride as a precursor to DBP formation, both of which are found in high concentrations in UOG extraction wastewater. The compiled literature found that bromide and chloride from oil and gas wastewater can become a source of DBPs when the wastewater is directly processed by POTWs or when POTWs that have processed oil and gas wastewater discharge into a river that provides the raw water for drinking water treatment plants

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[34] *Id.* at 111.
[35] *Id.* at 114-29.
[36] *Id.* at 130.
[37] *Id.* at 131.
[38] *Id.* at 129-40.
[39] *See* Kimberly M. Parker et al., *Enhanced formation of disinfection byproducts in shale gas wastewater-impacted drinking water supplies*, 48 Envtl. Sci. & Tech. 11,161-69 (2014).
[40] *See TDD*, *supra* note 17, at 141-45.

downstream.[41] With respect to this second means of DBP formation, the thirteen POTW case studies discussed in the TDD all indicate that chlorides, an established precursor to DBP formation, are not effectively removed during the treatment processes and are therefore discharged in the effluent.[42] A study by Kyle J. Ferrar et al. assessed effluent discharges from three wastewater treatment plants and found that concentrations of bromide (along with strontium, barium, TDS, chlorides, and benzene) are also significantly higher when facilities accept natural gas extraction wastewaters and are not effectively removed during the treatment process.[43]

A study by Michelle L. Hladick et al. adds additional weight to EPA's review of DBP formation.[44] The study analyzed twenty-nine different DBPs at POTWs that do not accept oil and gas extraction wastewater, POTWs that do accept oil and gas produced water, and CWTs. The facilities accepting produced waters were known to accept waste from both conventional and unconventional oil and gas operations, and were found to have higher concentrations of brominated and iodinated trihalomethanes than POTWs that did not accept produced waters and CWTs. While not all THMs and DBPs in drinking water are regulated by the EPA, the study found bromoform (which is regulated) at levels up to 10.1 ug/l at POTWs that accept produced water, compared to a maximum of 0.04 ug/l at a POTW that did not accept oil and gas wastewater. Brominated DBPs are among the most carcinogenic and genotoxic DBPs. While the total trihalomethanes did not exceed the MCL of 80 ug/L in drinking water, the study suggests that these concentrations in the effluent serve merely as a baseline DBP level, and do not account for downstream drinking water treatment plants that risk forming additional DBPs upon further treatment.

An important area in which the TDD lacks depth of analysis is with regard to iodinated DBPs. In addition to the risk from brominated DBPs, the Hladick et al. study also found elevated levels of iodinated DBPs in the effluent from POTWs that accept oil and gas produced water.[45] Although iodinated DBPs are not yet regulated and are therefore tested for less frequently, a 2007 study by Susan D. Richardson et al. found that iodinated DBPs may be the most genotoxic DBPs of all.[46] To produce lower levels of regulated DBPs, many wastewater treatment plants have switched from chlorine disinfectants to alternatives such as chloramine, ozone, and chlorine dioxide, but a 2006 study by Stuart W. Krasner et al. found that these alternative disinfectants produce higher concentrations of other DBPs, such as iodinated DBPs.[47]

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[41] *Id.*
[42] *Id.* at 112-13.
[43] Kyle J. Ferrar et al., *Assessment of effluent contaminants from three facilities discharging Marcellus Shale wastewater to surface waters in Pennsylvania*, 47 Envtl. Sci. & Tech. 3,472-81 (2013).
[44] Michelle L. Hladick et al., *Discharges of produced waters from oil and gas extraction via wastewater treatment plants are sources of disinfection by-products to receiving streams*. 466-467 *Sci. of the Total Env't* 1,085-93 (2014).
[45] *Id.*
[46] Susan D. Richardson et al., *Occurrence, genotoxicity, and carcinogenicity of regulated and emerging disinfection by-products in drinking water: A review and roadmap for research*, 636 *Mutation Research* 178-242 (2007).
[47] Stuart W. Krasner et al., *Occurrence of a new generation of disinfection byproducts*, 40 Envtl. Sci. & Tech. 7,175-85 (2006).

Specifically, iodinated DBP concentrations increase when chloramines are the only disinfectant used. While the studies exploring the formation of iodinated-DBPs have found concentrations at lower levels relative to other DBPs, they should not be overlooked, as their higher toxicity may make them more potent even at low concentrations.[48]

Additionally, wastewater from both unconventional and conventional oil and gas operations in the Marcellus and Fayetteville shale and Appalachian basins have been characterized with high concentrations of chloride, bromide, iodide, and ammonium, all of which promote the formation of toxic DBPs in receiving POTWs or drinking water treatment plants with disinfection treatments.[49] A 2015 study by Jennifer S. Harkness et al. was unable to identify any oil and gas wastewater operations which regulated or monitored for iodide or ammonium, exposing the potential for additional risks from UOG wastewater disposal at POTWs.

Finally, the above-cited study by Parker et al. evaluated the minimum percent volume of oil and gas wastewater from the Marcellus and Fayetteville shale in surface waters that would impact the formation of DBPs upon disinfection at a water treatment plant. The study found that volumes as little as 0.01 percent of oil and gas wastewater could alter the speciation of DBPs to favor brominated and iodinated DBPs. This study also found a reduction in the regulated trihalomethanes with chloramination, but an increased presence in iodinated trihalomethanes, similar to the findings in Hladick et al. and Krasner et al. studies.[50] In other words, the results suggest that merely changing the treatment and disinfection techniques may not be an effective strategy for minimizing impacts to drinking water, as changes are likely to just change the type of byproducts present.

IV. EPA Should Include Justification for the Proposed Rule's Distinction Between Conventional and Unconventional Wastewater ELGs

While noting that the existing ELG does not distinguish between conventional and unconventional oil and gas wastewater point source categories, EPA nevertheless has proposed to define technology-based guidelines related to unconventional oil and gas wastewater as an apparent subcategorization of the oil and gas extraction point source category. This is a reasonable initial step. At the same time, in reviewing the evidence of UOG and conventional oil and gas (COG) wastewater characteristics provided in response to the request for additional data, EPA should determine whether creation of an unconventional subclass should remain in effect based on whether a substantial variation between the proposed subcategories of conventional and unconventional oil and gas wastewater dischargers exists. In the Federal Register Notice EPA reserved the right to pursue a future rulemaking for conventional oil

[48] *Id.*
[49] Jennifer S. Harkness et al., *Iodide, Bromide, and Ammonium in hydraulic fracturing and oil and gas wastewaters: Environmental implications*, 49 Envtl. Sci. & Tech. 1,955-63 (2015).
[50] *See* Kimberly M. Parker et al., *Enhanced formation of disinfection byproducts in shale gas wastewater-impacted drinking water supplies*, 48 Envtl. Sci. & Tech. 11,161-69 (2014); *TDD*, *supra* note 17, at 145.

and gas facilities. We urge EPA to expedite this process upon the conclusion of the current ELG rulemaking and to consider whether a distinction is necessary in the future.

EPA has requested additional data and comments on three issues concerning conventional oil and gas:

(1) whether "extraction operators" and pretreatment authorities can adequately determine the difference between unconventional and conventional wastewaters based on the proposed definitions of "UOG" and "UOG extraction wastewater;"

(2) the volume and pollutant concentrations of conventional oil and gas wastewater; and

(3) "[t]he prevalence of conventional oil and gas wastewater discharges to POTWs."

As discussed in Section V, there are various ways that extraction operators and pretreatment authorities can determine the difference between unconventional and conventional wastewater based on the currently proposed definitions and future guidance could assist in enforcement.

It is possible that information provided during this and future rulemaking will prompt reconsideration of this subcategorization. Congress intended that ELGs provide uniform effluent limitations to individual point sources so that "similar characteristics, regardless of their location or the nature of the water into which the discharge is made, will meet similar effluent limitations."[51] Courts have warned, however that the emphasis on uniformity in the legislative history must be tempered with flexibility when EPA creates classes and subclasses of dischargers.[52] In addressing the Plaintiff's objection to subcategorization within the coastal oil- and gas-producing category, the *TOGA* court emphasized that EPA is required to address "substantial variations" in a category of point sources when promulgating ELGs.[53] In the absence of such information on substantial variations during the rulemaking, however, the Fifth Circuit invoked the Supreme Court's approach in *Chemical Mfrs. Ass'n* to allow for unknown differences to come up through a Fundamentally Different Factors variance.[54]

If EPA is not able to identify a substantial variation between UOG and COG wastewater characteristics in a future rulemaking, subcategorization will not be necessary because EPA should default to the Congressional preference of uniformity of effluent limits in a category. If dischargers within that category currently have evidence that they should be treated differently, EPA should obtain that data, provide it to the public and rely upon it to demonstrate a reasoned justification for the subcategory of, for example, conventional oil and gas wastewater in a future rulemaking. Similarly, if dischargers within

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[51] Environmental Policy Division of the Library of Congress, A Legislative History of the Water Pollution Control Act Amendments of 1972, 93d Cong., 1st Sess. (Comm. Print 1973), at 172 (statement by Senator Muskie).
[52] *Texas Oil & Gas Ass'n v. EPA*, 161 F.3d 923, 939 (5th Cir.1998) (citing *Chemical Mfrs. Ass'n v. Natural Resources Defense Council*, 470 U.S. 116 (1984)).
[53] *Id.*
[54] 33 U.S.C. § 1311(n); *see also* 33 U.S.C. § 1311(c) (describing EPA's authority to give individual dischargers an economic variance).

the oil and gas extraction category develop data that sets them apart from other dischargers in the category, their situation can be addressed through statutory variances.[55] Accordingly, the statutory scheme envisions the scenario that EPA is faced with now in issuing an ELG for the oil and gas extraction point source category. Unless EPA identifies "substantial variations" within the oil and gas extraction category, the currently proposed subcategorization will not be needed on a permanent basis.

V. EPA Must Provide the Enforcement Tools Necessary to Enforce a Zero-Discharge Standard that Applies to UOG Wastewater in a Context Where POTWs May Continue Accept COG Wastewater

In the Federal Register notice for the Proposed Rule, EPA solicited information and data on the following:

> EPA's proposed definitions of UOG and UOG extraction wastewater and specifically whether the proposed definition of unconventional oil and gas is sufficiently clear to enable oil and gas extraction operators and/or pretreatment authorities to determine whether specific wastewaters are from conventional or unconventional sources.[56]

The appropriate Control Authority, be it the Approval Authority or the POTW, must ensure that the zero-discharge standard is enforceable. Given the way in which EPA has defined UOG, POTWs will have to distinguish UOG and COG wastewater in order to enforce the zero-discharge requirement for UOG wastewater while also considering acceptance of COG wastewater subject to compliance with the general standards and their National Pollutant Discharge Elimination System (NPDES) permits.

The objectives of the National Pretreatment Program are to prevent the introduction of pollutants into POTWs that will cause interference or pass-through.[57] The Pretreatment Program requirements provide the necessary legal authority to implement and enforce a zero-discharge standard. The requirements include standards for analysis, inspection, and surveillance, monitoring, and reporting.[58] Such authority includes the ability to require identification of the character and volume of pollutants.[59] More generally, the Program places a great deal of emphasis on reporting to demonstrate continued compliance.[60] These requirements and emphasis will assist in distinguishing UOG and COG wastewater according to the proposed definition.

[55] *TOGA* at 939-940.
[56] Proposed Rule, 80 Fed. Reg. at 18,561.
[57] 40 C.F.R. § 403.2(a)-(b).
[58] 40 C.F.R. § 403.8(f).
[59] 40 C.F.R. § 403.8(f)(2)(ii).
[60] 40 C.F.R. § 403.12.

Sample analyses alone may not reveal whether the wastewater discharged to the POTW is UOG or COG wastewater.[61]

Because EPA has distinguished COG and UOG wastewater based on the characteristics of the formation from which extraction took place, Control Authorities should be able to require that industrial dischargers provide documentation confirming that the target formation where the wastewater originated is a COG formation and not a UOG formation as defined. This could be accomplished through local limits or more general application requirements.

One method of documentation could be to require dischargers provide the well or drilling permits and related applications that are associated with the wastewater. For example, in Pennsylvania, the Department of Environmental Protection issues well permits pursuant to the Oil & Gas Act.[62] Applications for well permits must identify the target formation proposed for production.[63] Issued well permits confirm this formation information by including a field called "Anticipated Maximum TVD" or vertical well depth. There is a similar practice in North Carolina, Ohio, and Texas.[64]

However, information in well permits or well permit applications, for example the name and depth of target formations, may not always be sufficient for making the determination that wastewater is not UOG wastewater as defined. UOG is proposed to be defined based on the porosity and permeability of a formation. Formation names and depths do not expressly convey information about porosity and permeability, and will not always serve as an easy reference proxy. While a POTW may be able to recognize popular names of formations that would meet the proposed definition (which wastewater it should reject), such as Marcellus, Utica, Bakken, or Barnett, the names of COG formations may not be as easily recognizable. Even if the oil and gas extraction operator is in a good position to know whether the wastewater originated from an eligible formation – one that does not meet the proposed definition of the UOG formation – it is crucial for the POTW to also have the necessary information to enforce the rule that prevents UOG wastewater discharges by itself being able to know whether the wastewater is from an eligible formation.

One workable solution could be for the Control Authority, working with state agencies and EPA, to compile a list of names and depths for UOG and COG formations within the Control Authority's jurisdiction. Such a list, combined with a requirement for the proposed discharger to provide the POTW with permitting and other materials that can substantiate wastewater origin, would facilitate enforcement. This process can be outlined in a future guidance document or future rulemaking. While methods of distinguishing UOG and COG are available to support finalization of the Proposed Rule, such guidance could be a positive next step.

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[61] *See*, *e.g.*, Harkness et al, *supra* note 49; *see also* the documents enclosed as Exhibit A that include data for COG influent that reveal similar chemistries for COG and UOG wastewater.
[62] 58 Pa.C.S. Ch. 32.
[63] *See* Permit Application To Drill And Operate An Unconventional Well, Doc. No. 8000-PM-OOGM0001b (rev. June 2014), *available at* http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-100999/8000-PM-OOGM0001b%20Permit%20-%20Unconventional%20WellRF2.pdf.
[64] *See* Exhibit B.

VI. Proposed Rule Supports Clean Water Act and Safe Drinking Water Act Integration, EPA Pollution Prevention Goals, and Drinking Water Source Protection

Integration of the Clean Water Act and Safe Drinking Water Act (SDWA) has been an area of increasing interest to diverse stakeholders during the past decade, is part of EPA's 2010 Drinking Water Strategy[65] and is embodied in EPA's Strategic Plan for 2011-2015.[66] Our nation's landmark federal water laws can and should work together to achieve the maximum protection of public health and pollution reductions. EPA's Proposed Rule supports this integration by preventing discharges of pollutants that could interfere with SDWA compliance at downstream Public Water Systems (PWS) and lead to increased public health risk. EPA's Proposed Rule is also consistent with stated pollution prevention policy because it avoids shifting the burden of contamination caused by upstream activity onto a downstream user through potential treatment costs.[67] The Proposed Rule supports the overall goals of the Clean Water Act, ensures that drinking water and public health are protected, and maximizes pollution prevention in the Clean Water Act's implementation.

A. SDWA Compliance and Public Health Risk Downstream

EPA's Proposed Rule will prevent downstream public health risk from drinking water and avoid SDWA compliance problems at downstream Public Water Systems. Because unconventional oil and gas wastewater can contain contaminants that are not typically removed by POTWs, prohibition of discharge to POTWs is the most effective way to prevent public health risk for downstream drinking water users.

For example, bromide in downstream drinking water sources can lead to increased formation of disinfection byproducts, which are associated with adverse health effects including cancer. Brominated disinfection byproducts are thought to present greater health risks than chlorinated disinfection byproducts.[68] Public Water Systems must comply with SDWA National Primary Drinking Water Regulations for some disinfection byproducts including some brominated DBPs. Increased bromide concentrations in source water have caused SDWA compliance issues at Public Water Systems.[69] Similarly, POTWs do not generally monitor for radioactivity and radionuclides, which are likely to pass

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[65] EPA, Water: Drinking Water Strategy, http://water.epa.gov/lawsregs/rulesregs/sdwa/dwstrategy/ (last visited July 16, 2015).
[66] EPA, Fiscal Year 2011 – 2015 Strategic Plan 12 (2013), *available at* http://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1008YOS.PDF.
[67] EPA, *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health* 4-2 (2000).
[68] Nancy McTigue et al., *Occurrence and Consequences of Increased Bromide in Drinking Water Sources*, 106 J. Am. Water Works Ass'n 492 (2014).
[69] Stanley States et al., *Marcellus Shale drilling and brominated THMs in Pittsburgh, PA drinking water*, 105 J. Am. Water Works Ass'n 432 (2013).

through municipal wastewater treatment and pose health risks and the potential exceedances at downstream PWS of SDWA MCLs for combined radium, gross alpha, and gross beta.[70]

Commenters agree with EPA that the Proposed Rule does not cause incremental changes to current industry practice that would require monetization of costs, since unconventional oil and gas wastewater is not generally being managed by discharge to POTWs. The Proposed Rule will provide potential future benefit in terms of reduced public health and reduced cost of drinking water treatment if discharge to POTWs were to become a more attractive option for unconventional oil and gas wastewater. Commenters urge EPA to improve capacity for quantifying reduction of public health risk from drinking water and drinking water treatment costs avoided in Clean Water Act rulemaking processes.

B. Drinking Water Source Protection

In 2014, high profile drinking water contamination events focused attention on drinking water and highlighted pollution sources that threaten drinking water sources. From the leaking toxic chemical tanks in West Virginia to the coal ash spill in North Carolina and the cyanotoxin blooms in Ohio, the quality and safety of our drinking water is directly related to the protections provided to the sources of this water. Source Water Protection is a key part of the "multi-barrier" approach to "providing safe drinking water to the public."[71] In a 2012 report, the National Academy of Sciences noted that "de facto" water reuse, in which a drinking water supply intake is located downstream from a wastewater treatment plant, is common and growing.[72] EPA's Proposed Rule protects drinking water sources from contamination by preventing pass through of pollutants present in unconventional oil and gas wastewater from POTWs into potential drinking water sources.

VII. EPA Should Expedite the Centralized Waste Treatment Facility Study and Associated ELG Revision

Commenters strongly support EPA's current study of Centralized Waste Treatment (CWT) facilities and treatment technologies. Given the potential increase in oil and gas wastewater sent to CWTs as a result of the Proposed Rule, EPA should expedite a revision to the relevant CWT ELG, thus closing a gap in federal regulation and ensuring that surface waters are not left vulnerable to oil and gas pollution.

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[70] HF Drinking Water Assessment

[71] EPA, Source Water Protection, http://water.epa.gov/infrastructure/drinkingwater/sourcewater/protection/index.cfm (last visited July 16, 2015).

[72] Nat'l Academies of Science, Understanding Water Reuse: Potential for Expanding the Nation's Water Supply through Reuse of Municipal Waste Water, http://nas-sites.org/waterreuse/ (last visited July 16, 2015).

It is clear that ELGs relating to CWTs need to be updated to reflect the same threats from oil and gas wastewater that POTWs face. EPA memos indicate that many CWTs cannot adequately treat unconventional wastewater.[73] EPA stated that appropriate limits or pretreatment standards would need to be applied to CWTs because the current guidelines did not evaluate certain pollutants common in oil and gas wastewater, such as radionuclides.[74] As outlined in this document, radioactive materials such as radium pose serious and persistent threats to public health and drinking water quality.

Completing this study will help begin to address critical questions about water quality and public health impacts of discharges from CWTs to POTWs that are not covered in the current rulemaking.

VIII. EPA Should Expedite Its Revision of ELGs Associated with Coalbed Methane Extraction

EPA should expedite a parallel ELG update for coalbed methane extraction. Commenters believe that EPA's decision to delist CBM from the definition of UOG was premature and that EPA should reconsider this proposal in light of inevitable shifts in gas prices, demand, and costs of wastewater treatment.

Coalbed methane extraction produces large volumes of wastewater characterized by the presence of numerous contaminants at potentially high concentrations. Inadequate treatment and discharge of these wastes jeopardizes the integrity of surface water, can lead to increased public health risks from drinking water, threatens fish and wildlife and causes other negative environmental impacts.

The Congressional intent underlying the Clean Water Act's Effluent Guidelines and Limitations-setting process included prevention of "pollution havens." Coalbed methane extraction ELG's are necessary and affordable treatments are available to avoid this outcome in places where coalbed methane extraction is occurring.[75]

IX. EPA Should Update ELGs for the Landfill Waste Category which Includes Landfill Leachate

Commenters urge EPA to undergo a similar rulemaking for ELGs governing the discharge of landfill leachate from landfills that currently accept or have historically accepted oil and gas extraction waste. As discussed below, certain landfills accept waste associated with the extraction of oil and gas – including drill cuttings, drilling muds, produced sand, and produced water – for disposal. Those landfills then often send their leachate to nearby POTWs, which are unequipped to properly treat it. Leachate from landfills accepting waste from oil and gas extraction facilities can contain many of the same pollutants as oil and gas extraction wastewater, and should be subject to the same controls.

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[73] EPA, *Natural Gas Drilling in the Marcellus Shale NPSED Program Frequently Asked Questions* (2011), *available at* http://www.epa.gov/npdes/pubs/hydrofracturing_faq.pdf.
[74] *Id.*
[75] *See Docket ID No. EPA-HQ-OW-2010-0824: Comments on Preliminary 2012 Effluent Guidelines Program Plan: Coalbed Methane Extraction and Shale Gas Wastewater Treatment* (comments submitted by nonprofit organizations and other environmental and public health advocacy groups).

In addition to over 300 chemicals, some of which are carcinogens or suspected carcinogens, frequently found in oil and gas waste is NORM in the form of radium-226 and radium-228. A 2011 study by the U.S Geological Survey found that produced waters from oil and gas operations had levels of radium-226 as high as 18,000 pCi/L.[76] Radium-226 and radium-228 have half-lives of 1,600 and 5 years respectively. Additionally, radium is highly soluble in water.

Radium and other contaminants from oil and gas waste that are disposed of in landfills could end up in landfill leachate. Rain and natural decomposition in waste result in leachate pools, which can contain many of the contaminants in the landfill waste. Many landfills then dispose of leachate by sending it to nearby wastewater treatment facilities, including POTWs.[77]

Many landfills do not currently test their leachate for radioactivity despite the fact that very few water treatment plants are capable of treating radioactive materials. However, landfills that do test their leachate for radioactivity have found concerning levels of radium. One such landfill is Hyland landfill in Angelica, New York. Testing results from 2014 indicate that levels of radium-226 in Hyland Landfill's leachate were as high as 120 pCi/L.[78] For comparison, the total radium limit for industrial effluent is 60 pCi/L, and the drinking water limit is 5 pCi/L.[79] Hyland's leachate is sent for treatment to the Village of Wellsville POTW, which discharges into the Genesee River.

Hyland is not a standalone example. Leachate testing results for Hakes C&D Landfill in Painted Post, New York showed similar results. Testing results from 2013 showed levels of radium-226 as high as 180 pCi/L.[80]

Given that leachate from landfills accepting oil and gas extraction wastewater can contain many of the same pollutants as oil and gas extraction wastewater, EPA should begin the process of updating the relevant ELG.

X. Conclusion

Commenters support EPA's efforts to protect our water from harmful contamination with the proposed Effluent Limitations Guidelines and Standards for the Oil and Gas Extraction Point Source Category. EPA has taken the appropriate course of action in requiring a zero-discharge standard for UOG facilities discharging to POTWs, given that UOG wastewater contains a number of constituents that POTWs are

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[76] U.S. Geological Survey, Radium Content of Oil and Gas Field Produced Waters in the Northern Appalachian Basin (USA): Summary and Discussion of Data (2011), *available at* http://pubs.usgs.gov/sir/2011/5135/pdf/sir2011-5135.pdf.
[77] *See* Environmental Advocates of New York, *License to Dump* 18-19 (Feb. 2015), *available at* http://www.eany.org/our-work/reports/license-dump-february-2015.
[78] *Id*.
[79] U.S. Geological Survey, Radium Content of Oil and Gas Field Produced Waters in the Northern Appalachian Basin, *supra* note 76.
[80] Environmental Advocates of New York, *supra* note 77, at 18-19.

unable to process or remove and that may lead to the formation of dangerous byproducts. The zero-discharge standard is a commonsense rule that provides regulatory clarity to the oil and gas industry. EPA should not deviate from the zero-discharge requirement as this is the limitation is based on the best available technology, in line with the purposes of the CWA, and the only way to ensure the protection of public health and the environment.

Thank you for the opportunity to submit these comments.

Sincerely,

Adam Kron
Attorney
Environmental Integrity Project

John Noël
National Oil and Gas Campaigns Coordinator
Clean Water Action

For Clean Water Action:
Emily A. Collins, Esq.
Executive Director and Managing Attorney
Oday Salim, Esq.
Senior Attorney
Fair Shake Environmental Legal Services

Ronald White
Director of Regulatory Policy
Center for Effective Government

Ellen Webb,
Energy & Health Program Associate
Center for Environmental Health

Sarah Eckel
Legislative & Policy Director
Citizens Campaign for the Environment

Deborah Goldberg
Managing Attorney
Earthjustice

Lauren Pagel
Policy Director
Earthworks

Elizabeth Moran
Water and Natural Resources Associate
Environmental Advocates of New York

Rachel Richardson
Stop Drilling Program Director
Environment America

Scott Anderson
Senior Policy Director
Environmental Defense Fund

Madeleine Foote
Legislative Representative
League of Conservation Voters

Rebecca Hammer
Staff Attorney, Water Program
Natural Resources Defense Council

Misti Duvall
Staff Attorney
Riverkeeper