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ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 423

[EPA-HQ-OW-2009-0819; FRL-8794-01-OW]

RIN 2040-AG23

Supplemental Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule; notification of public hearing.

SUMMARY: The Environmental Protection Agency (EPA or the Agency) is proposing a regulation to revise the technology-based effluent limitations guidelines and standards (ELGs) for the steam electric power generating point source category applicable to flue gas desulfurization (FGD) wastewater, bottom ash (BA) transport water, and combustion residual leachate (CRL) at existing sources. EPA is also soliciting comment on ELGs for legacy wastewater. This proposal is estimated to cost $200 million dollars annually in social costs and reduce pollutant discharges by approximately 584 million pounds per year.

DATES:

Comments: Comments on this proposal must be received on or before **[INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].** Comments intended for the associated direct final rule published elsewhere in this issue of the *Federal Register*, *Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category—Initial Notification Date Extension*, must be received on or before [**INSERT DATE 30 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER**].

Public hearing: EPA will conduct two online public hearings about this proposed rule on April 20, 2023, and April 25, 2023. After a brief presentation by EPA personnel, the Agency will

accept oral comments that will be limited to three (3) minutes per commenter. The hearing will be recorded and transcribed, and EPA will consider all the oral comments provided, along with the written public comments submitted via the docket for this rulemaking. To register for the hearing, please visit EPA's website at *www.epa.gov/eg/steam-electric-power-generating-effluent-guidelines-2023-proposed-rule*.

ADDRESSES: Submit your comments, identified by Docket ID No. EPA-HQ-OW-2009-0819 at *www.regulations.gov.* Follow the online instructions for submitting comments. Once submitted, comments cannot be edited or removed from www.*regulations.gov.* EPA may publish any comment received to its public docket. Do not electronically submit any information you consider to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Multimedia submissions (*e.g.*, audio, video) must be accompanied by a written comment. The written comment is considered the official comment and should include all points you wish to make. EPA will generally not consider comments or comment contents located outside of the primary submission (*i.e.*, on the web, cloud, or other file sharing system). For additional submission methods, the full EPA public comment policy, information about CBI and multimedia submissions, and general guidance on making effective comments, please visit *www.epa.gov/dockets/commenting-epa-dockets.* All documents in the docket are listed on the *www.regulations.gov* website. Although listed in the index, some information is not publicly available, such as CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy form. Electronically available docket materials are available through *www.regulations.gov*.

FOR FURTHER INFORMATION CONTACT: For technical information, contact Richard Benware, Engineering and Analysis Division, telephone: 202-566-1369; email: *benware.richard@epa.gov*. For economic information, contact James Covington, Water Economics Center, telephone: 202-566-1034; email: *covington.james@epa.gov*.

SUPPLEMENTARY INFORMATION:

Preamble Acronyms and Abbreviations. EPA uses multiple acronyms and terms in this preamble. While this list may not be exhaustive, to ease the reading of this preamble and for reference purposes, EPA defines terms and acronyms used in Appendix A of this preamble.

Supporting Documentation. The proposed rule is supported by a number of documents, including:

- Technical Development Document for Proposed Supplemental Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category (TDD), Document No. 821R23005. This report summarizes the technical and engineering analyses supporting the proposed rule. The TDD presents EPA's updated analyses supporting the proposed revisions to FGD wastewater, BA transport water, CRL, and legacy wastewater. The TDD includes additional data that has been collected since the publication of the 2015 and 2020 rules, updates to the industry (e.g., retirements, updates to wastewater handling), cost methodologies, pollutant removal estimates, corresponding non-water quality environmental impacts associated with updated FGD and BA methodologies, and calculation of the proposed effluent limitations. In addition to the TDD, the Technical Development Document for the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category (2015 TDD, Document No. EPA-821-R-15-007) and the Supplemental Technical Development Document for Revisions to the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category (2020 Supplemental TDD, Document No. EPA-821-R-20-001) provide a more complete summary of EPA's data collection, description of the industry, and underlying analyses supporting the 2015 and 2020 rules.

- Supplemental Environmental Assessment for Proposed Supplemental Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category (EA), Document No. 821R23004. This report summarizes the potential environmental and human health impacts estimated to result from implementation of the proposed revisions to the 2015 and 2020 rules.
- Benefit and Cost Analysis for Proposed Supplemental Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category (BCA Report), Document No. 821R23003. This report summarizes the societal benefits and costs estimated to result from implementation of the proposed revisions to the 2015 and 2020 rules.
- Regulatory Impact Analysis for Proposed Supplemental Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category (RIA), Document No. 821R23002. This report presents a profile of the steam electric power generating industry, a summary of estimated costs and impacts associated with the proposed revisions to the 2015 and 2020 rules, and an assessment of the potential impacts on employment and small businesses.
- Environmental Justice Analysis for Proposed Supplemental Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category (EJA), Document No. 821R23001. This report presents a profile of the communities and populations potentially impacted by this proposal, analysis of the distribution of impacts in the baseline and proposed changes, and a summary of inputs from potentially impacted communities that EPA met with prior to the proposal.
- Docket Index for the Proposed Supplemental Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category. This

document provides a list of the additional memoranda, references, and other information EPA relied on for the proposed revisions to the ELGs.

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Appendix A to the Preamble: Definitions, Acronyms, and Abbreviations Used in This Preamble

I. Executive Summary

A. Purpose of Rule

EPA is proposing new regulations that apply to wastewater discharges from steam electric power plants, particularly coal-fired power plants. These plants are increasingly aging and uncompetitive sources of electric power in many portions of the United States and are subject to several environmental regulations designed to control (and in some cases eliminate) air, water, and land pollution over time. One of these regulations, the Steam Electric Power Generating Effluent Limitations Guidelines—or steam electric ELGs—was promulgated in 2015 (80 FR 67838; November 3, 2015) and revised in 2020 (85 FR 64650; October 13, 2020). The 2015 and 2020 rules apply to the subset of the electric power industry where "generation of electricity is the predominant source of revenue or principal reason for operation, and whose generation of electricity results primarily from a process utilizing fossil-type fuel (coal, oil, gas), fuel derived from fossil fuel (*e.g.*, petroleum coke, synthesis gas), or nuclear fuel in conjunction with a thermal cycle employing the steam-water system as the thermodynamic medium" (40 CFR 423.10). The 2015 rule addressed discharges from FGD wastewater, fly ash (FA) transport water, BA transport water, flue gas mercury control (FGMC) wastewater, gasification

wastewater, CRL, legacy wastewater, and nonchemical metal cleaning wastes. The 2020 rule modified the 2015 requirements for FGD wastewater and BA transport water for existing sources only. The 2015 limitations for CRL from existing sources and legacy wastewater were vacated by the United States (U.S.) Court of Appeals for the Fifth Circuit in *Southwestern Electric Power Co., et al.* v. *EPA*, 920 F.3d 999 (5th Cir. 2019).

In the years since EPA revised the steam electric ELGs in 2015 and 2020, pilot testing and full-scale use of various, more stringent compliance technologies have continued to expand. This proposal, if finalized, would revise requirements for discharges associated with the two wastestreams addressed in the 2020 rule: BA transport water and FGD wastewater at existing sources. The proposal would also address the 2015 rule CRL requirements that were vacated. Finally, while EPA is proposing technology-based limitations determined by permitting authorities on a site-specific basis using their best professional judgment (BPJ), an option discussed by the Court in *Southwestern Electric Power Co. v. EPA*.

B. Summary of Proposed Rule

For existing sources that discharge directly to surface water, with the exception of the subcategories discussed below, the proposed rule would establish the following effluent limitations based on Best Available Technology Economically Achievable (BAT):

- A zero-discharge limitation for all pollutants in FGD wastewater and BA transport water.
- Numeric (non-zero) discharge limitations for mercury and arsenic in CRL.

The proposed rule would eliminate the separate, less stringent BAT requirements for two subcategories: high flow facilities and low utilization electric generating units (LUEGUs). The proposed rule does not seek to change the existing subcategories for oil-fired EGUs and small generating units (50 MW or less) established in the 2015 rule. The proposed rule also does not seek to change the existing subcategory for electric generating units (EGUs) permanently ceasing the combustion of coal by 2028, which was established in the 2020 rule (although the Agency

does solicit comment on possible changes to this subcategory). Finally, the proposed rule would create separate requirements for a new subcategory of facilities that have already complied with either the 2015 or 2020 rule's requirements (hereafter referred to as "early adopters") where such facilities would retire by 2032. For both the existing and new subcategory referenced immediately above, EPA proposes additional requirements for affected facilities to demonstrate permanent cessation of coal combustion or that permanent retirement will occur.

For the one known high flow facility (TVA Cumberland Fossil Plant) and the two known facilities with LUEGUs (GSP Merrimack LLC and Indiana Municipal Power Agency (IMPA) Whitewater Valley Station), the proposed rule would eliminate these two subcategories for FGD wastewater and BA transport water, subjecting those wastestreams to the otherwise applicable requirements for the rest of the industry. For early adopters retiring by 2032, the rule would retain the 2020 rule requirements for FGD wastewater and BA transport water rather than require the new, more stringent zero-discharge requirements for these wastestreams.

Where BAT limitations in this proposed rule are more stringent than previously established BPT and BAT limitations, EPA is proposing that any new limitations would not apply until a date determined by the permitting authority that is as soon as possible on or after [Final Rule Publication Date + 60 days], but no later than December 31, 2029.

For indirect discharges (*i.e.*, discharges to publicly owned treatment works (POTWs)), the proposed rule would establish pretreatment standards for existing sources that are the same as the BAT limitations.

C. Summary of Costs and Benefits

EPA estimates that the proposed rule will cost $200 million per year in social costs and result in $1,557 million per year in monetized benefits using a three percent discount rate and will cost $216 million per year in social costs and result in $1,290 million per year in monetized

benefits using a seven percent discount rate.[1] Not all costs and benefits can be fully quantified and monetized, and in particular EPA anticipates the proposed rule would also generate important unquantified benefits (*e.g.*, improved habitat conditions for plants, invertebrates, fish, amphibians, and the wildlife that prey on aquatic organisms). Furthermore, while some health benefits and willingness to pay for water quality improvements have been quantified and monetized, those estimates may not fully capture all important water quality-related benefits.

Table I-1 of this preamble summarizes the monetized benefits and social costs for the four regulatory options EPA analyzed at a three percent discount rate. EPA's analysis reflects the Agency's understanding of the actions steam electric power plants are expected to take to meet the limitations and standards in the proposed rule. EPA based its analysis on a modeled baseline that reflects the full implementation of the 2020 rule, the expected effects of announced retirements and fuel conversions, and the impacts of relevant final rules affecting the power sector. Although the baseline does not reflect anticipated impacts on the industry because of the recently passed Inflation Reduction Act (IRA), EPA solicits comment on means by which the Agency could model the impacts of the IRA for the final rule. Because the primary effect of the IRA in the context of this rule would be to increase the number of facilities that permanently cease coal combustion in the baseline, EPA expects that it would proportionally reduce the benefits and costs estimated in this proposal.[2] EPA understands that these modeled results are uncertain and that the actual costs for individual plants could be higher or lower than estimated. The current estimate reflects the best data and analysis currently available. For additional information on costs and benefits, see Sections VIII and XII of this preamble, respectively.

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[1] As discussed in Section XII of this preamble, not all benefits could be fully quantified and monetized at this time.

[2] Furthermore, because the cessation of coal combustion would occur in the baseline, EPA expect that the rule would continue to be economically achievable even after accounting for the IRA.

Table I-1. Total Monetized Annualized Benefits and Costs of Four Regulatory Options [Millions of 2021$, Three Percent Discount Rate]

Regulatory Option	Total Social Costs	Total Monetized Benefits[a, b]	Total Monetized Net Benefits[a, b]
Option 1	$88.4	$696	$608
Option 2	$167.0	$1,336	$1,169
Option 3 (Preferred)	$200.3	$1,557	$1,357
Option 4	$207.2	$1,670	$1,463

[a] EPA estimated the air-related benefits for Option 3 using the Integrated Planning Model (IPM). EPA did not analyze Options 1, 2, and 4 using IPM. Instead, EPA extrapolated estimates for Options 1, 2, and 4 air-related benefits from the estimate for Option 3 in proportion to total social costs.
[b] Includes benefits of changes in CO_2 air emissions monetized using the Interagency Working Group on the Social Cost of Greenhouse Gases (IWG) SC-CO_2 at 3% (average). See Section XII.B.3 of this preamble for benefits monetized using other SC-CO_2 values.

II. Public Participation

Submit your comments, identified by Docket ID No. EPA-HQ-OW-2009-0819, at *www.regulations.gov* (our preferred method), or the other methods identified in the **ADDRESSES** section. Once submitted, comments cannot be edited or removed from the docket. EPA may publish any comment received to its public docket. Do not submit electronically any information you consider to be CBI or other information whose disclosure is restricted by statute. Multimedia submissions (*e.g.*, audio, video) must be accompanied by a written comment. The written comment is considered the official comment and should include discussion of all points you wish to make. EPA will generally not consider comments or comment contents located outside of the primary submission (*i.e.*, on the web, cloud, or other file sharing system). For additional submission methods, the full EPA public comment policy, information about CBI or multimedia submissions, and general guidance on making effective comments, please visit *www.epa.gov/dockets/commenting-epa-dockets*.

III. General Information

A. Does this action apply to me?

Entities potentially regulated by any final rule following this action include:

Category	Example of Regulated Entity	North American Industry Classification System (NAICS) Code
Industry	Electric Power Generation Facilities—Electric Power Generation	22111

	Electric Power Generation Facilities—Fossil Fuel Electric Power Generation	221112

This section is not intended to be exhaustive, but rather provides a guide regarding entities likely to be regulated by any final rule following this action. Other types of entities that do not meet the above criteria could also be regulated. To determine whether your facility is regulated by any final rule following this action, carefully examine the applicability criteria listed in 40 CFR 423.10 and the definitions in 40 CFR 423.11. If you still have questions regarding the applicability of any final rule following this action to a particular entity, consult the person listed for technical information in the preceding **FOR FURTHER INFORMATION CONTACT** section.

B. What action is EPA taking?

The Agency is proposing to revise, and is soliciting comment on possible revision to certain BAT effluent limitations guidelines and pretreatment standards for existing sources in the steam electric power generating point source category that apply to FGD wastewater, BA transport water, CRL, and legacy wastewater.

C. What is EPA's authority for taking this action?

EPA is proposing to promulgate this rule under the authority of sections 301, 304, 306, 307, 308, 402, and 501 of the Clean Water Act (CWA), 33 U.S.C. 1311, 1314, 1316, 1317, 1318, 1342, and 1361.

D. What are the monetized incremental costs and benefits of this action?

This proposed action is estimated to cost $200 million per year in social costs and result in $1,557 million in benefits using a three percent discount rate. Using a seven percent discount rate, the estimated costs are $216 million per year and the benefits are $1,290 million.

IV. Background

A. Clean Water Act

Congress passed the Federal Water Pollution Control Act Amendments of 1972, also known as the Clean Water Act (CWA), to "restore and maintain the chemical, physical, and

biological integrity of the Nation's waters." 33 U.S.C. 1251(a). The CWA establishes a comprehensive program for protecting our nation's waters. Among its core provisions, the CWA prohibits the discharge of pollutants from a point source to waters of the United States (WOTUS), except as authorized under the CWA. Under section 402 of the CWA, discharges may be authorized through a National Pollutant Discharge Elimination System (NPDES) permit. The CWA also authorizes EPA to establish nationally applicable, technology-based ELGs for discharges from different categories of point sources, such as industrial, commercial, and public sources.

The CWA authorizes EPA to promulgate nationally applicable pretreatment standards that restrict pollutant discharges from facilities that discharge wastewater to WOTUS indirectly through sewers flowing to Publicly Owned Treatment Works (POTWs), as outlined in CWA sections 307(b) and (c), 33 U.S.C. 1317(b) and (c). EPA establishes national pretreatment standards for those pollutants in wastewater from indirect dischargers that may pass through, interfere with, or are otherwise incompatible with POTW operations. Pretreatment standards are designed to ensure that wastewaters from direct and indirect industrial dischargers are subject to similar levels of treatment. *See* CWA section 301(b), 33 U.S.C. 1311(b). In addition, POTWs are required to implement local treatment limits applicable to their industrial indirect dischargers to satisfy any local requirements. *See* 40 CFR 403.5.

Direct dischargers (*i.e.*, those discharging directly to surface waters rather than through POTWs) must comply with effluent limitations in NPDES permits. Discharges that flow through groundwater before reaching surface waters must also comply with effluent limitations in NPDES permits if those discharges are the "functional equivalent" of a direct discharge. *County of Maui v. Hawaii Wildlife Fund*, 140 S. Ct. 1462 (2020). Indirect dischargers, who discharge through POTWs, must comply with pretreatment standards. Technology-based effluent limitations in NPDES permits are derived from effluent limitations guidelines (CWA sections 301 and 304, 33 U.S.C. 1311 and 1314) and new source performance standards (CWA section

306, 33 U.S.C. 1316) promulgated by EPA, or based on best professional judgment (BPJ) where EPA has not promulgated an applicable effluent guideline or new source performance standard. CWA section 402(a)(1)(B), 33 U.S.C. 1342(a)(1)(B); 40 CFR 125.3(c). Additional limitations based on water quality standards are also required to be included in the permit in certain circumstances. CWA section 301(b)(1)(C), 33 U.S.C. 1311(b)(1)(C); 40 CFR 122.44(d). EPA establishes ELGs by regulation for categories of industrial dischargers and are based on the degree of control that can be achieved using various levels of pollution control technology.

EPA promulgates national ELGs for major industrial categories for three classes of pollutants: (1) conventional pollutants (*i.e.*, total suspended solids (TSS), oil and grease, biochemical oxygen demand (BOD_5), fecal coliform, and pH), as outlined in CWA section 304(a)(4) and 40 CFR 401.16; (2) toxic pollutants (*e.g.*, toxic metals such as arsenic, mercury, selenium, and chromium; toxic organic pollutants such as benzene, benzo-a-pyrene, phenol, and naphthalene), as outlined in section 307(a) of the Act, 40 CFR 401.15 and 40 CFR part 423 appendix A; and (3) nonconventional pollutants, which are those pollutants that are not categorized as conventional or toxic (*e.g.*, ammonia-N, phosphorus, and total dissolved solids (TDS)).

B. Relevant Effluent Guidelines

EPA develops effluent guidelines that are technology-based regulations for a category of dischargers. EPA bases these regulations on the performance of control and treatment technologies. The legislative history of CWA section 304(b), which is the heart of the effluent guidelines program, describes the need to press toward higher levels of control through research and development of new processes, modifications, replacement of obsolete plants and processes, and other improvements in technology, taking into account the cost of controls. Congress has also stated that EPA need not consider water quality impacts on individual water bodies as the guidelines are developed; *see* Statement of Senator Muskie (October 4, 1972), reprinted in Legislative History of the Water Pollution Control Act Amendments of 1972, at 170. (U.S.

Senate, Committee on Public Works, Serial No. 93-1, January 1973); *see also Southwestern Elec. Power Co. v. EPA*, 920 F.3d at 1005 ("The Administrator must require industry, regardless of a discharge's effect on water quality, to employ defined levels of technology to meet effluent limitations.") (citations and internal quotations omitted).

There are many technology-based effluent limitations (TBELs) that may apply to a discharger under the CWA: four types of standards applicable to direct dischargers, two types of standards applicable to indirect dischargers, and a default site-specific approach. The TBELs relevant to this rulemaking are described in detail below.

1. Best Practicable Control Technology Currently Available

Traditionally, EPA defines Best Practicable Control Technology (BPT) effluent limitations based on the average of the best performances of facilities within the industry, grouped to reflect various ages, sizes, processes, or other common characteristics. EPA may promulgate BPT effluent limitations for conventional, toxic, and nonconventional pollutants. In specifying BPT, EPA looks at a number of factors. EPA first considers the cost of achieving effluent reductions in relation to the effluent reduction benefits. The agency also considers the age of equipment and facilities, the processes employed, engineering aspects of the control technologies, any required process changes, non-water quality environmental impacts (including energy requirements), and such other factors as the Administrator deems appropriate. *See* CWA section 304(b)(1)(B), 33 U.S.C. 1314(b)(1)(B). If, however, existing performance is uniformly inadequate, EPA may establish limitations based on higher levels of control than what is currently in place in an industrial category, when based on an agency determination that the technology is available in another category or subcategory and can be practicably applied.

2. Best Available Technology Economically Achievable

BAT represents the second level of stringency for controlling direct discharge of toxic and nonconventional pollutants. Courts have referred to this as the CWA's "gold standard" for controlling discharges from existing sources. *Southwestern Elec. Power Co. v. EPA*, 920 F.3d at

1003. In general, BAT represents the best available, economically achievable performance of facilities in the industrial subcategory or category. As the statutory phrase intends, EPA considers the technological availability and the economic achievability in determining what level of control represents BAT. CWA section 301(b)(2)(A), 33 U.S.C. 1311(b)(2)(A). Other statutory factors that EPA considers in assessing BAT are the cost of achieving BAT effluent reductions, the age of equipment and facilities involved, the process employed, potential process changes, and non-water quality environmental impacts, including energy requirements, and such other factors as the Administrator deems appropriate. CWA section 304(b)(2)(B), 33 U.S.C. 1314(b)(2)(B). The agency retains considerable discretion in assigning the weight to be accorded these factors. *Weyerhaeuser Co. v. Costle*, 590 F.2d 1011, 1045 (D.C. Cir. 1978). EPA usually determines economic achievability on the basis of the effect of the cost of compliance with BAT limitations on overall industry and subcategory financial conditions. BAT reflects the highest performance in the industry and may reflect a higher level of performance than is currently being achieved based on technology transferred from a different subcategory or category, bench scale or pilot plant studies, or foreign plants. *Southwestern Elec. Power Co. v. EPA*, 920 F.3d at 1006; *American Paper Inst. V. Train*, 543 F.2d 328, 353 (D.C. Cir. 1976); *American Frozen Food Inst. V. Train*, 539 F.2d 107, 132 (D.C. Cir. 1976). BAT may be based upon process changes or internal controls, even when these technologies are not common industry practice. *See American Frozen Foods*, 539 F.2d at 132, 140; *Reynolds Metals Co. v. EPA*, 760 F.2d 549, 562 (4th Cir. 1985); *California & Hawaiian Sugar Co. v. EPA*, 553 F.2d 280, 285-88 (2nd Cir. 1977).

3. New Source Performance Standards

New Source Performance Standards (NSPS) reflect effluent reductions that are achievable based on the Best Available Demonstrated Control Technology (BADCT). Owners of new facilities have the opportunity to install the best and most efficient production processes and wastewater treatment technologies. As a result, NSPS should represent the most stringent controls attainable through the application of the BADCT for all pollutants (that is, conventional,

nonconventional, and toxic pollutants). In establishing NSPS, EPA is directed to take into consideration the cost of achieving the effluent reduction and any non-water quality environmental impacts and energy requirements. CWA section 306(b)(1)(B), 33 U.S.C. 1316(b)(1)(B).

4. Pretreatment Standards for Existing Sources

Section 307(b), 33 U.S.C. 1317(b), of the Act calls for EPA to issue pretreatment standards for discharges of pollutants to POTWs. Pretreatment standards for existing sources (PSES) are designed to prevent the discharge of pollutants that pass through, interfere with, or are otherwise incompatible with the operation of POTWs. Categorical pretreatment standards are technology-based and are analogous to BPT and BAT effluent limitations guidelines, and thus the agency typically considers the same factors in promulgating PSES as it considers in promulgating BAT. The General Pretreatment Regulations, which set forth the framework for the implementation of categorical pretreatment standards, are found at 40 CFR part 403. These regulations establish pretreatment standards that apply to all non-domestic dischargers. *See* 52 FR 1586 (January 14, 1987).

5. Pretreatment Standards for New Sources

Section 307(c), 33 U.S.C. 1317(c), of the Act calls for EPA to promulgate Pretreatment Standards for New Sources (PSNS). Such pretreatment standards must prevent the discharge of any pollutant into a POTW that may interfere with, pass through, or may otherwise be incompatible with the POTW. EPA promulgates PSNS based on best available demonstrated control technology (BADCT) for new sources. New indirect dischargers have the opportunity to incorporate into their facilities the best available demonstrated technologies. The agency typically considers the same factors in promulgating PSNS as it considers in promulgating NSPS.

6. Best Professional Judgment

The CWA section 301 and its implementing regulation at 40 CFR 125.3(a) indicate that technology-based treatment requirements under section 301(b) of the CWA represent the minimum level of control that must be imposed in an NPDES permit. Where EPA-promulgated effluent guidelines are not applicable to a non-POTW discharge, or where such EPA-promulgated guidelines have been vacated by a court, such treatment requirements are established on a case-by-case basis using the permitting writer's best professional judgment (BPJ). Case-by-case TBELs are developed pursuant to CWA section 402(a)(1), which authorizes EPA Administrator to issue a permit that will meet either: all applicable requirements developed under the authority of other sections of the CWA (*e.g.*, technology-based treatment standards, water quality standards, ocean discharge criteria) or, before taking the necessary implementing actions related to those requirements, "such conditions as the Administrator determines are necessary to carry out the provisions of this Act." The regulation at 40 CFR 125.3(c)(2) cites this section of the CWA, stating that technology-based treatment requirements may be imposed in a permit "on a case-by-case basis under section 402(a)(1) of the Act, to the extent that EPA-promulgated effluent limitations are inapplicable." Further, section 125.3(c)(3) indicates, "[w]here promulgated effluent limitations guidelines only apply to certain aspects of the discharger's operation, or to certain pollutants, other aspects or activities are subject to regulation on a case-by-case basis in order to carry out the provisions of the Act." The factors considered by the permit writer are the same. *See* 40 CFR 125.3(d)(1)-(3).

C. 2015 Steam Electric Power Generation Point Source Category Rule

1. Final Rule Requirements

On September 30, 2015, EPA promulgated a rule revising the regulations for the Steam Electric Power Generating point source category (40 CFR part 423) (hereinafter the "2015 rule"). The rule set the first Federal limitations on the levels of toxic metals that can be discharged in the steam electric industry's largest sources of wastewater, based on technology improvements in the

steam electric power industry over the preceding three decades. Before the 2015 rule, regulations for the industry were last updated in 1982.

Over the last 30 years, new technologies for generating electric power and the widespread implementation of air pollution controls have altered existing wastewater streams or created new wastewater streams at many steam electric facilities, particularly coal-fired facilities. Discharges of these wastestreams include arsenic, lead, mercury, selenium, chromium, and cadmium. Once in the environment, many of these toxic pollutants can remain there for years and continue to cause impacts.

The 2015 rule addressed effluent limitations and standards for multiple wastestreams generated by new and existing steam electric facilities: BA transport water, CRL, FGD wastewater, FGMC wastewater, FA transport water, gasification wastewater, and legacy wastewater. The rule required most steam electric facilities to comply with the effluent limitations "as soon as possible" after November 1, 2018, and no later than December 31, 2023. NPDES permitting authorities established particular compliance date(s) within that range for each facility (except for indirect dischargers) at the time they reissued the facility's NPDES permit.

The 2015 rule was projected to reduce the amount of metals defined in the CWA as toxic pollutants, nutrients, and other pollutants that steam electric facilities are allowed to discharge by 1.4 billion pounds per year and reduce water withdrawal by 57 billion gallons. At the time, EPA estimated annual compliance costs for the final rule to be $480 million (in 2013 dollars) and estimated benefits associated with the rule to be $451 to $566 million (in 2013 dollars).

2. Vacatur of Limitations Applicable to CRL and Legacy Wastewater

Seven petitions for review of the 2015 rule were filed in various circuit courts by the electric utility industry, environmental groups, and drinking water utilities. These petitions were consolidated in the U.S. Court of Appeals for the Fifth Circuit, *Southwestern Electric Power Co. v. EPA*, Case No. 15-60821 (5th Cir.). On March 24, 2017, the Utility Water Act Group

submitted to EPA an administrative petition for reconsideration of the 2015 rule. On April 5, 2017, the Small Business Administration (SBA) submitted an administrative petition for reconsideration of the 2015 rule.

On August 11, 2017, the Administrator announced his decision to conduct a rulemaking to potentially revise the new, more stringent BAT effluent limitations and pretreatment standards for existing sources in the 2015 rule that apply to FGD wastewater and BA transport water. The Fifth Circuit subsequently granted EPA's request to sever and hold in abeyance petitioners' claims related to those limitations and standards, and those claims are still in abeyance. With respect to the remaining claims related to limitations applicable to legacy wastewater and CRL, the Fifth Circuit issued a decision on April 12, 2019, vacating those limitations as arbitrary and capricious under the Administrative Procedure Act and unlawful under the CWA, respectively. *Southwestern Elec. Power Co. v. EPA*, 920 F.3d 999. In particular, the Court rejected EPA's attempts to set BAT limitations for each wastestream equal to previously promulgated BPT limitations based on surface impoundments. In the case of legacy wastewater, the Court held that EPA's record on surface impoundments did not support BAT limitations based on surface impoundments. *Id*. At 1015. In the case of CRL, the Court held that EPA's setting of BAT limitations equal to BPT limitations was an impermissible conflation of the two standards, which are supposed to be progressively more stringent, and that EPA's rationale was not authorized by the statutory factors for determining BAT. *Id*. At 1026. After the Court's decision, EPA announced its plans to address the vacated limitations in a later action after the 2020 rule.

In September 2017, using notice-and-comment procedures, EPA finalized a rule ("postponement rule") postponing the earliest compliance dates for the more stringent BAT effluent limitations and PSES for FGD wastewater and BA transport water in the 2015 rule, from November 1, 2018, to November 1, 2020. EPA also withdrew a prior action it had taken to stay parts of the 2015 rule pursuant to Section 705 of the Administrative Procedure Act, 5 U.S.C.

705. The postponement rule received multiple legal challenges, but EPA prevailed, and the courts did not sustain any of them.[3]

D. 2020 Steam Electric Reconsideration Rule and Recent Developments

1. Final Rule Requirements

On August 31, 2020, EPA promulgated the *Steam Electric Reconsideration Rule* (hereinafter the "2020 rule"). The 2020 rule revised requirements for FGD wastewater and BA transport water applicable to existing sources. Specifically, the 2020 rule made four changes to the 2015 rule. First, the rule changed the technology basis for control of FGD wastewater and BA transport water. For FGD wastewater, the technology basis was changed from chemical precipitation plus high hydraulic residence time biological reduction to chemical precipitation plus low hydraulic residence time biological reduction. This change in the technology basis resulted in less stringent selenium limitations but more stringent mercury and nitrogen limitations. For BA transport water, the technology basis was changed from dry handling or closed-loop systems to high recycle rate systems, allowing for a site-specific purge not to exceed 10 percent of the system volume. This change in technology resulted in less stringent limitations for all pollutants in BA transport water. Second, the 2020 rule revised the technology basis for the voluntary incentives program (VIP) for FGD wastewater from vapor compression evaporation to chemical precipitation plus membrane filtration. This change in the technology basis resulted in less stringent limitations for most pollutants but added new limitations for bromide and nitrogen. Third, the 2020 rule created three new subcategories for high-flow facilities, LUEGUs, and EGUs permanently ceasing coal combustion by 2028. These subcategories were subject to less stringent limitations. Finally, the 2020 rule required most steam electric facilities to comply with the revised effluent limitations "as soon as possible" after

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[3] *See Center for Biological Diversity v. EPA*, No. 18-cv-00050 (D. Ariz. filed January 20, 2018); *see also Clean Water Action. v. EPA*, No. 18-60079 (5th Cir.). On October 29, 2018, the District of Arizona case was dismissed upon EPA's motion to dismiss for lack of jurisdiction, and on August 28, 2019, the Fifth Circuit denied the petition for review of the postponement rule.

October 13, 2021, and no later than December 31, 2025.[4] NPDES permitting authorities established the particular compliance date(s) within that range for each facility (except for indirect dischargers) at the time they reissued the facility's NPDES permit.

2. Fourth Circuit Court of Appeals Litigation

Two petitions for review of the 2020 rule were timely filed by environmental group petitioners and consolidated in the U.S. Court of Appeals for the Fourth Circuit on November 19, 2020. *Appalachian Voices, et al. v. EPA*, No. 20-2187 (4th Cir.). An industry trade group and certain energy companies moved to intervene in the litigation, which the Court granted on December 3, 2020.

3. Executive Order 13990

On January 20, 2021, President Biden issued Executive Order (E.O.) 13990: *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis* (86 FR 7037). E.O. 13990 directed Federal agencies to immediately review and, if necessary, take action to address the promulgation of Federal regulations and other actions during the previous four years that conflict with the national objectives of protecting public health and the environment. A list of regulations to be reviewed, including the 2020 rule, was released in conjunction with this E.O.

4. Announcement of Supplemental Rule and Preliminary Effluent Guidelines Plan 15

On July 26, 2021, EPA announced the new rulemaking to strengthen certain wastewater pollution discharge limitations for coal-fired power plants that use steam to generate electricity. EPA later clarified that, as part of its new rulemaking, it would be reconsidering all aspects of the 2020 rule.[5] EPA undertook an evidence-based, science-based review of the 2020 Steam Electric Reconsideration Rule under E.O. 13990, finding that there are opportunities to

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[4] The 2015 rule's VIP compliance date was revised to December 31, 2028, in the 2020 rule.

[5] On April 8, 2022, the U.S. Court of Appeals for the Fourth Circuit granted EPA's motion for a long-term abeyance of the litigation challenging the 2020 rule, pending this rulemaking.

strengthen certain wastewater pollution discharge limitations. For example, EPA discussed how treatment systems using membranes have advanced since the 2020 rule's promulgation and continue to rapidly advance as an effective option for treating a wide variety of industrial pollution, including pollution from steam electric power plants. In the announcement, EPA also confirmed that until a new rule is promulgated, the 2015 and 2020 regulations will continue to be implemented and enforced to achieve needed pollutant reductions.

In September 2021, EPA issued *Preliminary Effluent Guidelines Program Plan 15*.[6] This document discussed the annual review of effluent limitations guidelines and pretreatment standards, rulemakings for new and existing industrial point source categories, and any new or existing sources receiving further analyses. Here, EPA not only discussed the wastestreams affected by the 2020 rule (FGD wastewater and BA transport water), but also the wastestreams from the 2015 rule which had limitations vacated and remanded to the Agency (*i.e.*, CRL and legacy wastewater). This was the first time EPA had publicly presented information that the supplemental rulemaking could cover these wastestreams as well. For further discussion of the vacatur and remand of the 2015 limitations applicable to CRL and legacy wastewater, see Section IV.D of this preamble.

E. Other Ongoing Rules Impacting the Steam Electric Sector

1. Coal Combustion Residuals Disposal Rule

On April 17, 2015, EPA promulgated the Disposal of Coal Combustion Residuals from Electric Utilities final rule (2015 CCR rule). This rule finalized national regulations to provide a comprehensive set of requirements for the safe disposal of coal combustion residuals (CCR), commonly referred to as coal ash, from steam electric power plants. The final 2015 CCR rule was the culmination of extensive study on the effects of coal ash on the environment and public health. The rule established technical requirements for CCR landfills and surface impoundments

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[6] Available online at: *www.epa.gov/system/files/documents/2021-09/ow-prelim-elg-plan-15_508.pdf.*

under subtitle D of the Resource Conservation and Recovery Act (RCRA), the nation's primary law for regulating solid waste.

These regulations established requirements for the management and disposal of coal ash, including requirements designed to prevent leaking of contaminants into groundwater, blowing of contaminants into the air as dust, and the catastrophic failure of coal ash surface impoundments. The 2015 CCR rule also set recordkeeping and reporting requirements, as well as requirements for each plant to establish and post specific information to a publicly accessible website. The rule also established requirements to distinguish between the beneficial use of CCR from disposal.

As a result of the D.C. Circuit Court decisions in *Utility Solid Waste Activities Group v. EPA*, 901 F.3d 414 (D.C. Cir. 2018), and *Waterkeeper Alliance Inc. et al. v. EPA*, No. 18-1289 (D.C. Cir. filed March 13, 2019), the Administrator signed two rules: *A Holistic Approach to Closure Part A: Deadline to Initiate Closure and Enhancing Public Access to Information* (CCR Part A rule) on July 29, 2020, and *A Holistic Approach to Closure Part B: Alternate Liner Demonstration* (CCR Part B rule) on October 15, 2020. EPA finalized five amendments to the 2015 CCR rule which continue to impact the wastewaters covered by this ELG. First, the CCR Part A rule established a new deadline of April 11, 2021, for all unlined surface impoundments, as well as those surface impoundments that failed the location restriction for placement above the uppermost aquifer, to stop receiving waste and begin closure or retrofitting. EPA established this date after evaluating the steps that owners and operators need to take for surface impoundments to stop receiving waste and begin closure, and the timeframes needed for implementation. (This would not affect the ability of plants to install new, composite-lined surface impoundments.) Second, the Part A rule established procedures for plants to obtain approval from EPA for additional time to develop alternative disposal capacity to manage their wastestreams (both coal ash and noncoal ash) before they must stop receiving waste and begin closing their coal ash surface impoundments. Third, the Part A rule changed the classification of compacted-soil-lined

and clay-lined surface impoundments from lined to unlined. Fourth, the Part B rule finalized procedures potentially allowing a limited number of facilities to demonstrate to EPA that, based on groundwater data and the design of a particular surface impoundment, the unit ensures there is no reasonable probability of adverse effects to human health and the environment. Should such a submission be approved, these CCR surface impoundments would be allowed to continue to operate.

As explained in the 2015 and 2020 ELG rules, the ELGs and CCR rules may affect the same EGU or activity at a plant. Therefore, when EPA finalized the ELG and CCR rules in 2015, and revisions to both rules in 2020, the Agency coordinated the ELG and CCR rules to minimize the complexity of implementing engineering, financial, and permitting activities. EPA considered the interaction of these two rules during the development of this proposal. EPA's analysis builds in the final requirements of these rules in the baseline accounting for the most recent data provided under the CCR rule reporting and recordkeeping requirements. This is further described in Supplemental TDD, Section 3. For more information on the CCR Part A and Part B rules, including information about their ongoing implementation, visit *www.epa.gov/coalash/coal -ash-rule*.

2. Air Pollution Rules and Implementation

EPA is taking several actions to regulate a variety of conventional, hazardous, and greenhouse gas (GHG) air pollutants, including actions to regulate the same steam electric plants subject to Part 423. Other actions impact steam electric plants indirectly when implemented by states. In light of these ongoing actions, EPA has worked to consider appropriate flexibilities in this proposed ELG rule to provide certainty to the regulated community while ensuring the statutory objectives of each program are achieved. Furthermore, to the extent that these actions are finalized and already impacting steam electric plant operations, EPA has accounted for these changed operations in its IPM modeling discussed in Section VIII of this preamble.

a. The Revised Cross State Air Pollution Rule (CSAPR) Update and the Proposed Good

Neighbor Plan for the 2015 Ozone National Ambient Air Quality Standards (NAAQS)

EPA recently completed a rulemaking to address "good neighbor" obligations for the 2008 ozone national ambient air quality standards (NAAQS) and proposed a rulemaking in 2022 with respect to the same statutory obligations for the 2015 ozone NAAQS. These actions implement the Clean Air Act's (CAA's) prohibition on emissions that significantly contribute to nonattainment or interfere with maintenance of the NAAQS in other states.

On April 30, 2021, EPA published the final Revised Cross-State Air Pollution Rule (CSAPR) Update, 86 FR 23054, which resolved 21 states' good neighbor obligations for the 2008 ozone NAAQS, following the remand of the 2016 CSAPR Update (81 FR 74504, October 26, 2016) in *Wisconsin v. EPA*, 938 F.3d 308 (D.C. Cir. 2019). Between them, these two rules establish the Group 2 and Group 3 market-based emissions trading programs for 22 states in the eastern United States for emissions of oxides of nitrogen (NO_X) from fossil fuel-fired EGUs during the summer ozone season.

On February 28, 2022, the Administrator signed a proposed rule, Federal Implementation Plan Addressing Regional Ozone Transport for the 2015 Ozone National Ambient Air Quality Standards, 87 FR 20036 (April 6, 2022) (also called the Good Neighbor Plan). This proposed rule includes further ozone-season NO_X pollution reduction requirements for fossil fuel-fired EGUs to address 25 states' good neighbor obligations for the 2015 ozone NAAQS. The proposed rule would establish an enhanced Group 3 market-based emissions trading program with NO_X budgets for EGUs in those 25 states, beginning in 2023. Further information about this proposal is available on EPA's website.[7]

b. Clean Air Act Section 111 Rule

On October 23, 2015, EPA finalized NSPSs for emissions from new, modified, and reconstructed fossil fuel-fired EGUs under CAA section 111(b). Specifically, the 2015 NSPS

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[7] *See www.epa.gov/csapr/good-neighbor-plan-2015-ozone-naaqs.*

established separate standards for emissions of CO_2 from newly constructed, modified, and reconstructed fossil fuel-fired electric utility steam generating units (*i.e.*, utility EGUs and integrated gasification combined cycle units) and from newly constructed and reconstructed fossil fuel-fired stationary combustion turbines. The standards set in the 2015 NSPS reflected the degree of emission limitation achievable through application of the best system of emission reduction that EPA determined to have been adequately demonstrated for each type of unit and was codified in 40 CFR part 60, subpart TTTT. EPA is currently reviewing the 2015 NSPS—including new technologies to mitigate GHG emissions from new, modified, and reconstructed stationary combustion turbines—and will, if warranted, propose to revise the NSPSs in an upcoming rulemaking.

On August 3, 2015, under CAA section 111(d), EPA promulgated its first emission guidelines regulating emissions from existing fossil fuel-fired EGUs in the Clean Power Plan (CPP) (40 CFR part 60, subpart UUUU). The CPP was subsequently stayed by the U.S. Supreme Court. On June 19, 2019, EPA promulgated new emission guidelines, known as the Affordable Clean Energy (ACE) Rule (40 CFR part 60, subpart UUUUa), and issued a repeal of the CPP. On January 19, 2021, the U.S. Court of Appeals for the D.C. Circuit vacated the ACE Rule and remanded the rule to EPA for further consideration consistent with its decision. The Supreme Court then overturned portions of the D.C. Circuit Court's decision in *West Virginia v. EPA*, No. 20-1530, in June 2022. EPA is now considering the implications of the Supreme Court's decision and is undertaking a new rulemaking to establish new emission guidelines under CAA section 111(d) to limit emissions from existing fossil fuel-fired EGUs.

c. Mercury and Air Toxics Standards Rule

After considering costs, EPA recently proposed to reaffirm the determination that it is appropriate and necessary to regulate hazardous air pollutants (HAPs), including mercury, from coal- and oil-fired steam generating power plants. These regulations are known as the Mercury and Air Toxics Standards (MATS) for power plants. The proposed MATS action would revoke a

2020 finding that it is not appropriate and necessary to regulate coal- and oil-fired power plants under CAA section 112, but which did not disturb the underlying MATS regulations. The MATS proposal would ensure that coal- and oil-fired power plants continue to control emissions of toxic air pollution, including mercury.

d. National Ambient Air Quality Standards Rules for Particulate Matter

EPA is currently reconsidering a December 7, 2020, decision to retain the primary (health-based) and secondary (welfare-based) NAAQS for particulate matter (PM).[8] EPA is reconsidering the December 2020 decision because available scientific evidence and technical information indicate that the current standards may not be adequate to protect public health and welfare, as required by the CAA.

V. Steam Electric Power Generating Industry Description

A. General Description of Industry

EPA provided a general description of the steam electric power generating industry in the 2013 proposed rule, the 2015 final rule, the 2019 proposed rule, and the 2020 final rule, and has continued to collect information and update that industry profile. The previous descriptions reflected the known information about the universe of steam electric power plants and incorporated final environmental regulations applicable at that time. For this proposal, as described in the Supplemental TDD, Section 3, EPA has revised its description of the steam electric power generating industry (and its supporting analyses) to incorporate major changes such as additional retirements, fuel conversions, ash handling conversions, wastewater treatment updates, and updated information on capacity utilization.[9] The analyses supporting the proposed rule use an updated baseline that incorporates these changes in the industry. The analyses then

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[8] *See www.epa.gov/newsreleases/epa-reexamine-health-standards-harmful-soot-previous-administration-left-unchanged*.

[9] The data presented in the general description continue to reflect some conditions existing in 2009, as the 2010 steam electric industry survey remains EPA's best available source of information for characterizing operations across the industry.

compare the effect of the proposed rule's requirements for FGD wastewater, BA transport water, CRL, and legacy wastewater to the effect on the industry (as it exists today) of the 2015 and 2020 rules' limitations for FGD wastewater, BA transport water, CRL, and legacy wastewater.

As described in the Regulatory Impact Analysis, of the 871 steam electric power plants in the country identified by EPA, only those coal-fired power plants that discharge FGD wastewater, BA transport water, CRL, and/or legacy wastewater may incur compliance costs under this proposal. EPA estimates that 69 to 93 such plants may incur compliance costs under the regulatory options in this proposal. For further information about plant retirements, fuel conversions, ash handling conversions, wastewater treatment updates, and updated information on capacity utilization, see *Changes to Industry Profile for Coal-Fired Generating Units for the Steam Electric Effluent Guidelines Proposed Rule* (DCN SE10241).

B. Greenhouse Gas Reduction Targets, the Inflation Reduction Act, and Potential Impacts on Current Market Conditions

While this proposal was motivated by the CWA and by the need to address water pollution, EPA acknowledges that there are also large changes happening in the industry, in part due to a series of actions targeted toward GHG reductions. First, in April 22, 2021, President Biden announced new 2030 GHG reduction targets for the United States.[10] As part of reaching net zero emissions by 2050, the nationally determined contribution submitted to the United Nations Framework Convention on Climate Change includes a 50–52 percent reduction from 2005 levels by 2030. These reduction targets were developed by the National Climate Task Force and support the United States' commitments under the Paris Agreement.

The steam electric sector is one of the largest contributors of U.S. GHG emissions. Figure IV-1 of this preamble below is reproduced from EPA's website.[11] As shown in the figure, EPA

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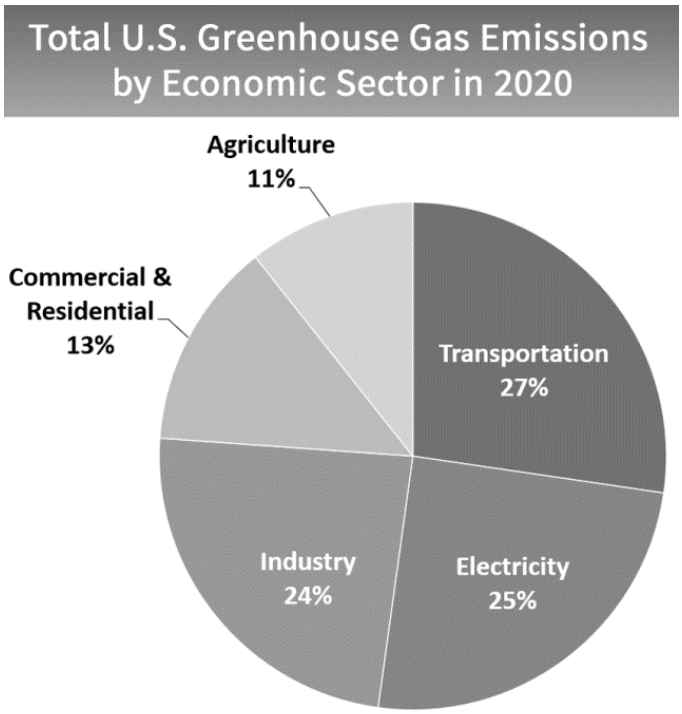
[10] *See www.whitehouse.gov/ceq/news-updates/2021/12/13/icymi-president-biden-signs-executive-order-catalyzing-americas-clean-energy-economy-through-federal-sustainability/.*

[11] *See www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions*.

estimates that 25 percent of 2020 GHG emissions in the United States came from electricity generation (largely comprised of emissions from steam electric power plants). Although this fraction continues to decline, several models looking at plausible pathways to meet the announced 2030 goal have estimated that substantial additional GHG reductions from coal combustion will be necessary.[12]

Figure IV-1. 2020 Greenhouse Gas Emissions[13,14]



The GHG reduction targets did not directly impose incentives on steam electric plants; however, on August 16, 2022, President Biden signed the IRA into law. The IRA includes many provisions that will affect the steam electric power generating industry. The IRA provides tax

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[12] Bistline, J., Abhyankar, N., Blanford, G., Clarke, L., Fakhry, R., Mcjeon, H., Reilly, J., Roney, C., Wilson, T., Yuan, M., and Zhao, A. 2022. *Actions for reducing US emissions at least 50% by 2030. Policies must help decarbonize power and transport sectors.* Science. Vol 376, Issue 6596. Pg 922-924. May 26. Available online at: *www.science.org/doi/10.1126/science.abn0661*.

[13] Total emissions in 2020 = 5,981 million metric tons of CO_2 equivalent. Percentages may not add up to 100 percent due to independent rounding.

[14] Land use, land-use change, and forestry in the United States is a net sink and removes approximately 13 percent of these GHG emissions. This net sink is not shown in the above diagram. All emission estimates are from the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2020.* Available online at: *www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks.*

credits, financing programs, and other incentives that will accelerate the transition to forms of energy that produce little or no GHG emissions. An analysis conducted by the Department of Energy (DOE) shows that tax incentives included in the IRA will increase the growth of wind and solar electricity generation while supporting the maintenance of the country's existing nuclear power fleet.[15] Thus, the DOE analysis suggests the IRA may reduce the number of coal burning power plants in operation.

Based on these DOE analytic results EPA would expect reduced baseline emissions of air and water pollution, lower total incremental costs, and lower total incremental benefits of this rule. Lower costs and benefits would alter the regulatory impact analysis under E.O. 12866 and E.O. 13563. While the impacts of the IRA are not reflected in the detailed analyses included with this proposal (because the analyses were completed prior to the passage of the IRA), EPA is evaluating how the IRA can be incorporated into the baseline of the final rule (including IPM) and will update the analyses to reflect the IRA for any final rule. EPA solicits comment on the incorporation of the IRA into its analyses, including any specific recommendations or data supporting a particular approach.

EPA does not expect the IRA to affect the current findings of economic achievability of the rule. To evaluate economic achievability, EPA considers the costs of the technologies that form the basis for BAT and uses IPM to assess changes in the power sector, including closures. As discussed in Section VIII of this preamble, EPA expects the costs of the technologies discussed here to result in a single coal-fired power plant closure; thus, the rule would be economically achievable.

C. Control and Treatment Technologies

In general, control and treatment technologies for some wastestreams have continued to advance since the 2015 and 2020 rules. Often, these advancements provide plants with additional

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[15] *See www.energy.gov/sites/default/files/2022-08/8.18%20InflationReductionAct_Factsheet_Final.pdf.*

approaches for complying with any effluent limitations. In some cases, these advancements have also decreased the associated costs of compliance. For this proposal, EPA incorporated updated information and evaluated several technologies available to control and treat FGD wastewater, BA transport water, CRL, and legacy wastewater generated by the steam electric industry. See Section VIII of this preamble for details on updated cost information.

1. FGD Wastewater

FGD scrubber systems are used to remove sulfur dioxide from flue gas so it is not emitted into the air. Dry FGD systems use water in their operation but generally do not discharge wastewater as it is evaporated during operation, while wet FGD systems produce a wastewater stream.

Steam electric power plants discharging FGD wastewater currently employ a variety of wastewater treatment technologies and operating/management practices to reduce the pollutants associated with FGD wastewater discharges. EPA identified the following types of treatment and handling practices for FGD wastewater as part of the 2015 and 2020 rules:

- **Chemical precipitation.** Chemicals are added as part of the treatment system to help remove suspended solids and dissolved solids, particularly metals. The precipitated solids are then removed from solution by coagulation/flocculation followed by clarification and/or filtration. The 2015 and 2020 rules focused on a specific design that employs hydroxide precipitation, sulfide precipitation (organosulfide), and iron coprecipitation to remove suspended solids and to convert soluble metal ions to insoluble metal hydroxides or sulfides. Chemical precipitation was part of the BAT technology basis for the effluent limitations in the 2015 and 2020 rule.
- **High hydraulic residence time biological reduction (HRTR).** EPA identified three types of biological treatment systems used to treat FGD wastewater: anoxic/anaerobic fixed-film bioreactors (which target removals of nitrogen compounds and selenium), anoxic/anaerobic suspended growth systems (which target removals of selenium and

other metals), and aerobic/anaerobic sequencing batch reactors (which target removals of organics and nutrients). An anoxic/anaerobic fixed-film bioreactor designed to remove selenium and nitrogen compounds using high hydraulic residence times of approximately 10 to 16 hours was the BAT technology basis for the effluent limitations in the 2015 rule.

- **Low hydraulic residence time biological reduction (LRTR).** A biological treatment system that targets removal of selenium and nitrate/nitrite using fixed-film bioreactors in smaller, more compact reaction vessels. This system differs from the HRTR biological treatment system evaluated in the 2015 rule, in that the LRTR system is designed to operate with a shorter residence time (approximately one to four hours, compared to a residence time of 10 to 16 hours for HRTR), while still achieving significant removal of selenium and nitrate/nitrite. LRTR was the BAT technology basis for the effluent limitations in the 2020 rule.
- **Membrane filtration.** A membrane filtration system (*e.g.,* microfiltration, ultrafiltration, nanofiltration, forward osmosis (FO), electrodialysis reversal (EDR), or reverse osmosis (RO)) designed specifically for high TDS and TSS wastestreams. These systems are designed to minimize fouling and scaling associated with industrial wastewater. These systems typically use pretreatment for potential scaling agents (*e.g.*, calcium, magnesium, sulfates) combined with one or more type of membrane technology to remove a broad array of particulate and dissolved pollutants from FGD wastewater. The membrane filtration units may also employ advanced techniques, such as vibration or creation of vortexes to mitigate fouling or scaling of the membrane surfaces. Membrane filtration can achieve zero discharge by recirculating permeate from the RO system back into plant operations.
- **Spray evaporation.** Spray evaporation technologies, which include spray dry evaporators (SDEs) and other similar proprietary variations, evaporate water by

spraying fine misted wastewater into hot gasses. The hot gasses allow the water to evaporate before contacting the walls of an evaporation vessel, treating wastewater across a range of water quality characteristics such as TDS, TSS, or scale forming potential. Spray evaporation technologies use a less complex treatment configuration than brine concentrator and crystallizer systems (*see* the description of thermal evaporation systems) to evaporate water by a heat source, such as a slipstream of hot flue gas or an external natural gas burner. Spray evaporation technologies can be used in combination with other volume reduction technologies, such as membranes, to maximize the efficiency of each process. Concentrate from the RO system can then be processed through the spray evaporation technology to achieve zero discharge by recirculating permeate from the RO system back into plant operations.

- **Thermal evaporation.** Thermal evaporation systems that use a falling-film evaporator (or brine concentrator), following a softening pretreatment step, to produce a concentrated wastewater stream and a distillate stream to reduce wastewater volume by 80 to 90 percent and reduce the discharge of pollutants. The concentrated wastewater is usually further processed in a crystallizer that produces a solid residue for landfill disposal and additional distillate that can be reused within the plant or discharged. These systems are designed to remove the broad spectrum of pollutants present in FGD wastewater to very low effluent concentrations.
- Some plants operate their wet FGD systems using approaches that eliminate the discharge of FGD wastewater. These plants use a variety of operating and management practices to achieve this, including the following:
  - **Complete recycle.** The FGD Wastestream is allowed to recirculate. Particulates (e.g., precipitates and other solids) are removed and landfilled. Water is supplemented when needed to replace that evaporated or removed with landfilled solids. This process does not produce a saleable product (e.g., wallboard grade gypsum) but it does not need a wastewater purge stream to maintain low levels of

chloride.

- **Evaporation impoundments.** Some plants located in warm, dry climates have been able to use surface impoundments as holding basins where the FGD wastewater is retained until it evaporates. The evaporation rate from the impoundments at these plants is greater than the flow rate of the FGD wastewater and amount of precipitation entering the impoundments; therefore, there is no discharge to surface water.[16] These impoundments must be large enough to accommodate extreme precipitation events to prevent overtopping and runoff.

- **FA conditioning.** Many plants that operate dry FA handling systems will utilize the water from their FGD system in the FA handling system to suppress dust or improve handling and/or compaction characteristics in an on-site landfill.

- **Combination of wet and dry FGD systems.** The dry FGD process involves atomizing and injecting wet lime slurry, which ranges from approximately 18 to 25 percent solids, into a spray dryer. The water contained in the slurry evaporates from the heat of the flue gas within the system, leaving a dry residue that is removed from the flue gas by a fabric filter (*i.e.*, baghouse) or electrostatic precipitator.

- **Underground injection.** These systems dispose of wastes by injecting them into a permitted underground injection well as an alternative to discharging wastewater to surface waters.

EPA also collected new information on other FGD wastewater treatment technologies, including direct contact thermal evaporators and ion exchange. These treatment technologies have been evaluated, in full- or pilot-scale, or are being developed to treat FGD wastewater. See Section 4.1 of the Supplemental TDD for more information on these technologies.

2. BA Transport Water

[16] Such impoundments must be lined based on the requirements in the CCR rule. This would significantly reduce the potential of a discharge to groundwater.

BA consists of heavier ash particles that are not entrained in the flue gas and fall to the bottom of the furnace. In most furnaces, the hot BA is quenched in a water-filled hopper.[17] Some plants use water to transport (sluice) the BA from the hopper to an impoundment or dewatering bins. The water used to transport the BA to the impoundment or dewatering bins is usually discharged to surface water as overflow from the systems after the BA has settled to the bottom. The industry also uses the following BA handling systems that generate BA transport water:

- **Remote mechanical drag system (MDS).** These systems transport BA to a remote MDS using the same processes as wet-sluicing systems. A drag chain conveyor pulls the BA out of the water bath on an incline to dewater the BA. The system can either be operated as a closed-loop system (technology basis for the 2015 rule) or a high recycle rate system (technology basis for the 2020 rule).[18]
- **Mobile MDS.** This technology is a smaller, mobile version of a remote MDS with an additional clarification system. It is not intended to be a permanent installation, allowing for the reduction of capital costs as facility needs allow. Once in place, the system works like a remote MDS—the incoming water is clarified and primary separation occurs. The clarified water is taken from the mechanical drag system to a mobile clarifier and polished to a level suitable for recirculation. The mobile clarifier thickens the collected solids, which are then sent back to the mechanical drag system portion and mixed with coarse BA. This mixture is sent up an incline, dewatered, and disposed of.
- **Dense slurry system.** These systems use a dry vacuum or pressure system to convey the BA to a silo (as described below for the "Dry Vacuum or Pressure System"), but instead of using trucks to transport the BA to a landfill, the plant mixes the BA with a

[17] Consistent with the 2015 and 2020 rule, boiler slag is considered BA.

[18] In some cases, additional treatment may be necessary to maintain a closed-loop system. This additional treatment could include polymer addition to enhance removal of suspended solids or membrane filtration of a slip stream to remove dissolved solids.

lower percentage of water compared to a wet-sluicing system and pumps the mixture to the landfill.

As part of the 2020 rule and this proposed rule, EPA identified the following BA handling systems that do not, by definition or practice, generate BA transport water.

- **MDS.** These systems are located directly underneath the boiler. The BA is collected in a water quench bath. A drag chain conveyor pulls the BA out of the water bath along an incline to dewater the BA.
- **Dry mechanical conveyor.** These systems are located directly underneath the boiler. The system uses ambient air to cool the BA in the boiler and then transports the ash out from under the boiler using a conveyor. There is no water used in this process.
- **Dry vacuum or pressure system.** These systems transport BA from the boiler to a dry hopper without using any water. Air is percolated through the ash to cool it and combust unburned carbon. Cooled ash then drops to a crusher and is conveyed via vacuum or pressure to an intermediate storage destination.
- **Vibratory belt system.** These systems deposit BA on a vibratory conveyor trough, where the ash is air-cooled and ultimately moved through the conveyor deck to an intermediate storage destination without using any water.
- **Submerged grind conveyor.** These systems are located directly underneath the boiler and are designed to reuse slag tanks, ash gates, clinker grinders, and transfer enclosures from the existing wet sluicing systems. The system collects BA from the discharge of each clinker grinder. A series of submerged drag chain conveyors transport and dewater the BA.

See Section 4.2 of the Supplemental TDD for more information on these technologies.

3. CRL

In promulgating the 2015 rule, EPA determined that combustion residual leachate from landfills and impoundments includes similar types of constituents as FGD wastewater, albeit at

potentially lower concentrations and smaller volumes. Based on this characterization of the wastewater and knowledge of treatment technologies, EPA determined that certain treatment technologies identified for FGD wastewater could also be used to treat leachate from landfills and impoundments containing combustion residuals. These technologies, described in Section V.C.1, of this preamble include chemical precipitation, biological treatment (including LRTR), membrane filtration, spray evaporation, or other thermal treatment options. EPA also identified other management and reuse strategies from responses to the 2010 *Questionnaire for the Steam Electric Power Generating Effluent Guidelines,* or steam electric survey, that included using CRL from either an impoundment or landfill for moisture conditioning FA, dust control, or truck wash. EPA also identified plants that collect CRL from impoundments and recycle it directly back to the impoundment.

4. Legacy Wastewater

Legacy wastewater can be comprised of FGD wastewater, BA transport water, FA transport water, CRL, gasification wastewater and/or FGMC wastewater generated before the "as soon as possible" date that more stringent effluent limitations from the 2015 or 2020 rules would apply. Discharges of legacy wastewater may occur through an intermediary source (e.g., a tank or surface impoundment) or directly into a surface waterbody (*see* Section VII.B.4 of this preamble). The record indicates that the following technologies can be applied to treat this type of legacy wastewater: chemical precipitation, biological treatment (including LRTR), membrane filtration, spray evaporation, or other thermal treatment options. These technologies are described in Section V.C.1 of this preamble. Another option, which may be used in combination with other systems such as chemical and physical treatment, is zero valent iron (ZVI).

- ZVI. This technology can be used to target specific inorganics, including selenium, arsenic, nitrate, and mercury in this type of legacy wastewater. The technology entails mixing influent wastewater with ZVI (iron in its elemental form), which reacts with oxyanions, metal cations, and some organic molecules in wastewater. ZVI causes a

reduction reaction of these pollutants, after which the pollutants are immobilized through surface adsorption onto iron oxide coated on the ZVI or generated from oxidation of elemental iron. The coated, or spent, ZVI is separated from the wastewater with a clarifier. The quantity of ZVI required and number of reaction vessels can vary based on the composition and amount of wastewater being treated.

EPA recognizes that the characterization of legacy wastewater differs within the layers of a CCR impoundment as it is dewatered and prepared for closure. Therefore, treatment requirements may change as closure continues. Wastewater characteristics also differ across CCR impoundments due to different types of fuels burned at the plant, duration of pond operation, and ash type. The list of treatment technologies identified for legacy wastewater above are all applicable to all legacy wastewaters; however, treatment may require a combination of those technologies (*e.g.*, chemical precipitation and membrane filtration).

In addition, solids dewatering is necessary to dredge CCR materials from the impoundment. Mobile dewatering systems are typically self-contained units on a trailer, allowing for the entire system to be easily moved on-site and off-site. Legacy wastewater from a holding area (*e.g.*, pit, pond, collection tank) is pumped through a filter press to generate a filter cake and water stream. A shaker screen can be added to the treatment train to remove larger particles prior to the filter press. Furthermore, the filter press can be equipped with automated plate shifters to allow solids to drop from the end of the trailer directly into a loader or truck. The resulting wastestream may be further treated to meet any discharge requirements.

VI. Data Collection Since the 2020 Rule

A. Information from the Electric Utility Industry

1. Data Requests and Responses

In January 2022, EPA requested the following pollution treatment system performance and cost information for coal-fired power plants from three steam electric power companies:

- FGD wastewater installations of the following technologies: thermal technology; membrane filtration technology; paste, solidification, or encapsulation of FGD wastewater brine; electrodialysis; and electrocoagulation.
- Overflow from an MDS, a compact submerged conveyor (CSC), or remote MDS installations, including purge rate and management from remote MDS systems, as well as any pollutant concentration data to characterize the overflow or purge.
- CRL treatment from on-site or off-site testing (full-, pilot-, or laboratory-scale).
- On-site or off-site testing (full-, pilot-, or laboratory-scale) and/or implementation of treatment technologies associated with surface impoundment decanting or dewatering treatment.
- Costs associated with these technologies.

In addition, EPA sent four additional power companies a voluntary request inviting them to provide the same data described above after EPA had met with these companies.

2. Meetings with Individual Utilities

To gather information to support this supplemental proposed rule, EPA met with representatives from four utilities. Two of these utilities reached out to EPA after the announcement of the supplemental rule. EPA contacted the remaining utilities due to their known or potential consideration of membrane filtration. At these meetings, EPA discussed the operation of the utility's coal-fired generating units and the treatment and management of BA transport water, FGD wastewater, legacy wastewater, and CRL since the 2020 rule. EPA learned about updates associated with plant operations and studies that were originally discussed during the 2015 and 2020 rules.

The specific objectives of these meetings were to gather general information about coal-fired power plant operations; pollution prevention and wastewater treatment system operations; ongoing pilot or laboratory scale study information for FGD wastewater treatment; BA system performance, characterization, and quantification of the overflow and purge from remote MDS

installations; and treatment technologies and pilot testing associated with CRL and legacy wastewater. EPA used this information to supplement the data collected in support of the 2015 and 2020 rules.

3. Voluntary CRL Sampling

In December 2021, EPA invited eight steam electric power companies to participate in a voluntary program designed to obtain data to supplement the wastewater characterization data set for CRL. EPA requested these data from facilities believed to have constructed new landfills pursuant to the 2015 CCR rule. Six power companies chose to participate in this program.

4. Electric Power Research Institute Voluntary Submission

The Electric Power Research Institute (EPRI) conducts industry-funded studies to evaluate and demonstrate technologies that can potentially remove pollutants from wastestreams or eliminate wastestreams using zero discharge technologies. Following the 2015 rule, EPA reviewed 35 reports published between 2011 and 2018 that EPRI voluntarily provided regarding characteristics of FGD wastewater, FGD wastewater treatment pilot studies, BA transport water characterization, BA handling practices, halogen addition rates, and the effect of halogen additives on FGD wastewater. For this supplemental proposed rule, EPRI provided an additional 25 reports generated in the intervening years. EPA used information presented in these reports to inform the development of numeric effluent limitations for FGD wastewater and to update methodologies for estimating costs and pollutant removals associated with candidate treatment technologies.

5. Meetings with Trade Associations

In 2021 and 2022, EPA met with the Edison Electric Institute and the American Public Power Association. These trade associations represent investor-owned utilities and community-owned utilities, respectively. They provided information and perspectives on the current status of many utilities transitioning away from coal.

B. Notices of Planned Participation

The 2020 rule required facilities to file a notice of planned participation (NOPP) with their permitting authority no later than October 13, 2021, if the facility wished to participate in the LUEGU subcategory, the permanent cessation of coal combustion subcategory, or in the VIP (*see* 40 CFR 423.19(e), (f), and (h), respectively). While EPA did not require that a copy be provided to the Agency, EPA nevertheless obtained a number of these filings. Some facilities provided EPA a courtesy copy when filing with the relevant permitting authority. The Agency received notice of other filings as part of its standard permit review process when a state permitting authority sent new draft permits or modifications to EPA for review. EPA also asked some states for NOPPs after those states asked EPA questions about the process or initiated discussions about specific plants. Environmental groups who had been tracking NOPPs at specific plants and states also shared with EPA the information they had collected.

EPA is currently aware of NOPPs covering 90 EGUs at 38 plants. Of these, four EGUs (at two plants) have requested participation in the LUEGU subcategory, an additional 12 EGUs (at four plants) have requested participation in the 2020 rule VIP, and the remaining 74 EGUs (at 33 plants) have requested participation in the permanent cessation of coal combustion subcategory.[19] EPA cautions that these counts are not a comprehensive picture of what facilities' plans are for two reasons. First, EPA was unable to obtain information for all plants and states, and thus solicits comment on whether the public is aware of additional NOPPs that are not yet known to the Agency. Second, even where a facility has filed a NOPP, it still retains the flexibility under the transfer provisions of 40 CFR 423.13(o) to transfer between subcategories, or between a subcategory and the 2020 VIP provisions until 2023 or 2025 (depending on the transfer desired). EPA therefore solicits comment on additional information that would inform

[19] Plant Scherer filed a permanent cessation of coal combustion NOPP for two EGUs and a 2020 rule VIP NOPP for the remaining two EGUs; thus, the plant count for the three groupings does not equal 38.

the Agency's understanding of facilities' plans under the 2020 rule. For further detail, the NOPPs EPA is aware of have been placed in the docket along with a memo summarizing the information and providing record index numbers for locating each facility, entitled *Changes to Industry Profile for Coal-Fired Generating Units for the Steam Electric Effluent Guidelines Proposed Rule* (SE10241).

C. Information from Technology Vendors and Engineering, Procurement, and Construction Firms

EPA gathered data on the availability and effectiveness of FGD wastewater, BA handling, CRL, and pond dewatering operations and wastewater treatment technologies in the industry from technology vendors and Engineering, Procurement, and Construction firms through presentations, conferences, meetings, and email and phone contacts. These collected data informed the development of the technology costs and pollutant removal estimates for FGD wastewater, BA transport water, CRL, and legacy wastewater.

D. Other Data Sources

EPA gathered information on steam electric generating facilities from the Department of Energy's (DOE's) Energy Information Administration (EIA) Forms EIA-860 (Annual Electric Generator Report) and EIA-923 (Power Plant Operations Report). EPA used the 2019 and 2020 data to update the industry profile, including commissioning dates, energy sources, capacity, net generation, operating statuses, planned retirement dates, ownership, and pollution controls at the EGUs.

EPA conducted literature and Internet searches to gather information on FGD wastewater treatment technologies, including information on pilot studies, applications in the steam electric power generating industry, and implementation costs and timelines. EPA also used Internet searches to identify or confirm reports of planned facility plant and EGU retirements and reports of planned unit conversions to dry or closed-loop recycle ash handling systems. EPA used this

information to inform the industry profile and identify process modifications occurring in the industry.

VII. Proposed Regulation

A. Description of the Options

This proposal evaluates four regulatory options and identifies one preferred option (Option 3), as shown in Table VII-1 of this preamble. All options include the same technology basis for CRL (chemical precipitation) and legacy wastewater (best professional judgment) while incrementally increasing controls on FGD wastewater, BA transport water, or both. Each successive option from Option 1 to 4 would achieve a greater reduction in wastewater pollutant discharges. Each subcategorization is described further in Section VII.C of this preamble. In addition to some specific requests for comment included throughout this proposal, EPA solicits comment on all aspects of this proposal, including the information, data, and assumptions EPA relied upon to develop the four regulatory options, as well as the proposed BAT, effluent limitations, and alternate approaches included in this proposal.

1. FGD Wastewater

Under Option 1, EPA proposes to eliminate the BAT and PSES subcategorizations for high FGD flow facilities and LUEGUs. Option 1 would establish the same mercury, arsenic, selenium, and nitrogen limitations applicable to the industrial category based on chemical precipitation, followed by low hydraulic residence time biological treatment and ultrafiltration. Under Options 2 and 3, EPA proposes to eliminate the BAT and PSES subcategorizations for high FGD flow facilities and LUEGUs and further proposes to require zero discharge of FGD wastewater based on chemical precipitation followed by membrane filtration with 100 percent recycle of the permeate. These proposed options would also create a subcategory for early adopters that have already installed compliant biological treatment systems and would retire no later than December 31, 2032. Under Option 4, EPA proposes to establish an industrywide zero-discharge requirement without establishing an early adopter subcategory. Note that for all four

options EPA proposes to retain the subcategory for EGUs permanently ceasing coal combustion by 2028.

2. BA Transport Water

Under Options 1 and 2, EPA proposes to eliminate the BAT and PSES subcategorization for LUEGUs. Options 1 and 2 would establish the same volumetric purge limitation applicable to the industrial category based on high recycle rate systems. Under Option 3, EPA proposes zero discharge based on dry handling or closed-loop systems. This proposed option would also create a subcategory for early adopters that have already installed a compliant high recycle rate system and would retire no later than December 31, 2032. Under Option 4, EPA proposes to establish an industrywide zero-discharge requirement without establishing an early adopter subcategory. For all four options, EPA proposes to retain the subcategory for EGUs permanently ceasing coal combustion by 2028.

3. CRL

Under all four options, EPA proposes to establish BAT limitations and PSES for mercury and arsenic based on chemical precipitation treatment.

4. Legacy Wastewater

Under all four options, EPA proposes not to specify a nationwide technology basis for BAT/PSES applicable to legacy wastewater at this time, but rather proposes that such limitations are to be derived on a site-specific basis by the permitting authorities, using their BPJ. EPA does solicit comment on other options, as discussed below.

Table VII-1. Main Regulatory Proposed Options

Wastestream	Subcategory	Technology Basis for the BAT/PSES Regulatory Options			
		1	2	3 (Preferred)	4
FGD wastewater	N/A	Chemical precipitation + biological treatment + ultrafiltration	Chemical precipitation + membrane filtration	Chemical precipitation + membrane filtration	Chemical precipitation + membrane filtration

	High FGD flow facilities/ LUEGUs	NS	NS	NS	NS
	EGUs permanently ceasing coal combustion by 2028	Surface impoundments	Surface impoundments	Surface impoundments	Surface impoundments
	Early adopters permanently ceasing coal combustion by 2032	NS	Chemical precipitation + biological treatment + ultrafiltration	Chemical precipitation + biological treatment + ultrafiltration	NS
BA transport water	N/A	High recycle rate systems	High recycle rate systems	Dry handling or closed-loop systems	Dry handling or closed-loop systems
	LUEGUs	NS	NS	NS	NS
	EGUs permanently ceasing coal combustion by 2028	Surface impoundments	Surface impoundments	Surface impoundments	Surface impoundments
	Early adopters permanently ceasing coal combustion by 2032	NS	NS	High recycle rate systems	NS
CRL	N/A	Chemical precipitation	Chemical precipitation	Chemical precipitation	Chemical precipitation
Legacy wastewater	N/A	Best professional judgment	Best professional judgment	Best professional judgment	Best professional judgment

N/A = Not applicable

NS = Not subcategorized

Note: The table above does not present existing subcategories included in the 2015 rule or the 2020 VIP for FGD wastewater. EPA is not proposing any changes to the existing 2015 rule subcategorization of oil-fired units, units with a nameplate capacity of 50 MW or less, or the 2020 VIP.

B. Rationale for the Proposed Rule

In light of the criteria and factors specified in CWA sections 301(b)(2)(A) and 304(b)(2)(B) (*see* Section IV of this preamble, above), EPA proposes to establish BAT effluent limitations based on the technologies described in Option 3.[20]

1. FGD Wastewater

EPA is proposing chemical precipitation, followed by membrane filtration, as the technology basis for establishing BAT limitations to control pollutants discharged in FGD wastewater. After considering the factors specified in CWA section 304(b)(2)(B), EPA proposes to find that this technology is technologically available, economically achievable, and has acceptable non-water quality environmental impacts. More specifically, the technology basis for BAT would include chemical precipitation to remove suspended solids and scaling compounds prior to treatment with one or more stages of nanofiltration, electrodialysis reversal (EDR), RO, and/or forward osmosis. The permeate from the final stage of treatment would then be recycled back into the plant either as FGD makeup water or boiler makeup water.[21]

In the subsection immediately below, EPA discusses its rationale for proposing membrane filtration as BAT for the control of FGD wastewater. In the following subsection, EPA discusses why it is not proposing as its main option other zero discharge technologies as BAT but is taking comment on such technologies. In the final subsection, EPA discusses why it is not proposing a less stringent technology as BAT.

a. Membrane Filtration

Availability of membrane filtration. EPA is proposing to determine that membrane filtration is available for use by the steam electric industry to control discharges of FGD

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[20] EPA proposes to include language in the final rule that makes clear that if any provisions of the final rule are reviewed and vacated by a court, it is EPA's intent that as many portions of the rule remain in effect as possible.

[21] The 2020 rule finalized an exemption from the definition of FGD wastewater applicable to "treated FGD wastewater permeate or distillate used as boiler makeup water."

wastewater. Such a finding is consistent with the technology forcing nature of BAT as described in the legislative history and legal precedents discussing this provision. "In setting BAT, EPA uses not the average plant, but the optimally operating plant, the pilot plant which acts as a beacon to show what is possible." (*Kennecott v. EPA*, 780 F.2d 445, 448 (4th Cir. 1985) (citing *A Legislative History of the Water Pollution Control Act Amendments of 1972*, 93d Cong., 1st Sess. (Comm. Print 1973), at 798). BAT is supposed to reflect the highest performance in the industry and may reflect a higher level of performance than is currently being achieved based on technology transferred from a different subcategory or category, bench scale or pilot plant studies, or foreign plants. *Southwestern Elec. Power Co. v. EPA*, 920 F.3d at 1006; *Am. Paper Inst. v. Train*, 543 F.2d 328, 353 (D.C. Cir. 1976); *Am. Frozen Food Inst. v. Train*, 539 F.2d 107, 132 (D.C. Cir. 1976). BAT may be based upon process changes or internal controls, even when these technologies are not common industry practice. *See Am. Frozen Foods*, 539 F.2d at 132, 140; *Reynolds Metals Co. v. EPA*, 760 F.2d 549, 562 (4th Cir. 1985); *California & Hawaiian Sugar Co. v. EPA*, 553 F.2d 280, 285-88 (2nd Cir. 1977). As recently reiterated by the U.S. Court of Appeals for the Fifth Circuit, "Under our precedent, a technological process can be deemed available for BAT purposes even if it is not in use at all, or if it is used in unrelated industries. Such an outcome is consistent with Congress'[s] intent to push pollution control technology." *Southwestern Elec. Power Co. v. EPA*, 920 F.3d at 1031 (citation and internal quotations omitted).

As further discussed below, EPA is proposing to base its determination that membrane filtration is available for control of pollutants found in FGD wastewater on the numerous full-scale foreign installations of membrane filtration to treat FGD wastewater, the large number of successful domestic and international pilot tests of membrane filtration on FGD wastewater, successful use of membrane filtration on other steam electric wastestreams, and the use of membrane filtration on wastestreams in a many different industries besides the steam electric industry.

In the 2020 rule, EPA determined that membrane filtration was not available to control FGD wastewater industrywide, primarily due to the lack of a full-scale membrane filtration system in use to control FGD wastewater discharges at a U.S. facility. There was also discussion of possible uncertainties or data gaps in the record regarding foreign plants, pilot tests, or use of membrane filtration on other wastestreams. When EPA promulgated the 2020 rule, however, the Agency was aware of membrane filtration being successfully used on FGD wastewater at 12 foreign plants, on FGD wastewater in 20 domestic pilots, and on several wastestreams with characteristics similar to those of FGD wastewater both within the steam electric sector and in other industries. The language and intent of the CWA, repeatedly confirmed by Federal appellate courts, demonstrates that Congress intended that BAT reflect the best performing plant (*see, e.g.*, *Kennecott v. EPA*, 780 F.2d. at 447; *Southwestern Elec. Power Co. v. EPA,* 920 F.3d at 1018). Accordingly, some might argue that the amount of information in the 2020 record was sufficient to support a finding of membrane filtration as BAT for control of FGD wastewater discharges. Based on EPA's current record, which contains additional information regarding the application of membrane filtration to FGD wastewater and other wastestreams inside and outside the steam electric industry,[22] the weight of the evidence supports the Agency's proposed conclusion that membrane filtration is available in the industry to control FGD wastewater discharges, notwithstanding the uncertainties raised in the 2020 rule. Agencies have inherent authority to reconsider past decisions and to revise, replace, or repeal a decision to the extent permitted by law and supported by a reasoned explanation. *FCC v. Fox Television Stations, Inc*., 556 U.S. 502, 515 (2009); *Motor Vehicle Mfrs. Ass'n v. State Farm Mutual Auto. Ins. Co*., 463 U.S. 29, 42

[22] Caselaw supports that EPA may base BAT on technologies used in other industries. *See, e.g*., *Kennecott v. EPA*, 780 F.2d at 453 ("Congress envisioned the scanning of broader horizons and asked EPA to survey related industries and current research to find technologies which might be used to decrease the discharge of pollutants.").

(1983). Thus, for the following reasons, EPA proposes coming to a different conclusion regarding the availability of membrane filtration than in it did in the 2020 rule.[23]

International installations. At the time of the 2020 rule, the Agency cited 12 foreign installations of membrane filtration on FGD wastewater.[24] These systems began operating as early as 2015, and all of the systems were designed to operate as zero discharge systems.[25] Since the 2020 rule, EPA has become aware of additional information about these international installations that supports its proposed determination that membrane filtration is available for control of FGD wastewater discharges. In particular, the Agency has learned that certain Chinese facilities with membrane installations have successfully achieved zero discharge of FGD wastewater, in part by adjusting the ratios and dosages of the specific chemicals used in their chemical precipitation pretreatment systems.[26] EPA also has learned that certain Chinese plants with later installations did not need to pilot membrane filtration systems before successfully installing and operating them at full scale. The operating information from the previous

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[23] EPA also recognizes that, while it may change policies based upon a reasoned explanation, where a prior policy has engendered serious reliance interests, those interests must be taken into account. *FCC v. Fox Television Stations, Inc.*, 556 U.S. at 515 (citation omitted). EPA has taken reliance interests into account in this rulemaking, as is clear from EPA's proposal in Section VII.C.4 of this preamble, below, to create a new subcategory for early adopters who relied on certain of EPA's past determinations. EPA also notes that no NPDES permittee has certainty of its limitations beyond its 5-year NPDES permit term, as reissued permits must incorporate any newly promulgated technology-based limitations as well as potentially more stringent limitations necessary to achieve water quality standards. *See* 40 CFR 122.44(a) & (d).

[24] ERG, 2020. Technologies for the Treatment of Flue Gas Desulfurization Wastewater. DCN SE09218.; ERG, 2020. Notes from Call with DuPont. DCN SE08618.; Beijing Jingneng Power. 20177. Beijing Jingneng Power Company, Ltd. Announcement on Unit No. 1 of the Hbei Shuoshou Jingyuan Thermal Power Co., Ltd. Passing Through the 168-hours Trial Operation. (13 November). DCN SE08624.; Broglio, Robert. 2019. Doosan. Vendor FGD Wastewater Treatment Details – Doosan. (15 July). DCN SE07107.; Lenntech. 2020. Lenntech Water Treatment Solutions. Flue Gas Desulfurization Treatment. DCN SE08622.; Nanostone. 2019. China Huadian Jiangsu Power Jurong Power Plant FGD Wastewater Zero Liquid Discharge Project was Awarded the Engineering Star Award. (27 June). DCN SE08628.

[25] *Technologies for the Treatment of Flue Gas Desulfurization Wastewater, Coal Combustion Residual Leachate, and Pond Dewatering* (SE10281).

[26] SE06915.

installations was sufficient to successfully install a full-scale membrane system without the need for an intermediate pilot.[27]

In the 2020 rule, EPA stated that there were too many unknowns about the foreign installations to support a finding of availability, including not knowing enough about their configurations, operations, performance, or long-term maintenance. These American-made systems have continued to operate since the 2020 rule, with the oldest now operating for seven years. This continued operation suggests that EPA's concerns in 2020 may have been overstated. Additional data on foreign system configurations and operations have also enhanced the Agency's understanding of these systems.[28] Particularly, EPA was able to learn more about the issues with pretreatment identified at the pilot stage for one of the first Chinese installations. These issues were a result of the FGD wastewater's high suspended solids and high hardness. While these issues were identified at the outset of pilot testing, they were sufficiently resolved through adjustment of the chemical precipitation pretreatment process, leading the facility to install the system at full scale. For later installations at different sites, this Chinese utility ceased conducting pilot tests since appropriate pretreatment steps had already been identified.

In the 2020 rule, EPA also stated that there was not enough information to know if the foreign installations could continually operate as zero discharge systems or whether there would be some periods during which discharges occur. EPA notes that two additional years of zero discharge operation for these foreign plants have occurred since the 2020 rule, which supports a finding that continuous zero discharge operations are achievable. As discussed in Section XIV of this preamble, while EPA proposes zero discharge of pollutants in FGD wastewater, the Agency solicits comment on alternative membrane filtration-based BAT limitations if comments demonstrate that a regular or intermittent discharge is necessary for some plants. For the reasons

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[27] SE08618.

[28] SE10245.

discussed above, the installation and operation of membrane filtration to treat FGD wastewater abroad supports the proposed BAT basis of membrane filtration for FGD wastewater discharges.

Pilot applications. Although EPA has sufficient information to propose that membrane filtration is available based on foreign installations alone, pilot applications also support the availability of membrane filtration for control of FGD wastewater discharges. In the 2020 rule record, the Agency cited 20 pilot applications of membrane filtration on FGD wastewater (19 domestic and one international).[29] While EPA stated that there were data gaps associated with the pilot studies that prevented a finding that membrane filtration is available, these gaps primarily related to the development of numeric limitations, and EPA nevertheless established limitations based on membrane filtration technology in the VIP. Furthermore, the record showed that membrane filtration pilots in the United States have demonstrated success removing pollutants from FGD wastewater under a number of pretreatment settings, whether performed without chemical precipitation pretreatment, with chemical precipitation pretreatment, or following biological treatment.[30] While specifics of these reports are claimed as CBI, EPA notes that the authors of several pilot test reports gave glowing reviews of the technology and detailed a number of advantages that membrane filtration offered versus biological treatment.

One of these reports, *Performance Evaluation of a Vibratory Shear Enhanced Processing Membrane System for FGD Wastewater Treatment*, which was published in 2014 but recently made publicly available, found that the piloted membrane filtration technology reliably removed the vast majority of pollutants in FGD wastewater. This pilot of the Vibratory Shear Enhanced

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[29] One of the systems EPA was aware of for the 2020 rule was a long-term pilot project at one facility, which is a commercial-scale system that may have sufficient capacity to treat the full FGD wastestream moving forward. Nevertheless, because the company is still making changes to the operation of the plant's FGD system, has also pilot tested a biological treatment system, and has continued to leave the possibility of biological treatment for compliance open, EPA defers to the company's characterization of this system as a pilot. Thus, it is not considered a domestic, full-scale installation.

[30] In one case, a utility conducted a successful membrane pilot even when there were significant failures in the performance of upstream pretreatment systems leading to excessive TSS passthrough to the membrane system.

Processing/Spiral Reverse Osmosis (VSEP/RO) system from New Logic Research, Inc. was performed at the Water Research Center at Georgia Power's Plant Bowen. The pilot included operations in both single pass mode (*i.e.*, continuous operations) and batch mode (focused on maximizing water recovery) on moderate TDS FGD wastewater and high TDS VSEP/RO concentrate. As explained in the report, "The first stage, VSEP pilot unit, removed approximately 94% TDS, while the second stage, Spiral RO pilot unit, removed an additional 5.8% TDS, yielding an overall TDS removal efficiency of 99.8%." Furthermore, the system successfully removed pollutants even when the pollutant concentrations were increased from an average of approximately 15,000 mg/L TDS to an average of approximately 54,000 mg/L TDS, demonstrating the versatility of the system across a range of concentrations. Finally, the system continued operation without decreased performance due to scaling/fouling. "In both modes of operation (single-pass and batch concentration), no irreversible membrane fouling, no irregular transmembrane pressure (TMP) increase was observed throughout the project." This appeared to result from a combination of the acid/base cleanings and the VSEP membrane vibration design/mechanism. This pilot supports that membrane filtration systems can successfully remove pollutants under a variety of TDS concentrations and scaling potentials found in FGD wastewater.

Since the 2020 rule, EPA has also become aware of new information on three additional domestic pilot applications of membrane filtration on FGD wastewater. Each of these pilots was performed with a different technology and demonstrated successful removal of pollutants in FGD wastewater and recovery of usable permeate. In particular, the first-of-its-kind domestic pilot of an EDR pilot plant for FGD wastewater indicates that treatment with membrane filtration has continued to advance and become more available. This pilot is detailed in EPRI (2020), which found that "The Flex EDR Selective pilot plant reliably operated for 61 days, 24/7, including weekends and unattended overnights." Other key findings included an average 93 percent water recovery, 98 percent uptime of continuous operations (more than 1440 hours),

selective removal of chloride, the elimination of the need for soda ash softening, "demonstrated versatility to treat wastewater of different concentrations and water chemistries with the same treatment plant," and the potential for cost savings when compared to comparable treatment systems. Thus, the weight of evidence available from a growing number of pilot studies supports the Agency's proposed conclusion that membrane filtration is BAT for FGD wastewater discharges.

Application to other wastestreams. As EPA explained in the 2020 rule, membrane filtration is used in full-scale applications to other wastestreams in the steam electric power sector and other industrial sectors. The domestic steam electric power sector regularly uses membrane filtration for boiler makeup water,[31] cooling tower blowdown,[32] and ash transport water.[33] Other industrial sectors with full-scale membrane filtration applications include the textiles,[34] chemical manufacturing,[35] mining,[36] agriculture, oil and gas extraction,[37] food and beverage,[38] microelectronics/semiconductors,[39] landfills,[40] and automotive industries.[41]

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[31] EPRI (Electric Power Research Institute). 2015. *State of Knowledge: Power Plant Wastewater Treatment—Membrane Technologies*. August. 3002002143.

[32] *See*, *e.g.*, 5 Daniels, D.G. 2015. *Winning the Cooling Tower Trifecta: Controlling Corrosion, Scale, and Microbiological Fouling*. Power Magazine. August 21. Available online at: *www.powermag.com/winning-the-cooling-towertrifecta-controlling-corrosion-scale-andaqmicrobiological-fouling/* (DCN SE09088).

[33] *See*, *e.g.*, *www.ge.com/in/sites/www.ge.com.in/files/GE_solves_ash%20pond_capacity_issue.pdf* (DCN SE09090).

[34] ERG. 2020 Final Notes from Call with DuPont. DCN SE08618.

[35] ERG. 2020. Final Notes from Call with DuPont. DCN SE08618.

[36] ERG. 2019. Final Notes from Meeting with Pall Water. (5 March). EPA-HQ-OW-2009-0819-7613; Wolkersdorfer, Christian et al. 2015. Intelligent mine water treatment—recent international developments. (21 July). DCN SE08581; U.S. EPA. 2014. Office of Superfund and Remediation and Technology Innovation. Reference Guide to Treatment Technologies for Mining-Influenced Water. EPA 542-R-14-001. (March). DCN SE08582.

[37] CH2M Hill. 2010. Review of Available Technologies for the Removal of Selenium from Water. (June). DCN SE08583.

[38] U.S. EPA. 2022. Notes from Meeting with BKT—April 9, 2021. DCN SE010253.

[39] U.S. EPA. 2022. Notes from Meeting with BKT—April 9, 2021. DCN SE010253.

[40] ERG. 2019. Sanitized_Saltworks Vendor Meeting Notes—Final. DCN SE07089.

[41] U.S. EPA. 2022. Notes from Meeting with ProChem—April 9, 2021. DCN SE10254.

In the 2020 rule, EPA stated that some of these other applications did not show that membrane filtration was available for use on FGD wastewater by focusing on the differences between specific characteristics of these individual wastewaters and FGD wastewater. Information in the 2020 record and the current record, however, indicates that there are many similarities between FGD and the non-FGD wastestreams where membranes have been utilized. In the 2020 rule record, EPA discussed that cooling tower blowdown at steam electric plants and desalination in oil and gas extraction were examples where membrane filtration was used in full-scale applications for treating high TDS wastewaters, a characteristic of FGD wastewater (85 FR at 64664-64665, October 13, 2020). The 2020 rule record also established that mining wastewaters, which are high in gypsum scaling potential (another characteristic of FGD wastewater), have been successfully treated with membrane filtration applications. Finally, the 2020 rule record established that despite the high variability in ash transport water (a third characteristic of FGD wastewater), it was successfully treated with membrane filtration. This information indicates that membrane filtration can operate effectively on wastestreams that contain several characteristics of FGD wastewater, including high TDS, high gypsum scaling potential, and high variability.[42] Thus, based on the information gathered in both EPA's prior and current records, the utilization of membrane technology on other wastestreams supports the Agency's proposed conclusion that membrane filtration technology is BAT for FGD wastewater discharges.

For all the foregoing reasons, EPA proposes to find that membrane filtration is technologically available for the control of discharges in FGD wastewater. Moreover, membrane filtration would make reasonable further progress toward the Act's goal of eliminating the

[42] Use of membrane filtration has since expanded into additional applications, treating wastewaters and industries beyond those where it was used at the time of the 2020 rule (*e.g.*, the food and beverage, microelectronics/semiconductors, landfills, and automotive industries).

discharge of all pollutants because it would result in zero discharge of FGD wastewater from steam electric power plants.

Economic achievability of membrane filtration. EPA proposes to find that the costs of membrane filtration for control of FGD wastewater discharges are economically achievable. Under the CWA, BAT limitations must be economically achievable. Courts have interpreted that requirement as a test of whether the regulations can be "reasonably borne" by the industry as a whole. *Chem. Mfrs. Ass'n v. EPA*, 870 F.2d 177, 262 (5th Cir. 1989); *BP Exploration & Oil v. EPA*, 66 F.3d 784, 799-800 (6th Cir. 1996); *see also Nat'l Wildlife Fed'n v. EPA*, 286 F.3d 554, 570 (D.C. Cir. 2002); *CPC Int'l Inc. v. Train*, 540 F.2d 1329, 1341-42 (8th Cir. 1976), *cert. denied,* 430 U.S. 966 (1977). "Congress clearly understood that achieving the CWA's goal of eliminating all discharges would cause 'some disruption in our economy,' including plant closures and job losses." *Chem. Mfrs. Ass'n v. EPA*, 870 F.2d at 252 (citations omitted); *see also id*. at 252 n.337 (reviewing cases in which courts have upheld EPA's regulations that projected up to 50 percent closure rates). Although the 2020 rule cited the increased cost of membrane filtration as compared to the selected technology basis as a reason for rejecting membrane filtration,[43] the Agency did not go so far as to find that the costs of membrane filtration were not economically achievable at that time. EPA proposes to find that the costs of membrane filtration for FGD wastewater are economically achievable for the industry as a whole, as discussed further below and in Sections VII.F and VIII of this preamble.

Non-water quality environmental impacts of membrane filtration. EPA proposes to find that the non-water quality environmental impacts of membrane filtration are acceptable. For further discussion of these impacts, see Sections VII.G and X of this preamble. There was one

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[43] While the relative costs of technologies differ from plant to plant, new information obtained during the 2022 information collection confirms what was shown in the 2020 record: that, in some cases, technologies such as membrane filtration may be less costly than biological treatment at individual plants even where, on average, they would be more expensive to the industry as a whole.

non-water quality environmental impact that the 2020 rule found was unacceptable. In that rule, EPA expressed concern that use of membrane filtration would unacceptably limit the beneficial use of FA. The 2020 rule record and the current record demonstrate that the beneficial use of FA as an admixture or to replace Portland cement in concrete provides a substantial environmental benefit. As such, the potential that using FA to help dispose of brine from membrane filtration would limit this beneficial use continues to be potentially the most substantial non-water quality environmental impact when considering whether membrane filtration is BAT. Nevertheless, in light of the facts and analyses described in the following paragraphs, EPA proposes to find that these non-water quality environmental impacts are acceptable, most importantly because EPA's record indicates that there is sufficient FA to accommodate both FGD brine encapsulation needs following membrane filtration of FGD wastewater and the beneficial use market.

At the outset, EPA notes that the 2020 rule record discusses two uses of FA: FA fixation and brine encapsulation. FA fixation occurs when a facility conditions its dry FA with FGD wastewater rather than fresh makeup water.[44] The use of FA fixation prior to the 2020 rule is partly due to the very low costs of FA conditioning compared to other wastewater treatment technologies for FGD wastewater, as well as the potential to eliminate the discharge of FGD wastewater. The 2020 rule record also included discussion of brine encapsulation. Brine encapsulation is the process of mixing raw FGD wastewater or concentrated FGD wastewater brine with FA and lime, which results in pozzolanic reactions that bind additional pollutants into the final solid matrix. Since the 2020 rule, additional facilities have evaluated FA fixation with FGD wastewater and/or encapsulation of FGD wastewater using FA and lime. In at least one instance, fixation/encapsulation was less costly than biological treatment. Thus, even without a new regulation establishing BAT limitations based on membrane filtration, the record

[44] Conditioning is required to avoid air dispersion of the fine FA particulates.

demonstrates that implementation of the baseline 2020 rule has resulted in the use of some FA for fixation or encapsulation.

While FA fixation still may be an option for brine management, EPA evaluated the option most discussed in the record: brine encapsulation. Since the question in evaluating the impact of brine encapsulation is not whether the FA needed for these processes will be disposed of, but to what extent additional disposal curtails the FA available for beneficial use, EPA conducted an analysis of FA availability entitled *2021 Steam Electric Supplemental Proposed Rule: Fly Ash Availability* (SE10242). This analysis shows that the amount of FA needed to dispose of membrane filtration's byproduct would not have an unacceptable impact on the amount of FA that is used for beneficial purposes. In this analysis, consistent with EPA's costing methodology, the Agency conservatively assumed that all facilities generate brine from a single pass of a membrane filtration system, which is then encapsulated with FA and lime.[45] In other words, EPA conservatively assumed no further brine concentration (*e.g.*, additional membrane filtration, or thermal evaporation) would be performed that would further decrease the amount of FA needed for encapsulation.

The results of EPA's conservative FA availability analysis support the finding that there is sufficient FA for the majority of the 22 plants that would be expected to make treatment upgrades to meet the proposed limitations. Based on EPA's analysis of 2019 and 2020 EIA data, 20 of these 22 power plants that would be expected to install membrane filtration under proposed Option 3 have enough FA for encapsulation before accounting for reported FA sales. For the two remaining plants, EPA estimates there would be a combined annual FA deficiency of approximately 240,000 tons. After accounting for reported FA sales, and assuming these sales continue, EPA estimates that an additional four power plants may not have enough FA available for encapsulation—a total of six plants with a combined annual FA deficiency of approximately

[45] While EPA's costs assume a polishing stage RO, the brine from that system in returned to the first stage system.

750,000 tons (or approximately one percent of all fly ash generated). In light of the relatively small on-site FA deficiency estimated using conservative assumptions and, as discussed more fully below, the potential for plants to use off-site FA or additional lime for their brine encapsulation needs or available brine management alternatives that do not rely on FA or use less FA, EPA proposes that its estimate of on-site FA that may no longer be available for beneficial use after implementation of this rule does not rise to the level of an unacceptable non-water quality environmental impact.

The 750,000 ton per year shortfall of FA described above is likely an overestimate for several reasons. First, based on the 2020 EIA data, coal-fired power plants reported more than 30 million tons of FA generated annually. While there are increasing FA sales reported each year, EPA identified more than 100 coal-fired power plants generating over 9.6 million tons of unsold FA that could be redirected from disposal towards either encapsulation or other beneficial uses.[46] Thus, EPA estimates that there is enough FA to accommodate both FGD brine encapsulation needs and the beneficial use market with millions of tons still requiring disposal. In the 2020 rule record, GenOn's plans to install membrane filtration at certain facilities did not include use of FA from those facilities. Instead, GenOn had plans to send the brine offsite to be mixed with other FA and lime for disposal and continued to seek options for beneficial use of the brine.[47] The concepts of use of off-site FA or beneficial use of brine are not unique to GenOn. With respect to alternate FA, the 2022 World of Coal Ash conference included 10 sessions with abstracts discussing the harvesting and beneficiation of previously disposed ash.[48] This further supports that, after accounting for FA availability across the entire industry, the non-water

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[46] EPA also notes that the 2020 rule record failed to acknowledge that both the American Coal Ash Association and EPA have historically considered waste stabilization and solidification as a category of beneficial use. *See, e.g.*, *www.acaa-usa.org/wp-content/uploads/coal-combustion-products-use/ACAA-Brochure-Web.pdf.*

[47] Notes from Call with GenOn (SE08614).

[48] Session abstracts are available online at: *www.woca2022.conferencespot.org/event-data/activity.*

quality environmental impacts of potential FA disposal associated with membrane filtration are acceptable.

Second, the Agency notes that multiple alternatives exist for handling the resulting brine that do not involve FA and thus would have no impact on the beneficial use of FA in other settings. EPA evaluated alternative scenarios including disposal of brine in a deep injection well and crystallization to a salt for disposal. With respect to disposal in a deep injection well, EPA has been encouraging efforts for water reuse rather than deep well injection, particularly in arid western climates. Most of the facilities in question here, however, are located in the Midwest and Southern U.S., places where water reuse may still be important when feasible, but not to the level that EPA would find injection to be unacceptable. With respect to crystallization and disposal of the resultant salt, none of the facilities that currently generates brine as part of a zero discharge system elects to encapsulate and dispose of that brine.[49] Rather, these facilities send the concentrated brine to a crystallizer, and these resulting salt crystals can then be disposed of without the use of FA. The costs and non-water quality environmental impacts of these alternatives are presented in *Alternative Brine Management Methodology* (SE10243). The 2015 rule record found crystallization to have acceptable non-water quality environmental impacts. Based on this most current analysis along with the 2015 record, EPA proposes to find that these alternative brine management strategies have acceptable non-water quality environmental impacts and that, while these costs are higher, they would be economically achievable.

Third, EPA also notes that the six plants with potentially insufficient FA may still be able to sell their FA if the brine encapsulation were performed with additional lime use. EPA notes that extraction, processing, and transportation associated with additional lime use would result in some additional air emissions, but that these emissions would be less than those associated with Portland cement, the material that FA replaces in its most environmentally beneficial use.

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[49] While these systems are thermal systems rather than membrane systems, the brine generated would not differ substantially in its ultimate characteristics.

Fourth, EPA's estimates regarding non-water quality environmental impacts associated with membrane filtration's byproduct are likely conservative (an overestimate) because, even where encapsulation will be the ultimate brine management scenario, further concentration of the brine is not only possible, but probable for at least some facilities. For example, one utility evaluating 2020 rule VIP-compliant systems for a specific facility discussed how it would send the membrane reject brine to a thermal system to further reduce the volume of FGD brine to be encapsulated. This process would result in less demand for FA due to the decreased volume of brine.

Finally, the 2020 record indicated that the management of FGD brine could actually lead to new beneficial uses. At least one Chinese plant was taking its brine down to salts and then selling its salts for an industrial use.[50] Where companies are ultimately able to beneficially use some of the brine in lieu of disposal, this would be a positive non-water quality environmental impact. Thus, both ongoing evaluation and historical practice indicate EPA's assumptions regarding FA use to encapsulate FGD brine is likely a conservative estimate of the amount of ash that will be diverted from beneficial use to disposal. All of the above information supports EPA's proposed finding that the non-water quality environmental impacts of membrane filtration are acceptable.

b. Other zero discharge technologies

For this proposal, EPA evaluated other zero discharge technologies that could also eliminate the discharge of FGD wastewater. However, EPA is not relying upon them as a basis for proposed BAT limitations because they achieve the same pollutant reductions as the proposed BAT technology basis (membrane filtration) but at a higher cost. Nevertheless, EPA solicits comment on whether the Agency should determine in a final rule that any one or more of these technologies constitutes an additional BAT technology basis for controlling pollutants

[50] Final DuPont Meeting Notes (SE08618), Notes from Vendor Call with DuPont October 29 and December 8, 2021 (SE10245).

discharged in FGD wastewater in addition to membrane technology, or alternatively, in place of membrane technology.

Currently, 36 coal-fired power plants in the United States operate wet FGD systems and manage their wastewater to achieve zero discharge.[51] These plants achieve zero discharge using evaporation ponds, recycling of FGD wastewater, ash fixation, thermal systems (*e.g.*, falling film evaporators), or SDEs. Since 2009, approximately 15 additional plants that also operated wet FGD systems and achieved zero discharge of FGD wastewater have retired or refueled such that the FGD wastewater has been eliminated. While some of these systems (evaporation ponds, fixation, and recycling) may not be available at every single site,[52] the number of thermal and SDE systems both domestically and internationally in use on FGD wastewater demonstrates that they are commercially available, and thus potentially technologically available, as technologies for treating FGD wastewater to meet zero-discharge limitations.[53] Specifically, at least some steam electric power plants have used the traditional thermal systems[54] and SDEs[55] to achieve zero discharge of FGD wastewater domestically and internationally for years, and several recent

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[51] A 37th project that will result in zero discharge may have also been completed: *www.woodplc.com/insights/articles/engineering-solutions-for-wastewater-treatment*.

[52] EPA acknowledged as much in both the 2015 and 2020 rules.

[53] *See*, *e.g.*, APEC (Asia-Pacific Economic Cooperation) Energy Working Group. 2015. *Water Energy Nexus: Coal- Based Power Generation and Conversion—Saving Water*. EWG 08/2014 A. December. Available online at: *www.apec.org/docs/default-source/Publications/2017/2/Water-Energy-Nexus-Coal-Based-Power-Generation-and-Conversion---Saving-Water/217_EWG_APEC-Energy-Water-Nexus-Report-20161230-_CPAU_010217.pdf.*

[54] The Italian thermal systems discussed first in the 2013 proposed rule have been in operation for over a decade.

[55] Spray dry absorbers, effectively the same technology as the SDE, have been in use for decades to capture the same pollutants present in FGD wastewater.

electric utility reports acknowledge this fact.[56,57,58,59] EPA has separately evaluated the costs of thermal and SDE systems. Costs per facility have decreased over time, and due to retirements and fuel conversions, total costs have decreased substantially. Although EPA has not estimated potential closures associated with these technologies using the same model it has for supporting the economic achievability of Option 3, as discussed more in Section VIII of this preamble below, EPA does not expect the costs associated with these technologies to have a significant impact on industry closures. In that case, the costs of these technologies, although higher than the costs estimated for industrywide membrane filtration,[60] would be reasonable for the category as whole, and thus economically achievable.[61,62] Furthermore, consistent with the findings of the 2015 rule, EPA proposes to find no unacceptable non-water quality environmental impacts from operation of thermal systems and proposes that SDEs have similarly acceptable non-water quality environmental impacts.[63]

EPA solicits comment on whether the Agency should identify, in any final rule, one or more of the technologies of evaporation ponds, recycling of FGD wastewater, ash fixation, thermal systems (*e.g.*, falling film evaporators), or SDEs as a BAT technology basis for control of FGD wastewater discharges, in addition to membrane filtration technology. EPA solicits comment on whether such additional BAT basis or bases would be technologically available and

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[56] "Proven technology (considered BAT for new sources by EPA). 3+ U.S. installations and 6+ European installations by Aquatech" (SE07206).

[57] SE10234.

[58] SE09998.

[59] EPRI (Electric Power Research Institute). 2017. *Thermal Evaporation Technologies for Treating Power Plant Wastewater: A Review of Six Technologies*. 000000003002011665. (SE06971).

[60] The record indicates that individual utilities have found thermal and/or SDE systems to be less expensive than membrane (and even biological) systems in some cases.

[61] Thermal Evaporation Cost Methodology (SE10246).

[62] Spray Dryer Evaporator Cost Methodology (SE10247).

[63] EPA evaluated the non-water quality environmental impacts of these technologies in *Alternative Brine Management Methodology* (SE10243). EPA performed this evaluation in the context of brine management technologies for membrane filtration, and the types of impacts and findings would remain the same even if used as standalone technologies.

economically achievable, and whether they would have acceptable non-water quality environmental impacts. EPA also solicits comment on whether any one or more of these alternative zero discharge technologies should be the BAT technology basis for control of FGD wastewater discharges in lieu of chemical precipitation plus membrane filtration.

c. EPA proposes to reject as BAT less stringent technologies than membrane filtration

Except for the early adopter subcategory discussed in Section VII.C.4 of this preamble, EPA is not proposing to base BAT on chemical precipitation followed by a low hydraulic residence time biological treatment including ultrafiltration, the technology which EPA determined to be BAT in the 2020 rule. Under CWA section 301(b)(2)(A), BAT is supposed to result in "reasonable further progress toward the national goal of eliminating the discharge of all pollutants" and "shall require the elimination of discharges of all pollutants if the Administrator finds . . . that such elimination is technologically and economically achievable" as determined in accordance with CWA section 304(b)(2)(B). The record shows that the 2020 rule industrywide BAT technology basis for FGD wastewater removes fewer pollutants than the BAT basis of chemical precipitation plus membrane filtration identified in this proposal. Similarly, except for the permanent cessation of coal combustion subcategory discussed in Section VII.C.3 of this preamble, EPA is not identifying the less stringent (and previously rejected) technologies of surface impoundments or chemical precipitation, as these technologies too will remove fewer pollutants than the BAT in this proposal.

2. BA Transport Water

EPA is proposing dry handling or closed-loop systems as the technology basis for establishing BAT limitations to control pollutants discharged in BA transport water. EPA proposes to find that these technologies are technologically available, are economically achievable, and have acceptable non-water quality environmental impacts after evaluating the factors specified in CWA section 304(b)(2)(B). Specifically, dry handling systems include mechanical drag systems (*e.g.*, submerged chain conveyors), submerged grind conveyors (*e.g.*,

compact submerged conveyors), air-cooled conveyor systems, and pneumatic systems. Closed-loop systems consist of remote mechanical drag systems paired with any necessary storage tanks, chemical addition systems, and/or RO treatment necessary to fully recycle BA transport water.[64]

In the 2020 rule, EPA rejected dry handling or closed-loop systems as the BAT technology basis in favor of high recycle rate systems due to process changes plants made to comply with the CCR rule (*i.e.*, re-routing non-CCR wastes to their wet BA handling systems to avoid sending them to their unlined surface impoundments, as the CCR rule's cease-receipt-of-waste date approached), as well as the additional costs of dry handling or closed-loop systems. EPA also stated in 2020 that many plants may not, as a technical matter, be able to fully close their BA handling systems to operate without discharge. Upon further careful consideration of the record and the CCR rule, EPA does not think that plants need a purge allowance to comply with the CCR rule. While in some cases plants may incur additional costs to achieve zero discharge by making process changes, the widespread use of dry handling or closed-loop systems supports the view that these technologies are available. As explained below, EPA proposes to find that the technologies are available and economically achievable, and they have acceptable non-water quality environmental impacts. Thus, EPA is proposing dry handling or closed-loop systems as the BAT technology basis for BA transport water.

In the first subsection immediately below, EPA discusses its rationale for proposing dry handling or closed-loop systems as BAT for BA transport water. In the following subsection, EPA discusses why it is not proposing less stringent technologies than dry handling or closed-loop systems. In the final subsection, EPA solicits comment on issues associated with a BA transport water purge allowance and bottom ash contact water.

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[64] In addition to remote MDSs, non-BAT technologies include many dewatering bins (also known as hydrobins), and surface impoundments may also have the flexibility to operate as closed-loop systems. Like remote MDSs, the latter systems may need to install chemical addition systems (acid, caustic, and/or flocculants), RO systems, and/or additional storage tanks to operate as fully closed loop.

a. Dry handling or closed-loop systems

Availability of dry handling or closed-loop systems. Based on the record, EPA proposes to find that dry handling or closed-loop systems are technologically available. At the time of the 2020 rule, EPA estimated that more than 75 percent of plants already employed dry handling systems or wet sluicing systems in a closed-loop manner, or had announced plans to switch to such systems in the near future. The high percentage of plants already employing these systems indicates that they are technologically available. Some of these systems have been in use since the 1970s, and today, most facilities have installed one or more such systems.[65]

In the 2015 and 2020 rule preambles, EPA discussed the widespread use of dry handling systems for control of BA transport water servicing approximately 200 EGUs at over 100 plants. In the 2020 rule, EPA also discussed advances in dry BA handling systems. Specifically, the Agency discussed a newer technology called submerged grind conveyors (one example of which is called a compact submerged conveyor). At the time, compact submerged conveyors were known to be installed and in operation at two plants. EPA has since learned that about 12 compact submerged conveyors have been installed.[66,67] Partly due to the increased use of compact submerged conveyors, more dry handling systems are currently in place than EPA originally forecasted. For example, as indicated in the 2020 rule record, one utility commented that it had space constraints at a facility that would preclude the installation of a compact submerged conveyor, and EPA thus projected that this facility would employ a high recycle rate system under the 2020 rule. Since the 2020 rule, however, that utility ultimately proceeded to install a different dry handling system, which highlights the broad array of dry handling options available for coal-fired power plants, regardless of their configuration. Even where space

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[65] One vendor estimates that only seven ash conversions remain in the entire industry.

[66] Some utilities have even suggested that the discussion of compact submerged conveyors in the final 2020 rule preamble and additional compliance timeframes have led them to consider these newer dry systems rather than a previously contemplated high recycle rate/closed-loop system.

[67] Final Burns & McDonnell Meeting Notes (SE10248).

constraints may prohibit certain dry systems, a plant could use a pneumatic system, albeit at a somewhat greater cost. The 2020 rule record included information on 50 pneumatic installations from as early as 1992. Given that BAT is to reflect the best performing plant in the field *Kennecott v. EPA*, 780 F.2d at 447, and the facts in the record support the use of dry handling technology to achieve zero discharge of BA transport water, EPA could propose to identify dry handling as the sole technology basis for control of BA transport water. Nonetheless, as it did in the 2015 rule, EPA is proposing to also identify closed-loop systems as a BAT technology basis for controlling discharges of BA transport water, given that a limited number of plants may find that option to be more attractive due to space constraints and lower costs when compared to a pneumatic system.

After the 2015 rule and throughout the 2020 rulemaking, certain industry representatives argued that there are challenges to operating a closed-loop BA handling system in a truly zero discharge manner. They argued that closed-loop systems, including remote MDS and dewatering bins, cannot maintain fully closed-loop operations due to chemistry issues or water imbalances in the system, such as those that might occur from unexpected maintenance or large precipitation events. However, even accounting for these issues, the 2020 rule did not find that closed-loop systems are not technologically available. Information in EPA's 2020 rule record indicated that plants can operate their closed-loop systems to achieve zero discharge, although this could require some process changes and their resulting costs. The 2020 record found that industry could achieve complete recycle at an additional cost of $63 million per year in after-tax costs (beyond the costs of the systems themselves) over the 2015 rule's estimates. Moreover, EPA's cost estimates at the time were admittedly conservative, as the Agency assumed the need to treat 10 percent of the BA handling system's volume using RO for every facility with a closed-loop system. See Section VIII of this preamble for a further discussion of costs associated with the proposed closed-loop system technology basis.

In the 2020 rule record, EPA discussed four potential challenges with maintaining closed-loop systems: (1) managing non-BA transport water inflows, (2) managing precipitation-related inflows, (3) managing unexpected maintenance events, and (4) maintaining water system chemistry. As further discussed below, based on the current record, none of these previously discussed challenges provide a reasoned basis for finding closed-loop systems not to be technologically available, although these issues may in certain circumstances require a plant to incur additional costs.

First, in 2020, EPA stated that managing non-BA transport water inflows had the potential to result in water imbalances within a closed-loop system. With respect to the inflow of other wastestreams into the BA handling system, EPA's record in the 2015 and 2020 rules indicates that closed-loop systems (*i.e.*, remote MDSs) can be sized to handle these additional wastestreams.[68] To ensure effective operations when designing and procuring closed-loop systems, facilities should seek to size these systems for all wastestreams the system would handle. Moreover, there is no evidence in the record that unanticipated inflows cannot be addressed with reasonable steps.[69] EPA solicits comment on whether the best performing remote MDSs have documented non-BA transport water inflows regularly exceeding the ability of the systems to reuse their wastewater. EPA solicits comment providing data from any remote MDS that would suggest whether a purge allowance is or is not appropriate due to the technological availability of the system.

Second, in 2020, EPA stated that managing precipitation-related inflows had the potential to result in water imbalances in the BA handling system. However, EPA's record shows that precipitation-related inflows can be adequately managed with design improvements, including

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[68] For example, the Belews Creek remote MDS discussed during the 2020 rulemaking also accepts economizer ash and pyrites (SE07137).

[69] Even including dewatering bins, which are not the basis for either the 2015 BAT for BA transport water or this proposed BAT, the 2020 record included only a single facility where the water inflows to its dewatering bin system were too great to be recycled due to the presence of other wastewaters.

the use of roofing where appropriate. The 2015 BAT technology basis and 2020 rule remote MDS technology designs included and costed for covers to avoid collecting precipitation.[70] There is no record evidence that this previously discussed precipitation-related challenge cannot be overcome with reasonable steps and, therefore, this concern does not provide a basis for rejecting closed-loop systems as BAT. EPA solicits comment on whether the best performing remote MDSs have documented precipitation inflows that have exceeded the ability of the systems to reuse or store their wastewater, or whether the technology issue can be addressed by undertaking measures at a reasonable additional cost. EPA solicits comment providing data from such systems that would suggest whether a purge allowance is or is not warranted. EPA solicits comment on allowing for unlimited one-time purges due to large precipitation events exceeding a 10-year storm event of 24-hour or longer duration (*e.g.*, a 30-day storm event) where drains or other precipitation-collection components may not be amenable to roofs or other covers, including any necessary reporting or recordkeeping requirements. Due to the increasing storm severity associated with climate change, EPA also solicits comment on whether a different type of storm event would be more appropriate. Should EPA allow such discharges, the Agency solicits comment on whether to require facilities to submit information when they discharge, such as why the discharge was necessary, how much was discharged, or any other specific information (*e.g.*, meteorological information) that would be helpful to the permitting authority or public at large.

A third previously discussed challenge mentioned in the 2020 rule to operating a remote MDS as a closed-loop system is the possibility of infrequent maintenance events that might fall outside the 2015 rule exemption of "minor maintenance" and "leaks" from the definition of BA transport water. EPRI (2018) listed several such maintenance events; most were expected to occur less than annually. EPRI provided information about the estimated frequency and volume

[70] 2020 Supplemental TDD (EPA-821-R-20-001).

of water associated with each maintenance event; however, EPRI did not provide information about a specific remote MDS unable to manage these maintenance events with existing maintenance tanks. Furthermore, even where maintenance wastewater volumes are too large to be managed in existing maintenance tanks, utilities can, at additional cost, lease storage tanks for short-term maintenance where these infrequent maintenance events are foreseeable.[71] There is no record evidence that infrequent maintenance events cannot be overcome with reasonable steps and, therefore, this concern does not provide a basis for rejecting closed-loop systems as BAT. EPA solicits comment on whether data from such systems would suggest a purge allowance is or is not warranted, as well as on the underlying data. EPA also solicits comment on whether the Agency should expand the existing "minor maintenance event" exemption from the definition of BA transport water in § 423.11(p). One example of such a potential expansion could include changing the current language that excludes "minor maintenance events (*e.g.*, replacement of valves or pipe section)" to instead state "minor maintenance (*e.g.*, replacement of valves or pipe sections) or infrequent (*i.e.*, occurring less than annually) maintenance events." Another example would be to delete the term "minor" and associated parenthetical and merely say "maintenance events." To the extent that EPA expands this exemption in 40 CFR 423.11(p), the Agency also solicits comment on any appropriate reporting or recordkeeping requirements. For example, EPA is interested in commenters' views on whether, when a facility discharges due to a maintenance event, facilities should submit information about why it was necessary to discharge, how much was discharged, or any other specific information that would be helpful to the permitting authority or broader public. Furthermore, EPA solicits comment on whether implementation of such a change to the definition of BA transport water should require, for example, a demonstration that the maintenance water could not be managed within the system.

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[71] In contrast, if the maintenance discharge is caused by an unforeseeable upset condition, the plant would have an affirmative defense to an enforcement action if the requirements of 40 CFR 122.41(n) are met.

The final engineering challenge discussed in the 2020 rule record as a reason for selecting high recycle rate systems rather than closed-loop systems was the need to maintain water system chemistry. The 2020 rule discussed potentially problematic system chemistries, such as extreme acidic conditions, high scaling potential, and the buildup of fine particulates that could clog pumps and other equipment. The 2015 closed-loop system BAT design basis included a chemical addition system to manage these system chemistries. In particular, corrosivity could be managed through pH adjustment, scaling could be managed with acid and/or antiscalants, and fines could be further settled out with polymers and other coagulants. EPRI[72] documented that some systems went slightly further, pairing the chemical addition systems with changes in operations such as higher flow rates or longer contact time. Even where all else fails, the same slipstream of purge allowed under the 2020 rule could be treated with RO and recycled back in as clean makeup water. While it is possible that addressing these issues could entail additional costs, there is no record evidence that this chemistry-related challenge cannot be overcome with reasonable steps and, therefore, this concern does not provide a basis for rejecting closed-loop systems as BAT. EPA solicits comment on the extent to which any plant using a remote MDS has tried all the processes described above and still failed to adequately control system chemistry. EPA solicits comment on whether data from such systems would suggest a purge is or is not warranted, as well as on the underlying data.

For all the foregoing reasons, EPA proposes to find that the record indicates that dry handling or closed-loop systems are technologically available for control of discharges in BA transport water. Moreover, dry handling or closed-loop systems would result in reasonable further progress toward the Act's goal of eliminating the discharge of all pollutants, as the limitations based on this technology would require zero discharge of BA transport water from the steam electric industry.

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[72] SE08927.

Economic achievability of dry handling or closed-loop systems. EPA proposes to find that the costs of dry handling or closed-loop systems are economically achievable for the industry as a whole. In the 2020 rule, EPA cited the additional costs of closed-loop systems as part of its basis for selecting high recycle rate systems. In the 2020 rule record, EPA noted that it had "conservatively" estimated costs of $63 million per year based on all facilities using a remote MDS needing a 10 percent purge to be treated with RO in order to achieve complete recycle (*i.e.*, zero discharge operations). However, EPA never found that the additional costs to achieve zero discharge were not economically achievable. Moreover, the 2020 rule record never demonstrated that a full 10 percent purge at all facilities was a realistic costing assumption. The primary basis for the 2020 rule purge allowance was a 2016 report from EPRI that involved continuous purges, the majority of which were well under one percent. Thus, in the 2020 rule record, EPA presented a sensitivity analysis with costs for a two percent purge treatment, which may better reflect actual operations.

Even using the more conservative cost estimates in the baseline IPM analysis for the 2020 rule (*i.e.*, full implementation of the 2015 rule),[73] the record demonstrated minimal changes in coal combustion and in steam electric power plant retirements. After updating these conservative cost estimates to $45 million per year pre-tax in proposed Option 3, the IPM analysis performed for this proposed rule continues to demonstrate that, after including the costs of treating all wastestreams—including achieving zero discharge for BA transport water—the proposed rule would result in minimal economic impacts. (For further information, see Sections VII.F and VIII of this preamble). Because EPA is required to consider whether the cost of BAT can be reasonably borne by the industry and confers on EPA discretion in consideration of the BAT factors, *see, e.g., Chem. Mfrs. Ass'n v. EPA*, 870 F.2d at 262; *Weyerhaeuser v. Costle*, 590

[73] The 2020 rule analysis had a baseline of zero discharge under the 2015 rule.

F.2d at 1045, EPA proposes to find that these additional costs are economically achievable as that term is used in the CWA.

Non-water quality environmental impacts of dry handling or closed-loop systems. EPA proposes to find that the non-water quality environmental impacts associated with dry handling or closed-loop systems for controlling BA transport water discharges are acceptable. See Sections VII.G and X of this preamble below for more details.

Process changes associated with dry handling or closed-loop systems. EPA also rejected closed-loop systems in the 2020 rule due to process changes happening at steam electric facilities as they move toward compliance with the CCR rule. EPA stated that as plants close their surface impoundments under the CCR rule, they may choose to send certain non-CCR wastewaters to their BA handling system. This could complicate their efforts to fully close their BA handling systems due to increased scaling, corrosivity, or plugging of equipment. Alternatively, EPA mentioned that a closed-loop requirement might incentivize plants to discharge their non-CCR wastes rather than send them to their BA handling systems for control, in which case they would be subject to less stringent requirements governing low-volume wastes. EPA also suggested that requiring limitations based on closed-loop systems could result in plants using their surface impoundments longer, assuming plants cannot build alternative storage capacity and need to continue to send their non-CCR wastes to unlined impoundments.

The rationale in the 2020 rule is not persuasive under the timeframe of any final ELG rule because by the time any BA transport water requirement would be implemented in NPDES permits, the CCR rule ash pond cease receipt of waste dates will have long since passed, or this rule's proposed subcategories could address any remaining CCR coordination issue. The CCR Part A rule required plants to cease receipt of waste in unlined surface impoundments by April 11, 2021.[74] This date has already passed, with most facilities having completed conversions from

[74] 40 CFR 257.101(a)(1).

leaking, unlined surface impoundment BA handling systems to a CCR rule-compliant BA handling system (*i.e.*, systems that do not rely on unlined CCR surface impoundments). Of the remaining unlined surface impoundments, those operating under CCR Part A flexibility found in § 257.103(f)(2) are permanently ceasing coal combustion, and EPA proposes to continue to treat them differently under the subcategory for EGUs permanently ceasing coal combustion by 2028. This leaves only the unlined surface impoundments where alternative capacity is technically infeasible, a CCR Part A flexibility with maximum timeframes of October 15, 2023, and October 15, 2024, to cease receipt of waste.[75] These later dates require EPA approval.[76] Even with extensions, nearly every facility will have completed its conversion to a CCR rule-compliant BA handling method by 2024, the year in which EPA intends to promulgate any final ELG following this proposal. Since EPA expects that all facilities would comply with the CCR rule cease-receipt-of-waste provisions and have alternative BA handling systems or compliant surface impoundments by then, there are no looming deadlines and tight timeframes that would justify continued flexibility. Instead, with the work to meet these CCR deadlines completed, facilities with high recycle rate systems would be free to focus on transitioning those high recycle rate systems to closed-loop operations.[77] Thus, EPA proposes that there are no "process change" reasons related to the CCR rule that undermine EPA's proposed BAT basis of dry handling or closed-loop systems for control of BA transport water discharges.

b. EPA Proposes to reject as BAT less stringent technologies than dry handling or closed-loop systems

Except for the early adopter subcategory, EPA is not proposing to base BAT on high recycle rate systems. In the 2020 rule, EPA reversed its decision from the 2015 rule and

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[75] 40 CFR 257.103(f)(1)(vi).

[76] Further information on the implementation of these Part A applications is available on EPA's website at: *www.epa.gov/coalash/coal-combustion-residuals-ccr-part-implementation.*

[77] Although EPA estimates that fully closing the loop would be less expensive than converting to dry handling, nothing would preclude a facility with a high recycle rate system from installing one of the technologically available and economically achievable dry handling systems.

determined that closed-loop systems were not BAT. As a result, EPA established a volumetric purge allowance (with a maximum of 10 percent of the system volume) to be determined on a case-by-case basis by the permitting authority, which required a permitting authority's BPJ analysis to determine whether that purge required further control. As discussed above, the technological issues can be resolved, albeit at potentially additional costs, which EPA now proposes are economically achievable. Furthermore, a dewatering bin or remote MDS with a purge removes fewer pollutants than the proposed BAT basis of dry handling or closed-loop systems, which the Agency proposes to find are technologically available, are economically achievable, and have acceptable non-water quality environmental impacts. Under CWA section 301(b)(2)(A), BAT is supposed to result in "reasonable further progress toward the national goal of eliminating the discharge of all pollutants" and "shall require the elimination of discharges of all pollutants if the Administrator finds . . . that such elimination is technologically and economically achievable" as determined in accordance with CWA section 304(b)(2)(B). Because high rate recycle systems achieve fewer pollutant removals than the dry handling or closed-loop systems EPA has proposed as BAT, such less stringent technologies would not result in reasonable further progress toward the CWA's goal of eliminating the discharge of pollutants.

Except for the permanent cessation of coal combustion subcategory, EPA is also not identifying the less stringent (and previously rejected) technology of surface impoundments as the technology basis for BAT, as this technology would also remove fewer pollutants than the proposed BAT basis of dry handling or closed-loop systems, which EPA proposes are technologically available, are economically achievable, and have acceptable non-water quality environmental impacts.

c. Solicitation of comment on additional BPJ-based permitting constraints and issues related to BA contact water

Despite the preceding discussion, if EPA were to maintain the 2020 rule's purge allowance, the Agency solicits comment on whether it should establish constraints and additional

requirements on where and how a purge may be allowed on a case-by-case basis. All the instances EPA is aware of involving requests by plants to purge BA transport water under the 2020 rule have included a request for a full 10 percent purge. The limitation EPA established in the 2020 rule was, however, a site-specific purge allowance with a maximum 10 percent threshold. In practice, this flexibility has resulted in a situation where BA handling systems either achieve zero discharge or purge the maximum 10 percent. EPA notes that all the chemistry-related purges discussed in EPRI (2016) were one percent or less of system volume, and it solicits comment on whether, if a final rule were to include allowance for any purge, the Agency should constrain the purge allowance to reflect the smaller continuous purge volumes in EPRI (2016). EPA also solicits comment on whether, in the event of allowance of any purge, the permittee should provide further analysis and justification to the permitting authority or if EPA should place further constraints on the permitting authority in allowing purges. For example, EPA solicits comment on whether permittees should be required to complete an engineering study, starting with closed-loop operations and slowly increasing purge as necessary after demonstrating that the system cannot be operated with the existing level of purge (*e.g.*, by using chemical addition systems, changing flows, or residence time).

Moreover, if EPA elects to retain a high recycle rate system as BAT for BA transport water, the Agency is interested in whether there should be any additional constraints on the purge allowance to ensure that the pollutant reductions achieved are consistent with the reductions expected from the BAT technology basis. In particular, EPA has become aware of system operations that recycle a high percent of water, but in practice may not achieve pollutant removals as high as those of the remote mechanical drag chain and dewatering bin systems described in the 2020 rule preamble, which were the bases for the following findings:

> Based on actual, measured purge rates in EPRI (2016), however, the agency estimates that actual purge rates necessary on a day-to-day basis may be less than one percent of the system's volume, with higher purges necessary at less frequent intervals due to

> precipitation and maintenance. Furthermore, while surface impoundments can cover dozens of acres and contain volumes in the billions of gallons, **typical high recycle rate systems have volumes closer to one-half million gallons (1⁄2 million)**. Thus, even assuming the proposed maximum allowable purge of 10 percent is necessary for a unit, the average gallons per day released by high recycle rate systems will be two percent of the average gallons per day released by surface impoundments, and therefore will also be 1.5 percent of the pollutant releases expected from surface impoundments. Industry-wide, EPA estimates this combination of reduced volume and increased recycling reduces discharges by 366 million lb/year of pollutants, and thus makes reasonable further progress toward the CWA goal to eliminate the discharge of pollutants. *See* 33 U.S.C. 1251(a), 1311(b)(2)(A). **Therefore, it is the combination of the reduced system volume and high capacity to recycle BA transport water that supports EPA's basis for high recycle rate systems as BAT.** (Emphasis added.)

As an example of such a system, following the 2020 rule, EPA became aware of one plant that intentionally constructed a concrete basin system intended to recycle only 90 percent of BA transport water (Smith et al., 2022).[78] Due to the size of this system, the 10 percent purge generated results in a much greater volume of discharged wastewater than the 2020 rule contemplated. This facility is not unique in its use of large, concrete basins. The APS Four Corners power plant recently submitted a request for a 10 percent purge of BA transport water[79] where the claimed system volume of over 4.5 million gallons would result in a BA transport water purge of nearly one-half MGD, a volume greater than the entirety of the purges claimed

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[78] *See www.woca2022.conferencespot.org/event-data/pdf/catalyst_activity_28074/catalyst_activity_paper_20220329020324138_a6f09dfc_ad86_4183_9ecb_a71e88b48245.*

[79] An updated submission made to EPA has since reduced this request to between two and 2.5 percent of system volume and is currently being evaluated by the Agency.

for the Duke Energy coal fleet.[80] While the facility employs dewatering bins as the primary BA handling mechanism, part of this high volume discharge request appears to stem from the large concrete basins, or "tanks," that APS has installed. EPA solicits comment on other facilities that have installed concrete basin systems or tanks and any facts describing the size, flows, and other operational parameters of such systems. Furthermore, should EPA ultimately elect to retain a purge allowance for BA transport water, the Agency solicits comment on whether the total volume (not just the percent) of purge should also be limited to ensure that the system achieves the pollutant removals of a true high recycle rate system (*i.e.*, a remote MDS).

While EPA is concerned that the site-specific purge in the 2020 rule may be unnecessary or not adequately justified, the Agency also notes that "dry handling" systems often are not completely dry. EPRI (2014) included information about an MDS with purge of 270 gpm from an under-boiler "dry handling" system. EPA has received additional flow diagrams in the most recent information collection that show purges from additional MDS systems.[81] Thus, while many facilities have installed pneumatic and air-cooled drag chain systems, many EGUs with "dry handling" due to under-boiler MDS or compact submerged conveyor systems still rely on wet hoppers that catch and cool hot (in some cases molten) BA in quench water. EPA has not considered this BA contact water to be transport water (instead considering it within the catch-all category of low volume wastewater), because, as explained in the 2015 rule, the water is not used to transport the BA, resulting in decreased contact times (and thus decreased pollutant concentrations) from the BA. While overall pollutant concentrations may be lower, leaching data in the 2015 CCR rule record indicate that some constituents wash out due to their high

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[80] In contrast, the purge requests from Duke Energy estimated a 10 percent purge of between approximately 50,000 and 100,000 gallons per day at each of the company's five plants with such systems.

[81] These flow diagrams did not include flow rates or pollutant concentrations. (SE09754 and SE09724.)

solubility.[82] For these pollutants, there may be little difference in concentration between transport water and contact water. In the absence of data from actual under-boiler purges, EPA solicits comment providing data and purge examples from existing dry handling systems. EPA solicits comment on whether limiting or removing the ability to purge from a high recycle rate system but not from a "dry" under-boiler system may result in unwarranted disparate treatment or perverse incentives. EPA solicits comment on whether there is a potential unwarranted disparity and how the Agency might address this disparity to avoid potentially encouraging larger discharges. For example, EPA solicits comment on whether it should continue to allow (or alternatively not allow, through a zero-discharge requirement) a purge for both contact water and transport water. Since contact water is not covered by the definition of transport water in 40 CFR 423.11(p), EPA solicits comment on whether the purge of such water should nevertheless be included as "bottom ash purge water" under § 423.11(cc) and thus subject to a BPJ analysis by the permitting authority.

3. Combustion Residual Leachate (CRL)

EPA is proposing chemical precipitation as the technology basis for establishing BAT limitations to control pollutants discharged in CRL. After evaluating the factors specified in CWA section 304(b)(2)(B), EPA proposes that this technology is available, is economically achievable, and has acceptable non-water quality environmental impacts. Specifically, the proposed BAT basis consists of chemical precipitation/coprecipitation employing the combination of hydroxide precipitation, iron coprecipitation, and sulfide precipitation.

In the subsection immediately below, EPA discusses its rationale for proposing chemical precipitation as BAT for control of leachate. In the following subsection, EPA solicits comment on whether it should base BAT for CRL on more stringent technologies, such as chemical

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[82] U.S. EPA (Environmental Protection Agency). 2014. *Human Health and Ecological Risk Assessment of Coal Combustion Residuals*. 2050-AE81. December. Available online at *www.regulations.gov*. Document ID#: EPA-HQ-OLEM-2019-0173-0008.

precipitation plus biological treatment, chemical precipitation plus membrane filtration, or chemical precipitation plus thermal treatment, and whether these technologies are technologically available, are economically achievable, and have acceptable non-water quality environmental impacts, as discussed below. In the third subsection, EPA discusses why it is not proposing to establish BAT for control of pollutants in CRL based on surface impoundments. In the fourth subsection below, EPA solicits comment on additional options related to co-treatment of FGD and CRL wastewater, a potential grandfathering provision, co-treatment of CRL and stormwater, and potential differences in leachate associated with pre- and post-close of landfills. Finally, in the last subsection below, EPA solicits comment on EPA's estimates of potential costs and loads of pollutant discharges through groundwater, treatment differences, and potential subcategorization related to discharges through groundwater.

a. Chemical precipitation

Technological availability of chemical precipitation. EPA proposes to find that chemical precipitation is technologically available for control of CRL discharges. In the 2015 rule record, EPA found that chemical precipitation systems are technologically available for treating CRL, capable of achieving low effluent concentrations of various metals, and effective at removing many of the pollutants of concern present in CRL discharges to surface waters. The Agency also found that the pollutants of concern in CRL are the same pollutants that are present in, and in many cases are also pollutants of concern for, FGD wastewater, FA transport wastewater, BA transport water, and other CCR solids. This proposed finding is consistent with the findings of this technology as the basis for the 2015 rule's NSPS and PSNS for CRL.[83]

EPA is basing the proposed effluent limitations on the chemical precipitation system for treating FGD wastewater as described in the 2015 rule record because the record indicates that

[83] In establishing chemical precipitation as the basis for NSPS, the Agency stated that chemical precipitation is a well-demonstrated technology for removing metals and other pollutants from a variety of industrial wastewaters. 80 FR 67859.

CRL wastewater is similar to FGD wastewater, which the record demonstrates can be effectively treated using chemical precipitation. Specifically, the system serving as the BAT technology basis employs equalization, hydroxide and organosulfide precipitation, iron coprecipitation, and removal of suspended and precipitated solids. As discussed in Section VI of this preamble above, EPA asked eight utilities to voluntarily perform CRL sampling at CCR landfills the Agency believed were new CCR rule-compliant landfills and/or expansions. EPA ultimately received supplemental CRL sampling data covering 25 landfills. EPA analyzed these data in the *CRL Analytical Data Evaluation* (SE10249) and found that CRL has a similar wastewater characterization to FGD wastewater. Chemical precipitation would make reasonable further progress toward the Act's goal of eliminating the discharge of all pollutants, as the limitations based on this technology would eliminate substantial amounts of arsenic, mercury, and other toxic pollutants from CRL discharges by the steam electric industry.

Economic achievability of chemical precipitation. EPA proposes to find that the costs of chemical precipitation for control of CRL discharges are economically achievable. This proposal includes IPM modeling of the preferred option (Option 3) which includes chemical precipitation costs for CRL. The results of the analysis show small changes in coal utilization and only one incremental retirement of a facility out of 871 steam electric power plants in the steam electric power generation industrial category. Furthermore, that plant already operates at a low capacity utilization rating. This is well within the economic impact estimated for other BAT rules and has been upheld by courts. *Chem. Mfrs. Ass'n v. EPA*, 870 F.2d at 252. As a result of this analysis, EPA proposes to find that chemical precipitation is economically achievable.[84] For further discussion of the economic analysis, see Sections VII.F and VIII of this preamble below.

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[84] EPA notes that the 2015 rule record indicated that the costs of treating CRL based on chemical precipitation were only marginally higher than the total costs in the selected option, which was found to result in minimal economic impacts. Furthermore, the cost screening in 2015 found that only a small portion of the plants and parent entities would experience costs greater than one percent or three percent of revenue, even with chemical precipitation treatment of CRL. While

Non-water quality environmental impacts of chemical precipitation. EPA proposes to find that the non-water quality environmental impacts associated with chemical precipitation to control CRL discharges are acceptable. See discussion below in Section VII.G and Section X of this preamble.

b. More stringent technologies than chemical precipitation

EPA solicits comment on whether the technology basis for BAT limitations to control discharges of pollutants in CRL should be based on more stringent technology, such as biological treatment, spray dry evaporation, thermal systems, or membrane filtration. The record includes plants that have successfully treated a combination of CRL and FGD wastewater with chemical precipitation as pretreatment for biological or thermal systems. This successful treatment history may further support the availability of chemical precipitation either alone or as pretreatment for more advanced systems. EPA solicits comment and additional data about these systems treating CRL beyond chemical precipitation and further solicits comment on whether and to what extent it should instead, or in addition, base BAT limitations applicable to CRL on these technologies.

With respect to biological treatment, EPA solicits comment on whether it should base BAT limitations applicable to CRL on chemical precipitation plus biological treatment. In the 2015 rule record, EPA found that chemical precipitation plus biological treatment was technologically available and in use domestically to treat a mix of FGD wastewater and CRL. Given the data cited above showing the similarity of FGD and CRL wastewater, EPA solicits comment on transferring the FGD wastewater technology basis and BAT limitations from the 2020 rule as the technology basis and BAT limitations for CRL as well.

With respect to thermal treatment, the 2020 rule record included a facility that co-treated its FGD wastewater and CRL with a thermal system to achieve zero discharge. At least four

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these thresholds do not necessarily equate to what is economically achievable, they may serve as a screening analysis to find that the costs do not raise economic achievability concerns.

vendors have conducted thermal system pilots on CRL, and there has been one full-scale thermal system installation for the treatment of CRL. EPA has identified four vendors that have conducted successful thermal system pilots, and each of these vendors has installed multiple full-scale thermal systems at non-power plant landfills. Thus, EPA solicits comment on finalizing a zero-discharge requirement for CRL based on chemical precipitation plus thermal treatment systems and/or SDE treatment systems, or alternatively on transferring the chemical precipitation plus thermal treatment-based BAT limitations established for the FGD wastewater NSPS in the 2015 rule.

With respect to membrane treatment, as discussed above under FGD wastewater, the record is also replete with the use of membrane filtration for a variety of wastestreams with characteristics like high TDS, high scaling potential, and high variability, both within the steam electric sector and in other industries. Furthermore, one midwestern facility conducted a successful pilot of a membrane filtration system on CRL.[85] EPA solicits comment on establishing zero discharge BAT limitations for CRL based on chemical precipitation plus membrane filtration, or alternatively on transferring the membrane filtration limitations established in the VIP for FGD wastewater in the 2020 rule.

EPA also solicits comment on establishing limitations based on any combination of chemical precipitation plus membrane filtration, chemical precipitation plus thermal, and/or SDE treatment. To facilitate comments on a zero discharge option, EPA has provided memos to the record evaluating the costs of achieving zero discharge of CRL and the associated pollutant reductions.[86] Should EPA finalize BAT limitations based on more stringent technologies than chemical precipitation, EPA also solicits comment on the appropriateness of revising NSPS and PSNS for CRL based on a more stringent technology than the NSPS basis selected in the 2015 rule (chemical precipitation).

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[85] This utility declined to provide the pilot in response to a voluntary request from EPA.
[86] Evaluation of Zero Discharge Options for CRL (SE10257).

c. Less stringent technologies than chemical precipitation

EPA is not proposing to base BAT limitations for control of CRL on surface impoundments because there are other technologies (like chemical precipitation) that achieve greater reductions in pollutant discharges, which EPA proposes are available and economically achievable, with acceptable non-water quality environmental impacts. Surface impoundments would not make reasonable further progress toward the national goal of eliminating the discharge of pollutants.

d. Solicitation of comment on additional options related to co-treatment of FGD and CRL wastewater, potential grandfathering provision, co-treatment of CRL and stormwater, and potential differences in discharges associated with pre- and post-closure of landfills

EPA also solicits comment on whether EPA should create a subcategory allowing facilities that co-treat their FGD and CRL wastewater to meet BAT limitations based on a different technology basis than the one used by facilities treating CRL alone. EPA solicits comment on whether there are engineering obstacles to such co-treatment based on proximity of the landfill or other factors. EPA also solicits comment on whether it would be appropriate to establish either a grandfathering provision that would allow such facilities a limited payback period to recover costs on the CRL treatment investments already made before having to comply with any new limitations or another provision that would account for the potentially unique circumstances of these facilities, in light of the factors specified under CWA section 304(b).

In developing the current record, EPA received information about systems that collect leachate and stormwater in the same system. For example, one type of system involves the use of chimneys that route stormwater straight through a landfill into the leachate collection system to minimize percolation through the CCR solids. Thus, EPA also solicits comment on flexibilities that might be warranted for such systems. For example, EPA solicits comment on whether such systems should be subcategorized, or whether either the definition of CRL or the applicability of

the CRL limitations should exclude discharges when stormwater exceeds specific storm events, such as events used as the basis of the BA transport water purge allowance in the 2020 rule.

EPA also discussed the differences between pre- and post-closure landfill operations with several stakeholders. For example, post-closure, the CCR rule requires landfills and surface impoundments closing with waste in place to have a cap that is graded to minimize infiltration into the CCR solids. This will result in volumes of CRL decreasing significantly post-closure. EPA solicits comment on specific information that would suggest whether different limitations should apply to the same landfill or surface impoundment pre- and post-closure. The change in flows also means the amount of capital expenditure on treatment systems (larger flows lead to larger treatment systems) might be disparate for landfills and surface impoundments nearing closure when compared to those with many operating years remaining or to those that have already closed under the CCR rule. Thus, EPA solicits comment on whether there should be flexibility for landfills and surface impoundments nearing closure such that limitations could be postponed until after closure to avoid construction of a larger, more expensive system that would operate for only a relatively short period of time. EPA also solicits comment on whether CRL generated by already closed landfills and surface impoundments should be subcategorized, as well as information demonstrating whether subcategorization is warranted.

e. Solicitation of comment on EPA estimates of potential costs and loads of pollutant discharges through groundwater, treatment differences, and potential subcategorization

EPA also notes that unlined landfills and surface impoundments potentially discharge CRL through groundwater before entering surface water.[87] EPA, through this action, is not

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[87] Three panels in the 2022 World of Coal Ash conference included discharges through groundwater as a topic in their abstracts, and one abstract stated that surface impoundments are located so close to surface waters that the groundwater underlying the surface impoundment "is often in hydraulic communication with surface water." DeJournett et al., 2022. Available online at: *www.woca2022.conferencespot.org/event-data/pdf/catalyst_activity_28060/catalyst_activity_paper_20220124235416545_8aa3636e_85c7_4a17_bcca_a3119e01a5f9.*

addressing the definition of any terms in the CWA (such as "point source" or "discharge of a pollutant") that govern when a discharge is subject to NPDES permitting requirements or when a discharge to WOTUS through groundwater is a functional equivalent of a discharge and thus subject to the Act's NPDES permitting requirement. *See County of Maui v. Hawaii Wildlife Fund*, 140 S. Ct. 1462 (2020). Those issues are outside the scope of this rulemaking. EPA proposes that any discharge through groundwater that is the functional equivalent of a direct discharge under the *Maui* decision would be subject to the same BAT limitations as discharges that occur at the end of pipe. To evaluate the potential costs and loads of such discharges, EPA conducted *Evaluation of Potential CRL in Groundwater* (SE10250). EPA solicits comment on the appropriateness of the Agency's proposed BAT findings and their application to any discharges of CRL via groundwater that permitting authorities ultimately determine are subject to NPDES permitting. EPA also solicits comment on the extent to which CRL discharges through groundwater might be different than other discharges potentially subject to any final rule, including specific facts demonstrating that the chemical makeup, treatment effectiveness, or other factors differ from end-of-pipe discharges of CRL. EPA solicits comment on whether such discharges of CRL through groundwater should be defined as a separate wastestream or subcategorized and how, including whether these discharges should be subject to BAT limitations on a case-by-case, BPJ basis. Should EPA reserve these limitations such that permitting authorities' BPJ would apply, section 304(b) of the CWA, 33 U.S.C. 1314(b), and 40 CFR 125.3 specify factors the permitting authority would consider when establishing BPJ-based effluent limitations for CRL. Furthermore, EPA solicits comment on whether the Agency should explicitly set BAT equal to BPJ in the regulation and include additional constraints (*e.g.*, one or more presumptive standards) that are specific to this wastestream in this industry.

4. Legacy Wastewater

EPA proposes not to establish a nationwide BAT basis for legacy wastewater at this time and instead to continue to reserve these limitations for determination by the permitting authority,

using its BPJ for what is technologically available, economically achievable, and has acceptable non-water quality environmental impacts. This potential case-by-case outcome was explicitly identified by the Court in *Southwestern Elec. Power Company v. EPA*, 920 F.3d at 1021, as an alternative EPA should have considered.

In the first subsection immediately below, EPA discusses its rationale for BPJ-based BAT limitations to control legacy wastewater. In the second subsection, EPA discusses why it is not proposing less stringent technologies as BAT for legacy wastewater. In the last subsection, EPA discusses why it is not selecting more stringent technologies as BAT for legacy wastewater and is soliciting comment on potentially different limitations for a subset of legacy wastewater.

a. BPJ-Based BAT limitations

After evaluating the factors specified in CWA section 304(b)(2)(B), EPA is proposing to find that no single technology is technologically available and economically achievable on a nationwide basis for control of pollutants in legacy wastewater. Because of process changes happening at plants in the form of ongoing and soon-to-be-completed rapid surface impoundment closures under the CCR rule, EPA proposes that a nationwide BAT limitation for legacy wastewater that would be finalized mid-closure could be infeasible. The statute requires BAT to reflect what is technologically available, is economically achievable, and has acceptable non-water quality environmental impacts based on consideration of several factors, including "process changes" and "such other factors" as the Administrator deems appropriate. Because many facilities with surface impoundments are or will be in the process of closing their surface impoundments under the CCR rule, the technology that represents BAT for legacy wastewater treatment is likely to vary at any given site depending on several factors. These factors include, but are not limited to, the types of wastes and wastewaters present, the characteristics of the legacy wastewater in each layer of a surface impoundment, the amount of legacy wastewater remaining to be treated in a surface impoundment, the treatment option costs, the extent to which CWA requirements could interfere with closure timeframes required under the CCR rule, and the

potential for increased discharges through groundwater. While there is no typical site given the dynamic and changing nature of this wastestream at this time, given the CCR rule's closure requirements, permitting authorities should seriously consider treatment beyond that afforded by surface impoundments, which the Fifth Circuit found to be arbitrary, capricious, and inconsistent with the "technology-forcing mandate of the CWA." *Southwestern Elec. Power Company v. EPA*, 920 F.3d at 1017. The effect of finalizing this proposal would be for permitting authorities to continue to establish site-specific technology-based effluent limitations using their BPJ. Because the limitations would be derived on a site-specific basis, taking into account the requisite statutory factors and applying them to the circumstances of a given plant, EPA proposes that these case-by-case limitations would be technologically available and economically achievable and have acceptable non-water quality environmental impacts.

As part of this proposal, EPA is proposing to segregate legacy wastewater into two main categories of separately regulated discharges, which would each be subject to separate case-by-case technology-based effluent limitations established by the permitting authority (after considering the statutory factors). Legacy wastewater was defined in the 2015 rule preamble as:

> "…FGD wastewater, fly ash transport water, bottom ash transport water, FGMC wastewater, or gasification wastewater generated prior to the date determined by the permitting authority that is as soon as possible…"[88]

In practice, there are two distinct categories of legacy wastewater: (1) wastewater that is continuously or intermittently generated and discharged to a pond after the issuance of the first permit implementing the 2015 or 2020 rule but before the compliance date specified in the permit (the "as soon as possible" date required by the rule), and (2) wastewater that was discharged to the pond previously and will be discharged when the pond is dewatered for closure.

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[88] 80 FR 67854. CRL does not appear in this list because, in 2015, EPA did not establish more stringent limitations for this wastewater than the previously applicable BPT limitations.

By segregating wastewaters continuously or intermittently generated and discharged after permit issuance from those already accumulated in closing surface impoundments, permitting authorities could justify more stringent BAT requirements on a BPJ basis for one or both categories of legacy wastewater. The first category is continuously or intermittently generated and discharged and may be able to be more easily transmitted to other treatment systems at the facility. The second type is typically treated with modular, leased systems for a shorter period, making treatment more affordable.

For example, regarding FGD wastewater generated after permit issuance but before the "as soon as possible" date determined by the permitting authority, a facility installing the 2020 BAT technology basis of chemical precipitation plus biological treatment and ultrafiltration may be able to operate the chemical precipitation module before the date the permitting authority determines is the soonest date that the more stringent limitations apply pursuant to § 423.11(t). In such a scenario, it would be reasonable for a permitting authority to establish BAT limitations for legacy FGD wastewater using a BPJ approach that would transfer mercury and arsenic limitations with a date corresponding to the operability of that chemical precipitation module. Since permitting authorities already determine the "as soon as possible" date, it is reasonable that the same information could be used for a BPJ analysis.

The state of Pennsylvania recently implemented a similar approach in an NPDES permit issued to Homer City. In the Homer City *NPDES Permit Fact Sheet Addendum 3,*[89] the state found the plant had "voluntarily committed" to a more stringent technology than BAT. The state further found that the plant needed time "to plan, design, procure, and install equipment" that would "bring about a result that is more desirable under the Clean Water Act than a treated discharge—the elimination of a discharge." While the permit limits for this legacy wastewater

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[89] Available online at: *www.files.dep.state.pa.us/water/wastewater%20management/EDMRPortalFiles/Permits/PA0005037_FACT_SHEET_20210819_DRAFT_V2.pdf.*

were not as stringent as the 2020 rule FGD wastewater BAT limitations, the state permit required the discharger to meet interim effluent limits based on a chemical precipitation and aerobic biological treatment system that was available to this facility but may not be to other facilities, as the facility already had this technology in place before the completion of upgrades to achieve zero discharge.

The second category of legacy wastewater is wastewater accumulated over years in a surface impoundment that is later drained during the closure of that surface impoundment. Such wastewater consists of:

- surficial water located above the CCR solids (hereafter referred to as "surface impoundment (SI) decant wastewater"); and
- pore water in the saturated CCR layer at levels beyond that needed for conditioning (hereafter referred to as "surface impoundment (SI) dewatering wastewater")

EPA also notes that there would necessarily be an interstitial zone where there may be some disturbed CCR solids. In this case, the water may not necessarily be pore water from CCR solids but would sufficiently mix with the CCR solids such that it presents similarly elevated pollutant concentrations. Hence, while it is not pore water per se, this interstitial zone water should be similarly situated with the pore water layer from a regulatory perspective. For this reason, EPA is proposing, and soliciting comment on, the following set of definitions and proposing to require a separate BAT/BPJ analysis for this category of legacy wastewater:

- The term "surface impoundment" means a natural topographic depression, man-made excavation, or diked area that is designed to hold an accumulation of coal combustion residuals and liquids, and the unit treats, stores, or disposes of coal combustion residuals.[90]

[90] EPA has always sought to harmonize the CCR rule and this ELG. Therefore, this definition, and terms therein (*e.g.*, unit), was taken from 40 CFR 257.53 to match the definition under the CCR rule.

- The term "surface impoundment decant wastewater" means the layer of a closing surface impoundment's wastewater that is located from the water surface down to the level sufficiently above any coal combustion residuals that, when drained, does not resuspend the coal combustion residuals.
- The term "surface impoundment dewatering wastewater" means the layer of a closing surface impoundment's wastewater that is located below surface impoundment decant water due to its contact with either stationary or resuspended coal combustion residuals.

EPA also proposes a clarifying change to the definition of "tank" to ensure that there would be no structure that would qualify as both a tank and a surface impoundment. By separating these legacy wastewaters as distinct wastestreams from the legacy wastewater definition discussed above, EPA is proposing that the treatment of SI decant and dewatering wastewaters can, and in many cases should, be subject to different limitations from the first category of continuously or intermittently generated and discharged legacy wastewater. For example, a permitting authority conducting a BPJ analysis for a plant with the first type of legacy wastewater discussed above (*e.g.*, a continuously or intermittently discharged FGD wastewater) may determine that BAT limitations based on chemical precipitation are appropriate for the plant's legacy FGD wastewater discharged before its "as soon as possible" date, and that BAT limitations based on chemical precipitation plus biological treatment are appropriate thereafter. At the same time, the same plant may have the second type of legacy wastewater—SI decant and/or dewatering wastewater. For example, the plant may be dewatering one or more surface impoundments with historically generated FA and BA transport water, which the permitting authority could determine should be subject to different BAT effluent limitations after performing a BPJ analysis. These limitations could be more or less stringent than the FGD-specific chemical precipitation limitations derived for discharges before the "as soon as possible" date.

Factors the permitting authority must consider when establishing BPJ-based BAT effluent limitations for these two types of legacy wastewater are specified in section 304(b) of the CWA, 33 U.S.C. 1314(b), and 40 CFR 125.3(d). EPA solicits comment on whether the Agency should explicitly promulgate specific elements related to these factors, which are particular to this wastewater in this industry, in regulatory text. For example, such specific elements could include: (1) technologies available at the site, (2) the characteristics of the legacy wastewater, (3) amount of remaining legacy wastewater, (4) the treatment option costs, (5) the extent to which CWA requirements would interfere with surface impoundment closure required under the CCR rule, (6) the completed stage of closure for each surface impoundment, or (7) the closure deadline under the CCR rule.

EPA notes that some permitting authorities have actively sought to regulate these SI decant and dewatering wastewaters (typically through water quality-based effluent limitations). For example, the state of North Carolina considered SI decant and dewatering wastewaters in issuing several permits to Duke Energy. These permits generally limited SI decant wastewater to a maximum elevation change (*e.g.*, one foot per day), applied controls to stop decanting if TSS or dissolved pollutants exceeded some fraction of the discharge limitations (*e.g.*, 50 percent of TSS, 85 percent of arsenic), and would not drop the water level below some threshold (*e.g.*, three feet above the CCRs).[91] These performance restrictions were also paired with monitoring and reporting requirements. EPA discussed these permits with North Carolina regulators who found that this set of restrictions in the uppermost layer (*i.e.*, SI decant water) have been sufficient to protect receiving water quality.[92] EPA also notes that this approach is consistent with the approach EPRI presents in section 4 of *Coal Combustion Residuals Pond Closure: Guidance for*

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[91] Requirements differ by permit. Permits are available online at: *www.deq.nc.gov/about/divisions/water-resources/duke-energy-npdes-wastewater-permitting.*

[92] Notes from Meeting with NC DEQ—December 13, 2021 (SE10258).

Dewatering and Capping.[93] These same North Carolina permits place water quality-based effluent limitations on several pollutants that apply once the lower water levels (*i.e.*, SI dewatering wastewater) are reached. These pollutants differ for each permit, but generally have led to the inclusion of physical settling, chemical precipitation, and (for at least one facility) ZVI treatment[94] to remove TSS, metals, and selenium/nutrients, respectively. This makes these systems a potential basis for BAT for the newly defined SI decant and dewatering wastewaters. In response to a voluntary information request from EPA, Duke Energy declined to provide additional data on these systems.[95] EPA solicits comment on the costs and performance of all the systems discussed above and whether any of these systems could be used as a basis for a nationwide BAT limitations for SI decant and dewatering wastewaters.

EPA also learned that Minnesota Power has commissioned an SDE for its Boswell Energy Center.[96] On October 4, 2020, the plant also provided a notice of intent to close its unit 4 surface impoundment under the CCR rule.[97] EPA has learned that the SDE is currently used to evaporate SI decant and dewatering wastewater as part of its closure process. Once this impoundment is drained, the SDE will treat FGD blowdown and other plant wastewater such as bottom ash blowdown, pond water, and cooling tower blowdown. EPA solicits comment on this system's use, as well as cost and performance data related to this system. EPA solicits comment on whether an SDE might serve as a technology basis for BAT for SI decant and dewatering wastewaters.

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[93] EPRI (Electric Power Research Institute). 2014. *Coal Combustion Residuals Pond Closure: Guidance for Dewatering and Capping*. Palo Alto, CA. 3002001117. March.

[94] Duke Energy Site Visit Notes—November 2021 (SE10259).

[95] Although Duke declined to provide this information on claim that it was proprietary information of the vendors, EPA has already discussed some of these systems with the vendors and notes that the Agency can protect proprietary information as CBI.

[96] SE10376

[97] This filing is available online at: *www.mp-ccr.azurewebsites.net/Content/Facilities/Boswell/Closure_And_Post_Closure/BEC%20Pond%204%20Notice%20of%20Intent%20to%20Close.pdf.*

While there may be technologies in use to treat these wastewaters, EPA notes that the vast majority of SI decant and dewatering wastewater is likely to have already been discharged pursuant to BPJ determinations under existing permits rather than in any new permits implementing any finalized ELG revisions. Rapid closure of many of these surface impoundments is ongoing under the CCR rule. EPA notes that the vast majority of surface impoundments had to cease receipt of waste by April 11, 2021, and commence closure soon after. These surface impoundments were either unlined and leaking, in violation of location restrictions, or both. Thus, the vast majority of surface impoundments have already begun the closure process, of which dewatering is one of the first steps. Since closure must be completed within five years, subject to limited extensions,[98] most surface impoundments potentially discharging SI decant and dewatering wastewater to comply with the CCR rule will no longer be discharging by 2026. As is the case for all promulgated effluent limitations guidelines, the requirements for direct dischargers[99] do not become applicable to a given discharger until they are contained in revised NPDES permits. NPDES permits are typically issued for the maximum allowed five-year permit term. Most permits are not immediately revised after EPA issues a new ELG rule. Moreover, it is not uncommon for permits to be administratively continued beyond the five-year permit term if a permittee submits a timely permit renewal application, in which case the existing permit stays in effect until a new permit is effective. EPA expects to issue the final rule in 2024. Thus, even if these new ELG requirements were implemented into NPDES permits in a timely manner, the vast majority of SI decant and dewatering wastewater would have been discharged pursuant to BPJ determinations in existing permits rather than pursuant to any regulations EPA might promulgate.

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[98] *See* 40 CFR 257.102(f).

[99] Indirect dischargers (those who discharge to POTWs) are subject to pretreatment standards that are directly implemented and enforceable. CWA section 307; 40 CFR part 403.

EPA proposes that a BPJ approach for permitting legacy wastewater would result in reasonable further progress toward the CWA's goal of eliminating the discharge of all pollutants because it would allow permitting authorities to impose more stringent limitations (including potentially zero-discharge limitations) based on technologies that remove more pollutants than surface impoundments on a case-by-case basis, depending on what is technologically available and economically achievable for individual facilities.

EPA solicits comment on the proposed approach of continuing the current practice of case-by-case BPJ for determining BAT for legacy wastewater. EPA also solicits comment on explicitly establishing BAT equal to BPJ in the text of the regulations in a manner consistent with CWA section 304(b)(2)(B), 33 U.S.C. 1314(b)(2)(B) and 40 CFR 125.3(d).

b. B. Less stringent technologies than BPJ

EPA is not proposing surface impoundments as the BAT basis for control of legacy wastewater discharges because there are technologies more stringent than surface impoundments that could be used at some plants. Thus, to make reasonable further progress as required by the CWA, EPA is proposing a case-by-case BAT approach rather than defaulting to the BPT technology basis for the wastestreams implicated here. This is in keeping with the Fifth Circuit's order vacating the 2015 legacy wastewater BAT limitations, which were set equal to previously established BPT limitations based on surface impoundments, in *Southwestern Elec. Power Co. v. EPA*, 920 F.3d at 1018.

c. C. More stringent technologies and solicitation of comments on potentially different limitations for a subset of legacy wastewater

EPA is not proposing more stringent technologies, such as chemical precipitation, biological treatment, membrane filtration, thermal evaporation, and/or spray dryer evaporation as the BAT basis for controlling discharges of legacy wastewater. EPA is not certain that these systems can be used nationwide on the vast array of legacy wastewaters that exist at steam electric plants without disrupting some plants' already commenced (and contracted for) closure

process, thereby possibly jeopardizing the ability of those plants to meet their closure deadlines under the CCR rule. However, EPA is soliciting comment on limitations based on chemical precipitation, biological treatment, membrane filtration, thermal evaporation, and/or spray dryer evaporation or any other more stringent technologies that plants may be using to dewater their surface impoundments. EPA is especially interested in information related to the technological availability, economic achievability, and non-water quality environmental impacts of such technologies. Since these wastewaters are the same wastewaters as those regulated elsewhere in Part 423, EPA solicits comment on whether the Agency could transfer limitations, specifically any of the 2015 or 2020 limitations for FGD wastewater (including subcategories or VIP) or the proposed zero-discharge limitations.

Finally, EPA solicits comment on whether any presumptive standard or other appropriate constraint should be placed on any BPJ analysis should the Agency finalize a case-by-case BPJ approach. Even if EPA's final rule adopts a BPJ standard for deriving BAT limitations for legacy wastewater, recognizing that the wastewater contained in surface impoundments can vary across sites in the country, EPA could expect permitting authorities to thoroughly assess the technologies a plant already uses (including for treatment of other wastewaters) to determine whether the legacy wastewater could be directed to those systems for treatment. This would presumably represent an acceptable application of BPJ at the plant. For example, if a facility has installed and already uses an SDE to treat its FGD wastewater, then it would be reasonable for the permitting authority to find such technology to be technologically available and economically achievable to treat legacy wastewater that exists in a surface impoundment designed to store legacy FGD wastewater.

In contrast to most surface impoundments, EPA has identified 22 surface impoundments at 17 facilities that the record indicates are composite lined and meet the location restrictions of the CCR rule. A further discussion of these surface impoundments can be found in *Legacy Wastewater at CCR Surface Impoundments* (SE10252). Since these surface impoundments

continue to operate, they would likely not begin closure and dewatering until after the effective date of any final rule. Thus, these surface impoundments do not present the same issue as the surface impoundments which have commenced, or imminently will commence, closure. A further discussion of these surface impoundments and the corresponding costs and pollutant loadings associated with candidate technologies for a potential BAT basis can be found in *Legacy Wastewater at CCR Surface Impoundments* (SE10252). EPA solicits comment on whether the Agency should establish a subcategory or different limitations applicable to discharges of these wastewaters. EPA solicits comment on what the subcategory could look like, including what cutoff could be used to establish this subcategory, as well as whether the subcategory should apply to surface impoundments that have not triggered the cease receipt of waste and/or closure requirements of the CCR rule, to surface impoundments that have not yet begun the dewatering process, and to just the SI dewatering water where decanting has already begun or completed. Finally, EPA is currently developing a proposed CCR rule for legacy surface impoundments at inactive or retired power plants. EPA solicits comment on the universe of potential legacy surface impoundments under that rule that may become subject to any limitations established under a final ELG.

5. Clarification on the Interpretation of 40 CFR 423.10 (Applicability) with Respect to Inactive/Retired Power Plants and Solicitation of Comments on Potential Clarifying Changes to Regulatory Text

EPA is clarifying that part 423 applies to discharges of the proposed SI decant and dewatering wastewaters at inactive/retired power plants because the discharge of these wastewaters "result[s] from the operation of a generating unit." [100] Due to the potential expansion

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[100] 40 CFR 423.10 Applicability**.** The provisions of this part apply to discharges resulting from the operation of a generating unit by an establishment whose generation of electricity is the predominant source of revenue or principal reason for operation, and whose generation of electricity results primarily from a process utilizing fossil-type fuel (coal, oil, or gas), fuel derived from fossil fuel (e.g., petroleum coke, synthesis gas), or nuclear fuel in conjunction with a thermal cycle employing the steam water system as the thermodynamic medium. This part

of the CCR rule closure requirements to cover inactive surface impoundments at inactive (*i.e.*, retired) plants, these surface impoundments will likely need to dewater and discharge legacy wastewater, specifically SI decant and dewatering wastewaters. Thus, EPA wishes to clarify the applicability of these proposed regulations at inactive/retired power plants.

On August 21, 2018, the U.S. Court of Appeals for the District of Columbia issued a decision in *Utility Solid Waste Activities Group, et al.* v. *EPA,* which vacated and remanded the CCR rule provision that exempted inactive impoundments at inactive facilities from the CCR rule requirements. As a first step to respond to the Court's order, EPA sought comments and data on inactive surface impoundments at inactive facilities in an advanced notice of proposed rulemaking (ANPRM) to help develop future regulations for these CCR units (85 FR 65015, October 14, 2020). This ANPRM also discussed the related research conducted to date, described EPA's preliminary analysis of that research, and sought additional data and public input on issues that may inform a future proposed rule.

As a result of the ANPRM, EPA's understanding of the potential universe of legacy surface impoundments has grown. Specifically, comments by Earthjustice *et al.* identified an estimated 170 surface impoundments and 47 landfills at 72 retired power plants in *Potential CCR Legacy Units (2021)*.[101] EPA is currently evaluating this information, as well as comments submitted by states, local governments, environmental groups, tribes, and industry, as part of *Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals From Electric Utilities; Legacy Surface Impoundments* (RIN: 2050-AH14).[102] EPA notes that many of these 72 facilities were still operating for some or all of the period during which EPA performed its detailed study for the steam electric power generating industry, 2013 proposal, and 2015 final

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applies to discharges associated with both the combustion turbine and steam turbine portions of a combined cycle generating unit.

[101] Available online at: *www.regulations.gov/comment/EPA-HQ-OLEM-2020-0107-0073*.

[102] EPA is currently evaluating potential legacy surface impoundments and intends to include a more refined estimate in its upcoming proposal.

rule. The record includes no information that these wastewaters have changed during closure such that there is any difference between the types of wastes and wastewaters in these units as compared to units at active power plants.

EPA wishes to clarify the applicability of 40 CFR part 423 to inactive/retired plants because some may question whether the existing effluent guidelines apply to discharges from surface impoundments at inactive/retired plants. Because the existing requirements under the ELGs for legacy wastewater were based on the pollutant removals achieved by surface impoundments (*i.e.,* gravity settling), whether the rule applied or not did not make a practical difference in terms of the technology-based limitations for this wastewater. Should EPA finalize limitations for SI decant and dewatering wastewater at inactive/retired plants that are more stringent than those based on the treatment achieved by surface impoundments, it is important that permittees with the estimated 170 legacy surface impoundments at inactive/retired power plants understand EPA's interpretation of the rule's applicability.

EPA notes that the current applicability text in § 423.10 conditions applicability on whether a discharge is "resulting from the operation of a generating unit." Generally, when a plant ceases electricity production and retires, it either turns off, removes, or demolishes wastewater equipment such as intakes, cooling towers, pumps, and other equipment related to power generation. Thus, EPA expects that most wastewaters would no longer be generated and, therefore, no longer discharged. In contrast, some wastewaters, such as stormwater, will clearly continue to be generated and discharged after retirement, but cannot be said to result from the operation of an EGU. Between these two groupings of wastewaters lay wastewaters that, but for the operation of the generating unit, would not have been generated and discharged. Specifically, the proposed SI decant and dewatering wastewaters (legacy wastewaters) can be generated years in advance and retained in surface impoundments, either at the surface of the unit or in its pore water.

The interpretation above is consistent with EPA's long-time view on the applicability of part 423 to inactive/retired plants and consistent with implementation by state permitting authorities. For example, in 2016, South Carolina DHEC reissued a permit to the South Carolina Electricity & Gas Company's Canadys Station Site (SC0002020) which stated, "Because electricity is not being generated, 40 CFR part 423-Steam Electric Power Generating Point-Source Category will only apply to the discharge of legacy wastewaters."[103]

In summary, EPA interprets the rule to apply to legacy wastewater at inactive/retired steam electric power plants. EPA solicits comment on whether § 423.10 should be amended to further support such a clarification with respect to legacy wastewater or whether the existing regulatory text already sufficiently supports this interpretation. In particular, the current applicability provision means that discharges of legacy wastewater that occur after the unit has ceased generating still "result from" the operation of the generating unit because *but for* the operation of the generating unit, there would be no subsequent discharge.

EPA solicits comment on whether there are other wastewaters that may continue to be discharged after the retirement of a facility and the generation of electricity is the "but for" cause of the discharge. EPA solicits comment on whether the Agency should clarify its interpretation for any such wastewaters or modify the text of section 423.10 to further clarify applicability to these wastewaters. For example, EPA solicits comment on whether CRL generated after retirement should continue to remain subject to 40 CFR part 423. Finally, EPA solicits comment on whether there are wastewaters at retired power plants that the Agency should clarify are explicitly excluded from the applicability of 40 CFR part 423.

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[103] DHEC (Department of Health and Environmental Control). 2016. *FACT SHEET AND PERMIT RATIONALE: South Carolina Electric & Gas Company, Canadys Station Site*. NPDES Permit No. SC0002020. May 16.

C. Proposed Changes to Subcategories

In the 2015 rule, EPA established subcategories for small EGUs (less than or equal to 50 MW nameplate capacity) and oil-fired EGUs. In the 2020 rule, EPA established additional subcategories for high FGD flow facilities, LUEGUs, and EGUs permanently ceasing coal combustion by 2028. For these subcategorized units, EPA established differentiated limitations with different technology bases from the remaining steam electric point source category. EPA has authority in a national rulemaking to establish different limitations for different plants after considering the statutory factors listed in section 304(b). *See Texas Oil & Gas Ass'n* v. *EPA,* 161 F.3d 923, 938 (5th Cir. 1998) (stating that the CWA does not "exclude a rule allowing less than perfect uniformity within a category or subcategory.").

EPA is not proposing to eliminate the 2015 rule subcategorization of small EGUs or oil-fired EGUs. Furthermore, while the Agency is soliciting comment on the permanent cessation of coal combustion subcategory, it is also not proposing to eliminate this 2020 rule subcategorization. However, EPA is proposing to remove both the high FGD flow and low utilization 2020 rule subcategories. EPA is also proposing a new subcategory for early adopters which permanently cease coal combustion by December 31, 2032. These subcategories are discussed below.

1. Plants with High FGD Flows

EPA is proposing to eliminate the high FGD flow subcategory. EPA proposes that, after evaluating the factors specified in CWA section 304(b)(2)(B), the subcategory is no longer warranted. In the 2020 rule, EPA evaluated one facility, TVA Cumberland, when it established the high FGD flow subcategory. At the time, this facility was found to have the highest costs due to its high FGD flows. Several commenters on the 2019 proposal claimed that this subcategory of one facility was inconsistent with the CWA, and further contested that the costs estimated for

TVA were overestimated and not disparate.[104] EPA acknowledges that its cost estimates were higher than TVA's own estimates for installing biological treatment, and thus costs may not be as disparate as indicated in the 2020 rule. Nevertheless, EPA need not reach a determination on these costs as TVA has since issued a *Federal Register* notice for plans to retire the facility, which are further detailed in a draft Environmental Impact Statement (EIS) (86 FR 25933. May 11, 2021). This draft EIS solicits comment on three alternatives, all of which include retirement but with different electricity replacement scenarios.

EPA bases this proposal principally on TVA's primary decision to permanently cease coal combustion at the Cumberland plant. Because all the alternatives TVA is considering (including its preferred alternative) would result in the plant's retirement, EPA proposes to eliminate the 2020 rule high FGD flow subcategory as unnecessary. EPA solicits comment on the 2020 basis of disparate costs used to subcategorize this facility in the first place. Since this subcategory consists of only mercury and arsenic limitations based on chemical precipitation, EPA also solicits comment on whether, should TVA step back from its retirement plans, elimination of the subcategory would still be warranted.

2. Low Utilization EGUs (LUEGUs)

EPA proposes to eliminate the low utilization subcategory after evaluating the factors specified in CWA section 304(b)(2)(B) and based on EPA's proposed finding that the subcategory is no longer warranted. EPA proposes that the low utilization subcategory is no longer warranted given that only one plant has expressed an interest in availing itself of the BAT limitations in the subcategory, and the concerns EPA originally sought to address by creating the subcategory are not present for that plant. EPA established the subcategory for LUEGUs in the 2020 rule based on cost (disparate capital costs), non-water quality environmental impacts (including energy requirements), and other factors the Administrator deemed appropriate (*i.e.,*

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[104] EPA notes that these commenters were also petitioners in the consolidated *Appalachian Voices* case discussed in Section IV of this preamble above.

harmonization with CAA and RCRA regulations that apply to electric utilities). Any facility seeking subcategorization of one or more EGUs as an LUEGU was required to submit a NOPP to the permitting authority by October 13, 2021. While EPA did not perform a comprehensive search for NOPPs, EPA's large collection of NOPPs across several states (described above in Section VI.B of this preamble) only included one submission for participation in the LUEGU subcategory from a direct discharger. This submission was for EGUs at the GSP Merrimack Station in Bow, New Hampshire. This plant is discussed below.

Merrimack Station has two EGUs (MK1 and MK2). Although these units were once baseload generating units, over approximately the last 10 years, these units have transitioned to only operating intermittently when needed, primarily during winter and (even less frequently) summer months when natural gas supplies are constrained. As provided in Merrimack Station's 2021 NOPP, MK1 has a nameplate capacity of 113.6 MW and in 2019 and 2020 had capacity utilization factors (CUFs) of 6.6 percent and 3.6 percent, respectively. MK2 has a nameplate capacity of 345.6 MW and had 2019 and 2020 CUFs of 7.8 percent and three percent, respectively.

Following Merrimack Station's request for permit modification to incorporate the 2020 steam electric ELGs for both its BA transport water and FGD wastewater, the facility submitted a timely NOPP. In its NOPP, the facility requested coverage under the low utilization subcategory for both wastestreams, as well as the ability to transition to the 2020 rule subcategory for permanent cessation of coal combustion by 2028 or the 2020 rule VIP for its FGD wastewater, pursuant to 40 CFR 423.13(o). EPA acknowledges the facility's request to participate in the low utilization subcategory but to have the flexibility to potentially shift to operate under another subcategory or the VIP, as allowed by the 2020 rule.

However, EPA does not think the subcategory is warranted for this plant because the facility has already installed an advanced FGD wastewater treatment system capable of meeting the limitations in this proposed rule, and thus is not expected to incur any capital costs, let alone

disparate costs, to meet the proposed FGD wastewater limitations. Moreover, the facility operates in a capacity futures market that helps offset the financial challenges potentially faced by a facility that operates at a reduced capacity. Because the cost/financial concerns EPA discussed in the 2020 rule are not present for this facility, EPA also proposes to find that there are no grid reliability concerns with eliminating this subcategory.

After an initial startup period,[105] Merrimack Station has operated since 2012 with zero discharges of its FGD wastewater. To operate with zero discharge, the plant has both a primary and secondary wastewater treatment system. The primary system consists of equalization tanks, reaction tanks, a softener, gravity filters, an enhanced mercury and arsenic removal system, and a holding tank. The secondary wastewater treatment system, referred to by the facility as the vapor compression evaporation system, generally consists of a brine concentrator, two crystallizers, and a belt filter press. Although the plant has operated with zero discharge, in its most recent permit application, the plant at one point requested authorization to discharge FGD wastewater, but later withdrew the request. While technically the anti-backsliding provisions of 40 CFR 122.44(l) do not apply to Merrimack's FGD wastewater (since it has never had a limitation in its permit), the current permit does not allow FGD wastewater discharges and thus the permit would effectively become less stringent through the application of the low utilization subcategory, which would allow such discharges. Where a technology has already been in use at a facility for a decade and has been shown to be available and economically achievable for that facility, with acceptable non-water quality environmental impacts, relaxing a permit so use of that technology can be discontinued is inconsistent with the statute's BAT provisions intended to make reasonable further progress toward eliminating discharges into U.S. waters.[106]

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[105] The wet scrubbers became operational on September 28, 2011. For approximately two years, while the treatment system was being adjusted and optimized, wastewater was periodically hauled off-site to local POTWs for disposal.

[106] This plant is arguably one of the best performing plants in the industry with respect to its FGD wastewater, further supporting that subcategorization is not appropriate.

Furthermore, Merrimack Station receives a production-independent revenue stream in the form of payments from the Independent System Operator (ISO) New England region's capacity futures markets. These competitive markets were designed to ensure sufficient capacity and reliability for the New England grid as described by ISO New England:

> The Forward Capacity Market (FCM) ensures that the New England power system will have sufficient resources to meet the future demand for electricity. Forward Capacity Auctions (FCAs) are held annually, three years in advance of the operating period. Resources compete in the auctions to obtain a commitment to supply capacity in exchange for a market-priced capacity payment. These payments help support the development of new resources. Capacity payments also help retain existing resources. For example, they incentivize investment in technology or practices that help ensure strong performance. They also serve as a stable revenue stream for resources that help meet peak demand but don't run often the rest of the year.[107]

In 2019, an independent estimate suggested that, between 2018 and 2023, Merrimack Station would receive approximately $189 million in these capacity market payments.[108] Thus, the plant is in a different financial situation than the other plants discussed in the 2020 rule record, which EPA was concerned would be forced to prematurely retire due to costs associated with the rule and reduced utilization and which, as a result, would potentially impact grid reliability. Furthermore, the fact that several of the plants that EPA estimated would participate in the low utilization subcategory in the 2020 rule record have since retired despite the flexibility of the subcategory and without causing grid reliability problems suggests that EPA may have overestimated both the financial viability of these plants and the threat of reliability issues. Since Merrimack Station also requested the ability to transfer to limitations for the permanent cessation of coal combustion subcategory for its discharges of both FGD wastewater and BA transport

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[107] *See www.iso-ne.com/markets-operations/markets/forward-capacity-market/.*

[108] *See www.concordmonitor.com/merrimack-station-bow-nh-28840181.*

water, it is also possible that regardless of any flexibilities EPA affords, the plant is headed toward retirement. EPA notes that the ISO New England's last two Forward Capacity Auctions show a downward trend of reduced capacity commitments for Merrimack Station.

With respect to BA transport water, Merrimack Station does not have a dry handling or high recycle rate system. The plant has an unlined boiler slag pond that is also used to accept other wastestreams from around the plant. The utility represented to EPA Region 1 permitting staff that this surface impoundment was not subject to the CCR rule. EPA plans to further evaluate this issue, but for purposes of estimating costs for this rule, EPA is currently relying on the facility's representation and has included costs of BA conversion in its analysis. Working with EPA Region 1 permitting staff, Merrimack Station previously represented that it could achieve zero discharge through construction of a new remote MDS system by 2022.[109] Furthermore, this system was estimated to cost $14.9 million at most.[110] Given the timing of this proposal, Merrimack Station's representations about what date it could achieve zero discharge and cost of the relevant BA system are no longer accurate. EPA now conservatively estimates the raw capital costs of a closed-loop system to be over $26 million. Of this, approximately $22 million would be for the installation of a remote MDS and associated equipment, while approximately $4 million would be capital costs to achieve complete recycle. As discussed in Section VII.B.2 of this preamble, the over $4 million in capital costs to close the loop may be unnecessary or overstated, and EPA has incorporated these cost estimates into its consideration of cost and economic achievability for BA transport water BAT limitations.

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[109] *See* January 30 email from Linda Landis, available online at: *www3.epa.gov/region1/npdes/merrimackstation/pdfs/ar/AR-1513.pdf.* After EPA announced its reconsideration of the 2015 steam electric rule in 2017, the facility announced it would halt any efforts toward achieving zero discharge of its BA transport water pending revision of the rule. *See* April 20 letter from Linda Landis, available at: *www3.epa.gov/region1/npdes/merrimackstation/pdfs/ar/AR-1362.pdf*. Ultimately, EPA issued a renewed NPDES permit for Merrimack Station in 2020 with a zero discharge BA transport water limitation to be achieved by December 31, 2023.

[110] See *www3.epa.gov/region1/npdes/merrimackstation/pdfs/final/merrimack-final-rtc-ch-5.pdf.*

After considering the record discussed above, EPA proposes to remove the 2020 rule low utilization subcategory. The record now indicates that there has been only one facility seeking to avail itself of low utilization discharge limitations for FGD wastewater, and that single facility already has zero discharge treatment equipment in place. Thus, it is not appropriate to continue the subcategory for this wastewater, as there are no disparate capital costs, no unacceptable non-water quality environmental impacts (including potential grid reliability impacts), and no need to allow this facility to otherwise discontinue use of its very efficient pollution treatment equipment to "harmonize" with other regulations. EPA solicits comment on whether any additional facilities with FGD wastewater have submitted NOPPs for the low utilization subcategory of which the Agency is not aware.

Finally, EPA does not think that Merrimack Station's costs *(e.g.*, in installing and operating a technology to meet the proposed BA transport water limitations), even if higher, warrant a special subcategory, given that this facility receives a production-independent revenue stream in the form of payments from New England's capacity futures markets. EPA is continuing to examine whether the plant's unlined slag settling pond is "a natural topographic depression, man-made excavation, or diked area, which is designed to hold an accumulation of CCR and liquids, and the unit treats, stores, or disposes of CCR."[111] Should the slag settling pond meet this definition, the unlined status of this pond would mean the facility is obligated under the CCR rule to cease receipt of waste in the surface impoundment and construct an alternative BA handling system, eliminating any potentially disparate capital costs associated with meeting potentially more stringent BA transport water limitations. Even if the pond is not subject to the CCR rule, EPA questions whether there would be disparate costs for treating BA transport water at Merrimack Station, which receives capacity market payments designed specifically to allow the plant to stay in operation for reliability purposes, even though its

[111] 40 CFR 257.53.

operating costs may not otherwise be recouped by the plant's low sales without those payments. EPA further notes that, while courts have upheld subcategorization based on consideration of statutory factors, courts have also upheld BAT based on consideration of the point source category as a whole. *See Texas Oil & Gas Ass'n et al. v. EPA*, 161 F.3d 923, 928 (5th Cir. 1998) ("[I]n promulgating ELGs, EPA must set discharge limits reflecting best available technology that EPA determines to be economically feasible across the category or subcategory as a whole.").

Finally, EPA solicits comment on the level of recycling that this plant's BA transport water system could employ, with or without additional modifications to the plant. For example, in the 2020 rule record, NRG Energy suggested that it would be able to recycle all its BA transport water from an existing surface impoundment system by merely changing the flow of existing sumps. Should comments demonstrate that Merrimack Station's two EGUs are necessary for reliability, that the slag settling pond is not a CCR surface impoundment, and that the costs for upgrading BA transport water systems are too great to bear in light of the unique circumstances above, EPA also solicits comment on whether the LUEGU subcategory should be retained only for BA transport water and/or for plants with a lower capacity utilization rate (CUR).[112] Finally, EPA solicits comment on whether future LUEGUs should be subcategorized such that they must only achieve the 2020 rule BAT limitations for FGD wastewater, which would still be less costly than the zero-discharge limitations of the current proposal.

3. EGUs Permanently Ceasing Coal Combustion by 2028

After evaluating the record, and to help establish certainty for the regulated community, EPA proposes to: maintain the subcategory for EGUs permanently ceasing coal combustion by 2028 for the reasons discussed below, modify reporting and recordkeeping requirements, clarify

[112] For example, in comments provided during state and local government consultations, IMPA suggested a seven percent CUR.

how limitations should be written into permits, and extend the period to file the initial notice of planned participation.

a. The Subcategory Continues to be Warranted

EPA proposes that, after evaluating the factors specified in CWA section 304(b)(2)(B), the subcategory continues to be warranted. EPA established this subcategory in the 2020 rule based on the statutory factors of cost (the cost burden on these facilities is greater because they have less time to recoup investments); the age of the equipment and plants involved (the remaining useful life of the plants and their pollutant control equipment is shorter than for typical plants); potential non-water quality environmental impacts, including energy requirements (early retirement of these plants could affect energy supply); and harmonization with the CCR rule alternative closure provisions. EPA continues to find that these factors weigh in favor of the subcategory but solicits comment on several issues, as detailed below.

With respect to cost and age, the 2020 rule record included an analysis showing that amortization of capital costs for less than the typical 20-year life of pollution control equipment leads to disparate annualized costs until after about eight years, which at the time was 2028. Many plants made decisions at the time of the 2020 rule to opt for the alternative retirement compliance pathway, and they are now several years into meeting the milestones for that path.

Similarly, with respect to non-water quality environmental impacts, including energy requirements, a review of new information continues to support this subcategory in some instances. First, utilities have planned and budgeted for replacement capacity under timelines approved by public utility commissions (PUCs) and public service commissions (PSCs) as part of the normal integrated resource planning process. These submissions were made since the 2020 rule, as part of the 2020 rule's eight-year window to permanently cease coal combustion. EPA does not think it should disrupt these ongoing plans by changing the date. There will continue to be some plants for which replacement capacity is not an issue due to excess reserve margins, and others where replacement capacity is still necessary but changes in the power sector (including

the Inflation Reduction Act) may allow for replacement capacity to be constructed more quickly. That said, EPA thinks that maintaining the same timeframe allowed by the prior rule supports efforts planned as a result of the 2020 rule and weighs in favor of retaining the same date in a revised rule.

Second, with respect to air pollution, EPA notes that several utilities have accelerated their retirement of coal-fired power plants and construction of replacement capacity. For example, the DTE filed a NOPP for this subcategory for its Belle River Power Plant and is accelerating the plant's retirement from 2030 to 2028. Replacing coal-fired capacity with natural gas, renewables, and other sources leads to decreased emissions of several air pollutants. The subcategory allows utilities already seeking to accelerate retirements to do so and achieve the associated air pollution reductions (a non-water quality environmental impact), which further supports the proposed finding that the subcategory continues to be warranted.

In addition, EPA still wishes to harmonize this rule with the CCR rule alternative closure provisions, which have not changed. Twenty-five plants are seeking to use the CCR rule's alternative closure provisions, which allow for closure of the unlined impoundment(s) and the power plant no later than 2023 (for surface impoundments under 40 acres) or 2028 (surface impoundments over 40 acres).[113] Elimination of the permanent cessation of coal combustion subcategory from this ELG could potentially interfere with the plans of utilities with surface impoundments in the 2028 category, complicating their compliance with the CCR rule. Furthermore, EPA has also solicited comment on a corresponding flexibility under the proposed Good Neighbor Plan, discussed in Section IV.E.2.a of this preamble, above.[114] Harmonization

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[113] Further information is available online at: *www.epa.gov/coalash/coal-combustion-residuals-ccr-part-implementation.*

[114] "To facilitate a potentially economic and environmentally superior unit-level compliance response across these programs that nonetheless maintains the NO_X reductions required by the state budgets from 2026 forward in this proposal, EPA is requesting comment on potentially deferring the application of the backstop daily rate for large coal EGUs that submit written attestation to EPA that they make an enforceable commitment to retire by no later than the end of calendar year 2028." 87 FR 20036, 20122 (April 6, 2022).

between regulations on air, water, and land pollution gives industry certainty to plan and implement these requirements in an orderly, efficient manner.

Finally, EPA notes that even if the permanent cessation of coal combustion subcategory were eliminated in a final rule, it is unlikely to result in more stringent limitations in time to affect these plants. As discussed elsewhere in this proposal, EPA intends to issue a final rule in 2024, and the rule's requirements would not be implemented for direct dischargers until permitting authorities issue new permits incorporating those limitations. Since permits are typically not immediately reissued upon promulgation of a new rule, and the rule would likely allow some time to accomplish the new more stringent requirements as soon as possible, but not later than approximately five years after promulgation (*i.e.*, no later than December 31, 2029), it is likely that the 2028 permanent cessation of coal combustion date would have passed before a new "no later than" date under a new permit implementing the rule. Furthermore, in many cases, retirements and fuel conversions are planned to be completed well before 2028, with some already having occurred. After considering all the information above, EPA proposes that the consideration of the factors that led to the creation of this subcategory in the 2020 rule not only continues to weigh in favor of subcategorization but may be stronger than at the time of the 2020 rule. Thus, EPA proposes to retain this subcategory in its current form.

EPA solicits comment on the proposal to retain the subcategory. EPA also solicits comment on additional information that would suggest eliminating the subcategory, selecting a more stringent BAT for the subcategory, or specifying that BAT should be determined by the permitting authority on a case-by-case, BPJ basis. EPA explicitly solicits comment on a constrained BPJ approach whereby the permitting authority could require more stringent limitations where a facility has previously installed technologies that were designed to achieve pollutant removals beyond those achievable with surface impoundments, or alternatively, limitations based specifically on the more advanced technologies that a facility has previously

installed. EPA is interested in whether these alternate approaches might better achieve the goals of the CWA, which requires reasonable further progress toward the elimination of discharges.

b. Clarification of Existing Limitations

As a clarification of how existing limitations should be written into permits, EPA also proposes to explicitly require permitting authorities to include in these sources' permits limitations requiring zero discharge of FGD wastewater and BA transport water after December 31, 2028, to ensure that permit requirements accurately reflect that no discharges of these wastewaters are allowed after the cessation of coal combustion date applicable to the subcategory. If the plant fails to cease combustion of coal by 2028 for any reason other than those specified in section 423.18, the zero-discharge limitations would automatically apply. These provisions are costless, and merely clarify the intent that plants which get the benefit of this subcategory do so because they will no longer discharge after 2028. To help ensure that facilities benefitting from less stringent requirements between the effective date of any final rule and the closure date are truly going to meet the deadline for participation in the subcategory, EPA is proposing to add this requirement.

Proposal to Extend NOPP Filing Deadline Should EPA Receive Adverse Comment and Withdraw Related Direct Final Rule. Utilities have continued to assess and consider plans for plants and EGUs as part of their normal integrated resource planning process. "Representatives from Utilities and trade associations suggested that these continued evaluations have led additional facilities to seek accelerated retirement or fuel conversion of coal-fired power plants beyond those for which NOPPs were filed by the 2020 rule's October 13, 2021, deadline. Having not filed a NOPP by the 2021 deadline, such facilities would be forced to incur capital expenditures to install technologies to meet the 2020 rule limitations, thus receiving disparate treatment from those who filed a NOPP by October 13, 2021. EPA is proposing to change the NOPP filing date to 60 days after publication of a final rule. However, the Agency notes that following the public comment period and time to consider any comments on this issue, EPA

would likely be unable to finalize a rule earlier than summer 2023, which would leave industry without certainty that plants that had not previously filed NOPPs might still be able to avail themselves of the 2020 subcategory for plants ceasing coal combustion by 2028. Given the lead times necessary to procure and install 2020 rule-compliant technologies (*e.g.*, biological treatment), the regulated community would benefit from certainty that such a provision will be finalized much sooner than summer 2023 to guarantee that unnecessary costs can still be avoided.[115] Thus, separately from this proposed rule, EPA is publishing a related direct final rule that changes the date of the NOPP filing to [**INSERT DATE 90 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER**], which will take effect on [**INSERT DATE 60 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER**] assuming EPA does not receive any adverse comments on the direct final rule. As described in the direct final rule, any adverse comment on the direct final rule must be received by [**INSERT DATE 30 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER**] if the commenter wishes to keep the direct final rule from taking effect.

While EPA is promulgating a direct final rule to extend the NOPP deadline to [**INSERT DATE 90 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER**], EPA is through this proposal also proposing to extend the NOPP deadline to 60 days after publication of a final rule. Thus, if EPA receives adverse comment on the direct final rule within 30 days of publication and subsequently withdraws that rule, the Agency still has the option of finalizing its proposal to extend the NOPP filing deadline. It is possible that EPA could take final action on this aspect of the rule prior to the rest of the proposed rule. If EPA does not receive adverse comment on the direct final rule and it takes effect, then the Agency would not plan to finalize this aspect of the proposal. In connection with the proposal to extend the NOPP filing deadline to

[115] EPA notes that, given the timeframes for procurement and installation of 2020 rule-compliant technologies presented in the 2020 rule record, utilities would have to start incurring expenses around the end of the comment period of this proposal to avoid the risk of noncompliance with the 2020 rule.

60 days after publication of a final rule, EPA solicits comment on briefly extending the NOPP filing deadline to allow for these additional retirements and fuel conversions to qualify for treatment under this subcategory. EPA solicits comment on specific information suggesting that specific plants or EGUs not the subject of a previously filed NOPP would consider permanently ceasing coal combustion by December 31, 2028. This could include new integrated resource plans, new retirement announcements, or other similar information. EPA solicits comment on whether a different NOPP filing deadline is appropriate and information demonstrating why. Any comments on this aspect of this proposal should clearly state that they are being made in response to the proposed extension of the NOPP filing deadline rather than on the direct final rule being published elsewhere in this issue of the *Federal Register*.

c. Additional Reporting and Recordkeeping Requirements

For a discussion of additional reporting and recordkeeping requirements, see Section XV.C.1 of this preamble.

4. Subcategory for Early Adopters Retiring by 2032

EPA is proposing a new subcategory for plants that have achieved compliance either with the 2015 or 2020 rule limitations on FGD wastewater and BA transport water by publication of this proposed rule, and which elect to retire no later than December 31, 2032. EPA further proposes to explicitly require, as a condition for being eligible for this subcategory, that permitting authorities include the BAT limitations (proposed here as zero discharge of FGD wastewater and BA transport water) in these sources' permits after December 31, 2032. This will ensure that permits accurately reflect that no discharges of these wastewaters are allowed after the cessation of coal combustion date applicable to the subcategory. If a plant fails to cease combustion of coal by 2032 for any reason other than those specified in section 423.18, the zero-discharge limitations would automatically apply. After evaluating the factors specified in CWA section 304(b)(2)(B), EPA proposes that such a subcategory is warranted on the basis of cost (disparate costs to facilities with these units), age (both the age of the new pollution treatment

technology and the remaining useful life of the plant), non-water quality environmental impacts (air pollution), and other factors the Administrator deems appropriate (impacts to early adopters who relied on the identification of biological treatment as BAT for FGD wastewater in the 2015 and 2020 rules). For units in this subcategory, EPA proposes limitations based on the same technology bases for control of FGD wastewater and BA transport water in the 2020 rule, which EPA proposes are available, are economically achievable, and have acceptable non-water quality environmental impacts.

As discussed in Section IV of this preamble above, discharges from steam electric plants have been the subject of proposed and final regulations for the past decade, an unsurprising fact given this industry's long tenure among the top industrial point source discharges.[116] Some utilities and states pushed forward pursuant to the 2015 and 2020 rules with biological treatment and dry or closed-loop BA handling systems (even where these systems turned out to have a purge), and have achieved compliance with the limitations in those rules by the date of publication of this proposed rule. This proposal refers to those facilities as "early adopters." In contrast, other utilities have avoided incurring any cost for as long as possible, and as a result may be better poised to adjust to today's more stringent proposal. Thus, EPA considered how the statutory factors may justify a balancing of these equities.

EPA gathered as much information as possible to consider when early adopter units might plan to close in order to qualify for this subcategory. With respect to disparate costs and age (remaining life of the EGU), EPA continued to gather information from publicly available sources, company announcements, industry public comments, and government databases to identify EGUs that may have already installed 2020 rule-compliant technologies. Many of these

[116] *See*, *e.g.*, Effluent Guidelines Plan 14/Preliminary Effluent Guidelines Plan 15, available online at: *www.epa.gov/eg/effluent-guidelines-plan*.

EGUs have already announced retirement by 2032 or soon thereafter.[117] EPA presents a list of such EGUs in Table VII-1 of this preamble below. As shown in the table, the record includes 15 EGUs at five plants that have already adopted technologies to comply with the 2015 or 2020 rules that may incur costs under the proposal without a subcategory for early adopters. Under Option 3, these EGUs combined have estimated capital costs of $51 million and estimated operations and maintenance (O&M) costs of $4 million per year. Under Option 4, these EGUs combined have estimated capital costs of $110 million and estimated O&M costs of $11 million per year. Thus, the costs for the rule more than double without subcategorization of these units. Furthermore, accounting for the remaining useful life of these EGUs, costs in many cases would be amortized over periods shorter than the assumed 20-year life of the equipment. As discussed in the 2020 rule record and above in the discussion for the subcategory for EGUs permanently ceasing coal combustion by 2028, amortization periods shorter than eight years may lead to disparate costs.

Table VII-1. Early Adopters

Plant Name	SE Unit ID	Retire Year	Capacity (MW)	Option 3 Costs		Option 4 Costs	
				Capital (2021$)	O&M (2021$)	Capital (2021$)	O&M (2021$)
Plant James H Miller Jr	SE Unit-1	N/A	706	$0	$0	$4,700,000	$130,000
Plant James H Miller Jr	SE Unit-2	N/A	706	$0	$0	$4,700,000	$130,000
Plant James H Miller Jr	SE Unit-3	N/A	706	$0	$0	$4,700,000	$130,000
Plant James H Miller Jr	SE Unit-4	N/A	706	$0	$0	$4,700,000	$130,000
Marshall Steam Station	SE Unit-1	2028	380	$2,800,000	$210,000	$4,900,000	$540,000
Marshall Steam Station	SE Unit-2	2028	380	$2,800,000	$210,000	$4,900,000	$540,000
Marshall Steam Station	SE Unit-3	2032	658	$4,900,000	$370,000	$9,200,000	$1,100,000
Marshall Steam Station	SE Unit-4	2032	660	$4,900,000	$370,000	$7,300,000	$750,000

[117] Even the one EGU with a retirement date of 2040 (Mountaineer Unit 1) recently contemplated retirement by 2028 when both Virginia and Kentucky rejected rate recovery for ELG-compliant upgrades to AEP's coal-fired power plants.

Mountaineer Plant	SE Unit-1	2040	1,300	$7,300,000	$780,000	$17,000,000	$2,200,000
Gallatin	SE Unit-1	2035	300	$2,300,000	$110,000	$3,700,000	$250,000
Gallatin	SE Unit-2	2035	300	$2,300,000	$110,000	$3,700,000	$250,000
Gallatin	SE Unit-3	2035	328	$2,500,000	$120,000	$4,000,000	$270,000
Gallatin	SE Unit-4	2035	328	$2,500,000	$120,000	$4,000,000	$270,000
Belews Creek Steam Station	SE Unit-1	2035	1,110	$9,700,000	$790,000	$18,000,000	$2,100,000
Belews Creek Steam Station	SE Unit-2	2035	1,110	$9,700,000	$790,000	$19,000,000	$2,300,000
		Total	***9,675***	***$51,000,000***	***$4,000,000***	***$110,000,000***	***$11,000,000***

Note: Totals may not add due to rounding.

With respect to non-water quality environmental impacts, including energy requirements, a review of new information supports the creation of this subcategory. Replacement of coal-fired capacity with natural gas, renewables, and other sources leads to decreased emissions of several air pollutants, including GHGs. Thus, to the extent that the subcategory allows utilities already seeking to accelerate retirements in response to the Inflation Reduction Act and other factors the ability to do so and achieve the associated air pollution reductions (a non-water quality environmental impact), it further supports the proposed finding that the subcategory is warranted.

With respect to age (of pollution treatment equipment) and "other factors" the Administrator deems appropriate, EPA considered the impacts of expecting early adopters to meet new limitations based on technologies different than those identified as the technology bases in the 2015 and 2020 rules. As stated above, the ELGs for direct discharges are implemented in permits. Some facilities have diligently applied for and obtained permits implementing the 2015 or 2020 rules' limitations for FGD wastewater and BA transport water and installed technologies that meet those limitations. Several utilities have biological treatment that could meet the 2020 rule limitations. For example, Duke Energy made a fleetwide conversion to chemical precipitation plus biological treatment and ultrafiltration for its FGD wastewater, despite EPA's reconsideration of the 2015 rule. In part, continued investments in FGD wastewater treatment technologies by Duke and others were driven by permit

limitations.[118] However, at least some of these plants relied upon EPA's continued determinations in the 2019 proposal and 2020 final rule that some form of biological treatment was still BAT for FGD wastewater. It is also worth noting that some of these utilities may not have been able to select more stringent technologies, even under the 2020 VIP, in part because PUCs/PSCs would not agree to this higher cost *unless* the more stringent limitations were legally required. Thus, several companies installed a technology unable to achieve the same zero-discharge limitations that the BAT basis proposed in Option 3 (chemical precipitation plus membrane filtration) can achieve. While some of these systems were installed over a decade ago and may have already achieved some payback, in other cases these systems are new and far from the end of their useful life. For this reason, it is appropriate for EPA to consider the additional cost associated with these early adopters having to meet a new set of limitations.

EPA notes that these same plants that have already incurred costs for FGD wastewater treatment technologies have also moved forward with converting previous surface impoundment-based BA transport water systems. These conversions often occurred due to a combination of the CCR and ELG rules. Nevertheless, in instances where a plant incurred capital costs to install a remote MDS, the plant may similarly face the task of adjusting this system to operate zero discharge for additional costs in conjunction with the costs of installing additional FGD wastewater treatment technologies. EPA notes that the costs to upgrade the BA handling system are typically relatively small, with EPA's conservative estimates of capital and O&M costs averaging approximately $4 million up front and $370,000 per year for each EGU. For this reason, EPA does not propose extending this subcategory to facilities with high recycle rate BA transport systems that have not also installed biological treatment or comparable systems for FGD wastewater.[119]

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[118] *See*, *e.g.*, water quality-based effluent limitations at Plant Miller (SE08188).

[119] Note that many facilities also meet existing 2020 FGD wastewater BAT limitations because they either do not generate or do not discharge FGD wastewater. This subcategory would not apply to such facilities.

EPA solicits comment on several issues regarding this subcategory, including whether the subcategory is warranted based on the record. Many of the solicitations below are in direct response to suggestions from utilities and trade associations that were similar to, but contained differences from, the proposed subcategory. For example, EPA solicits comment on whether costs are disparate in light of the relatively higher utilization of some of these EGUs and the ability of utilities to lease the additional treatment stages necessary to meet any new limitations. EPA solicits comment on alternate cutoff dates the Agency could use for early adoption. For example, EPA could make the cutoff date earlier than publication of the proposed rule (*e.g.*, full compliance by the announcement of this rulemaking in 2021) or later (*e.g.*, any facility that had already entered into a binding contract by the signature date of the proposal).[120] EPA also solicits comment on whether early adoption should be required at all, or whether the Agency should merely include a new subcategory for retirement by 2032 rather than 2028, as discussed above. In the case of such a change, EPA solicits comment on the appropriate BAT limitations until that time. EPA also solicits comment on whether the early adopter subcategory should require a different date for the permanent cessation of coal combustion. EPA is undertaking rulemakings related to EGUs under the CAA and solicits comment on whether the permanent cessation of coal combustion date proposed here should be harmonized with any CAA rule that is ultimately promulgated. EPA solicits comment on whether the Agency should finalize an early adopter subcategory that would be available to early adopters of the 2015/2020 rule technology bases (or similar bases), whether they plan to retire by a certain date or not. Whether or not the subcategory is tied to retirement, EPA also solicits comment on whether the early adopter subcategory should be limited such that less stringent limitations based on 2015/2020 rule technologies would only be available to a plant until the capital investment of the previous technologies has been paid back. EPA solicits comment on whether, after a full payback period

[120] For an example of the latter approach, see 40 CFR 122.29(b)(4)(ii) as it relates to defining new sources.

has passed, an early adopter should immediately be subject to any new, more stringent limitations. EPA also solicits comment on whether the Agency should allow participation in this subcategory if the plant is not retiring, but instead converting to other fuels (*e.g.*, natural gas), as was done in the 2020 rule for the EGUs permanently ceasing coal combustion by 2028 subcategory.

EPA solicits comment on whether this subcategory should be extended to facilities other than those that installed biological treatment or ZVI treatment for FGD wastewater. ZVI is an equivalent technology to biological treatment that several plants had identified could meet the limitations during the 2020 rulemaking but couldn't achieve zero discharge. Although EPA isn't aware of any completed installations of ZVI, the Agency does not wish to close the door on any facilities that had similar reliance interests but installed the competitor technology. EPA solicits comment on whether an early adopter subcategory should include facilities that have already met both the FGD wastewater and BA transport water limitations for the LUEGU or high FGD flow subcategory by any means, not by a specified treatment technology. EPA also solicits comment on whether the subcategory should include facilities that have only met the limitations for BA transport water because they have no FGD wastewater. If so, EPA solicits comment on whether it should require that early adopters for BA transport water actually incurred capital costs to install a remote MDS system rather than merely recycling wastewater through existing systems (*e.g.*, through surface impoundments). EPA also solicits comment on whether BA transport water should be included in the subcategory at all, or alternatively whether the subcategory should apply only to early adopters of FGD wastewater technologies.

D. Additional Rationale for the Proposed PSES and PSNS

Before establishing PSES/PSNS for a pollutant, EPA examines whether the pollutant "passes through" a POTW to WOTUS or interferes with the POTW operation or sludge disposal practices. In determining whether a pollutant passes through POTWs for these purposes, EPA typically compares the percentage of a pollutant removed by well-operated POTWs performing

secondary treatment to the percentage removed by the BAT/NSPS technology basis. A pollutant is determined to pass through POTWs when the median percentage removed nationwide by well-operated POTWs is less than the median percentage removed by the BAT/NSPS technology basis. EPA establishes pretreatment standards for those pollutants regulated under BAT/NSPS that pass through POTWs.

EPA is continuing to rely on the pass-through analysis as the basis of the limitations and standards in the 2015 rule, which found that mercury and arsenic in CRL are not significantly removed by POTWs. As in the 2015 rule, EPA also did not conduct its traditional pass-through analysis for wastestreams with proposed zero-discharge limitations or standards. Zero-discharge limitations and standards achieve 100 percent removal of pollutants; therefore, all pollutants in those wastestreams treated by the proposed zero discharge technologies would otherwise pass through the POTW absent application of those technologies.

After considering all the relevant factors and technology options presented in this preamble and in the TDD, EPA is proposing to establish PSES for indirect dischargers based on the technologies described in Option 3. EPA is proposing the Option 3 technologies as the bases for PSES for the same reasons that the Agency is proposing the Option 3 technologies as the bases for BAT for direct dischargers.[121] EPA's analysis shows that, for both direct and indirect dischargers, the Option 3 technologies are available and economically achievable, and Option 3 has acceptable non-water quality environmental impacts, including energy requirements (*see* Sections VIII and X of this preamble). For the preferred option (Option 3), EPA is not proposing other technology bases for PSES for the same reasons that the Agency is not proposing other technology bases for BAT. Furthermore, for the same reasons that apply to EPA's proposed retention of differentiated BAT limitations for EGUs permanently ceasing coal combustion by

[121] Since Dallman has converted to a direct discharger (SE10256), EPA projects that the proposed PSES for FGD wastewater would not apply to any plants.

2028 and creation of differentiated limitations for early adopters, EPA proposes the same flexibilities in PSES under Option 3.

With respect to the low utilization subcategory, EPA proposes to eliminate the PSES subcategory for LUEGUs, as it does for direct dischargers, after considering specific facts for the lone indirect discharge from a LUEGU. EPA is only aware of one indirect discharger that has filed a NOPP to avail itself of this subcategory, the Whitewater Valley Station. Whitewater Valley Station consists of two EGUs (Coal Boiler #1 and Coal Boiler #2). Coal Boiler #1 has a nameplate capacity of 35 MW and a 2019 and 2020 CUR of five percent and 3.67 percent, respectively. Coal Boiler #2 has a nameplate capacity of 65 MW and a 2019 and 2020 CUR of 5.5 percent and 5.1 percent, respectively. On the IMPA website, the Agency states that the station "has been utilized by IMPA during peak load periods during the hot summer months and cold winter months."[122] EPA notes that Coal Boiler #1 need not have been included in this facility's NOPP filing as this EGU is small enough to avail itself of the 2015 rule subcategory for small EGUs (*i.e.*, less than or equal to 50 MW nameplate capacity).

Whitewater Valley Station does not generate or discharge FGD wastewater but does generate BA transport, water which it has historically discharged indirectly through a POTW. According to comments filed during consultations with state and local government entities and associations, IMPA described a treatment chain it might utilize for this subcategory:

> "Under the existing system, LUEGUs will be able to use gravity settling in surface impoundments to remove Total Suspended Solids (TSS). Low utilization subcategory EGUs then must develop and implement a best management practice (BMP) plan to minimize the discharge of pollutants from BA transport water. As an example, an IMPA facility that plans to apply the low utilization subcategory transports its BA transport

[122] *See www.impa.com/about-impa/generation-resources/giant-tcr.*

water through a settlement and filtration system that removes TSS and other contaminants before discharging to the relevant POTW for treatment."[123]

EPA estimated this facility would need to employ two under-boiler MDS systems because of the CCR requirement to cease receipt of waste in the facility's unlined surface impoundments. However, the comment excerpted above (received after EPA had completed its analysis) suggests that has already taken, and possibly finalized, an alternative treatment system that is not zero discharge, given the CCR rule's April 2021 cease receipt of waste deadline.

Nevertheless, EPA proposes to eliminate the LUEGU subcategory for indirect dischargers. With respect to FGD wastewater under the LUEGU subcategory, no NOPPs were filed from indirect dischargers requesting this subcategory for this wastestream. Thus, continued existence of this subcategory is unnecessary. With respect to BA transport water, EPA has not evaluated costs for Whitewater Valley Station's Coal Boiler #2 for the reasons discussed above, but again notes that no costs would be imposed for Coal Boiler #1 as it could continue to discharge under the less stringent limitations in the 2015 subcategory for small units. Given the very low utilization of the two EGUs, EPA solicits comment on whether the peaking function of Whitewater Valley Station could continue by utilizing only Coal Boiler #1 after 2028 if the facility transitioned Coal Boiler #2 into the permanent cessation of coal combustion subcategory.[124] EPA also solicits comment on the specific pollution controls in place at the Whitewater Valley Station, as well as the levels of pollution reduction that system achieves both alone and in combination with the downstream POTW via which the facility discharges its BA transport water. For PSES, EPA also solicits comment on the same issues discussed in Section VII.C.2 of this preamble for direct dischargers. Finally, EPA solicits comment on whether the LUEGU subcategory should be retained for BA transport water for indirect dischargers only.

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[123] Available online at: *www.regulations.gov*, Document ID: EPA-HQ-OW-2009-0819-9020.
[124] Note that small EGUs are not limited to a 10 percent CUR.

For purposes of the proposed PSES, EPA also proposes the same definitional changes for legacy wastewater that were proposed for BAT in Section VII.B.4 of this preamble. For the same reasons as the proposed BAT determination, EPA proposes to decline establishing a nationally applicable PSES for wastewater generated before the "as soon as possible" date, SI decant wastewater, and SI dewatering wastewater. The effect of not finalizing PSES for this set of wastewaters would mean that any pretreatment standards in addition to those set forth in 40 CFR part 403 would need to be established as local limits by the control authority.

E. Availability Timing of New Requirements

Where BAT limitations in the 2015 and 2020 rules are more stringent than previously established BPT limitations, those BAT limitations do not apply until a date determined by the permitting authority that is "as soon as possible" after considering four factors.[125] Depending on the particular wastewater, the 2015 and 2020 rules also established a "no later than" date of December 31, 2023, and/or December 31, 2025, for reasons discussed in the record of those rules, including that without such a date, implementation could be substantially delayed, and a firm "no later than" date creates a more level playing field across the industry.

As part of the consideration of the technological availability and economic achievability of the BAT limitations in this proposal, EPA considered the magnitude and complexity of process changes and new equipment installations that would be required for plants to meet the proposed rule's limitations and standards. Specifically, EPA selected the timeframes described above to enable many plants to raise needed capital, plan and design systems, procure equipment, and construct and test systems. EPA also considered the timeframes needed for

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[125] These factors are: (1) Time to expeditiously plan (including to raise capital), design, procure, and install equipment to comply with the requirements of the final rule; (2) changes being made or planned at the plant in response to GHG regulations for new or existing fossil fuel-fired power plants under the Clean Air Act, as well as regulations for the disposal of coal combustion residuals under subtitle D of the Resource Conservation and Recovery Act; (3) for FGD wastewater requirements only, an initial commissioning period to optimize the installed equipment; and (4) other factors as appropriate. 40 CFR 423.11(t).

appropriate consideration of any plant changes being made in response to other Agency rules affecting the steam electric power generating industry. EPA understands that some plants may have already installed, or are now installing, technologies that could comply with the proposed limitations. Therefore, EPA proposes that the earliest date some plants can achieve compliance with these new limitations would be the effective date of any final rule. Where this is not the case, nothing in this proposal would preclude a permitting authority from establishing a later date, up to the "no later than" date, after considering the four specific factors in 40 CFR 423.11(t).

With respect to the latest compliance dates, EPA collected updated information regarding the technical availability of the proposed technology bases. Information in EPA's rulemaking record indicates that a typical timeframe to raise capital, plan and design systems (including any necessary pilot testing), procure equipment, and construct and test systems falls well within the existing five-year permit cycle.[126] Furthermore, the chemical precipitation and zero discharge technologies proposed here do not implicate the same industrywide competition over a small number of biological treatment vendors that the 2020 rule implicated. EPA notes that while plants may not need approximately five years to comply with the proposed limitations, the "no later than" date creates an outer boundary beyond which no discharger may seek additional time and creates a level playing field regarding the latest date. Therefore, EPA proposes that any final limitations be achieved "no later than" December 31, 2029.

As with the proposed BAT effluent limitations, in considering the availability and achievability of the proposed PSES, EPA concluded that existing indirect dischargers need some time to achieve the final standards, in part to avoid forced outages. While the BAT limitations apply on a date determined by the permitting authority that is as soon as possible beginning on the effective date of any final rule (but no later than December 31, 2029), under CWA section

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[126] *See* FGD and Bottom Ash Implementation Timing (SE08480).

307(b)(1), pretreatment standards shall specify a time for compliance not to exceed three years from the date of promulgation, so EPA cannot establish a longer implementation period. Moreover, unlike requirements on direct discharges, requirements on indirect discharges are not implemented through NPDES permits. Nevertheless, EPA proposes to find that all existing indirect dischargers can meet the standards within three years of promulgation. There will be no remaining indirect dischargers of FGD wastewater by the time any final rule is promulgated. With respect to BA transport water, EPA estimates that a closed-loop system can achieve zero discharge within 35 months, and substantially sooner if a high recycle rate system is already operating.[127] Finally, with respect to CRL, EPA estimates the chemical precipitation systems can achieve the mercury and arsenic limitations within 22 months.[128] Thus, the proposed PSES technologies are available in the proposed timeframe. Further discussion of availability timing can be found in Section XV of this preamble.

F. Economic Achievability

As explained in detail in Section VIII of this preamble, below, EPA's analysis for the proposed BAT limitations and PSES demonstrates that they are economically achievable for the steam electric industry as a whole, as required by CWA section 301(b)(2)(A). EPA used IPM to perform cost and economic impact assessments, using a baseline that reflects impacts from other relevant environmental regulations (*see* RIA).[129] For the proposed rule, the model showed very small additional effects on the electricity market, on both a national and regional sub-market basis. Based on the results of these analyses, EPA estimated that the proposed rule requirements would result in a net reduction of 249 MW in steam electric generating capacity as of the model year 2030, reflecting full compliance by all plants. This capacity reduction corresponds to a net

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[127] SE08480.

[128] SE10289.

[129] IPM is a comprehensive electricity market optimization model that can evaluate such impacts within the context of regional and national electricity markets. See Section VIII of this preamble for additional discussion.

effect of approximately one EGU closure or, when aggregating to the level of steam electric generating plants, one early plant closure.[130] These IPM results support EPA's conclusion that the proposed rule is economically achievable.

G. Non-Water Quality Environmental Impacts

The proposed BAT limitations and PSES have acceptable non-water quality environmental impacts, including energy requirements. Section X of this preamble describes EPA's analysis of non-water quality environmental impacts and energy requirements in more detail. EPA estimates that by 2029, under the proposed rule and reflecting full compliance, energy consumption would increase by less than 0.003 percent of the total electricity generated by power plants. EPA also estimates that the amount of fuel consumed by increased operation of motor vehicles (*e.g.*, for transporting waste) would increase by approximately 0.0005 percent of total fuel consumption by all motor vehicles.

EPA also evaluated the effect of the BAT effluent limitations on air emissions generated by all electric power plants (NO_X, SO_X, and CO_2), solid waste generation, and water usage. Under the proposed rule, depending on the year, CO_2 emissions are projected to decrease by 0.1 to 1.1 percent, NO_X emissions are projected to decrease by 0.6 to 2.4 percent, and SO_2 emissions are projected to decrease by 0.2 to 3.9 percent due to changes in the mix of electricity generation (*e.g.*, less electricity from coal-fired steam EGUs and more electricity from natural gas-fired steam EGUs). Moreover, solid waste generation is projected to increase by less than one percent of total solid waste generated by all electric power plants. Finally, EPA estimates that the proposed rule will have a positive impact on water withdrawal, with steam electric power plants reducing the amount of water they withdraw by 4.33 billion gallons per year (11.8 MGD).

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[130] Given the design of IPM, unit-level and thereby plant-level projections are presented as an indicator of overall regulatory impact rather than a precise prediction of future unit-level or plant-specific compliance actions. The projected net plant closure occurs at a plant whose only steam electric EGU had a capacity utilization of only six percent in the baseline.

H. Impacts on Residential Electricity Prices and Low-Income and Minority Populations

EPA examined the effects of the proposed rule on consumers as an additional factor that might be appropriate when considering what level of control represents BAT. If all annualized compliance costs were passed on to residential consumers of electricity instead of being borne by the operators and owners of power plants (a conservative assumption), the average yearly electricity bill increase for a typical household would be no more than $0.63 under the proposed rule. For further information see Chapter 7 of the RIA.

EPA also considered the effect of the proposed rule on minority and low-income populations. As explained in Section XVI of this preamble, using demographic data regarding who resides closest to steam electric power plant discharges, who fishes in downstream waterbodies, and who consumes drinking water from downstream drinking water treatment plants, EPA concluded that low-income and minority populations benefit to an even greater degree than the general population from the reductions in discharges associated with the proposed rule.

VIII. Costs, Economic Achievability, and Other Economic Impacts

EPA evaluated the costs and associated impacts of the four regulatory options on existing EGUs at steam electric plants. These costs are analyzed within the context of existing environmental regulations, market conditions, and other trends that have affected steam electric plant profitability and generation, as described in Section V.B of this preamble. This section provides an overview of the methodology EPA used to assess the costs and the economic impacts and summarizes the results of these analyses. See the RIA in the docket for additional detail.

In developing ELGs, and as required by CWA section 301(b)(2)(A), EPA evaluates the economic achievability of regulatory options to assess the impacts of applying the limitations and standards to the industry as a whole, which typically includes an assessment of incremental plant closures attributable to a regulatory option. As described in more detail below, this

proposed ELG is expected to result in incremental costs when compared to baseline. Like the prior analysis of the 2015 and 2020 rules, the cost and economic impact analysis for this proposed rulemaking focuses on understanding the magnitude and distribution of compliance costs across the industry and the broader market impacts. EPA used indicators to assess the impacts of the four regulatory options on the whole steam electric power generating industry. These indicators are consistent with those used to assess the economic achievability of the 2015 rule and 2020 rule. For this proposal, EPA compared the values to a baseline that reflects implementation of existing environmental regulations (as of this proposal), including the 2020 rule. As such, the baseline appropriately includes the costs of achieving the 2020 rule limitations and standards, and the policy cases show the impacts resulting from potential changes to the existing 2020 limitations and standards. More specifically, EPA considered the total cost to industry and change in the number and capacity of specific EGUs and plants expected to close under the proposed rule (Option 3) compared to baseline. EPA also analyzed the ratio of compliance costs to revenue to see how the four main regulatory options change the number of plants and their owning entities that exceed thresholds indicating potential financial strain. In addition to the analyses supporting the economic achievability of the regulatory options, EPA conducted other analyses to (1) characterize other potential impacts of the regulatory options (*e.g.*, on electricity rates) and (2) to meet the requirements of E.O.s or other statutes (*e.g.*, E.O. 12866, Regulatory Flexibility Act, Unfunded Mandates Reform Act).

A. Plant-Specific and Industry Total Costs

EPA estimated plant-specific costs to control FGD wastewater, BA transport water, and CRL discharges at existing EGUs at steam electric plants to which the ELGs apply. EPA assessed the operations and treatment system components currently in place at a given unit (or expected to be in place because of other existing regulations, including the 2020 ELG rule), identified equipment and process changes that plants would likely make under each of the four regulatory options presented in Table VII-1 of this preamble, and estimated the capital and O&M

costs to implement those changes. As explained in the TDD, the baseline also accounts for additional announced unit retirements, conversions, and relevant operational changes that have occurred since EPA promulgated the 2020 rule. Following the same methodology used for the 2015 and 2020 rule analyses, EPA used a rate of seven percent to annualize one-time costs and costs recurring on other than an annual basis. For capital costs and initial one-time costs, EPA used a 20-year amortization period. For O&M costs incurred at intervals greater than one year, EPA used the interval as the annualization period (*e.g.*, five years, 10 years). EPA added annualized capital, initial one-time costs, and the nonannual portion of O&M costs to annual O&M costs to derive total annualized plant costs. EPA then calculated total industry costs by summing plant-specific annualized costs. For the assessment of industry costs, EPA considered costs on both a pre-tax and after-tax basis.

Pre-tax annualized costs provide insight on the total expenditure as incurred, while after-tax annualized costs are a more meaningful measure of impact on privately owned for-profit entities and incorporate approximate capital depreciation and other relevant tax treatments in the analysis. EPA uses pre- and/or after-tax costs in different analyses, depending on the concept appropriate to each analysis (*e.g.*, social costs are calculated using pre-tax costs whereas cost-to-revenue screening-level analyses are conducted using after-tax costs).

Table VIII-1 of this preamble summarizes estimates of incremental pre- and post-tax industry costs for the four regulatory options presented in Table VII-1 of this preamble as compared to baseline. The after-tax annualized costs of the proposed rule (Option 3) are $181 million.

Table VIII-1. Estimated Total Annualized Industry Costs [Millions of 2021$, Seven Percent Discount Rate]

Regulatory Option	Pre-Tax	After-Tax
Option 1	$102.4	$81.1
Option 2	$189.0	$149.0
Option 3	$230.5	$181.2
Option 4	$241.3	$189.6

B. Social Costs

Social costs are the costs of the proposed rule from the viewpoint of society as a whole, rather than the viewpoint of regulated plants and owning entities (which are private costs). In calculating social costs, EPA tabulated the pre-tax costs in the year they are estimated to be incurred, which varies across plants based on the estimated compliance year. EPA performed the social cost analysis over a 25-year period of 2025 to 2049, which combines the length of the period during which plants are anticipated to install the control technologies (which could be as late as 2029) and the useful life of the longest-lived technology installed at any plant (20 years). EPA calculated the social cost of the proposed rule using both a primary three percent discount rate and an alternative seven percent discount rate. Social costs include costs incurred by both private entities and the government (*e.g.*, in implementing the regulation).

As described further in Chapter 10 of the RIA, there were no incremental increases in the cost to state governments to revise NPDES permits. Consequently, the only category of costs used to calculate social costs are those pre-tax costs estimated for steam electric plants. Note that the annualized social costs presented in Table VIII-2 of this preamble for the seven percent discount rate differ from comparable pre-tax industry compliance costs shown in Table VIII-1 of this preamble. The costs in Table VIII-1 of this preamble represent the annualized costs of each option if they were incurred in 2024, whereas the annualized costs in Table VIII-2 of this preamble are estimated based on the stream of future costs starting in the year that individual plants are projected to comply with the requirements of the proposed options.

Table VIII-2 of this preamble presents the total annualized social costs of the four regulatory options, compared to baseline and calculated using three percent and seven percent discount rates. The proposed rule (Option 3) has estimated incremental social costs of $200 million using a three percent discount rate and $216 million using a seven percent discount rate.

Table VIII-2. Estimated Total Annualized Social Costs [Millions of 2021$, Three and Seven Percent Discount Rate]

Regulatory Option	3% Discount Rate	7% Discount Rate

Option 1	$88.4	$96.6
Option 2	$167.0	$180.4
Option 3	$200.3	$216.5
Option 4	$207.2	$224.1

C. Economic Impacts

EPA assessed the economic impacts of this proposed rule in two ways: (1) a screening-level assessment of the cost impacts on existing EGUs at steam electric plants and the entities that own those plants, based on comparison of costs to revenue and (2) an assessment of the impacts within the context of the broader electricity market, which includes an assessment of changes in predicted plant closures attributable to the proposed rule. The following sections summarize the results of these analyses. The RIA discusses the methods and results in greater detail.

The first set of cost and economic impact analyses—at both the plant and parent company level—provides screening-level indicators of the impacts of costs for FGD wastewater, BA transport water, and CRL controls relative to historical operating characteristics of steam electric plants incurring those costs (*i.e.*, level of electricity generation and revenue). EPA conducted these analyses for baseline and for the four regulatory options presented in Table VII-1 of this preamble, then compared these impacts to understand the incremental effects of the regulatory options in this proposal.

The second set of analyses looks at broader electricity market impacts, considering the interconnection of regional and national electricity markets. This analysis also looks at the distribution of impacts at the plant and EGU level. This second set of analyses provides insight on the impacts of the proposed rule on steam electric plants, as well as the entire electricity market, including changes in capacity, generation, and wholesale electricity prices. The market analysis compares model predictions for the proposed rule to a base case that includes the predicted and observed economic and market effects of the 2020 rule and other environmental regulations.

1. Screening-Level Assessment

EPA conducted a screening-level analysis of each regulatory option's potential impact on existing EGUs at steam electric plants and parent entities based on cost-to-revenue ratios. For each of the two levels of analysis (plant and parent entity), the Agency assumed, for analytic convenience and as a worst-case scenario, that none of the compliance costs would be passed on to consumers through electricity rate increases and would instead be absorbed by the steam electric plants and their parent entities. This assumption overstates the impacts of compliance expenditures since steam electric plants that operate in a regulated market may be able to pass on changes in production costs to consumers through changes in electricity prices. It is, however, an appropriate assumption for a screening-level estimate of the potential cost impacts.

a. Plant-Level Cost-to-Revenue Analysis

EPA developed revenue estimates for this analysis using EIA data. EPA then calculated the change in the annualized after-tax costs of the four regulatory options presented in Table VII-1 of this preamble as a percent of baseline annual revenues. See Chapter 4 of the RIA for a more detailed discussion of the methodology used for the plant-level cost-to-revenue analysis.

Cost-to-revenue ratios are screening-level indicators of potential economic impacts. EPA guidance describes certain cost-to-revenue ratios for evaluating small entity impacts under the RFA (U.S. EPA 2006).[131] As described in the Guidance, plants incurring costs below one percent of revenue are unlikely to face economic impacts, while plants with costs between one percent and three percent of revenue have a higher chance of facing economic impacts, and plants incurring costs above three percent of revenue have a still higher probability of economic impact.

Under the proposed rule (Option 3), EPA estimated that 19 plants would incur incremental costs greater than or equal to one percent of revenue, including three plants that have

[131] U.S. Environmental Protection Agency. (2006). Final Guidance for EPA Rulewriters: Regulatory Flexibility Act as Amended by the Small Business Regulatory Enforcement Fairness Act.

costs greater than or equal to three percent of revenue, and an additional 73 plants would incur costs that are less than one percent of revenue. Section 4.2 in the RIA provides results for the other regulatory options EPA analyzed.

b. Parent Entity-Level Cost-to-Revenue Analysis

EPA also assessed the economic impact of the regulatory options presented in Table VII-1 of this preamble at the parent entity level. The screening-level cost-to-revenue analysis at the parent entity level provides insight on the impact on those entities that own existing EGUs at steam electric plants. In this analysis, the domestic parent entity associated with a given plant is defined as the entity with the largest ownership share in the plant. For each parent entity, EPA compared the incremental change in the total annualized after-tax costs and the total revenue for the entity to baseline (see Chapter 4 of the RIA for details). Following the methodology employed in the analyses for the 2015 and 2020 rules, EPA considered a range of estimates for the number of entities owning an existing EGU at a steam electric plant to account for partial information available for steam electric plants that are not expected to incur ELG compliance costs.

Like the plant-level analysis above, cost-to-revenue ratios provide screening-level indicators of potential economic impacts, this time to the owning entities; higher ratios suggest a higher probability of economic impacts. EPA estimated that the number of entities owning existing EGUs at steam electric plants ranges from 229 (lower-bound estimate) to 427 (upper-bound estimate), depending on the assumed ownership structure of plants not incurring ELG costs and not explicitly analyzed. EPA estimates that under the proposed rule (Option 3), four parent entities would incur annualized costs representing one percent or more of their revenues, including one parent entity that would incur costs representing more than three percent of revenue.

2. Electricity Market Impacts

To analyze the impacts of regulatory actions affecting the electric power sector, EPA commonly uses IPM, a comprehensive electricity market optimization model that can evaluate such impacts within the context of regional and national electricity markets. The model is designed to evaluate the effects of changes in EGU-level electric generation costs on the total cost of electricity supply, subject to specified demand and emissions constraints. Use of a comprehensive market analysis system is important in assessing the potential impact of any power plant regulation because of the interdependence of EGUs in supplying power to the electric transmission grid. Changes in electricity production costs at some EGUs can have a range of broader market impacts affecting other EGUs, including the average likelihood that various units are dispatched. The analysis also provides important insight on steam electric capacity closures (*e.g.*, retirements of EGUs that become uneconomical relative to other EGUs), based on a more detailed analysis of market factors than in the screening-level analyses above.

In contrast to the screening-level analyses, which are static analyses and do not account for interdependence of EGUs in supplying power to the electricity transmission grid, IPM accounts for potential changes in the generation profile of steam electric and other EGUs and consequent changes in market-level generation costs as the electric power market responds to changes in generation costs for steam electric EGUs due to the regulatory options. Additionally, in contrast to the screening-level analyses, in which EPA assumed no cost pass-through of ELG compliance costs, IPM depicts production activity in wholesale electricity markets where the specific increases in electricity prices for individual markets would result in some recovery of compliance costs for plants. IPM is based on an inventory of U.S. utility- and nonutility-owned EGUs and generators that provide power to the integrated electric transmission grid, including plants to which the ELGs apply.

EPA analyzed proposed Option 3 using IPM. The results of this analysis further inform EPA's understanding of the potential impacts of the proposed rule (Option 3). The version of IPM used for this analysis, IPM V6, embeds an energy demand forecast that is derived from

DOE's "Annual Energy Outlook 2021" (AEO 2021). IPM also incorporates the expected compliance response into existing regulatory requirements for regulations affecting the power sector, including the 2020 ELG rule, CSAPR and CSAPR Update, MATS rule, the final 2014 CWA section 316(b) rule, and the final 2015 CCR rule and CCR Part A rule. The reference case also includes the effects of the Regional Greenhouse Gas Initiative; California's Global Warming Solutions Act; Renewable Portfolio Standards state-level policies, including recent Clean Energy Standards in Illinois, Oregon, Delaware, North Carolina, and Massachusetts; and the 45Q tax credit for CO_2 sequestration.

In analyzing the proposed option, EPA estimated incremental fixed and variable costs for the steam electric plants and EGUs to comply with Option 3. Because IPM is not designed to endogenously model the selection of wastewater treatment technologies as a function of electricity generation, effluent flows, and pollutant discharge, EPA estimated these costs exogenously for each steam EGU and input these costs into the IPM model as fixed and variable O&M cost adders in addition to the costs already reflected in the Base Case, which included compliance with the 2020 ELG rule (the baseline analysis). EPA then ran IPM with these new cost estimates to determine the dispatch of EGUs that would meet projected demand at the lowest costs, subject to the same constraints as those in the baseline analysis. The estimated changes in plant- and EGU-specific production levels and costs—and, in turn, changes in the electric power sector's total costs and production profile—are key data elements in evaluating the expected national and regional effects of the regulatory options in this proposal, including closures or avoided closures of EGUs and plants.

EPA considered impact metrics of interest at three levels of aggregation: (1) impact on national and regional electricity markets (all electric power generation, including steam and nonsteam electric plants); (2) impact on steam electric plants as a group, and (3) impact on individual steam electric plants incurring costs. Chapter 5 of the RIA discusses the first analysis; the sections below summarize the last two, which are further described in Chapter 5 of the RIA.

All results presented below are representative of modeled market conditions in the model year 2030, when the plants will have implemented changes to meet the proposed ELGs.

a. Impacts on Existing Steam Electric Power Plants

EPA used IPM results for 2030 to assess the potential impact of the proposed rule on existing EGUs at steam electric plants. The purpose of this analysis is to assess any fleetwide changes from baseline impacts on EGUs at steam electric plants. Table VIII-3 of this preamble reports estimated results for existing EGUs at steam electric plants, as a group. EPA looked at the following metrics: (1) incremental early retirements and capacity closures, calculated as the difference between capacity under the regulatory option and capacity under baseline; (2) incremental capacity closures as a percentage of baseline capacity; (3) change in electricity generation from plants subject to the ELGs; (4) changes in variable production costs per MWh, calculated as the sum of total fuel and variable O&M costs divided by net generation; and (5) changes in annual costs (fuel, variable O&M, fixed O&M, and capital). Note that changes in electricity generation at steam electric plants presented in Table VIII-3 of this preamble are attributable both to changes in retirements and changes in capacity utilization at operating EGUs and plants.

Table VIII-3. Estimated Impact of the Proposed Rule (Option 3) on Steam Electric Plants as a Group at the Year 2030

Metric	**Baseline Value**	**Change Attributable to the Proposed Rule as Compared to Baseline**	
		Value	**Percent**
Total capacity (MW)	274,256	-249	-0.1%
Early retirement or closure (MW)	56,422	249	0.4%
Early retirement or closure (number of plants)	28	1	3.6%
Total generation (GWh)	1,226,067	-5,703	-0.5%
Average variable production cost (2021$/MWh)	$21.63	$0.02	0.1%
Annual cost (million 2021$)	$44,427	$2	0.0%
MW = megawatt; MWh = megawatt-hour; GWh = gigawatt-hour = 1,000 MWh			

Under the proposed rule, generation at steam electric plants is projected to decrease by 5,703 GWh (0.5 percent) nationally when compared to baseline. IPM projects a net decline in

total steam electric capacity by 249 MW (approximately 0.1 percent of total baseline capacity) due to early retirement attributable to this proposal. One additional plant is projected to retire early under the proposed rule when compared to baseline. See section 5.2.2.2 in the RIA for details.

These findings suggest that the proposed rule can be expected to have small economic consequences for steam electric plants as a group. Option 3 would affect the operating status of very few steam electric plants, with only one additional plant closure (a plant with very low capacity utilization of less than six percent in baseline).

b. Impacts on Individual Plants Incurring Costs

To assess potential plant-level effects, EPA also analyzed plant-specific changes attributable to the proposed rule for the following metrics: (1) capacity utilization (defined as annual generation (in MWh) divided by [capacity (MW) times 8,760 hours]), (2) electricity generation, and (3) variable production costs per MWh, defined as variable O&M cost plus fuel cost divided by net generation. The analysis of changes in individual plants is detailed in Chapter 5 of the RIA. The results indicate that most plants would experience only slight effects—*i.e.*, no change or less than a one percent reduction or one percent increase. Across the full set of steam electric plants modeled, 30 plants would incur a reduction in generation of at least one percent; 18 of these plants are also estimated to incur a reduction in capacity utilization of at least one percent. Of the subset of 46 steam electric plants that would incur costs under Option 3, 19 plants incur a decrease in generation, whereas 16 plants see no change, 10 plants close in baseline, and one additional plant closes under Option 3.

IX. Pollutant Loadings

In developing ELGs, EPA typically evaluates the pollutant loading reductions of regulatory options to assess the impacts of the compliance requirements on discharges from the whole industry. EPA took the same approach to the one described above for plant-specific costs for estimating pollutant reductions associated with this proposal. That is, EPA compared the

values to a baseline that reflects implementation of existing environmental regulations, including the 2020 rule for FGD wastewater and BA transport water.

The general methodology that EPA used to calculate pollutant loadings is the same as that described in the 2020 rule. EPA first estimated—on an annual, per plant basis—the pollutant discharge load associated with the technology bases evaluated for plants to comply with the 2020 rule requirements for FGD wastewater and BA transport water, accounting for the current or planned conditions at each plant. For CRL, EPA estimated the pollutant discharge load associated with current discharges. For all wastestreams, EPA similarly estimated plant-specific post-compliance pollutant loadings as the load associated with the technology bases for plants to comply with effluent limitations based on each regulatory option in this proposal. For each regulatory option, EPA then calculated the changes in pollutant loadings at a particular plant as the sum of the differences between the estimated baseline and post-compliance discharge loads for each applicable wastestream.

For plants that discharge indirectly to POTWs, EPA adjusted the baseline and option loads to account for pollutant removals expected from POTWs. These adjusted pollutant loadings for indirect dischargers therefore reflect the resulting discharges to receiving waters. For additional details on the methodology EPA used to calculate pollutant loading reductions, see section 6 of the TDD.

A. FGD Wastewater

For FGD wastewater, EPA continued to use the average pollutant effluent concentration with plant-specific discharge flow rates to estimate the mass pollutant discharge per plant for baseline and each proposed regulatory option in Table VII-1 of this preamble. EPA used data compiled for the 2015 and 2020 rules as the initial basis for estimating discharge flow rates and updated the data to reflect retirements or other relevant changes in operation. As in the 2020 rule, EPA also accounted for increased rates of recycle through the scrubber that would affect the discharge flow.

EPA assigned pollutant concentrations for each analyte based on the operation of a treatment system designed to comply with baseline or the regulatory options. EPA used data compiled for the 2020 rule to characterize FGD chemical precipitation plus LRTR effluent and chemical precipitation plus membrane filtration effluent. In addition, EPA used data provided by industry and other stakeholders during the 2020 rule, as described in Section IV of this preamble, to quantify bromide in FGD wastewater under baseline conditions and for the four regulatory options.

B. BA Transport Water

EPA estimated baseline and post-compliance loadings for each regulatory option in Table VII-1 of this preamble using pollutant concentrations for BA transport water and plant-specific flow rates. EPA used data compiled for the 2020 rule as the basis for estimating BA transport water discharge flows and updated the data set to reflect retirements and other relevant changes in operation (*e.g.,* ash handling conversions, fuel conversions) that have occurred since collecting the 2020 rule data. Under the baseline, which reflects the 2020 rule requirement for the high recycle rate technology option (or BMP plan in the case of Merrimack Station), EPA estimated discharge flows associated with the purge from remote MDS operation, based on the generating unit capacity and the volume of the remote MDS. Under the zero discharge option, EPA estimated a flow rate of zero.

C. CRL

For CRL, EPA used the average pollutant effluent concentration with plant-specific discharge flow rates to estimate the mass pollutant discharge per plant for baseline and chemical precipitation (proposed in each regulatory option) in Table VII-1 of this preamble. EPA used data compiled for the 2015 rule as the initial basis for estimating discharge flow rates and updated the data to reflect retirements. EPA also used utilities' "CCR Rule Compliance Data and Information" websites to identify new landfills constructed since 2015. For new landfills, EPA used the 2015 methodology to estimate leachate flow proportionate to landfill size, if available,

or as the median leachate volume (in gallons per day (GPD)) calculated from the 2010 steam electric survey.

EPA assigned pollutant concentrations for each analyte based on current operating conditions or treatment in place for baseline and the operation of a treatment system designed to comply with the four regulatory options. EPA used data compiled for the 2015 rule to characterize untreated CRL and, as in the 2015 rule, transferred the average FGD effluent concentrations for chemical precipitation.

D. Legacy Wastewater

EPA is not proposing nationally applicable BAT limitations or PSES for legacy wastewater and, therefore, did not estimate changes in loadings under the regulatory options. EPA has nevertheless evaluated the scope of pond dewatering and decant wastewaters and associated baseline pollutant discharges in *Legacy Wastewater at CCR Surface Impoundments* (SE10252). As discussed in Section VII.B.4 of this preamble, EPA is soliciting comment on various technologies that could potentially serve as a technology basis for BAT for these two specific legacy wastewaters. EPA has evaluated the potential costs and pollutant removals of these technologies as part of its *Legacy Wastewater at CCR Surface Impoundments* (SE10252).

E. Summary of Incremental Changes of Pollutant Loadings from Four Regulatory Options

Table IX-1 of this preamble summarizes the net reduction to annual pollutant loadings, compared to baseline, associated with each regulatory option in Table VII-1 of this preamble. Compared to the 2020 rule (baseline), all regulatory options result in decreased pollutant loadings to surface waters.

Table IX-1. Estimated Incremental Reductions in Annual Pollutant Loading for Regulatory Options 1, 2, 3, and 4 [in Pounds/Year] Compared to Baseline

Regulatory Option	Reductions in Annual Pollutant Loadings
1	18,100,000
2	575,000,000
3	584,000,000
4	639,000,000

Note: Reductions in pollutant loadings are rounded to three significant figures.

X. Non-Water Quality Environmental Impacts

The elimination or reduction of one form of pollution may create or aggravate other environmental problems. Therefore, sections 304(b) and 306 of the CWA require EPA to consider non-water quality environmental impacts (including energy requirements) associated with ELGs. Accordingly, EPA has considered the potential impact of the regulatory options in this proposal on air emissions, solid waste generation, and energy consumption. In general, EPA used the same methodology (with updated data as applicable) as it did for the analyses supporting the 2015 and 2020 rules to conduct this analysis. The following sections summarize the methodology and results. See section 7 of the supplemental TDD for additional details.

A. Energy Requirements

Steam electric power plants use energy when transporting ash and other solids on or off site, operating wastewater treatment systems (*e.g.,* chemical precipitation, membrane filtration), or operating ash handling systems. For this proposal, EPA considered whether there would be an associated change in the incremental energy requirements compared to baseline. Energy requirements vary depending on the regulatory option evaluated and the current operations of the facility. Therefore, as applicable, EPA estimated the increase in energy usage in megawatt hours (MWh) for equipment added to the plant systems or in consumed fuel (gallons) for transportation/operating equipment for all four regulatory options. EPA summed the facility-specific estimates to calculate the net change in energy requirements from baseline for the regulatory options.

EPA estimated the amount of energy needed to operate wastewater treatment systems and ash handling systems based on the horsepower rating of the pumps and other equipment. EPA also estimated any changes in the fuel consumption associated with transporting solid waste and combustion residuals (*e.g.,* ash) from steam electric power plants to landfills (on- or off-site). The frequency and distance of transport depends on a plant's operation and configuration; specifically, the volume of waste generated and the availability of either an on-site or off-site

nonhazardous landfill and its distance from the plant. Table X-1 of this preamble shows the net change in annual electrical energy usage associated with the regulatory options compared to baseline, as well as the net change in annual fuel consumption requirements associated with the four regulatory options compared to baseline.

Table X-1. Estimated Incremental Change in Energy Requirements Associated with Regulatory Options Compared to Baseline

Non-Water Quality Environmental Impact	Energy Use Associated with Regulatory Options			
	Option 1	Option 2	Option 3	Option 4
Electrical energy usage (MWh)	38,000	126,000	139,000	151,000
Fuel (thousand gallons)	53.0	122	622	639

B. Air Pollution

The four proposed regulatory options are expected to affect air pollution through three main mechanisms: (1) changes in auxiliary electricity use by steam electric plants to operate wastewater treatment, ash handling, and other systems needed to comply with regulatory requirements; (2) changes to transportation-related emissions due to the trucking of CCR waste to landfills; and (3) the change in the profile of electricity generation due to regulatory requirements. This section discusses air emission changes associated with the first two mechanisms and presents the corresponding estimated net changes in air emissions. See Section XII.B.3 of this preamble for additional discussion of the third mechanism.

Steam electric power plants generate air emissions from operating transport vehicles, such as dump trucks, which release criteria air pollutants and GHGs. Similarly, a decrease in energy use or vehicle operation would result in decreased air pollution.

To estimate the net air emissions associated with changes in electrical energy use projected as a result of the regulatory options in this proposal compared to baseline, EPA combined the energy usage estimates with air emission factors associated with electricity production to calculate air emissions associated with the incremental energy requirements. EPA estimated NO_X, SO_2, and CO_2 emissions using plant- or North American Electric Reliability

Corporation (NERC)-specific emission factors (ton/MWh) obtained from IPM for run year 2035.[132]

To estimate net air emissions associated with the change in operation of transport vehicles, EPA used the MOVES2021b model to identify air emission factors (gram per mile) for the air pollutants of interest. EPA estimated the annual number of miles that dump trucks moving ash or wastewater treatment solids to on- or off-site landfills would travel for the regulatory options. EPA used these estimates to calculate the net change in air emissions for the four regulatory options. Table X-2 of this preamble presents EPA's estimated net change in air emissions associated with auxiliary electricity and transportation for the proposed options.

Table X-2. Estimated Net Change in Industry-Level Air Emissions Associated with Auxiliary Electricity and Transportation for Options Compared to Baseline

Non-Water Quality Environmental Impact	Option 1	Option 2	Option 3	Option 4
CO_2 (million tons/year)	0.03	0.12	0.13	0.14
NO_X (thousand tons/year)	0.02	0.065	0.081	0.085
SO_2 (thousand tons/year)	0.022	0.06	0.07	0.072

The modeled output from IPM predicts changes in electricity generation due to compliance costs attributable to the proposed options compared to baseline. These changes in electricity generation are, in turn, predicted to affect the amount of NO_X, SO_2, and CO_2 emissions from steam electric power plants.[133] A summary of the net change in annual air

[132] While EPA only ran IPM for the proposed rule (Option 3), EPA extrapolated the benefits estimated using these IPM outputs to options 1, 2, and 4 to provide insight on the potential air quality-related effects of the other regulatory options. See Section 8 of the BCA for details.

[133] EPA also considered changes in particulate matter (see Section XII.B.3 of this preamble). As explained in the BCA Chapter 8.1: "IPM outputs include estimated CO2, NOX, and SO2 emissions to air from EGUs. EPA also used IPM outputs to estimate EGU emissions of primary PM2.5 based on emission factors described in U.S. EPA (2020c). Specifically, EPA estimated primary PM2.5 emissions by multiplying the generation predicted for each IPM plant type (ultrasupercritical coal without carbon capture and storage, combined cycle, combustion turbine, etc.) by a type-specific empirical emission factor derived from the 2016 National Emissions Inventory (NEI) and other data sources. The emission factors reflect the fuel type (including coal rank), FGD controls, and state emission limits for each plant type, where applicable."

emissions associated with Option 3 for all three mechanisms are shown in Table X-3 of this preamble. As with costs, the IPM run from this option reflects the range of non-water quality environmental impacts associated with all four regulatory options. To provide some perspective on the estimated changes, EPA compared the estimated change in air emissions to the net amount of air emissions generated in a year by all electric power plants throughout the United States. For a detailed breakout of each of the three sources of air emission changes, see section 7 of the TDD.

Table X-3. Estimated Net Change in Industry-Level Air Emissions Associated with Changes in Auxiliary Electricity, Transportation, and Electricity Generation for Proposed Option 3 Compared to Baseline

Non-Water Quality Environmental Impact	Change in Emissions—Option 3	2020 Emissions by Electric Power Generating Industry
CO_2 (million tons/year)	-11	1,650
NO_X (thousand tons/year)	-5.1	1,020
SO_2 (thousand tons/year)	-5.8	954

C. Solid Waste Generation and Beneficial Use

Steam electric power plants generate solid waste associated with sludge from wastewater treatment systems (*e.g.,* chemical precipitation). EPA estimated the change in the amount of solids generated under each regulatory option for each plant compared to baseline. Table X-4 of this preamble shows the net change in annual solid waste generation, compared to baseline, associated with the four regulatory options.

Table X-4. Estimated Incremental Changes to Solid Waste Generation Associated with Regulatory Options Compared to Baseline

Non-Water Quality Environmental Impact	Solid Waste Generation Associated with Regulatory Options			
	Option 1	Option 2	Option 3	Option 4
Solids generated (tons/year)	236,000	1,220,000	1,240,000	1,330,000

EPA also evaluated the potential impacts of diverting FA from current beneficial uses toward encapsulation of membrane filtration brine for disposal in a landfill. According to the

latest American Coal Ash Association survey,[134] more than half of the FA generated by coal-fired power plants is being sold for beneficial uses rather than disposed, and the majority of this beneficially used FA is replacing Portland cement in concrete. This also holds true for the specific facilities currently discharging FGD wastewater and expected to install membranes under proposed Option 3, as seen by sales of FA in the 2020 EIA-923 Schedule 8A.[135] Summary statistics of the FA beneficial use percentage for these facilities is displayed in Table X-5 below.

Table X-5. Percent of FA Sold for Beneficial Use at Facilities Discharging FGD Wastewater

Statistic	FA Percent Sold for Beneficial Use
Min	0%
10th	0%
25th	<1%
Median	39%
Mean	46%
75th	86%
90th	99%
Max	100%

In the CCR rule,[136] EPA noted that FA replacing Portland cement in concrete would result in significant avoided environmental impacts to energy use, water use, GHG emissions, air emissions, and waterborne wastes.

Based on EPA's analysis of 2019 and 2020 EIA data, most of the power plants that would be expected to install membrane filtration under proposed Option 3 have enough FA for encapsulation before accounting for reported FA sales, leaving only two plants without enough FA needed for the estimated encapsulation recipe (by approximately 240,000 tons of FA). After accounting for reported FA sales, EPA estimates that six power plants may not have enough FA available for encapsulation (by approximately 750,000 tons of FA). These facilities would thus have to reduce sales of their FA, use additional lime, find a beneficial use of the brine, dispose of

[134] Available online at: *www.acaa-usa.org/wp-content/uploads/coal-combustion-products-use/2016-Survey-Results.pdf.*
[135] Available online at: www.eia.gov/electricity/data/eia923/.
[136] Available online at: www.regulations.gov. Docket ID: EPA-HQ-RCRA-2009-0640.

the brine through deep well injection, or reduce the volume of brine with thermal technologies including potential crystallization. EPA expects that the amount of FA required for encapsulation will vary based on the amount of FGD wastewater generated and treated in a given operating year, in addition to the variability in FA markets. Based on the 2020 EIA data, coal-fired power plants reported more than 30 million tons of FA sold, and while there are increasing FA sales reported, EPA identified more than 100 coal-fired power plants (9.6 million tons of FA) that do not report any FA sales. EPA estimates that there is enough FA to accommodate both FGD brine encapsulation needs and the beneficial use market and proposes to find that this non-water quality environmental impact is acceptable. See also discussion in Section VII.B.1.a of this preamble.

D. Changes in Water Use

Steam electric power plants generally use water for handling solid waste, including ash, and for operating wet FGD scrubbers. The technology basis for FGD wastewater in the 2020 rule, chemical precipitation plus LRTR, was not expected to reduce or increase the volume of water used. Under this proposed rule, plants that install a membrane filtration system for FGD wastewater treatment are assumed to decrease their water use compared to baseline by recycling all permeate back into the FGD system, which would avoid the costs of pumping or treating new makeup water. Therefore, EPA estimated the reduction in water use resulting from membrane filtration treatment as equal to the estimated volume of the permeate stream from the membrane filtration system.

The BA transport technologies associated with the baseline and the proposed rule for BA transport water eliminate or reduce the volume of water used by wet sluicing BA operating systems. The 2020 rule established limitations based on plants operating a high recycle rate system, allowing up to a 10 percent purge of the total system volume. As part of this rule, EPA is proposing options that include zero-discharge requirements for BA handling, which may result in a decrease in water use for BA handling by eliminating the purge. For proposed Options 1 and 2,

EPA generally expects no change in water use associated with BA handling. For proposed Options 3 and 4, EPA expects to see a decrease in water use for BA handling operations. Under this proposed rule, plants that operate zero discharge BA handling systems are assumed to decrease their water use compared to baseline by recycling all transport water back to the BA handling system, which would avoid the costs of pumping or treating new makeup water. Therefore, EPA estimated the reduction in water use resulting from complete recycle as equal to the estimated volume of the 10 percent purge.

EPA does not estimate a change in water use associated with the treatment technology considered for the treatment of CRL as part of this proposed rule.

Overall, EPA estimates that plants impacted by the proposed rule would decrease their water use by 11.8 MGD compared to baseline for preferred regulatory Option 3. Table X-6 of this preamble sums the changes for FGD wastewater and BA transport water and shows the net decrease in water use, compared to baseline, for the four regulatory options.

Table X-6. Estimated Incremental Decreases in Water Use Associated with Regulatory Options Compared to Baseline

Non-Water Quality Environmental Impact	Decreases in Water Use Associated with Regulatory Options			
	Option 1	Option 2	Option 3	Option 4
Decreases in water use (MGD)	4.47	9.79	11.8	12.4

XI. Environmental Assessment

A. Introduction

EPA conducted an environmental assessment for this proposed rule. The Agency reviewed available literature on the documented environmental and human health effects of the pollutants discharged in steam electric power plant FGD wastewater, BA transport water, CRL, and legacy wastewater. EPA conducted modeling to determine the impacts of pollutant discharges from the plants to which the proposed rule applies. For the reasons described in Section VIII of this preamble of this preamble, the baseline for these analyses appropriately

consists of the environmental and human health results of achieving the 2020 rule requirements (the same baseline EPA used to evaluate costs, benefits, and pollutant loads). Under this assessment, EPA compared the change in impacts associated with the four regulatory options presented in Table VII-1 of this preamble to those projected under baseline.

Information from EPA's review of the scientific literature and documented cases of impacts of pollutants discharged in steam electric power plant wastewater on human health and the environment, as well as a description of EPA's modeling methodology and results, are provided in the Environmental Assessment for Proposed Supplemental ELGs (EA Report). The EA Report contains information on literature that EPA has reviewed since the 2020 rule, updates to the environmental assessment analyses, and modeling results for each of the regulatory options in this proposal. The 2015 EA (EPA-821-R-15-006) and 2020 EA (EPA 821-R-20-002) provide information from EPA's earlier review of the scientific literature and documented cases of the impacts associated with the wider range of steam electric power plant wastewater discharges addressed in the 2015 rule on human health and the environment, as well as a full description of EPA's modeling methodology.

Current scientific literature indicates that untreated steam electric power plant wastewaters, such as FGD wastewater, BA transport water, CRL, and legacy wastewater, contain large amounts of a wide range of pollutants, some of which are toxic and bioaccumulative and cause detrimental environmental and human health impacts. For additional information, see section 2 of the EA Report. EPA also considered environmental and human health effects associated with changes in air emissions, solid waste generation, and water withdrawals. Sections X and XII of this preamble discuss these effects.

B. Updates to the Environmental Assessment Methodology

The environmental assessment modeling for this proposed rule consisted of the steady-state, national-scale immediate receiving water (IRW) model that EPA used to evaluate the direct and indirect discharges from steam electric power plants for the 2020 ELG rule, 2015 ELG rule,

and 2015 CCR rule. The model focused on impacts within the immediate surface waters where discharges occurred (the closest segments of approximately 0.25 miles to five miles long). EPA also modeled receiving water concentrations downstream from steam electric power plant discharges using a downstream fate and transport model (*see* Section XII of this preamble). For this proposed rule, the Agency expanded its environmental assessment to evaluate cumulative impacts by assessing human health impacts from the joint toxic action of multiple pollutants in steam electric power plant discharges. The environmental assessment also incorporates changes to the industry profile outlined in Section V of this preamble.

C. Outputs from the Environmental Assessment

Compared to baseline, EPA estimated environmental and ecological changes associated with changes in pollutant loadings for the four regulatory options presented in Table VII-1 of this preamble. These include changes in impacts to wildlife and humans. More specifically, in addition to other unquantified environmental changes (*e.g.,* groundwater quality and attractive nuisances), the environmental assessment evaluated changes in: (1) surface water quality, (2) impacts to wildlife, (3) number of receiving waters with potential human health cancer risks, (4) number of receiving waters with potential to cause noncancer human health effects, (5) metal and nutrient discharges to sensitive waters (*e.g.*, CWA Section 303(d) impaired waters impaired waters), and (6) number of receiving waters with potential joint toxic action of multiple pollutants. EPA also evaluates further impacts in Section XII of this preamble.

As described in the EA Report, EPA focused its quantitative analyses on the changes in environmental and human health impacts associated with exposure to toxic bioaccumulative pollutants via the surface water pathway. EPA modeled changes in discharged toxic, bioaccumulative pollutants from FGD wastewater, BA transport water, and CRL into rivers, streams, and lakes, including reservoirs. EPA also addressed environmental impacts from nutrients in the EA Report, as well as in a separate analysis in Section XII of this preamble.

The environmental assessment concentrates on impacts to aquatic life based on changes in surface water quality; impacts to aquatic life based on changes in sediment quality in surface waters; impacts to wildlife from consumption of contaminated aquatic organisms; and impacts to human health from consumption of contaminated fish and water. The EA Report discusses, with quantified results, the estimated environmental improvements projected within the immediate receiving waters due to the estimated pollutant loading reductions associated with the regulatory options in this proposal compared to the 2020 rule.

XII. Benefits Analysis

This section summarizes EPA's estimates of the changes in national environmental benefits expected to result from changes in steam electric plant discharges described in Section IX of this preamble, and the resultant environmental effects, summarized in Section XI of this preamble. The Benefit Cost Analysis (BCA) report provides additional details on the benefits methodologies and analyses. The analysis methodology for quantified benefits is generally the same that EPA used for the 2015 and 2020 rule*s*, but with revised inputs and assumptions that reflect updated data and regulatory options.

A. Categories of Benefits Analyzed

Table XII-1 of this preamble summarizes benefit categories associated with the four regulatory options and notes which categories EPA was able to quantify and monetize. Analyzed benefits fall into four broad categories: (1) human health benefits from surface water quality improvements, (2) ecological conditions and effects on recreational use from surface water quality changes, (3) market and productivity benefits, and (4) air-related effects.[137] Within these broad categories, EPA was able to assess the benefits associated with the regulatory options in

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[137] Consistent with Office of Management and Budget Circular A-4, EPA appropriately considers ancillary benefits of this proposal (*e.g.*, air benefits). Circular A-4 states:

> *Your analysis should look beyond the direct benefits and direct costs of your rulemaking and consider any important ancillary benefits and countervailing risks. An ancillary benefit is a favorable impact of the rule that is typically unrelated or secondary to the statutory purpose of the rulemaking…*

this proposal with varying degrees of completeness and rigor. Where possible, EPA quantified the expected changes in effects and estimated monetary values. However, data limitations, modeling limitations, and gaps in the understanding of how society values certain environmental changes prevent EPA from quantifying and/or monetizing some benefit categories. EPA notes that all human health and environmental improvements discussed in the EA Report also represent benefits of the proposal (whether quantified or unquantified), and the Agency will continue to enhance its benefits analysis methods where appropriate as it finalizes the rule.

The following section summarizes EPA's analysis of the benefit categories the Agency was able to partially quantify and/or monetize to various degrees (identified in the columns of Table XII-1 of this preamble, respectively). EPA solicits comment on the extent to which unquantified benefits (*e.g.*, some health endpoints without defined dose-response relationship) or partially quantified benefits (*e.g.*, the social cost of GHG metrics which omit many significant categories of climate damages) could be more fully quantified and/or monetized for any final rule. The regulatory options would also affect additional benefit categories that the Agency was not able to quantify or monetize at all. The BCA Report further describes some of these important nonmonetized benefits, and the Agency solicits comment on the extent to which these benefits could be quantified and/or monetized for any final rule.

Table XII-1. Summary of Estimated Benefits Categories

Benefit Category	Quantified and Monetized	Quantified, but Not Monetized	Neither Quantified nor Monetized
Human Health Benefits from Surface Water Quality Improvements			
Changes in incidence of bladder cancer from exposure to total trihalomethanes (TTHM) in drinking water	☐		
Changes in incidence of cancer from arsenic exposure via consumption of self-caught fish		☐	
Changes in incidence of cardiovascular disease from lead exposure via consumption of self-caught fish			☐
Changes in incidence of other cancer and noncancer adverse health effects (*e.g.*, reproductive, immunological, neurological, circulatory, or respiratory toxicity) due to exposure to arsenic, lead, cadmium, and other toxics from consumption of self-caught fish or drinking water		☐	☐

Changes in IQ loss in children from lead exposure via consumption of self-caught fish	☐		
Changes in specialized education needs for children from lead exposure via fish consumption of self-caught fish		☐	
Changes in *in utero* mercury exposure via maternal fish consumption of self-caught fish	☐		
Changes in health hazards from exposure to pollutants in waters used recreationally (*e.g.*, swimming)			☐
Ecological Condition and Recreational Use Effects from Surface Water Quality Changes			
Benefits from changes in surface water quality, including: aquatic and wildlife habitat; water-based recreation, including fishing, swimming, boating, and near-water activities; aesthetic benefits, such as enhancement of adjoining site amenities (*e.g.*, residing, working, traveling, and owning property near the water);[a] and nonuse value (existence, option, and bequest value from improved ecosystem health)[a]	☐		
Benefits from protection of threatened and endangered species		☐	
Changes in sediment contamination			☐
Market and Productivity Benefits			
Changes in water treatment costs for municipal drinking water, irrigation water, and industrial process			☐
Changes in commercial fisheries yields			☐
Changes in tourism and participation in water-based recreation			☐
Changes in property values from water quality changes			☐
Changes in maintenance dredging of navigational waterways and reservoirs due to changes in sediment discharges	☐		
Air-Related Effects			
Human health benefits from changes in morbidity and mortality from exposure to NO_X, SO_2, and particulate matter ($PM_{2.5}$)	☐		
Avoided climate change impacts from CO_2 emissions	☐		
a. Some, although not necessarily all, of these values are implicit in the total willingness to pay (WTP) for water quality improvements.			

B. Quantification and Monetization of Benefits

1. Human Health Effects From Surface Water Quality Changes

Changes in pollutant discharges from steam electric plants affect human health in multiple ways. Exposure to pollutants in steam electric power plant discharges via consumption of fish from affected waters can cause a wide variety of adverse health effects, including cancer, kidney damage, nervous system damage, fatigue, irritability, liver damage, circulatory damage, vomiting, diarrhea, brain damage, and IQ loss. Exposure to drinking water containing

brominated disinfection byproducts can cause adverse health effects such as cancer and reproductive and fetal development issues. Because the regulatory options in this proposal would change discharges of steam electric pollutants into waterbodies that directly receive or are downstream from these discharges, they may alter incidence of associated illnesses, even if by relatively small amounts.

Due to data limitations and uncertainties, EPA can only monetize a subset of the health benefits associated with changes in pollutant discharges from steam electric plants resulting from the regulatory options in this proposal as compared to baseline. EPA estimated the change in the number of individuals experiencing adverse human health effects in the populations exposed to steam electric discharges and/or altered exposure levels and valued these changes using different monetization methods for different benefit endpoints.

EPA estimated changes in health risks from the consumption of contaminated fish from waterbodies within 50 miles of households. EPA used Census block population data and region-specific average fishing rates to estimate the exposed population. EPA used cohort-specific fish consumption rates and waterbody-specific fish tissue concentration estimates to calculate potential exposure to steam electric pollutants in recreational fishers' households. Cohorts were defined by age, sex, race/ethnicity, and fishing mode (recreational or subsistence). EPA used these data to quantify and monetize changes in two categories of human health effects, which are further detailed in the BCA Report: (1) changes in IQ loss in children aged zero to seven from lead exposure via fish consumption and (2) changes in *in utero* mercury exposure via maternal fish consumption and associated IQ loss. EPA also analyzed the changes in the incidence of skin cancer from arsenic exposure via fish consumption but found negligible changes and therefore did not monetize the associated benefits.

Table XII-2 of this preamble summarizes the monetary value of changes in estimated health outcomes associated with consumption of contaminated fish for the ELG options compared to baseline. EPA estimated the annualized benefits of the proposed rule at $3.1 million

using a three percent discount rate ($0.6 million using a seven percent discount rate). Chapter 5 of the BCA provides additional detail on the methodology. EPA solicits comment on the assumptions and uncertainties included in this analysis.

Table XII-2. Annualized Estimated Benefits of Changes in Human Health Outcomes Associated with Fish Consumption (Millions of 2021$) for Proposed ELG Options Compared to Baseline

Discount Rate	Regulatory Option	Reduced Lead Exposure for Children	Reduced Mercury Exposure for Children	Total
3%	Option 1	$0.00	$2.94	$2.94
	Option 2	$0.00	$2.99	$2.99
	Option 3	$0.00	$3.11	$3.11
	Option 4	$0.01	$3.11	$3.12
7%	Option 1	$0.00	$0.54	$0.54
	Option 2	$0.00	$0.55	$0.55
	Option 3	$0.00	$0.58	$0.58
	Option 4	$0.00	$0.58	$0.58

EPA also estimated changes in bladder cancer incidence from the use and consumption of drinking water with changing levels of total trihalomethanes (TTHMs) resulting from reductions in bromide loadings associated with the four regulatory options relative to baseline. EPA estimated changes in cancer risks within populations served by drinking water treatment plants with intakes on surface waters affected by bromide discharges from steam electric plants. EPA used Safe Drinking Water Information System and U.S. Census data to estimate and characterize the exposed population. EPA modeled changes in waterbody-specific bromide concentrations and changes in drinking water treatment facility-specific TTHM concentrations to calculate potential changes in TTHM exposure and associated adverse health outcomes.

Table XII-3 of this preamble summarizes the estimated monetary value of estimated changes in bromide-related human health outcomes from modeled surface water quality improvements under the four regulatory options. The proposed rule (Option 3) is estimated to result in 112 avoided cancer cases and to have associated annualized benefits of $9.6 million using a three percent discount rate ($6.2 million using a seven percent discount rate).

Table XII-3. Estimated Annualized Human Health Benefits of Changing Bromide Discharges (Millions of 2021$) Under the Proposed ELG Options Compared to Baseline

Discount Rate	Regulatory Option	Benefits from Avoided Mortality	Benefits from Avoided Morbidity	Total Benefits
3%	Option 1	$0.45	$0.00	$0.45
	Option 2	$9.29	$0.08	$9.37
	Option 3	$9.53	$0.08	$9.61
	Option 4	$12.60	$0.10	$12.70
7%	Option 1	$0.13	$0.00	$0.28
	Option 2	$6.04	$0.05	$6.09
	Option 3	$6.19	$0.05	$6.24
	Option 4	$8.19	$0.07	$8.26

The formation of TTHM in a particular water treatment system is a function of several site-specific factors, including chlorine, bromine, organic carbon, temperature, pH, and the system residence time. EPA did not collect site-specific information on these factors at each potentially affected drinking water treatment facility. Instead, EPA's analysis only addresses the estimated site-specific changes in bromides. EPA used the national relationship between changes in TTHM exposure and changes in incidence of bladder cancer modeled by Regli et al. (2015)[138] and Weisman et al. (2022).[139] Thus, while the national changes in TTHM and bladder cancer incidence given estimated changes in bromide are EPA's best estimate, EPA cautions that estimates for any specific drinking water treatment facility could be over- or underestimated. Additional details on this analysis are provided in Chapter 4 of the BCA Report. EPA solicits comment on all aspects of the approach to assessing bladder cancer risk as well as the uncertainty surrounding site-specific estimated benefits, as well as data that would help EPA evaluate this uncertainty.

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[138] Regli, S., Chen, J., Messner, M., Elovitz, M. S., Letkiewicz, F. J., Pegram, R. A., . . . Wright, J. M. (2015). Estimating Potential Increased Bladder Cancer Risk Due to Increased Bromide Concentrations in Sources of Disinfected Drinking Waters. Environmental Science & Technology, 49(22), 13094–13102. *doi.org/10.1021/acs.est.5b03547*.

[139] Weisman, R., Heinrich, A., Letkiewicz, F., Messner, M., Studer, K., Wang, L., . . . Regli, S. (2022). Estimating National Exposures and Potential Bladder Cancer Cases Associated with Chlorination DBPs in U.S. Drinking Water. Environmental Health Perspectives, 130:8, 087002-1–087002-10. *ehp.niehs.nih.gov/doi/full/10.1289/EHP9985*.

2. Ecological Condition and Recreational Use Effects from Changes in Surface Water Quality Improvements

EPA evaluated whether the regulatory options in this proposal would alter aquatic habitats and human welfare by changing concentrations of harmful pollutants such as arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, nitrogen, phosphorus, and suspended sediment relative to baseline. As a result, the usability of some recreational waters relative to baseline discharge conditions could change under each option, thereby affecting recreational users. Changes in pollutant loadings can also change the attractiveness of recreational waters by making recreational trips more or less enjoyable. The regulatory options may also change nonuse values stemming from bequest, altruism, and existence motivations. Individuals may value water quality maintenance, ecosystem protection, and healthy species populations independent of any use of those attributes.

EPA uses a water quality index (WQI) to translate water quality measurements, gathered for multiple parameters that are indicative of various aspects of water quality, into a single numerical indicator that reflects achievement of quality consistent with the suitability for certain uses. The WQI includes seven parameters: dissolved oxygen, biochemical oxygen demand, fecal coliform, total nitrogen, total phosphorus, TSS, and one aggregate subindex for toxics. EPA modeled changes in four of these parameters and held the remaining parameters (dissolved oxygen, biochemical oxygen demand, and fecal coliform) constant for the purposes of this analysis.

EPA estimated the change in monetized benefit values using an updated version of the meta-regressions of surface water valuation studies used in the benefit analyses of the 2015 and 2020 rules. The meta-regressions quantify average household willingness to pay (WTP) for incremental improvements in surface water quality. Chapter 6 of the BCA provides additional detail on the valuation methodology.

Table XII-4 of this preamble presents annualized total WTP values for water quality changes associated with reductions in metal (arsenic, cadmium, chromium, copper, lead, mercury, zinc, and nickel), nonmetal (selenium), nutrient (phosphorus and nitrogen), and sediment pollutant discharges to the reach miles affected by the proposed regulatory options. An estimated 82 million households reside in Census block groups within 100 miles of reaches with steam electric plants affected under the proposed rule.[140] The central tendency estimate of the total annualized benefits of water quality changes for the proposed rule are $4.1 million using a three percent discount rate ($3.6 million using a seven percent discount rate).

Table XII-4. Estimated Total WTP for Water Quality Improvements Under the Proposed ELG Options Compared to Baseline

Regulatory Option	Number of Affected Households (Million)	Average Annual WTP per Household (2021$)	Total Annualized WTP (Million 2021$)	
			3% Discount Rate	7% Discount Rate
Option 1	76.2	$0.05	$3.02	$2.64
Option 2	80.6	$0.05	$3.82	$3.32
Option 3	82.1	$0.06	$4.09	$3.56
Option 4	82.1	$0.06	$4.27	$3.73

3. Changes in Air-Quality-Related Effects

EPA expects the proposed options to affect air pollution through three main mechanisms: (1) changes in auxiliary electricity use by steam electric facilities to operate wastewater treatment, ash handling, and other systems that facilities may use under each proposed option; (2) changes in transportation-related air emissions due to changes in trucking of CCR waste to landfills; and (3) changes in the electricity generation profile from increases in wastewater treatment costs compared to baseline and the resulting changes in EGU relative operating costs.

Changes in the electricity generation profile can increase or decrease air pollutant emissions because emission factors vary for different types of EGUs. For this analysis, the changes in air emissions are based on the change in dispatch of EGUs as projected by IPM after

[140] A reach is a section of a stream or river along which similar hydrologic conditions exist, such as discharge, depth, area, and slope.

overlaying the costs of complying with the proposed rule onto EGUs' production costs. As discussed in Section VIII of this preamble, the IPM analysis accounts for the effects of other regulations on the electric power sector.

EPA evaluated potential effects resulting from net changes in air emissions of four pollutants: CO_2, NO_X, SO_2, and primary $PM_{2.5}$. CO_2 is a key GHG linked to a wide range of climate-related effects, and also the main GHG emitted from coal power plants. NO_X and SO_X are precursors to fine particles sized 2.5 microns and smaller ($PM_{2.5}$), which are also emitted directly, and NO_X is an ozone precursor. These air pollutants cause a variety of adverse health effects including premature death, nonfatal heart attacks, hospital admissions, emergency department visits, upper and lower respiratory symptoms, acute bronchitis, aggravated asthma, lost work and school days, and acute respiratory symptoms.

Table XII-5 of this preamble shows the changes in emissions of CO_2, NO_X, SO_2, and primary $PM_{2.5}$ under the proposed rule (Option 3) relative to baseline for selected IPM run years. The proposed rule would result in a net reduction in air emissions of all four pollutants. This effect is driven mostly by the estimated changes in the profile of electricity generation, as emission reductions due to shifts in modeled EGU dispatch and energy sources offsets relatively small increases in air emissions from increased electricity use and trucking by steam electric plants.

Table XII-5. Estimated Changes In Air Pollutant Emissions Under the Proposed Rule Compared to Baseline

Year	CO_2 (Million Metric Tonnes/Year)	NO_X (Thousand Short Tons/Year)	SO_2 (Thousand Short Tons/Year)	Primary $PM_{2.5}$ (Thousand Short Tons/Year)
2028	-0.7	-1.9	-1.0	-0.12
2030	-4.7	-3.3	-2.0	-0.20
2035	-10.5	-5.1	-5.8	-0.32
2040	-7.2	-3.7	-4.4	-0.19
2045	-11.9	-7.5	-9.3	-0.75
2050	-3.0	-2.0	-7.6	-0.13

EPA estimated the monetized value of human health benefits among populations exposed to changes in $PM_{2.5}$ and ozone. The proposed rule is expected to alter the emissions of primary $PM_{2.5}$, SO_2 and NO_X, which will in turn affect the level of $PM_{2.5}$ and ozone in the atmosphere. Using photochemical modeling, EPA predicted the change in the annual average $PM_{2.5}$ and summer season ozone across the United States. EPA next quantified the human health impacts and economic value of these changes in air quality using the environmental Benefits Mapping and Analysis Program—Community Edition. EPA quantified effects using concentration-response parameters, which are consistent with those the Agency used in the PM NAAQS, Ozone NAAQS, and ACE RIAs (U.S. EPA, 2012; 2015; 2019).

To estimate the climate benefits associated with changes in CO_2 emissions, EPA used estimates of the social cost of carbon (SC-CO_2) to value changes in CO_2 emissions. The SC-CO_2 is the monetary value of the net harm to society associated with a marginal increase in CO_2 emissions in a given year, or the benefit of avoiding that increase.[141]

EPA estimates the climate benefits of CO_2 emission reductions expected from the proposed rule using the SC-CO_2 estimates presented by the Interagency Working Group on the Social Cost of Greenhouse Gases (IWG) in the February 2021 Technical Support Document (TSD): Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under E.O. 13990 (IWG 2021). These SC-CO_2 estimates are interim values developed under E.O. 13990 for use in benefit-cost analyses until updated estimates of the impacts of climate change can be developed based on the best available climate science and economics. EPA has evaluated the SC-CO_2

[141] In principle, the SC-CO2 includes the value of all climate change impacts, including (but not limited to) changes in net agricultural productivity, human health effects, property damage from increased flood risk and natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services. The SC-CO2 therefore, reflects the societal value of reducing emissions of by one metric ton. EPA and other Federal agencies began regularly incorporating estimates of SC-CO2 in their benefit-cost analyses conducted under Executive Order (E.O.) 12866 since 2008, following a Ninth Circuit Court of Appeals remand of a rule for failing to monetize the benefits of reducing CO2 emissions in a rulemaking process.

estimates in the TSD and have determined that these estimates are appropriate for use in estimating the climate benefits of CO_2 emission reductions expected from this proposed rule. After considering the TSD, and the issues and studies discussed therein, EPA finds that these estimates, while likely an underestimate, are the best currently available SC-CO_2 estimates. These SC-CO_2 estimates were developed over many years, using a transparent process, peer-reviewed methodologies, the best science available at the time of that process, and with input from the public.[142] The IWG is currently working on a comprehensive update of the SC-CO_2 estimates (under E.O. 13990) taking into consideration recommendations from the National Academies of Sciences, Engineering and Medicine, recent scientific literature, public comments received on the February 2021 TSD and other input from experts and diverse stakeholder groups. The EPA is participating in the IWG's work. In addition, while that process continues, EPA is continuously reviewing developments in the scientific literature on the SC-CO_2, including more robust methodologies for estimating damages from emissions, and looking for opportunities to further improve SC-CO_2 estimation going forward. Most recently, EPA has developed a draft updated SC-CO_2 methodology within a sensitivity analysis in the regulatory impact analysis of EPA's November 2022 supplemental proposal for oil and gas standards that is currently undergoing external peer review and a public comment process. See Chapter 8 of the BCA for more discussion of this effort.

Table XII-6 of this preamble shows the annualized climate change, $PM_{2.5}$, and ozone-related human health benefits for the proposed rule (Option 3). Climate change benefits are presented for each of four SC-CO_2 values and discounted using the same discount rate used in developing the SC-CO_2 values, whereas the $PM_{2.5}$ and ozone-related human health benefits are

[142] As discussed in Chapter 8 of the BCA, these interim SC-CO2 estimates have a number of limitations, including that the models used to produce them do not include all of the important physical, ecological, and economic impacts of climate change recognized in the climate-change literature and that several modeling input assumptions are outdated. As discussed in the February 2021 TSD, the IWG finds that, taken together, the limitations suggest that these SC-CO2 estimates likely underestimate the damages from CO2 emissions.

based on long-term ozone exposure mortality risk estimates and with three and seven percent discount rates. Consistent with the 2015 rule, summary benefits and net benefits estimates focus on the three percent (average) SC-CO_2 value. See Chapter 8 of the BCA report for benefits based on pooled short-term ozone exposure mortality risk estimate.

Table XII-6. Estimated Changes In Air Pollutant Emissions Under the Proposed Rule Compared to Baseline (Millions of 2021$)

SC-CO_2	Climate Change Benefits	$PM_{2.5}$ and Ozone Related Human Health Benefits at 3% Discount Rate[a]	Total	Climate Change Benefits	$PM_{2.5}$ and Ozone Related Human Health Benefits at 7% Discount Rate	Total
3% (Average)	$440	$1,100	**$1,540**	$440	$840	**$1,280**
5% (Average)	$140	$1,100	**$1,240**	$140	$840	**$980**
2.5% (Average)	$630	$1,100	**$1,730**	$630	$840	**$1,470**
3% (95th Percentile)	$1,300	$1,100	**$2,400**	$1,300	$840	**$2,140**
a. Reflects long-term ozone exposure mortality risk estimate.						

Estimates of monetized co-benefits shown here do not include several important benefit categories, such as direct exposure to SO_2, NO_X, and HAPs, including mercury and hydrogen chloride. Although EPA does not have sufficient information or modeling available to provide monetized estimates of changes in exposure to these pollutants for the proposed rule, EPA includes a discussion of these unquantified benefits in the BCA. For more information on the benefits analysis, see Chapter 8 of the BCA Report.

4. Other Quantified and/or Monetized Benefits

a. Changes in Dredging Costs

The four regulatory options would affect discharge loadings of various categories of pollutants, including TSS, thereby changing the rate of sediment deposition to affected waterbodies, including navigable waterways and reservoirs that require dredging for maintenance. Sediment buildup in navigable waterways, including rivers, lakes, bays, shipping channels, and harbors can reduce the navigable depth and width of the waterway. In many cases, periodic dredging is necessary to keep them passable. Reservoirs serve many functions,

including storage of drinking and irrigation water supplies, flood control, hydropower supply, and recreation. Streams can carry sediment into reservoirs, where it can settle and cause buildup of silt layers over time. Sedimentation reduces reservoir capacity and the useful life of reservoirs unless measures such as dredging are taken to reclaim capacity. As it had done for the 2015 and 2020 rule analyses, EPA estimated changes in sedimentation and associated maintenance dredging costs in reaches and reservoirs affected by steam electric plant discharges. Chapter 9 of the BCA provides additional detail on the methodology.

EPA expects that the proposed rule may provide relatively small annualized cost savings ranging from $3,900 to $5,500 per year, using three percent and seven percent discount rates, respectively.

b. Benefits to Threatened and Endangered Species

To assess the potential for the rule to benefit threatened and endangered species (both aquatic and terrestrial) relative to the 2020 ELG baseline, EPA analyzed the overlap between waters expected to see reductions in wildlife water quality criteria exceedance status under a particular option and the known critical habitat locations of high-vulnerability threatened and endangered species. EPA examined the life history traits of potentially affected threatened and endangered species and categorized them by potential for population impacts due to surface water quality changes. Chapter 7 of the BCA Report provides additional detail on the methodology. EPA's analysis showed that there are 28 species whose known critical habitats overlap with surface waters where facilities may be affected by the proposed options. Improvements under the proposed rule between 2025 and 2029 are estimated to potentially benefit five species, including two species EPA categorized as having a higher vulnerability to water pollution (Colorado pikeminnow and Razorback sucker). Improvements projected after 2030 are estimated to benefit three species, including one higher vulnerability specie (Topeka Shiner). Principal sources of uncertainty include the specifics of how changes under the

regulatory options will impact threatened and endangered species, exact spatial distribution of the species, and additional species of concern not considered.

C. Total Monetized Benefits

Using the analysis approach described above, EPA estimated annualized benefits of the four regulatory options for all monetized categories. Table XII-7 and Table XII-8 of this preamble summarize the total annualized benefits using three percent and seven percent discount rates, respectively. The proposed rule (Option 3) has monetized benefits estimated at $1,557 million using a three percent discount rate and $1,290 million using a seven percent discount rate.

Table XII-7. Summary of Total Estimated Annualized Monetized Benefits at Three Percent [Millions of 2021$]

Benefit Category	Option 1	Option 2	Option 3	Option 4
Human Health Effects from Water Quality Changes	**$3.4**	**$12.4**	**$12.7**	**$15.8**
Changes in IQ losses in children from exposure to lead[a]	<$0.01	<$0.01	$0.01	$0.01
Changes in IQ losses in children from exposure to mercury	$2.9	$3.0	$3.1	$3.1
Reduced cancer risk from disinfection byproducts in drinking water	$0.5	$9.4	$9.6	$12.7
Ecological Conditions and Recreational Use Changes	**$3.0**	**$3.8**	**$4.1**	**$4.3**
Use and nonuse values for water quality improvements	$3.0	$3.8	$4.1	$4.3
Market and Productivity[a]	**<$0.01**	**<$0.01**	**<$0.01**	**<$0.01**
Changes in dredging costs[a]	<$0.01	<$0.01	<$0.01	<$0.01
Air-Related Effects	**$690**	**$1,320**	**$1,540**	**$1,650**
Changes in CO_2 air emissions[b,c]	$190	$370	$440	$450
Changes in human health effects from Changes in NO_X and SO_2 emissions[b]	$500	$950	$1,100	$1,200
Total	**$696**	**$1,336**	**$1,557**	**$1,670**

[a] "<$0.01" indicates that monetary values are greater than $0 but less than $0.01 million
[b] EPA estimated the air-related benefits for Option 3 using IPM. EPA did not analyze Options 1, 2, and 4 using IPM. Instead, EPA extrapolated estimates for air-related benefits from Options 1, 2, and 4 from the estimate for Option 3 in proportion to social costs.
[c] Changes in CO_2 air emissions monetized using the SC-CO_2 at 3% (average). See Section XII.B.3 of this preamble for benefits monetized using other SC-CO_2 values.

Table XII-8. Summary of Total Estimated Annualized Monetized Benefits at Seven Percent [Millions of 2021$]

Benefit Category	Option 1	Option 2	Option 3	Option 4

Human Health Effects from Water Quality Changes	**$0.8**	**$6.6**	**$6.8**	**$8.8**
Changes in IQ losses in children from exposure to lead[a]	<$0.01	<$0.01	<$0.01	<$0.01
Changes in IQ losses in children from exposure to mercury	$0.5	$0.6	$0.6	$0.6
Reduced cancer risk from DBPs in drinking water	$0.3	$6.1	$6.2	$8.3
Ecological Conditions and Recreational Use Changes	**$2.6**	**$3.3**	**$3.6**	**$3.7**
Use and nonuse values for water quality improvements	$2.6	$3.3	$3.6	$3.7
Market and Productivity[a]	**<$0.01**	**<$0.01**	**<$0.01**	**<$0.01**
Changes in dredging costs[a]	<$0.01	<$0.01	<$0.01	<$0.01
Air-Related Effects	**$570**	**$1,070**	**$1,280**	**$1,320**
Changes in CO_2 air emissions[b,c]	$190	$370	$440	$450
Changes in human health effects from Changes in NO_X and SO_2 emissions[b]	$380	$700	$840	$870
Total	**$573**	**$1,080**	**$1,290**	**$1,333**

[a] "<$0.01" indicates that monetary values are greater than $0 but less than $0.01 million
[b] EPA estimated the air-related benefits for Option 3 using IPM. EPA did not analyze Options 1, 2, and 4 using IPM. Instead, EPA extrapolated estimates for air-related benefits from Options 1, 2, and 4 from the estimate for Option 3 in proportion to social costs.
[c] Changes in CO_2 air emissions monetized using the SC-CO_2 at 3% (average). See Section XII.B.3 for benefits monetized using other SC-CO_2 values.

D. Additional Benefits

The monetary value of the proposed rule's effects on social welfare does not account for all effects of the proposed options because, as described above, EPA is currently unable to quantify and/or monetize some categories. EPA anticipates the proposed rule would also generate important unquantified benefits, including but not limited to:

- health benefits to over 30 million people who will experience reductions in PWS-level arsenic, lead, and thallium concentrations, including reductions in unmonetized cancer and non-cancer effects from exposure to toxic pollutants from consumption of fish consumption or drinking water;
- reduced cardiovascular disease from changes in exposure to lead from fish consumption;
- unquantified and unmonetized averted IQ losses and educational effects from childhood lead exposure and *in-utero* mercury exposure from fish consumption by households that do not engage in recreational and subsistence fishing;

- reduced cancer morbidity effects beyond medical expenses;
- improved habitat conditions for plants, invertebrates, fish, amphibians, and the wildlife that prey on aquatic organisms;
- enhanced ecosystem productivity and health, including reduced toxic discharges into habitats for over 100 high-vulnerability threatened and endangered species;
- changes to water treatment costs for drinking water, irrigation, and agricultural uses;
- changes in fisheries yield and harvest quality from aquatic habitat changes;
- changes in health hazards from recreational exposures; and
- groundwater quality impacts.

While some health benefits and willingness to pay for water quality improvements have been partially quantified and/or monetized, those estimates may not fully capture all important water quality-related benefits. Although the following quantifications cannot necessarily be combined with other monetized effects, another way to characterize the benefits is that the proposed rule is expected to result in a 12.5 percent reduction in chronic exceedances and a 100 percent reduction in acute exceedances of the national recommended water quality criteria, and up to an 82 percent reduction in the number of reaches with ambient concentrations exceeding human health criteria for at least one pollutant.

The BCA Report discusses changes in these potentially important effects qualitatively, indicating their potential magnitude where possible. EPA will continue to seek to enhance its approaches to quantify and/or monetize a broader set of benefits for any final rule and solicits comment on monetizing some of these additional benefits categories consistent with the approach discussed in IPI (2022).[143]

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[143] IPI (Institute for Policy Integrity). June 2022. *Measuring the Benefits of Power Plant Effluent Regulation:*
The 2020 Steam Electric Reconsideration Rule and Potential Future Methods.

XIII. Environmental Justice Impacts

Consistent with EPA's commitment to integrating environmental justice (EJ) in the Agency's actions, the Agency has analyzed the impacts of this action on communities with EJ concerns and sought input and feedback from stakeholders representing these communities. EPA has prepared this analysis to implement the recommendations of the Agency's EJ Technical Guidance.[144] For ELG rulemakings, this analysis is typically conducted as part of the BCA alongside other nonstatutorily required analyses such as monetized benefits, but for this action was placed in a standalone Environmental Justice Analysis (EJA) document to present in more detail the potential EJ impacts of this proposal and the initial outreach to communities with potential EJ impacts. This analysis is intended to provide the public with a discussion of the potential EJ impacts of this proposal. The analysis does not form a basis or rationale for any of the actions EPA is proposing in this rulemaking. Executive Order 12898 is discussed in Section XI.J of this preamble.

Overall, the analysis showed that benefits associated with improvements to water quality, wildlife, and human health resulting from reductions in pollutants in surface water and drinking water will accrue to minority and low-income populations at a higher rate under some or all of the proposed regulatory options. Remaining exposures, impacts, costs, and benefits analyzed either accrue at a higher rate to populations which are not minority or low-income, accrue proportionately to all populations, or are small enough that EPA could not conclude whether changes in disproportionate impacts would occur. While the changes in GHGs attributable to the proposed regulatory options are relatively small compared to worldwide emissions, findings from peer-reviewed evaluations demonstrate that actions that reduce GHG emissions are also

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[144] U.S. EPA (Environmental Protection Agency). 2016. *Technical Guidance for Assessing Environmental Justice in Regulatory Analysis*. June. Available online at: *www.epa.gov/environmentaljustice/technical-guidance-assessing-environmental-justice-regulatory-analysis.*

likely to reduce climate impacts on vulnerable communities, including minority and low-income communities. The methods and findings of the EJA are described in further detail below.

A. Literature Review

EPA conducted a literature review to identify academic research and articles on EJ concerns related to coal-fired power plants. EPA identified four papers that focused on coal-fired power plants in the United States that were directly relevant to this proposed rule. The findings of these papers suggest that coal-fired power plants tend to be in poor, minority, and indigenous communities. Toomey (2013) reported that 78 percent of African Americans in the United States live within a 30-mile radius of a coal-fired power plant.[145] Impacts discussed in the reports included adverse health impacts resulting from air pollutants (*e.g.*, SO_2, NO_X, $PM_{2.5}$) for those living in proximity to coal-fired power plants, climate justice issues resulting from GHG emissions, and risk of impoundment failures for populations living in proximity to coal waste surface impoundments where coal is mined.[146, 147, 148] All these impacts were found in one or more papers to disproportionately impact poor, minority, and indigenous communities. EPA solicits comment on additional literature that discusses EJ impacts related to the specific changes being made to steam electric power plants. For further discussion of the literature review, see section 5 of the EJA.

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[145] Toomey, Diane. 2013. *Coal Pollution and the Fight for Environmental Justice*. Yale Environment 360. June 19. Available online at: *www.e360.yale.edu/features/naacp_jacqueline_patterson_coal_pollution_and_fight_for_environmental_justice.*

[146] Liévanos, R.S., P. Greenberg, and R. Wishart. 2018. *In the Shadow of Production: Coal Waste Accumulation and Environmental Inequality Formation in Eastern Kentucky*. Social Science Research, Vol. 71: pp. 37–55.

[147] Israel, B. 2012. *Coal Plants Smother Communities of Color*. Scientific American. *www.scientificamerican.com/article/coal-plants-smother-communities-of-color/#:~:text=People%20living%20near%20coal%20plants,percent%20are%20people%20of%20color.*

[148] NAACP. 2012. National Association for the Advancement of Colored People. *Coal Blooded: Putting Profits Before People*. *www.naacp.org/resources/coal-blooded-putting-profits-people*.

B. Screening Analysis and Community Outreach

EPA performed a set of screening analyses with the EJSCREENBatch tool to identify the environmental and socioeconomic characteristics of the communities that are expected to be impacted by discharges from steam electric plants via relevant exposure pathways. First, EPA conducted a screening for potential air impacts using one- and three-mile buffers around the facility GIS coordinates. Second, EPA conducted a screening for potential impacts in downstream surface waterbodies using one-, three-, 50-, and 100-mile buffer distances around each waterbody segment downstream of the initial common identifiers (COMIDs) identified for each effluent discharge.[149] Finally, EPA conducted a screening for potential drinking water impacts using ZIP code information for downstream public water systems (PWSs) in the absence of a complete data set of actual service area boundaries for all PWSs.

Using the results of these screening analyses, EPA tiered communities under all three screening analyses to prioritize communities for potential outreach and engagement. To tier the communities, EPA evaluated how many of the following criteria applied to a community's screening results:

- The community has both demographic (minority and low income[150]) indicators and at least one environmental indicator[151] above the 50th percentile nationally or has all environmental indicators and at least one demographic indicator above the 50th percentile nationally;
- The community has two or more demographic and/or environmental indicators above the 80th percentile nationally;

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[149] Defined as 300 kilometers (~187 miles).

[150] The minority and low-income indicators are derived from EPA's Environmental Justice Screening and Mapping Tool (EJSCREEN). For more information on EJSCREEN's definitions of minority and low income, *see* U.S. EPA. 2019. U.S. Environmental Protection Agency. *EJSCREEN Technical Documentation*. *www.epa.gov/ejscreen/technical-information-about-ejscreen.*

[151] EPA used environmental indicators from EJSCREEN that include direct and proxy indicators of potential pollution exposures. For more information on the environmental indicators included in EJSCREEN *see* U.S. EPA (2019).

- The community has one or more demographic and/or environmental indicators above the 90th percentile nationally; or
- The community has one or more demographic and/or environmental indicators above the 95th percentile nationally.

Tier 3 communities met one of the above criteria, Tier 2 communities met two or three of the above criteria, and Tier 1 communities met all four of the above criteria. EPA sought to conduct initial outreach meetings with nine communities. Thus, for each of the three screening analyses (air, surface water, and drinking water), EPA selected the top three Tier 1 communities for outreach. For the latter two screening analyses, there were no Tier 1 communities in scope. In these cases, EPA supplemented up to three by adding either the top Tier 2 communities or communities EPA had engaged with prior to the decision to conduct the current rulemaking. A list of communities and selection criteria is presented in Table XIII-1 of this preamble. The communities that EPA engaged with prior to the initiation of the current rulemaking are indicated by a "YES" in the Pre-Rule column.

EPA conducted initial outreach to local environmental and community development organizations, local government agencies, and individual community members involved in community organizing in all nine communities. Between May and September of 2022, EPA was able to meet with community members in five of the identified communities either virtually (indicated in the table by "Virtual Meeting") or in a hybrid format with some in-person participation (indicated in the table by "Hybrid Meeting"). While EPA has not been able to hold a virtual or hybrid meeting with the remaining four communities (those indicated in the table as "Initial Outreach"), EPA is continuing to consider whether and how to engage with these communities. Each meeting began with a presentation providing background information about the rulemaking before opening the meeting for questions and comments from community members.

EPA received a broad range of input from individuals in these communities on regulatory preferences, environmental concerns, human health and safety concerns, economic impacts, cultural/spiritual impacts, ongoing communication/public outreach, and interest in other EPA actions. Two broad themes were conveyed consistently across communities. First, community members conveyed several perceived harmful impacts from steam electric power plants and their desire for more stringent regulations to reduce these harmful impacts. Second, community members expressed the desire for more transparency and communication to overcome their decreasing trust in the regulated power plants and state regulatory agencies and, thus, a corresponding skepticism that their community would be protected from these harmful impacts. In addition to these broad themes, commenters also raised concerns unique to each community. For example, members of the Navajo Nation discussed with EPA the spiritual and cultural impacts to the community from pollution related to steam electric power plants. In Jacksonville, Florida, community members raised concerns regarding tidal flows of pollution upstream and storm surges during extreme weather events which cause additional challenges in their community. More detailed summaries of these meetings are described in section 7.5 of the EJA.

Table XIII-1. Initial Community Outreach Selection

#	Screening Result (Plant/Waterbody/PWS)[a]	State	Screen	Tier	Pre-Rule[b]	Proposal
1	EIA #667, Northside Generating Station	FL	Air	1		Virtual Meeting
2	EIA #3297, Wateree Station	SC	Air	1		Initial Outreach
3	EIA #2442, Four Corners Steam Electric Station	NM	Air	1	YES	Virtual Meeting
4	COMID 10161978, Ohio River (EIA#6071, Trimble County)	KY	Surface Water	2		Virtual Meeting
5	COMID 6499098, Etowah River (EIA# 703, Plant Bowen)	GA	Surface Water	2		Initial Outreach
6	COMID 3124250, Rabbs Bayou (EIA# 3470, W.A. Parish E.G.S.)	TX	Surface Water	2		Hybrid Meeting

7	PWSID 84690510, Standing Rock Rural Water System, Fort Yates (EIA# 2817, Leland Olds Station)	ND	Drinking Water	2		Initial Outreach
8	PWSID MI0001800, City of Detroit (EIA#6034, Belle River Power Plant and EIA#1733, Monroe Power Plant)	MI	Drinking Water	2		Initial Outreach
9	PWSID NC0279010, NC0279030, NC0279040, and NC3079031 Town of Eden, Town of Madison, Dan River Water Inc, Rockingham Co – 220 Corridor (EIA# 8042, Belews Creek Steam Station)	NC	Drinking Water	3	YES	Hybrid Meeting

Notes:
a) Steam electric power plants, surface waters, and PWSs are identified by their U.S. Energy Information Administration (EIA) identification number, National Hydrography Dataset Plus (NHDPlus) V2.1 common identifier (COMID), and Safe Drinking Water Information System (SDWIS) Public Water System ID (PWSID).
b) While not included in the list of communities for outreach, EPA also met with members of Clean Power Lake County before the supplemental rule announcement to discuss potential EJ impacts of the Waukegan Power Plant, a plant that is retired.

EPA considered all feedback received in these outreach meetings, including feedback regarding the stringency of potential new regulations and negative impacts experienced as a result of steam electric discharges. The proposed rule, if finalized, would result in more stringent limitations that would further reduce negative impacts associated with steam electric discharges. EPA also considered feedback expressing the desire for increased transparency and communication. As discussed in Section XV.C.5 of this preamble, EPA is proposing posting of required reports to a publicly available website to improve transparency. Furthermore, EPA calls attention to the availability of the more recent feature of Enforcement and Compliance History Online (ECHO) called ECHO Notify. ECHO Notify provides weekly email notifications of changes to enforcement and compliance data in ECHO. Notifications are tailored to the geographic locations, facility IDs, and notification options that users select. EPA encourages interested community members to sign up for these alerts. Further information is available on

EPA's website at *www.echo.epa.gov/tools/echo-notify.* EPA also encourages individual facilities to work with local communities to foster trust and communication, for example, through text alert systems. Finally, EPA solicits comment on whether and how the Agency could update its analyses to reflect the site-specific information presented in these meetings.

C. Distribution of Risks

EPA evaluated the distribution of pollutant loadings, estimated human health, and estimated environmental impacts resulting from polluted air, surface water, and drinking water. EPA examined these distributions under both baseline and the regulatory options to identify where current conditions and future improvements may have a disproportionate impact on communities with potential EJ concerns (PEJC). The following sections discuss EPA's methodology and findings.

1. Air

EPA evaluated air quality impacts in terms of changes in warm season maximum daily average 8-hour (MDA8) ozone and average annual $PM_{2.5}$ concentrations, as described in the BCA. EPA used the results of the analysis to further evaluate the distribution of air quality impacts in the EJA to determine whether population groups of concern experience disproportionately high exposures to MDA8 ozone and average annual $PM_{2.5}$ under baseline and Option 3.

The results of EPA's analysis of baseline MDA8 ozone and average annual $PM_{2.5}$ concentrations showed that there are differences in baseline exposures across population groups and area categories (no change, improving, worsening). EPA found that Option 3 results in similar absolute and relative changes in MDA8 ozone and average annual $PM_{2.5}$ exposures across population groups in areas with improving and worsening air quality. The modeled changes in MDA8 ozone and average annual $PM_{2.5}$ exposures generated by Option 3 are relatively small and not expected to have significant impacts on distributional disparities. For more information on the analysis of air quality impacts, see section 9.1 of the EJA.

2. Surface Water

EPA evaluated both immediate receiving waters[152] and downstream surface waters,[153] as described in the EA and BCA.

a. Immediate Receiving Waters

Using results from the immediate receiving water analysis performed in the EA, EPA further evaluated the immediate receiving water impacts in the EJA to determine whether these impacts disproportionately affect population groups of concern. This analysis was done with respect to waters that exceeded benchmarks for national recommended water quality criteria (NRWQC) and maximum contaminant levels (MCLs), benchmarks for sediment biota and piscivorous wildlife, and human health benchmarks.

b. Distribution of Water Quality Impacts

After examining baseline results of the EA where arsenic, cadmium, selenium, or thallium concentrations exceeded benchmark NRWQC and MCL values,[154] EPA's analysis showed that, in communities with immediate receiving waters with pollutant-specific benchmark exceedances, the percent of the population identified as American Indian or Alaskan Native (non-Hispanic) is larger than the national average. This result is driven by baseline exceedances observed in the Unnamed tributary to the Chaco River, which is in the Navajo Nation, an area in which about 98 percent of the population is identified as American Indian or Alaska Native (non-Hispanic). When compared to communities with immediate receiving waters without exceedances, communities with immediate receiving waters with exceedances had larger proportions of the population identifying as African-American (non-Hispanic), American Indian

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[152] The immediate receiving water analysis focused on evaluating baseline and regulatory impacts at the point of discharges in surface waters receiving wastewater discharges from steam electric power plants.

[153] The downstream analysis focused on evaluating baseline and regulatory impacts 300 kilometers (~187 miles) downstream from the point of discharges in surface waters receiving wastewater discharges from steam electric power plants.

[154] The IRW Model did not identify any immediate receiving waters with benchmark value exceedances under the baseline for copper, lead, mercury, nickel, and zinc loadings.

or Alaskan Native (non-Hispanic), Other (non-Hispanic), and Hispanic or Latino. Based on these findings regarding the distribution of population groups of concern in communities with immediate receiving waters with exceedances, EPA concluded that there are PEJC present under the baseline. EPA's analysis of the regulatory options showed that all regulatory options resulted in a reduction in the number of immediate receiving waters with pollutant-specific benchmark exceedances and in the population affected by these exceedances compared to the baseline. Options 3 and 4 generated the largest reductions in immediate receiving waters with exceedances and the affected population relative to the baseline. Furthermore, Options 3 and 4 produced the greatest improvements in the distribution of water quality impacts across population groups of concern relative to the baseline when comparing proportions of these populations to the national average and communities with immediate receiving waters without exceedances. For more information on the results of the water quality impact analysis, see section 9.2.1.1 of the EJA.

c. Distribution of Wildlife Impacts

After examining baseline results of the EA where sediment biota, eagle, and mink impacts exceeded benchmark values, EPA's analysis showed that communities with immediate receiving waters with exceedances had a larger proportion of the population identified as American Indian or Alaskan Native (non-Hispanic) than the national average. Additionally, communities with immediate receiving waters with exceedances under baseline had larger proportions of various population groups of concern than communities with immediate receiving waters without exceedances. Based on these findings regarding the distribution of population groups of concern in communities with immediate receiving waters with exceedances, EPA concluded that there are PEJC present under the baseline. EPA's analysis of wildlife impacts under the regulatory options showed that none of the regulatory options results in increases in the number of immediate receiving waters with exceedances of wildlife- and pollutant-specific benchmarks compared to the baseline. Across the wildlife analyses, Options 3 and 4 generated the largest reductions in the number of immediate receiving waters with exceedances and in the

affected population compared to the baseline. Furthermore, relative to the baseline, Options 3 and 4 produced the greatest improvements in the distribution of wildlife impacts across population groups of concern when comparing proportions of these populations to the national average and communities with immediate receiving waters without exceedances. For more information on the analysis of wildlife impacts, see section 9.2.1.2 of the EJA.

d. Distribution of Human Health Risks

After examining baseline results of the EA where fish consumer cohort- and pollutant-specific noncancer hazard quotients and lifetime excess cancer risks exceeded benchmark values,[155] the record indicates that across all fish consumer cohorts, communities with immediate receiving waters with noncancer and cancer exceedances have larger proportions of the population identified as population groups of concern, particularly American Indian or Alaskan Native (non-Hispanic), than the national average. This result is driven by baseline exceedances observed in the Unnamed tributary to the Chaco River, which is in the Navajo Nation. Additionally, communities with immediate receiving waters with noncancer and cancer exceedances have larger proportions of the population identified as population groups of concern than communities with immediate receiving waters without noncancer and cancer exceedances. Based on these findings regarding the distribution of population groups of concern in communities with immediate receiving waters with noncancer and cancer exceedances, EPA concluded that there are PEJC present under the baseline. EPA's analysis under the regulatory options showed human health improvements, in terms of the reduction in the number of immediate receiving waters with noncancer and cancer benchmark exceedances, across fish consumer cohorts. Options 3 and 4 generated the largest reductions in the number of immediate receiving waters with noncancer and cancer exceedances and in the affected population. Additionally, Options 3 and 4 produced the greatest improvements in the distribution of human

[155] Fish consumer cohorts analyzed were child subsistence, child recreational, adult subsistence, and adult recreational fish consumers.

health impacts across population groups of concern relative to the baseline when comparing proportions of these populations to the national average and communities with immediate receiving waters without exceedances. For more information on the analysis of human health risks, see section 9.2.1.3 of the EJA.

e. Downstream Waters

Using the results from the downstream analysis performed in the BCA, EPA further evaluated the downstream surface water impacts in the EJA to determine whether population groups of concern experience a disproportionate share of noncancer and cancer health effects from exposure to lead, mercury, and arsenic through consuming fish in contaminated downstream surface waters. The results of EPA's analysis are discussed in the following two sections.

f. Distribution of Noncancer Health Impacts

Noncancer health impacts evaluated by EPA were cognitive and neurological impacts—expressed as total IQ points under baseline and avoided IQ point losses under the regulatory options—among children exposed to lead and mercury through consuming fish at subsistence and recreational consumption rates caught in contaminated surface waters. The distribution of impacts within the two consumer cohorts was evaluated by racial and ethnic group (White, Black, Hispanic, Asian, American Indian and Alaskan Native, and Other) and by income group (below the poverty line or not below the poverty line). When comparing across income groups and racial and ethnic groups, baseline results of the analysis of neurological and cognitive health impacts from exposure to lead and mercury showed that population groups of concern in the children of subsistence and recreational cohorts had a proportional or larger share of total baseline IQ points compared to their share of the exposed population. The results of the analysis indicated no disparate IQ impacts to minority and low-income groups under baseline.

Based on EPA's evaluation of the four regulatory options, each of the regulatory options would result in avoided IQ point losses for children of subsistence fishers and recreational fishers

who regularly consume fish caught in local water compared to baseline across all racial, ethnic, and income groups in the children of both subsistence and recreational consumer cohorts. While children of all racial and ethnic population groups in the subsistence and recreational cohorts are expected to experience avoided IQ point losses under the regulatory options compared to baseline, these improvements were relatively small and did not change the distribution of IQ points compared to baseline. For more information on the analysis of noncancer health impacts in downstream surface waters, see section 9.2.2.1 and section 9.2.2.2 of the EJA.

g. Distribution of Cancer Health Impacts

EPA evaluated national cancer health impacts—in terms of cancer cases (any type of cancer) under baseline and avoided cancer cases (any type of cancer) under the regulatory options—among adult subsistence and recreational fishers exposed to arsenic through fish consumption. The distribution of impacts within the two fisher cohorts was evaluated by racial and ethnic group and by income group.

When comparing total cancer cases across racial and ethnic groups, the results of the baseline analysis showed that population groups of concern (except for those in the Black population group) in the adult subsistence fisher cohort had a larger proportion of cancer cases compared to their share of the exposed population. In contrast, when comparing total cancer cases across income groups, the results of the baseline analysis showed that those below the poverty line in both the adult subsistence and recreational fisher cohorts had a smaller proportion of cancer cases compared to their share of the exposed population, while those not below the poverty line in both fisher cohorts had a larger proportion of cancer cases. The results of the analysis indicate PEJC in the baseline related to the distribution of cancer health impacts when comparing across racial and ethnic population groups, but not across income groups.

Based on EPA's evaluation of the four regulatory options, each of the regulatory options would result in avoided cancer cases compared to baseline across all racial, ethnic, and income population groups in both the adult subsistence and recreational fisher cohorts. While all racial,

ethnic, and income population groups in the adult subsistence and recreational fisher cohorts were expected to experience avoided cancer cases under the regulatory options compared to baseline, these improvements were relatively small and did not change the distribution of total cancer cases compared to baseline. For more information on the analysis of cancer health impacts in downstream surface waters, see section 9.2.2.3 of the EJA.

3. Drinking Water

Using the results from the drinking water analysis performed in the BCA, EPA further evaluated downstream drinking water impacts in the EJA to determine whether population groups of concern served by potentially affected drinking water systems experience a disproportionate share of bladder cancer cases from exposure to TTHM. In the BCA, EPA modeled baseline incremental TTHM concentrations and bladder cancer cases attributable to steam electric discharges.[156] Since EPA evaluated only the changes in TTHM concentrations and avoided bladder cancer cases and deaths attributable to steam electric discharges in the BCA, in this analysis, EPA only evaluated whether the distribution of exposures and health effects indicated PEJC under the incremental changes resulting from the regulatory options. The results of EPA's analysis are discussed in the following two sections.

a. Distribution of TTHM Exposures and Resulting Avoided Bladder Cancer Cases and Deaths

Based on EPA's evaluation of the four regulatory options, EPA's record shows that all regulatory options would result in decreases in TTHM concentrations and cases of bladder cancer and deaths across potentially affected drinking water systems. Of the regulatory options EPA evaluated, across the states with affected systems, Option 4 generated the greatest reductions in TTHM concentrations and bladder cancer cases and deaths. Under all of the regulatory options, for those potentially affected systems with modeled reductions in TTHM

[156] Background TTHM concentrations and bladder cancer cases attributable to sources other than steam electric discharges were not modeled under the baseline but would not impact the analysis of incremental changes as discussed in the BCA.

concentrations and in bladder cancer cases and deaths, most serve populations that have a higher proportion of at least one population group of concern as compared to the national average, with the largest proportion serving populations with two population groups of concern above the national average. Additionally, EPA found that states with affected systems serving populations with one population group of concern above the national average experienced the largest median reductions in TTHM concentrations and bladder cancer cases and deaths. Furthermore, EPA found that the magnitude of the median change in TTHM and bladder cancers decreased with the more stringent regulatory options in communities with one, two, or three or more population groups of concern above the national average. EPA determined that this was not due to there being fewer reductions in TTHM concentrations and in bladder cancer cases and excess bladder cancer deaths with more stringent options, but rather that more new states with affected systems experiencing smaller changes were being added under the more stringent options. Therefore, Option 4 still generated the greatest improvements across analyses. For more information of the analysis of drinking water impacts, see sections 9.3.1 and 9.3.2 of the EJA.

4. Cumulative Risks

In the EA, EPA expanded upon its assessment of human health impacts from individual pollutant exposures to include an evaluation of potential human health risks from exposures to mixtures of pollutants present in steam electric power plant discharges. Using information on human health risks related to pollutant mixtures from the Agency for Toxic Substances and Disease Registry (ATSDR), EPA estimated potential human health risks among fish consumer cohorts exposed to pollutant mixtures of concern – Arsenic-Cadmium-Lead (As-Cd-Pb), Zinc-Lead (Zn-Pb), and Methylmercury-Lead (MeHg-Pb) – from consuming fish caught in potentially affected immediate receiving waters of steam electric power plants. EPA used the results of this analysis to assess the distribution of potential human health risks across population groups of concern in communities with immediate receiving waters with human health endpoint-specific Hazard Index (HI) exceedances.

After examining baseline results of the EA where human health endpoint-specific HI values were greater than 1, the record indicates that across mixtures of concern and fisher cohorts, EPA found that in communities with immediate receiving waters with exceedances there are larger proportions of the population identified as groups of concern, particularly American Indian or Alaskan Native (non-Hispanic), than the national average. This result is driven by baseline exceedances observed in the Unnamed tributary to the Chaco River, which is in the Navajo Nation. Additionally, the record indicates that across mixtures of concern and cohorts, communities with immediate receiving waters had larger proportions of various population groups of concern under the baseline than communities with immediate receiving waters without exceedances. Based on these findings regarding the distribution of population groups of concern in communities with immediate receiving waters with exceedances, EPA concluded that there are PEJC present under the baseline.

EPA's analysis under the regulatory options showed that, across mixture of concern and cohorts, none of the regulatory options results in increases in the number of immediate receiving waters with exceedances and in the population affected compared to the baseline. Across mixtures of concern and cohorts, Options 3 and 4 most often generated the largest reductions relative to the baseline in immediate receiving water with exceedance and in the population affected. Additionally, Options 3 and 4 most often produced the greatest proportional reductions in the distribution of human health impacts for population groups of concern in communities with immediate receiving waters with exceedances compared to the national average and communities with immediate receiving waters without exceedances. For more information on the analysis of potential cumulative human health risks, see section 9.4 of the EJA.

D. Distribution of Benefits and Costs

EPA examined the estimated benefits and costs of the regulatory options in this proposal for potential differences in how they are distributed across socioeconomic groups, in addition to evaluating the distribution of exposures and health impacts discussed above. Office of

Management and Budget (OMB) Circular A-4, which implements E.O. 12866, states that regulatory analyses "should provide a separate description of distributional effects (*i.e.*, how both benefits and costs are distributed among sub-populations of particular concern)." As discussed below, EPA research demonstrates that climate change impacts are likely to accrue to minority and low-income populations, but other benefits and costs under the proposed rule may not have substantial impacts.

EPA began its evaluation of benefits with a screening of the benefits categories. For Option 3, at both three percent and seven percent discount rates, approximately 99 percent of monetized benefits accrued from reductions in air pollution due to estimated shifts in electric generation resulting from the incremental costs of the proposed rule. Furthermore, these air benefits were always comprised of approximately a 3-to-1 ratio of conventional air pollutant health benefits to GHG benefits.[157] Thus, while EPA evaluated a number of exposures and endpoints for disproportionate baseline impacts, the Agency screened these two benefit categories through this initial comparison for further evaluation.

With respect to GHG benefits, scientific assessments and Agency reports produced over the past decade by the U.S. Global Change Research Program,[158,159] the Intergovernmental Panel

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[157] EPA scaled the air benefits to other regulatory options based on total costs.

[158] USGCRP, 2018. Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 1515 pp. *doi.org/10.7930/NCA4.2018*.

[159] USGCRP, 2016. The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. Crimmins, A., J. Balbus, J.L. Gamble, C.B. Beard, J.E. Bell, D. Dodgen, R.J. Eisen, N. Fann, M.D. Hawkins, S.C. Herring, L. Jantarasami, D.M. Mills, S. Saha, M.C. Sarofim, J. Trtanj, and L. Ziska, Eds. U.S. Global Change Research Program, Washington, DC, 312 pp. *www.dx.doi.org/10.7930/J0R49NQX*.

on Climate Change,[160,161,162,163] and the National Academies of Science, Engineering, and Medicine[164,165] provide evidence that the impacts of climate change raise PEJC. These reports conclude that poorer or predominantly non-White communities can be especially vulnerable to climate change impacts because they tend to have limited adaptive capacities, are more dependent on climate-sensitive resources such as local water and food supplies, or have less access to social and information resources. Some communities of color, specifically populations

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[160] Oppenheimer, M., M. Campos, R.Warren, J. Birkmann, G. Luber, B. O'Neill, and K. Takahashi, 2014: Emergent risks and key vulnerabilities. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L.White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 10391099.

[161] Porter, J.R., L. Xie, A.J. Challinor, K. Cochrane, S.M. Howden, M.M. Iqbal, D.B. Lobell, and M.I. Travasso, 2014: Food security and food production systems. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L.White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 485–533.

[162] Smith, K.R., A.Woodward, D. Campbell-Lendrum, D.D. Chadee, Y. Honda, Q. Liu, J.M. Olwoch, B. Revich, and R. Sauerborn, 2014: Human health: impacts, adaptation, and co-benefits. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel,A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L.White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 709–754.

[163] IPCC (Intergovernmental Panel on Climate Change), 2018. Global Warming of 1.5°C, An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. In Press.

[164] National Research Council. 2011. America's Climate Choices. Washington, DC: The National Academies Press. *www.doi.org/10.17226/12781*.

[165] NASEM. 2017. Communities in Action: Pathways to Health Equity. Washington, DC: The National Academies Press. *www./doi.org/10.17226/24624*.

defined jointly by ethnic/racial characteristics and geographic location, may be uniquely vulnerable to climate change health impacts in the United States.

EPA recently conducted a peer-reviewed analysis of the distribution of climate change impacts. EPA (2021) evaluated the disproportionate risks to socially vulnerable populations (defined based on age, income, education, race, and ethnicity) associated with six impact categories: air quality and health, extreme temperature and health, extreme temperature and labor, coastal flooding and traffic, coastal flooding and property, and inland flooding and property.[166] EPA calculated risks for each socially vulnerable group relative to its "reference population" (all individuals outside of each group) for scenarios with 2°C of global warming or 50 centimeters of sea level rise. The estimated risks were based on current demographic distributions in the contiguous United States. EPA (2021) includes findings[167] that the following groups are more likely than their reference population to currently live in areas with:

- The highest increases in childhood asthma diagnoses from climate-driven changes in $PM_{2.5}$ (low-income, Black and African American, Hispanic and Latino, and Asian populations);
- The highest percentage of land lost to inundation (low-income and American Indian and Alaska Native populations);
- The highest increases in mortality rates due to climate-driven changes in extreme temperatures (low-income and Black and African American populations);

[166] U.S. EPA (Environmental Protection Agency). 2021. *Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts*. U.S. Environmental Protection Agency, EPA 430-R-21-003.

[167] EPA (2021) also noted that American Indian and Alaska Native individuals may place a high value on risks to subsistence, cultural, and other natural resources that were not explored in the report. This is consistent with concerns raised by tribal community members as part of the outreach discussed above.

- The highest rates of labor hour losses for weather-exposed workers due to extreme temperatures (low-income, Black and African American, American Indian and Alaska Native, Hispanic and Latino, and Pacific Islander populations);
- The highest increases in traffic delays associated with high-tide flooding (low-income, Hispanic and Latino, Asian, and Pacific Islander populations); and
- The highest damages from inland flooding (Pacific Islander populations).

For further discussion of the impacts analyzed in U.S. EPA (2021) and other peer-reviewed evaluations, see section 10.1.1 of the EJA.

EPA notes that the changes in GHG emissions attributable to the proposed regulatory options are relatively small compared to worldwide emissions. Nevertheless, the findings of peer-reviewed evaluations demonstrate that actions that reduce GHG emissions are likely to reduce climate impacts on vulnerable communities such as minority and low-income populations.

With respect to conventional air pollutant health benefits, the current EPA modeling methodology results in benefits that are proportional to exposures. In other words, the distributional findings of air pollutant exposures discussed above are the same findings EPA has for this benefit category: exposure and health benefit improvements and degradations attributable to this proposal will be proportionately experienced by all demographic populations evaluated. However, there are several important nuances and caveats to this conclusion owing to differences in vulnerability and health outcomes across population subgroups. For example, there is some information suggesting that the same $PM_{2.5}$ exposure reduction will reduce the hazard of

mortality more so in Black populations than in White populations.[168,169] In addition, demographic-stratified information relating $PM_{2.5}$ and ozone to other health effects and valuation estimates is currently lacking.

With respect to costs, EPA notes that the impacts on ratepayers will depend on the degree to which compliance costs are passed through to electricity consumers via higher electricity rates. In general, lower-income households spend less, in the absolute, on energy than higher-income households, but energy expenditures represent a larger share of their income. Therefore, electricity price increases tend to have a relatively larger effect on lower-income households. Further discussion of these disparities is provided in section 10.2 of the EJA. EPA estimated the potential impacts of incremental ELG compliance costs on households' utility bills based on average electricity consumption and assuming a worst-case scenario where all costs are passed through to consumers. EPA estimated that the proposed rule corresponds to an average increase of $0.63 per household per year, with a range of $0.09 to $1.31 per year across NERC regions. These cost increases are too small to indicate the potential for significant direct impacts to household electricity consumers.[170]

E. Results of the Analysis

Overall, the analysis showed that benefits associated with improvements to water quality, wildlife, and human health resulting from reductions in pollutants in surface water and drinking water will accrue to minority and low-income populations at a higher rate under some or all of

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[168] U.S. EPA (2019). Integrated Science Assessment (ISA) for Particulate Matter (Final Report). U.S. Environmental Protection Agency, Office of Research and Development, Center for Public Health and Environmental Assessment. Research Triangle Park, NC. U.S. EPA. EPA/600/R-19/188. December 2019. Available at: *www.epa.gov/naaqs/particulate-matter-pm-standards-integrated-science-assessments-current-review*.

[169] U.S. EPA (2022). Supplement to the 2019 Integrated Science Assessment for Particulate Matter (Final Report). U.S. Environmental Protection Agency, Office of Research and Development, Center for Public Health and Environmental Assessment. Research Triangle Park, NC. U.S. EPA. EPA/600/R-22/028. May 2022. Available at: *www.epa.gov/isa/integrated-science-assessment-isa-particulate-matter*.

[170] EPA notes that other electricity consumers (*e.g.,* industrial consumers) could also face increased electricity prices.

the proposed regulatory options. Remaining exposures, impacts, costs, and benefits analyzed either accrue at a higher rate to populations which are not minority or low-income, accrue proportionately to all populations, or are small enough that EPA could not conclude whether disproportionate positive or negative impacts from the options being considered would occur. While the changes in GHGs attributable to the proposed regulatory options are relatively small compared to worldwide emissions, findings from peer-reviewed evaluations demonstrate that actions that reduce GHG emissions are also likely to reduce climate impacts on vulnerable communities, including minority and low-income communities.

F. Solicitations on Environmental Justice Analysis and Community Outreach

EPA solicits comment on the data, analysis, and results of the EJA. EPA solicits comment on additional data or methods that could be used to further expand the EJA and better capture the potential impacts of the proposed rule. In light of the considerations EPA discussed for conventional air pollution health benefits, EPA solicits comment on whether and how the Agency could further evaluate the distributional impacts of this benefit category in a final rule analysis. EPA also solicits comment on any regulatory options not explicitly analyzed that would further benefit communities with PEJC and could be built into any final rule analyses.

EPA solicits comment on how the Agency should continue to engage with the communities from Table XIII-1 of this preamble that were included in the initial outreach. EPA asks that comments suggesting additional outreach activities, especially those that might occur during the public comment period, be provided early in the comment period to allow the Agency sufficient time to plan and execute any outreach. EPA solicits comment on whether EPA should conduct in-person or hybrid public hearings in any or all of these communities during the public comment period, in addition to the two nationwide virtual public hearings already planned. EPA solicits comment on the best means for maximizing public participation at any such meetings. EPA also solicits comment on other communities that may warrant additional outreach and

engagement based on the results of the full-scale analysis or for reasons not well documented in the EJA due to site-specific information that was not readily available to the Agency.

XIV. Development of Effluent Limitations and Standards

This section describes the statistical methodology used to calculate the long-term averages, variability factors, and proposed BAT limitations and PSES. The effluent limitations and standards are based on long-term average effluent values and variability factors that account for variation in treatment performance of the model technology. The proposed effluent limitations and/or standards, collectively referred to in the remainder of this section as "limitations," for pollutants for each technology option are provided as "daily maximums" and "maximums for monthly averages." Definitions provided in 40 CFR 122.2 state that the daily maximum limitation is the "highest allowable 'daily discharge,'" and the maximum for monthly average limitation is the "highest allowable average of 'daily discharges' over a calendar month, calculated as the sum of all 'daily discharges' measured during a calendar month divided by the number of 'daily discharges' measured during that month." Daily discharges are defined to be the "'discharge of a pollutant' measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling." In this section, the term "option long-term average" and "option variability factor" refer to the long-term averages and variability factors for technology options for an individual wastestream rather than the regulatory options described in Section VII of this preamble.

A. Criteria Used to Select Data as the Basis for the Limitations and Standards

In developing effluent limitations guidelines and standards for any industry, EPA qualitatively reviews all the data before selecting data that represents proper operation of the technology that forms the basis for the limitations. EPA typically uses four criteria to assess the data.

The first criterion requires that the plants have the model treatment technology and demonstrate consistently diligent and optimal operation. Application of this criterion typically

eliminates any plant with treatment other than the model technology. EPA determines whether a plant meets this criterion based upon site visits; discussions with plant management; and/or comparison to the characteristics, operation, and performance of treatment systems at other plants. EPA often contacts plants to determine whether data submitted were representative of normal operating conditions for the plant and equipment. As a result of this review, EPA typically excludes the data when the plant has not optimized the performance of its treatment system to the degree that represents the appropriate level of control (*e.g.*, BAT).

The second criterion requires that the influents and effluents from the treatment components represent typical wastewater from the industry, without incompatible wastewater from other sources. Application of this criterion results in EPA selecting plants where the commingled wastewaters did not result in substantial dilution, un-equalized slug loads resulting in frequent upsets and/or overloads, more concentrated wastewaters, or wastewaters with different types of pollutants than those generated by the wastestream for which EPA is proposing effluent limitations.

The third criterion ensures that the pollutants are present in the influent at sufficient concentrations to evaluate treatment effectiveness. To evaluate whether the data meet this criterion for inclusion as a basis of the limitations, EPA uses the long-term average test for plants where EPA possesses paired influent and effluent data (see section 13 of the 2015 TDD for details of the long-term average test). The test measures the influent concentrations to ensure a pollutant is present at a sufficient concentration to evaluate treatment effectiveness. If a data set for a pollutant fails the test (*i.e.*, pollutant not present at a treatable concentration), EPA excludes the data for that pollutant at that plant when calculating the limitations.

The fourth criterion requires that the data are valid and appropriate for their intended use (*e.g.*, the data must be analyzed with a sufficiently sensitive method). Also, EPA does not use data associated with periods of treatment upsets because these data would not reflect the performance of well-designed and well-operated treatment systems. In applying the fourth

criterion, EPA may evaluate the pollutant concentrations, analytical methods and the associated quality control/quality assurance data, flow values, mass loading, plant logs, and other available information. As part of this evaluation, EPA reviews the process or treatment conditions that may have resulted in extreme values (high and low). Because of this review, EPA may exclude data associated with certain time periods or other data outliers that reflect poor performance or analytical anomalies by an otherwise well-operated site.

EPA also applies the fourth criterion when reviewing data corresponding to the initial commissioning period for treatment systems. Most industries incur commissioning periods during the adjustment period associated with installing new treatment systems. During this acclimation and optimization process, the effluent concentration values tend to be highly variable with occasional extreme values (high and low). This occurs because the treatment system typically requires some "tuning" as the plant staff and equipment and chemical vendors work to determine the optimum chemical addition locations and dosages, vessel hydraulic residence times, internal treatment system recycle flows (*e.g.*, filter backwash frequency, duration and flow rate, return flows between treatment system components), and other operational conditions like clarifier sludge wasting protocols. It may also take several weeks or months for treatment system operators to gain expertise on operating the new treatment system, which also contributes to treatment system variability during the commissioning period. After this initial adjustment period, the systems should operate at steady state with relatively low variability around a long-term average over many years. Because commissioning periods typically reflect one-time operating conditions unique to the first time the treatment system begins operation, EPA generally excludes such data in developing the limitations.[171]

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[171] Examples of conditions that are typically unique to the initial commissioning period include operator unfamiliarity or inexperience with the system and how to optimize its performance; wastewater flow rates that differ significantly from engineering design, altering hydraulic residence times, chemical contact times, and/or clarifier overflow rates, and potentially causing large changes in planned chemical dosage rates or the need to substitute alternative chemical additives; equipment malfunctions; fluctuating wastewater flow rates or other dynamic

B. Data Selection for Each Technology Option

For FGD wastewater and BA transport water, the preferred regulatory option proposes zero discharge of pollutants; therefore, no effluent concentration data were used to develop the limitations for these wastestreams.[172] As described in Section VII of this preamble, EPA is proposing that permitting authorities establish limitations for discharges of pollutants in SI decant wastewater, SI dewatering wastewater, and legacy wastewater on a case-by-case basis. Thus, no effluent concentration data were used to set national effluent limitations. For the limitations on CRL based on the chemical precipitation technology option, EPA is proposing to transfer the limitations calculated based on the 2015 and 2020 rule chemical precipitation technology option for FGD wastewater because while EPA does not have effluent data for leachate from plants that employ chemical precipitation technology on CRL, EPA's record demonstrates that CRL is chemically similar to FGD wastewater and amenable to such treatment. EPA used the same approach in the 2013 proposed rule and in the final 2015 rule for NSPSs for CRL, and the Agency solicits comment on additional pilot tests or full-scale installations that could be used in lieu of, or to supplement, this approach.

C. CRL

EPA is proposing limitations on mercury and arsenic in leachate based on chemical precipitation. As discussed in Section VII.B.3 of this preamble, some discharges of leachate may also occur through groundwater. EPA solicits comment on whether site-specific variability in the subsurface soils, sorbents, and other characteristics could result in lowering measured concentrations of the two chosen indicator pollutants (mercury and arsenic) below the proposed

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conditions (*i.e.*, not steady state operation); and initial purging of contaminants associated with installing the treatment system, such as initial leaching from coatings, adhesives, and susceptible metal components. These conditions differ from those associated with the restart of an already commissioned treatment system, like that which may occur from a treatment system that has undergone either short or extended duration shutdown.

[172] This is also true for some of the technologies EPA solicits comment on for CRL, SI decant wastewater, SI dewatering wastewater, and legacy wastewater.

CRL limitations without actually treating the full suite of pollutants that EPA proposes chemical precipitation is able to treat. Thus, for leachate discharged through groundwater, EPA solicits comment on whether the Agency should calculate daily and monthly limitations for these other pollutants in Table XIV-1.

Table XIV-1. Other Pollutants Treated by Chemical Precipitation[173]

Antimony	Magnesium
Barium	Manganese
Beryllium	Molybdenum
Cadmium	Nickel
Chromium	Thallium
Cobalt	Titanium
Copper	Vanadium
Lead	Zinc

Should EPA elect to calculate daily and monthly limitations for the pollutants in Table XIV-1, EPA solicits comment on whether to use the same data sets and methods used to calculate limitations for arsenic and mercury that the Agency used in the 2015 rule record. Specifically, EPA solicits comment on the data set of FGD wastewater treated by chemical precipitation with regard to each of these pollutants. EPA also solicits comment on the methodology described in the 2015 and 2020 rule records, which consists of interim steps of calculating a long-term average and variability factors. EPA also solicits comment on data where leachate was treated in a pilot or full-scale chemical precipitation system that could be used in the calculation of such limitations either in lieu of, or in addition to, the data discussed above.

XV. Regulatory Implementation

A. Continued Implementation of Existing Limitations and Standards

EPA has continually stressed, since the announcement of this supplemental rulemaking, that the 2015 and 2020 limitations (or lack thereof) continue to apply.[174] In the sections below,

[173] The pollutants treated by chemical precipitation are discussed in Section 8 of the TDD.
[174] 86 FR 41801 (August 3, 2021).

EPA discusses considerations for permitting authorities and regulated entities as they continue to implement existing regulations and look ahead to the regulations in this proposal.

1. Reaffirmation of Expectation that Requirement that FGD and BA Transport Water BAT Limitations Apply "As Soon As Possible" Requires Careful Consideration of the Soonest Date That the Discharger Can Meet the Limitations

EPA reaffirms that permitting authorities must continue to write permits that include the current 2015 and 2020 rule BAT limitations, whether as part of permit renewals or permit modifications. Similarly, permittees must meet applicable permit limitations as soon as possible. EPA stresses that the Agency did not issue a postponement rule for the 2020 rule FGD wastewater and BA transport water BAT limitations as it did in 2017 for the 2015 rule. The 2017 rule postponed the earliest compliance dates of the 2015 rule for FGD wastewater and BA transport water to November 2020 to "preserve the status quo for FGD wastewater and bottom ash transport water until EPA completes its next rulemaking."[175] This made sense at the time because EPA had received new information in petitions suggesting that the 2015 rule limitations could not be met with the 2015 BAT technology basis.[176] In contrast, EPA's 2020 rulemaking generally reaffirmed, and provided further flexibilities for, the technology bases established in the 2015 rule. There is no basis in the record indicating that the limitations finalized in 2020 are not available or economically achievable, and thus there is no reason for EPA to postpone their implementation. Instead, EPA focused on progress toward eliminating discharges, consistent with CWA section 301(b)(2)(A). Thus, EPA's announcement of this supplemental rulemaking stated that "the pollutant reductions accomplished by the existing Rules will occur while the

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[175] U.S. EPA (Environmental Protection Agency). 2017. *Fact Sheet: Postponement of Certain Compliance Dates for the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Industry*. EPA 823-S-17-001. September. Available online at: *www.epa.gov/sites/default/files/2017-09/documents/steam-electric-elg_final_postpone-compliance-dates_fact-sheet_sept-2017.pdf.*

[176] EPA notes that upon review in the 2020 rule record, these suggestions were found to be without merit.

Agency engages in rulemaking to consider more stringent requirements" (86 FR at 41802, August 3, 2021). This is consistent with the CWA's structure of progressively more stringent limitations pushing technological advances over time.

Since EPA did not postpone the earliest compliance dates, permitting authorities should not establish an "as soon as possible" date that is anything other than as soon as possible for the selected technology. For example, where an applicant provides site-relevant information on its biological treatment system that demonstrates it can meet limitations by 2023, it would not be appropriate for the applicant to request an "as soon as possible" date that is later by using as an "other factor" the fact that EPA is currently undergoing a supplemental rulemaking. This would serve to further postpone compliance with limitations intended to reflect technological advances since promulgation of steam electric ELGS in 1982. EPA also notes that the Agency is soliciting comment in the sections above on alternative flexibilities such as alternative formulations of an early adopter subcategory, one of which may include plants that have already contracted for, but not yet installed, biological treatment. Though EPA solicits comment on various potential permutations of any final rule, the Agency is not changing or postponing the existing 2020 rule. Thus, anything but steadfast implementation of the current 2020 rule limitations at this time is not warranted.

In some cases, however, a facility may not yet have contracted for a specific technology and may be considering alternatives. In such circumstances, a permitting authority may consider the timeframes of more advanced technologies when determining the "as soon as possible" date. For example, if a permit applicant submitted timeframes for both a ZVI system that could be operational in 2024 and an alternative consisting of plant modifications to recycle wastewater

and operate zero discharge by 2025, it would be reasonable for the permitting authority to set an "as soon as possible" date for the facility to eliminate its discharge in 2025.[177]

Similar parallels can be seen with BA transport water. Limitations based on a high recycle rate system should still be included in a permit with a date that is "as soon as possible" to meet the site-specific purge limitation. If a facility has not yet contracted for a technology and is deciding between a dry handling system (*e.g.*, pneumatic) and a high recycle rate system, it would be reasonable for the permitting authority to consider the longer timeframe necessary for the dry handling system.

2. Reaffirmation that CRL and Legacy Wastewater BAT Limitations Require a Site-Specific BPJ Analysis and Careful Consideration of Technologies Beyond Surface Impoundments

Under current law, permitting authorities must continue to conduct BPJ analyses and establish TBELs pursuant to 40 CFR 125.3(c)(2) and (3) for BA purge water, CRL,[178] and legacy wastewater unless and until EPA promulgates nationwide BAT. In conducting these analyses, EPA has discussed several technologies in the 2015, 2020, and current proposed rule TDDs and preambles that permitting authorities may consider or select as the basis for TBELs. Where these technologies are included in a BPJ analysis, they must be evaluated by the permitting authority pursuant to the factors set forth in section 125.3(d)(3).[179] Furthermore, as EPA notes in the discussion of FGD wastewater above, there may be multiple, separate legacy wastewaters at a single plant. Thus, in some cases, permitting authorities may have to decide whether these

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[177] Note that a decision between biological vendors or between a biological and ZVI vendor with essentially the same performance would not warrant a later date just because one vendor cannot complete its system until a later date.

[178] For CRL discharged via groundwater, EPA notes that this is a technology-based CWA requirement—a separate and distinct requirement from any CCR rule corrective action requirements which may apply.

[179] Consistent with section 304(b)(2)(B) of the CWA, these consist of: (i) The age of equipment and facilities involved; (ii) The process employed; (iii) The engineering aspects of the application of various types of control techniques; (iv) Process changes; (v) The cost of achieving such effluent reduction; and (vi) Non-water quality environmental impact (including energy requirements).

wastewaters should receive separate limitations.[180] Due to the ongoing rulemaking, EPA also recommends, but is not requiring, that permits issued or modified between this proposal and any final rule contain a reopener clause in accordance with 40 CFR 122.62(a)(7) and 124.5.

3. Consideration of Late Notice of Planned Participation

In Section VII of this preamble above, EPA discussed the proposed retention of the subcategory for EGUs permanently ceasing coal combustion by 2028. EPA also solicited comment on extending the period for filing a NOPP for this subcategory. EPA also solicits comment on whether this extended period should be available to LUEGUs and high FGD flow plants. Any final rule would not be promulgated until 2024. Therefore, the effect of removing these subcategories in a final rule would be that the three impacted plants of which EPA is aware would still be required to meet any permitted subcategory limitations presently, and in the next permit renewal these plants would be required to meet the zero-discharge limitations for FGD wastewater in this proposal. Given the five-year permit cycle and assuming implementation through permitting immediately after promulgation of the final rule in 2024, the "no later than" date would be December 31, 2029. Thus, under the flexibility of the permitting authority to consider "other factors" under section 423.11(t), these plants could, subject to permitting authority discretion, effectively have one additional year to discharge under the current, less stringent limitations than plants in the existing subcategory for EGUs permanently ceasing coal combustion by 2028. EPA solicits comment on the reasonableness of this possible result, including whether these plants should be required to file a NOPP for limitations under the subcategory for EGUs permanently ceasing coal combustion by 2028, should they elect to retire.

B. Implementation of New Limitations and Standards

The limitations and standards in this proposed rule would apply to discharges from steam electric power plants through incorporation into NPDES permits issued by EPA and authorized

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[180] Furthermore, permitting authorities could determine that more stringent water quality-based effluent limitations are needed to achieve water quality standards.

states under CWA section 402, and through pretreatment programs under CWA section 307. NPDES permits or control mechanisms issued after a final rule's effective date must incorporate the ELGs, as applicable. Where permits with the 2015 and/or 2020 rule limitations have already been issued, EPA expects that any final rule requirements would be incorporated in the next permit. Also, under CWA section 510, states can require effluent limitations under state law as long as they are no less stringent than the requirements of any final rule. Finally, in addition to requiring application of the technology-based ELGs in any final rule, CWA section 301(b)(1)(C) requires the permitting authority to impose more stringent effluent limitations, as necessary, to meet applicable water quality standards.

1. Availability Timing of Proposed Requirements

The direct discharge limitations in this rule apply only when implemented in an NPDES permit issued to a discharger. Under the CWA, the permitting authority must incorporate these ELGs into NPDES permits as a minimum level of control. The proposed rule provides the plant's permitting authority with discretion to determine the date when the new effluent limitations for FGD wastewater and BA transport water would apply to a given discharger. EPA proposes that the earliest date these new limitations could apply to a discharger is the effective date of any final rule. Except for the limitations in certain subcategories, for any finalized effluent limitation that is specified to become applicable after the effective date, the specified date must be as soon as possible after that date, but in no case later than December 31, 2029. For dischargers subject to less stringent limitations based on certifications that they qualify for a subcategory based on permanent cessation of coal combustion, however, EPA proposes to require permitting authorities to put the more stringent zero-discharge limitations for FGD wastewater and BA transport water in the existing permit effective the day after the date of closure. This way, EPA would ensure that dischargers would not benefit from less stringent limitations based on closure by a certain date if that closure does not occur. This proposal would not impact dischargers

choosing to meet the 2020 VIP effluent limitations for FGD wastewater; the date for meeting those limitations is December 31, 2028.

Pretreatment standards, unlike effluent limitations, are directly enforceable and must specify a time for compliance not to exceed three years from the date of promulgation under CWA section 307(b)(1). Under EPA's General Pretreatment Regulations for Existing and New Sources, POTWs with flows in excess of five MGD must develop pretreatment programs meeting prescribed conditions. These POTWs have the legal authority to require compliance with applicable pretreatment standards and control the introduction of pollutants to the POTW through permits, orders, or similar means. POTWs with approved pretreatment programs act as the control authorities for their industrial users. Among the responsibilities of the control authority are the development of the specific discharge limitations for the POTW's industrial users. Because pollutant discharge limitations in categorical pretreatment standards may be expressed as concentrations or mass limitations, in many cases, the control authority must convert the pretreatment standards to limitations applicable to a specific industrial user and then include these in POTW permits or another control instrument.

Regardless of when a plant's NPDES permit is ready for renewal, EPA recommends that each plant immediately begin evaluating how it intends to comply with the requirements of any potential final rule. In cases where significant changes in operation are appropriate, EPA recommends that the plant discuss such changes with its permitting authority and evaluate appropriate steps and a timeline for the changes as soon as any final rule is promulgated, even before the permit renewal process.

The "as soon as possible" date is the effective date of any final rule, unless the permitting authority determines another date after receiving relevant information submitted by the discharger.[181] The proposed rule would not revise the specified factors permitting authorities

[181] Information in the record indicates that most facilities should be able to complete all steps to implement changes needed to comply with proposed BA transport water requirements within 32–

must consider in determining the as soon as possible date under the 2015 and 2020 rules. Based on receiving relevant information from the discharger, the NPDES permitting authority may determine a different date is "as soon as possible" within the implementation period, using the factors below:

(1) Time to expeditiously plan (including to raise capital), design, procure, and install equipment to comply with the requirements of the final rule.

(2) Changes being made or planned at the plant in response to GHG regulations for new or existing fossil fuel-fired plants under the CAA, as well as regulations for the disposal of coal combustion residuals under subtitle D of the RCRA.

(3) For FGD wastewater requirements only, an initial commissioning period to optimize the installed equipment.

(4) Other factors as appropriate.

The "as soon as possible" date determined by the permitting authority may or may not be different for each wastestream. The NPDES permitting authority should provide a well-documented justification of how it determined the "as soon as possible" date in the fact sheet or administrative record for the permit. If the permitting authority determines a date later than the effective date of any final rule, the justification should explain why allowing additional time to meet any final limitations is appropriate, and why the discharger cannot meet the effluent limitations as of the effective date. Finally, while the Agency is proposing a "no later than" date of December 31, 2029, EPA solicits comment on earlier or later "no later than" dates such as five years from the effective date of the rule or a date that would harmonize with air regulations currently being developed for this same industry.

2. Conforming Changes for Transfers in Sections 423.13(o) and 423.19(i)

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35 months, the FGD wastewater requirements within 28 months, and the CRL requirements within 22 months (DCN SE08480).

EPA is proposing to remove the LUEGU subcategory as discussed in Section VII.C of this preamble above. For consistency, EPA is proposing to remove the portions of section 423.13(o) that refer to this subcategory. This includes removal of paragraph (o)(1)(i), removal of paragraphs (o)(1)(ii)(C)–(E), and a renumbering of the remaining paragraphs. EPA is also revising paragraph (o)(3) as it would now apply to all remaining transfers. EPA is proposing to revise the reporting and recordkeeping requirements of section 423.19(i) to reflect the remaining transfer provisions. EPA solicits comment on whether any additional conforming changes are necessary for the transfer provisions of section 423.13(o).

3. Conforming Changes for Voluntary and Involuntary Delays in sections 423.18(a) and 423.19(j)

EPA is proposing to remove the LUEGU subcategory and add an early adopter subcategory, as discussed in Section VII.C of this preamble above. For consistency, EPA is proposing to remove reference to LUEGUs and add a reference to early adopter EGUs in the permit conditions of section 423.18(a). EPA is also proposing conforming changes to the reporting and recordkeeping requirements in section 423.19(i). Specifically, EPA is proposing to add reference to the filings for material delays associated with the early adopter subcategory and associated 2032 permanent cessation of coal combustion date. EPA solicits comment on whether any additional conforming changes are necessary for the permit conditions or reporting and recordkeeping provisions to document these voluntary and involuntary delays.

EPA also wishes to clarify the applicability of section 423.18(a) with respect to TVA. TVA is not subject to regulation or oversight by either a public utility commission or an independent system operator but rather serves those functions for itself in its service territory. In addition, as of May 31, 2007, TVA was certified by NERC as the reliability coordinator for

itself, as well as for TVA Reliability Coordinator Members.[182] As the NERC-certified reliability coordinator, TVA has the authority to issue operating instructions and emergency operating instructions with which the TVA Reliability Coordinator Members must comply. It is in every respect a competent electricity regulator. The current regulations broadly refer to "a competent electricity regulator (e.g., an independent system operator)" and therefore would reasonably include unique situations such as that of TVA. Nevertheless, EPA solicits comment on whether this unique situation should explicitly be included in the regulatory text.

4. Recommended Information to be Submitted with a Permit Application for a Potential Discharge of CRL Through Groundwater

The question of whether facilities in this sector require a permit for any wastewater that travels through groundwater is a long-standing one. The Supreme Court recently clarified that discharges of pollutants through groundwater to WOTUS are subject to the NPDES permit program if they are the functional equivalent of a direct discharge. *See County of Maui v. Hawaii Wildlife Fund,* 140 S. Ct. 1462 (2020). The record indicates that it is currently uncommon for CRL discharges through groundwater to be controlled in NPDES permits. Thus, EPA is recommending that all facilities with CCR landfills or surface impoundments evaluate whether there are any such discharges that are subject to the NPDES permit program. For any such discharges that are not currently authorized by an NPDES permit, EPA strongly recommends that the permittee expeditiously seek permit coverage. CWA section 301(a) explains that, except as in compliance with certain provisions of the act, "…the discharge of any pollutant by any person shall be unlawful." The process to obtain NPDES permit authorization for any discharges typically begins when a permittee submits a permit application to seek permit coverage for discharge(s).

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[182] These members consist of Memphis Light, Gas, and Water (MLGW), Associated Electric Cooperative, Inc. (AECI), Louisville Gas & Electric and Kentucky Utilities (LG&E/KU), Owensboro Municipal Authority, and Smoky Mountain Transmission.

To help permitting authorities decide whether to issue a permit authorizing such discharges, EPA recommends that the permittees submit a permit application with sufficient information to inform that decision. NPDES regulations at 40 CFR 122.21(e) prohibit permitting authorities from issuing an individual permit until and unless a prospective discharger provides a complete application. Section 122.21(e)(1) states, "an application for a permit is complete when the Director receives an application form and any supplemental information which are completed to his or her satisfaction." Absent EPA or state permit application forms specific to discharges through groundwater, EPA recommends that permit applicants with potential CRL discharges through groundwater subject to 40 CFR part 423 submit a permit application using the existing form(s) the permitting authority requires for industrial facilities, along with any supplemental information that would assist the permitting authority, including any of the information described below.

EPA recommends that permitting authorities also meet with applicants early in the process to understand what supplemental information they may need. The itemized elements of general and technical information described below are provided for consideration; the permitting authority may determine it needs this information, only a subset of this information, or other information. Providing the supplemental information that the permitting authority deems appropriate will help expedite the permitting authority's review of the permit application and potential permit issuance. As discussed in the *NPDES Permit Writer's Manual*:[183]

> "[A]fter the initial application review, the permit writer may request that an applicant submit other information needed to decide whether to issue a permit and for permit development. The requested information could include the following: additional information, quantitative data…"

[183] Available online at: *www.epa.gov/npdes/npdes-permit-writers-manual*.

Supplemental information also can be obtained later when the permit writer is drafting the permit. The applicant may submit additional information voluntarily or be required to do so under CWA section 308 or a similar provision of state law. This process can be time consuming and intensive, as described in the *Permit Writer's Manual*: "in some situations, a considerable amount of correspondence might be required before the permit writer obtains all the information that he or she believes is necessary to draft the permit." For permittees that request NPDES permit authorization for discharges of CRL through groundwater, EPA recommends that the permittee provide the information described below as soon as possible to the permitting authority. This information is unique to the steam electric industrial sector and may not be warranted for other industrial sectors at this time. This sector contains hundreds of large, unlined landfills and surface impoundments that are within a mile of a surface waterbody (and often substantially closer). Furthermore, EPA believes much of the supplemental data and information described below (and that would be part of the permit application) is already required and made publicly available under the CCR rule. Thus, the incremental burden to facilities should be minimal, especially when compared to the potential burden of the permitting authorities seeking out and compiling this same information.

- *EPA Recommended General Information*. General information helps the permitting authority identify the major site features and monitoring capabilities of the facility. The general information could include:

(1) Facility name and owner(s).

(2) The identification number of the most recent final national pollution discharge elimination permit, if any, and the date of issuance.

(3) A table listing all coal-fired EGUs, if any, or a statement that all EGUs have permanently ceased combustion of coal. The table shall also include the name or identifier, commission year, and nameplate capacity of each such EGU.

(4) A table listing all landfills and surface impoundments subject to 257.50 *et seq*. For each such landfill or surface impoundment, the table should also include the name or identifier, commission year, acreage, the liner status consistent with the definitions of sections 257.70–257.72, types of solid wastes present, quantity of waste present, and a statement that the landfill or surface impoundment is either active or has ceased receipt of waste, listing the date it ceased receipt of waste.

(5) A table listing all groundwater monitoring wells. For each such well, the table should also include the name or identifier, commission year, location information, screen depths, and type of geologic material in which the well was screened (*e.g.*, sand, silt, clay).

(6) A table listing all surface waterbodies located within one mile of any landfill or surface impoundment from the table in #4 above, if any, or the closest such waterbody if none are located within one mile. The table should also include the hydraulic unit code and the shortest measurable distance from any edge of the nearest landfill or surface impoundment to any edge of the waterbody. This shortest distance should be measured and reported at an average water level, maximum water level (*e.g.*, flood conditions), and minimum water level.

(7) A map with a legend depicting the location and boundaries of all items listed in the above information, including labels identifying such items.

- *EPA Recommended Technical Information*. Technical information on groundwater and subsurface data provides permitting authorities a compiled set of information to evaluate the seven factors identified in *Maui*. EPA notes that permitting authorities may request any other information or data as appropriate. Technical information could include:

  (1) For each aquifer underlying the landfills and surface impoundments identified in the general information above, a time series of groundwater elevations as

measured in the groundwater monitoring wells covering either 2015 through the present, or the groundwater monitoring well commission year through the present, whichever is shorter.

(2) For each surface water identified in the general information above, a time series of surface water elevations covering the same date range of as in #1.

(3) For each landfill or surface impoundment from the general information above, the elevation of the waste bottom. For each surface impoundment, the operating level and freeboard shall also be included.

(4) A graph plotting the elevations in #1–3 over time.

(5) Measured, calculated, or estimated values of the site hydraulic conductivity, hydraulic gradient, velocity of groundwater, and effective porosity, giving particular consideration to these along the trajectory of groundwater flow from the landfill or surface impoundment to the surface waterbody.

(6) Estimated groundwater travel time from each landfill or surface impoundment into each surface waterbody in the general information. In addition to average estimates, minimum and maximum travel times should be estimated.

(7) A groundwater potentiometric surface map of the facility illustrating the average travel times estimated in #6. To the extent possible, such a map should be created with data collected during the same sampling round.

(8) Summary statistics including the minimum, maximum, and average of the data and estimates in #1, 2, and 6.

(9) Using all available data, summary statistics (including minimum, maximum, and average) of the concentration of each pollutant in the table following this section for each groundwater monitoring well supported by appendix tables containing all groundwater monitoring data. Where no data exist for any pollutant in this table, there should be a certification for each such pollutant that no groundwater

monitoring data exist. Erroneous data (*e.g.*, due to lab error) may be excluded with a narrative explaining the exclusions.

(10) Three isoconcentration plots showing the horizontal extent of the most dispersed pollutant reported in #9 using the minimum, maximum, and average values from each well. These plots should be supported by an appendix containing isoconcentration plots showing the horizontal extent of all remaining pollutants reported in #9 in the same manner.

(11) Three isoconcentration plots showing the vertical extent of the most dispersed pollutant reported in #9 using the minimum, maximum, and average values. These plots should be supported by appendix isoconcentration plots showing the vertical extent of all remaining pollutants reported in #9 in the same manner.

(12) Boring logs, geotechnical laboratory reports, and sieve analyses from the initial safety factor assessment, if any, other site-specific data and evaluations of the subsurface, and supplemental geologic subsurface data from regional databases where necessary.

(13) A list of sorbents for the pollutants listed in the table following this section, a list of which pollutants are known to sorb to each, and a discussion of which sorbents are present in the subsurface that contaminated groundwater would pass through to the surface waterbodies listed in the general information. If available, include laboratory measurements of contaminated uppermost aquifer material.

(14) The estimated cross-sectional surface area through which CRL enters each surface waterbody listed in the table in the general information.

(15) For each pollutant listed in the table following this section, a minimum, maximum, and average estimate of the mass flux from each landfill or surface impoundment and into each surface waterbody in the general information, the mass sorbed in the subsurface, and the mass dissolved in the groundwater.

BAT/PSES Treated Pollutants in CRL	
Antimony	Magnesium
Arsenic	Manganese
Barium	Mercury
Beryllium	Molybdenum
Cadmium	Nickel
Chromium	Thallium
Cobalt	Titanium
Copper	Vanadium
Lead	Zinc

EPA solicits comment on every aspect of these recommendations. While administrative burden to permitting agencies may initially increase, given the *Maui* decision and the high visibility of the data collected under the CCR rule, EPA anticipates that some of these facilities may need permit coverage in the future. EPA's intent is to assist permitting agencies by clarifying some of the supplemental data that would be useful for determining the presence and nature of a discharge of CRL through groundwater. EPA solicits comment on the extent to which this recommended information would reduce the existing burden to permitting authorities post-*Maui* and on alternatives that might further reduce this burden.

EPA also solicits comment on three alternative approaches for obtaining this information. First, EPA solicits comment on directly obtaining this information through a series of CWA 308(a) information request letters to all plants subject to 40 CFR part 423. Second, EPA solicits comment on placing the recommendations above directly in a regulation that would require provision of this information under CWA 308 authority. Third, EPA solicits comment on adding a requirement to the permit application regulations of part 122 that a facility must provide this information to the permitting authority as part of the permit application process. Under all these alternatives, EPA solicits comment on whether and how this information could be made publicly available to increase transparency.

C. Reporting and Recordkeeping Requirements

EPA is proposing several new reporting and recordkeeping requirements or changes and soliciting comment on others. First, to implement the proposed rule's removal of two

subcategories and addition of an early adopter subcategory, under CWA sections 304(i) and 308, this proposal includes four proposed changes to the individual reporting and recordkeeping requirements of section 423.19. In particular, EPA is proposing to add an additional component to the annual progress reports under the subcategory for EGUs permanently ceasing coal combustion. As with the reporting and recordkeeping requirements of the 2020 rule, for the early adopter subcategory, EPA is proposing to balance the additional flexibilities for certifying to the subcategory at a later date with additional reporting and recordkeeping to provide extra certainty that plants still intend to avail themselves of those provisions. Moreover, EPA is proposing to add reporting and recordkeeping requirements to facilitate evaluation of CRL discharges through groundwater. EPA is also proposing to make conforming changes that would remove reporting and recordkeeping requirements applying to LUEGUs.

Second, to increase transparency for impacted communities, EPA is proposing to require all steam electric plants subject to the reporting and recordkeeping requirements of 423.19(d)–(k) to post this reporting and recordkeeping information to a public-facing website.[184]

Finally, EPA is soliciting comment on a potential reporting requirement intended to enhance flexibility for the transition to zero-discharge limitations for FGD wastewater and BA transport water.

1. Summary of Proposed Changes to the Annual Progress Reports for EGUs Permanently Ceasing Coal Combustion by 2028

EPA proposes to modify the annual progress reports for the subcategory of EGUs permanently ceasing coal combustion by 2028. Specifically, EPA proposes adding a requirement that the annual progress reports include either the official filing to the facility's reliability authority or a certification providing an estimate of when such a filing will be made. Furthermore, EPA is proposing that the final annual progress report prior to permanent cessation

[184] EPA is seeking to adopt provisions for the websites consistent with those of the CCR rule.

of coal combustion must include the official filing. While facilities may already include these filings in the NOPP or annual progress reports, these filings were not explicitly required in the 2020 rule and provide the strongest assurance that a facility will not voluntarily change its plans and continue operations beyond 2028. EPA solicits comment on whether this or additional requirements would further support the operation of the subcategory without unduly burdening regulated facilities.

2. Summary of the Proposed Reporting and Recordkeeping Requirements for Early Adopters

EPA is proposing new reporting and recordkeeping requirements for early adopters, including an initial NOPP and annual progress reports. EPA is proposing that the initial NOPP contain three items. First, EPA is proposing the NOPP include a statement that the facility discharged FGD wastewater after the effective date of the 2020 rule (85 FR 64650, October 13, 2020). Second, EPA is proposing the NOPP include a demonstration that the facility already complies with the limitations for FGD wastewater and BA transport water in the 2020 rule by **[INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER]**. Third, EPA is proposing the NOPP include information, with milestones, about plans for the permanent cessation of coal combustion by 2032 from the relevant EGUs. EPA is proposing the first two reporting requirements to ensure that early adopters relied on EPA's rules when incurring the costs to comply with existing regulations and subsequently did comply with these regulations. Specifically, EPA is proposing that this information include diagrams and descriptions of the relevant treatment chains, commission dates, and monitoring data demonstrating compliance. EPA is proposing the latter requirement to ensure that facility have a firm commitment to permanently cease coal combustion by 2032. For this requirement, EPA is proposing to require the same information and milestones as were required for the permanent cessation of coal combustion subcategory by 2028 in the 2020 rule. Finally, EPA is proposing that, as with the permanent cessation of coal combustion subcategory in the 2020 rule (and consistent with the proposed modification above), the early adopter subcategory also include annual progress reports

on completion of milestones, upcoming milestones, and including certifications and official filings made to the reliability authority. Thus, EPA proposes the same language for consistency.

3. Summary of Proposed Reporting and Recordkeeping Requirements for CRL Discharges Through Groundwater

As discussed in Section VII of this preamble above, EPA is proposing BAT limitations and PSES for CRL. EPA further discusses in that section and in the implementation section above that CRL can be discharged not only through end-of-pipe discharges, but also through groundwater. EPA is proposing to include annual reporting and recordkeeping requirements to facilitate the permitting authorities' review of CRL discharges through groundwater to surface waters that are subject to NPDES permits. It would also facilitate compliance monitoring and make compliance information available to the public.

EPA is proposing that facilities with discharges of CRL through groundwater file an Annual Combustion Residual Leachate Monitoring Report with the permitting authority, or control authority in the case of indirect dischargers, annually. This annual reporting requirement would be implemented via NPDES permits that authorize discharges of CRL through groundwater or directly where an indirect discharger eliminates the discharge through groundwater and subsequently discharges the treated CRL to a POTW. EPA is proposing that this report provide a comprehensive set of monitoring data. EPA is proposing this requirement to facilitate permitting and control authorities' ability to determine compliance with CRL limitations and to increase transparency to local communities. Thus, in addition to the data provided under 40 CFR part 127, where a CRL discharge occurs through groundwater, EPA is proposing to require groundwater monitoring data on the CRL leaving each landfill and surface impoundment and where it enters surface waterbodies. To increase transparency to local communities, EPA is proposing to require the report to include monitoring data on all the pollutants treated by chemical precipitation, rather than just mercury and arsenic. EPA solicits comment on this approach.

EPA solicits comment on all aspects of the proposed CRL monitoring report including the scope, types of information to be included, and the timeframes for submitting these reports to the permitting authority. EPA also solicits comment on whether there are additional pieces of information that would increase transparency or that the public or permitting authorities would find helpful. For example, one comment in a community meeting suggested that EPA require some limited independent monitoring and reporting to increase local community members' trust in any results presented. EPA also solicits comment on whether alternatives with a lower burden should be available in certain circumstances.

4. Proposed Deletion of Reporting and Recordkeeping Requirements for LUEGUs

EPA is proposing to remove the reporting and recordkeeping requirements for LUEGUs in current section 423.19(c) and for the associated BMP plans in current section 423.19(d), since EPA is proposing to eliminate this subcategory, as described in Section VII of this preamble above.

5. Proposed Requirement to Post Information to a Publicly Available Website

The reporting and recordkeeping requirements of the CCR rule included a novel approach for posting information to a publicly available website. This was initially done because at the time the CCR rule was signed, EPA did not have enforcement authority over the CCR rule. Thus, given the self-implementing nature of the regulations, EPA sought to make information more readily available to states and the public who could enforce the CCR rule through citizen suits.[185]

In contrast to the CCR rule, ELGs are implemented largely through authorized state permitting programs with EPA oversight. Nevertheless, one message that EPA received in initial outreach to communities was that there was a lack of trust of utilities (and in some cases, the states that regulate them). Another message was that there was an interest in more accessible

[185] While the Water Infrastructure Improvements for the Nation Act later provided EPA with permitting and oversight authority, the CCR rule continues to require posting to publicly available websites.

information. Given the success CCR websites have achieved in disseminating information to a variety of stakeholders, EPA proposes a comparable posting requirement for the ELG. Specifically, EPA proposes that all reporting and recordkeeping information not only be retained by the regulated entity and provided to the permitting authority, but that it also be posted to a public website for 10 years, or the length of the permit plus five years, whichever is longer. EPA solicits comment on this timeframe. Furthermore, EPA's proposal would include NOPPs and other filings that have occurred since the 2020 rule. These new requirements are detailed in proposed regulatory text for section 423.19(c), and EPA solicits comment on the appropriateness of this approach, as well as any modifications to the approach that could improve transparency. EPA also proposes to allow this posting on existing CCR compliance websites to reduce paperwork burden and make it easier for communities to access. The Agency solicits comment on other ways such postings could be done while minimizing burdens.

6. Additional Solicitation on Providing a More Flexible Transition to Zero Discharge

EPA solicits comment on creation of a temporary reporting requirement, which would be in place prior to the facility meeting a zero-discharge limitation. Under such an approach, a plant would not include an optimization period in the calculation of its "as soon as possible" date. Rather, the plant would monitor and report any necessary discharges over the first year of attempted zero discharge while the system was being optimized and these discharges would not be a violation of the zero-discharge requirements. For subsequent years, such a flexibility would be discontinued.

D. Site-Specific Water Quality-Based Effluent Limitations

EPA regulations at 40 CFR 122.44(d)(1), implementing section 301(b)(1)(C) of the CWA require each NPDES permit to include any requirements, in addition to or more stringent than ELGs or standards promulgated pursuant to sections 301, 304, 306, 307, 318, and 405 of the CWA, necessary to achieve water quality standards established under section 303 of the CWA, including state narrative criteria for water quality. Those same regulations require that limitations

must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) that the Director determines are or may be discharged at a level that will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard, including state narrative criteria for water quality (40 CFR 122.44(d)(1)(i)).

The preamble to the 2015 rule discussed bromide as a parameter for which water quality-based effluent limitations may be appropriate. EPA stated its recommendation that permitting authorities carefully consider whether water quality-based effluent limitations for bromide or TDS would be appropriate for FGD wastewater discharged from steam electric power plants upstream of drinking water intakes. EPA also stated its recommendation that the permitting authority notify any downstream drinking water treatment plants of the discharge of bromide.

While the 2020 rule did not include limitations on bromide for FGD wastewater or BA transport water (beyond the removals that would be required of plants choosing to meet the VIP limitations), the current proposal would require zero discharge of FGD wastewater and BA transport water for most plants. Nevertheless, EPA is proposing subcategories for these wastewaters, and new data submitted to EPA on CRL show measurable levels of bromide.[186] Therefore, the records for the 2015 rule, the 2020 rule, and this proposal continue to suggest that permitting authorities should consider establishing water quality-based effluent limitations where necessary to meet applicable water quality standards to protect of populations served by downstream drinking water treatment plants.

In consultations conducted with state and local government entities, EPA received comments from the American Water Works Association (AWWA) and the Association of Metropolitan Water Agencies. These comments requested that EPA consider technologies that could treat upstream pollutants at the point of discharge, but also suggested that EPA empower states to address the issue as well. The latter discussion referenced the approaches discussed in

[186] The record also includes iodide in these discharges, another pollutant which should be considered alongside bromide for water quality-based effluent limitations.

Methods to Assess Anthropogenic Bromide Loads from Coal-Fired Power Plants and Their Potential Effect on Downstream Drinking Water Utilities.[187] This document, provided in comments during the 2020 rulemaking and again during consultations on the current rulemaking, describes methodologies, data sources, and considerations for constructing an approach to bromide issues on a site-specific basis. This document presents additional data sources that NPDES permitting authorities could use to establish site-specific, water quality-based effluent limitations (*see*, *e.g.*, figure 29 in AWWA's document). The document also provides examples of where states have already taken similar action. For example, AWWA cites California's 0.05 mg/L standard for in-river bromide to protect public health for specific waterways and drinking water treatment systems.

In addition to considering water quality-based effluent limitations for parameters present in the wastestreams in this proposal, EPA also calls attention to the need to address potential for per- and polyfluoroalkyl substance (PFAS) discharges. In EPA's *PFAS Strategic Roadmap*,[188] the Agency laid out actions that would prevent PFAS from entering the environment. Specifically, EPA stated it would "proactively use existing NPDES authorities to reduce discharges of PFAS at the source and obtain more comprehensive information through monitoring on the sources of PFAS and quantity of PFAS discharged by these sources." EPA has already drafted a memorandum covering facilities where EPA is the permitting authority,[189] as well as guidance to state permitting authorities to address PFAS in NPDES permits.[190] While the

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[187] Available online at: *www.awwa.org/Portals/0/AWWA/ETS/Resources/17861ManagingBromideREPORT.pdf?ver=2020-01-09-151706-107*.

[188] U.S. EPA (Environmental Protection Agency). 2021. *PFAS Strategic Roadmap: EPA's Commitments to Action 2021–2024*. October 18. Available online at: *www.epa.gov/system/files/documents/2021-10/pfas-roadmap_final-508.pdf*.

[189] Fox, Radhika. 2022. *Addressing PFAS Discharges in EPA-Issued NPDES Permits and Expectations Where EPA is the Pretreatment Control Authority*. April 28. Available online at: *www.epa.gov/system/files/documents/2022-04/npdes_pfas-memo.pdf*.

[190] Fox, Radhika. 2022. *Addressing PFAS Discharges in NPDES Permits and Through the Pretreatment Program and Monitoring Programs.* December 5. Available online at:

steam electric power sector was not identified as one of the top PFAS dischargers, EPA notes that PFAS may nevertheless be present in steam electric discharges. For example, the Wisconsin Department of Natural Resources has found PFAS at eight power plants.[191] In addition, firefighting foam used in exercises or actual fires at steam electric plants could contain PFAS. Therefore, permitting or control authorities may appropriately consider whether PFAS monitoring and any further restrictions (*e.g.*, BMPs) would be appropriate at a given facility.

XVI. Related Acts of Congress, E.O.s, and Agency Initiatives

Additional information about these statutes and E.O.s can be found at *www.epa.gov/laws-regulations/laws-and-executive-orders*.

A. E.O.s 12866 (Regulatory Planning and Review) and 13563 (Improving Regulation and Regulatory Review)

This proposed rule was submitted to the OMB for review as significant under Section 3(f)(1) of Executive Order 12866. Any changes made in response to OMB recommendations have been documented in the docket. EPA prepared an analysis of the potential social costs and benefits associated with this action. This analysis is contained in Chapter 12 of the BCA and is available in the docket.

B. Paperwork Reduction Act

EPA has submitted the information collection activities in this proposed rule to the OMB for approval under the Paperwork Reduction Act. The Information Collection Request (ICR) document EPA prepared has been assigned EPA ICR number 2752.01 and OMB Control Number 2040-NEW. A copy of the ICR is available in the docket for this rule and is briefly summarized here.

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https://www.epa.gov/system/files/documents/2022-12/NPDES_PFAS_State%20Memo_December_2022.pdf.

[191] The maximum sampled concentrations in discharge from eight power plants was 28 ng/L for PFOS and 35 ng/L for PFOA, which the Wisconsin Department of Natural Resources theorized was due to concentration in cooling tower effluent.

As described in Section XV.C of this preamble, EPA is proposing several changes to the individual reporting and recordkeeping requirements of section 423.19 for specific subcategories of plants and/or plants that have certain types of discharges. EPA is proposing to add reporting and recordkeeping requirements to plants in the early adopter subcategory and plants that discharge CRL through groundwater, and to remove reporting and recordkeeping requirements for LUEGUs. EPA is also proposing a new requirement for plants to post reports to a publicly available website.

Respondents/affected entities: The respondents affected by this ICR are steam electric power plants. The North American Industry Classification System (NAICS) identification number applicable to respondents is 221112: Electric Power Generation Plants—Fossil Fuel Electric Power Generation. The U.S. Census Bureau describes this U.S. industry as establishments primarily engaged in operating fossil fuel powered electric power generation facilities. These facilities use fossil fuels, such as coal, oil, or gas, in internal combustion or combustion turbine conventional steam process to produce electric energy. The electric energy produced in these establishments is provided to electric power transmission systems or to electric power distribution systems.

Respondent's obligation to respond: Proposed language at 40 CFR 423.19 (c)–(l).

Estimated number of respondents: EPA estimates 100 steam electric facilities would be subject to this proposed rulemaking.

Frequency of response: EPA made the following assumptions for estimating frequency:

- NOPPs, notices, and the Leachate Groundwater Information Report (LGIR) would be submitted one time (in the first year of the requirements).
- Progress reports and the annual LGIR would be submitted once a year following the submittal of the official NOPP (*i.e.*, twice over a three-year period).

- Progress reports associated with EPA's VIP program or NOPPs that have already been submitted would be submitted once a year following the publication of the final rule.

Total estimated burden: For facilities, the estimated facility universe for any reporting for the purpose of this estimate is 100 facilities. EPA estimates the total one-time labor hours associated with this ICR for facilities is 11,525 and total annual labor hours ranging from 1,400 to 7,260 for a total annual average of 9,160 hours. For permitting/control authorities, the estimated total one-time labor hours associated with this ICR is 4,350 and total annual labor hours ranging from 30 to 1,900 for a total annual average of 2,700 hours. Burden is defined at 5 CFR 1320.3(b).

Total estimated cost: For facilities, EPA estimates the total one-time labor costs to be $667,000 and total annual labor costs to range from $81,000 to $422,300 for a total annual average of $531,000. For permitting/control Authorities, EPA estimates the total one-time labor costs to be $212,000 and total annual labor costs to range from $1,300 to $89,800 for a total annual average of $131,000.

An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations in 40 CFR are listed in 40 CFR part 9.

Submit your comments on EPA's need for this information, the accuracy of the provided burden estimates and any suggested methods for minimizing respondent burden using the docket identified at the beginning of this rule. Written comments and recommendations for the proposed information collection may also be sent within 30 days of publication of this notice to *www.reginfo.gov/public/do/PRAMain*. Find this particular information collection by selecting "Currently under 30-day Review—Open for Public Comments" or by using the search function. Since OMB is required to make a decision concerning the ICR between 30 and 60 days after

receipt, OMB must receive comments no later than [insert date 30 days after publication in the *Federal Register*]. EPA will respond to any ICR-related comments in the final rule.

C. Regulatory Flexibility Act

I certify that this action will not have a significant economic impact on a substantial number of small entities under the Regulatory Flexibility Act. The small entities subject to the requirements of this action include small businesses and small governmental jurisdictions that own steam electric plants. EPA has determined that 229 to 427 entities own steam electric plants subject to the ELGs, of which 109 to 200 entities are small. These small entities own a total of 250 steam electric plants (out of the total of 871 plants), including 20 plants estimated to incur costs under the regulatory options. EPA considered the impacts of the regulatory options in this proposal on small businesses using a cost-to-revenue test. The analysis compares the cost of implementing wastewater controls under the four regulatory options to those under baseline (which reflects the 2020 rule, as explained in Section V of this preamble). Small entities estimated to incur compliance costs exceeding one or more of the one percent and three percent impact thresholds were identified as potentially incurring a significant impact. For the proposed rule (Option 3), EPA's analysis shows only three small entities (one non-utility and two municipalities) expected to incur incremental costs equal to or greater than one percent of revenue. For one of these small entities (non-utility), the incremental cost of the proposed rule exceeds three percent of revenue. Details of this analysis are presented in Chapter 8 of the RIA, included in the docket.

These results support EPA's finding of no significant impact on a substantial number of small entities.

D. Unfunded Mandates Reform Act

This action contains a Federal mandate under the Unfunded Mandates Reform Act (UMRA), 2 U.S.C. 1531–1538 that may result in expenditures of $100 million (adjusted annually for inflation) or more for state, local, and tribal governments, in the aggregate, or the

private sector in any one year ($170 million in 2021 dollars). Accordingly, EPA has prepared a written statement required under section 202 of UMRA. The statement is included in the docket for this action (see Chapter 9 in the RIA report) and briefly summarized below.

Consistent with the intergovernmental consultation provisions of section 204 of the UMRA, EPA has initiated consultations with government entities potentially affected by this proposed rule. As described in Section XVI.E of this preamble, EPA held consultation meetings with elected officials or their designated employees in January 2022 to ensure their meaningful and timely input into the proposed ELGs development. As described in Section XVI.F of this preamble, EPA also initiated consultation and coordination with federally recognized tribal governments in February 2022.

Consistent with section 205, EPA has identified and considered a reasonable number of regulatory alternatives to develop proposed BAT. These regulatory options are discussed in Section VII of this preamble. These options included a range of technology-based approaches. As discussed in detail in Section VII.B of this preamble, EPA is proposing Option 3 as the preferred BAT after considering the factors required under CWA section 304(b)(2)(B). The technologies are available, are economically achievable, and have acceptable non-water quality environmental impacts.

This proposed rule is not subject to the requirements of section 203 of UMRA because it contains no regulatory requirements that might significantly or uniquely affect small governments. To assess the impact of compliance requirements on small governments (*i.e.*, governments with a population of less than 50,000), EPA compared total costs and costs per plant estimated to be incurred by small governments with the costs estimated to be incurred by large governments. EPA also compared costs for small government-owned plants with those of non-government-owned facilities. The Agency evaluated both the average and maximum annualized costs per plant. Chapter 9 of the RIA report provides details of these analyses. In all these comparisons, both for the cost totals and, in particular, for the average and maximum cost

per plant, the costs for small government-owned facilities were less than those for large government-owned facilities or small non-government-owned facilities. On this basis, EPA concludes that the compliance cost requirements of the proposed steam electric ELGs would not significantly or uniquely affect small governments.

E. E.O. 13132: Federalism

EPA has concluded that this action has federalism implications because it imposes direct compliance costs on state or local governments, and the Federal Government will not provide the funds necessary to pay those costs.

As discussed in Section XVI.B of this preamble, EPA anticipates that this proposed action would not impose incremental administrative burden on states from issuing, reviewing, and overseeing compliance with discharge requirements. EPA has identified 148 steam electric plants owned by 64 state or local government entities. Under the proposed regulatory Option 3 (BAT and PSES), EPA projects that 17 government-owned plants would incur compliance costs. EPA estimates that the maximum compliance cost in any one year to governments (excluding the Federal Government) for the four regulatory options ranges from $31 million under Option 1 to $46 million under Options 3 and 4 (see Chapter 9 of the RIA report for details).

EPA provides the following federalism summary impact statement.

EPA consulted with state and local officials early in the process of developing the proposed action to permit them to have meaningful and timely input into its development. EPA invited government officials to a consultation meeting held on January 27, 2022. EPA conducted outreach with several intergovernmental associations representing elected officials and encouraged their members to participate in the meeting, including the National Governors Association, the National Conference of State Legislatures, the Council of State Governments, the National Association of Counties, the National League of Cities, the U.S. Conference of Mayors, the County Executives of America, and the National Associations of Towns and Townships.

Participants representing 15 state and local government organizations participated in the virtual consultation meeting. EPA representatives were also present. EPA received five sets of unique written comments after the meeting. Two comments came from trade associations representing public water systems. These comments generally recommended more advanced treatment to reduce the pollutants making their way downstream to intakes for government-owned public water systems or, alternatively, to empower states to more effectively address these discharges. The remaining three comments came from the American Public Power Association and two of its member utilities. These comments recommended the retention of existing limitations and subcategories, a careful consideration of the CRL definition and BAT, and a compliance pathway for utilities that installed or are installing technologies to comply with the 2015 and 2020 rules.

As explained in Section VII of this preamble, EPA is proposing more stringent limitations on several wastestreams that would alleviate concerns raised by the public water systems. At the same time, EPA's preferred option (Option 3) includes retention of the permanent cessation of coal combustion subcategory and a proposed subcategory for early adopters. EPA believes these differentiated requirements would alleviate some of the concerns raised by publicly owned utilities. Further, as explained in Section VIII of this preamble, EPA's analysis demonstrates that the proposed requirements are economically achievable for the steam electric industry as a whole and for plants owned by state or local government entities. EPA is including in the docket for this proposed action a memorandum that responds to the comments it received through this consultation and the consultations described in Section XVI.F of this preamble below. For further information regarding the consultation process and supplemental materials provided to state and local government representatives, please go to the steam electric power generating effluent guidelines website at: *www.epa.gov/eg/2021-supplemental-steam-electric-rulemaking*. In the spirit of E.O. 13132, and consistent with EPA policy to promote

communications between EPA and state and local governments, EPA specifically solicits comment on the proposed ELGs from state and local officials.

F. E.O. 13175: Consultation and Coordination with Indian Tribal Governments

This proposed action would not have tribal implications, as specified in E.O. 13175 (65 FR 67249 (November 9, 2000)). It would not have substantial direct effects on tribal governments, on the relationship between the Federal Government and the Indian Tribes, or the distribution of power and responsibilities between the Federal Government and Indian Tribes as specified in E.O. 13175. EPA's analyses show that no facility subject to these proposed ELGs is owned by tribal governments. Thus, E.O. 13175 does not apply to this proposed action.

Although E.O. 13175 does not apply to this action, EPA consulted with tribal officials in developing this action. EPA initiated consultation and coordination with federally recognized tribal governments in January 2022, sharing information about the steam electric effluent guidelines rulemaking with the National Tribal Caucus, the National Tribal Water Council, and several individual tribes. EPA continued this government-to-government dialogue and, on February 1 and February 9, 2022, invited tribal representatives to participate in further discussions about the rulemaking process and objectives, with a focus on identifying specific ways the rulemaking may affect tribes.[192] The consultation process ended on March 29, 2022. While no tribal governments requested direct government-to-government consultations, EPA received written comments from three tribes: the Sault Ste. Marie Tribe of Chippewa Indians, the Mille Lacs Band of Ojibwe, and the Little Traverse Bay Bands of Odawa Indians. These comments conveyed the importance of historical tribal waters and rights (*e.g.*, fishing, trapping) and recommended more stringent technological controls to protect those rights or encourage retirement or fuel conversion of old coal-fired units. EPA is including in the docket for this action a memorandum that provides a response to the comments it received through this

[192] As discussed in Sections XIII and XVI.J of this preamble, EPA also did targeted outreach to communities in the top tier of its EJ screening analysis which included two tribal communities.

consultation and the consultations described in Sections XVI.D and XVI.E of this preamble above. For further information regarding the consultation process and supplemental materials provided to tribal representatives, please go to the steam electric power generating effluent guidelines website at: *www.epa.gov/eg/2021-supplemental-steam-electric-rulemaking.* EPA specifically solicits additional comment on this proposed action from tribal officials.

G. E.O. 13045: Protection of Children from Environmental Health Risks and Safety Risks

This action is not subject to E.O. 13045 because EPA does not believe the environmental health risks or safety risks addressed by this action present a disproportionate risk to children. This action's health and risk assessments are discussed in Chapters 4 and 5 of the BCA and are summarized below.

EPA identified several ways in which the proposed regulatory options could benefit children, including by potentially reducing health risks from exposure to pollutants present in steam electric plant discharges, or through impacts of the discharges on the quality of source water used by public water systems. This reduction arises from more stringent pollutant limitations as compared to baseline. In particular, EPA quantified the changes in IQ losses from lead exposure among preschool children and from mercury exposure *in utero* resulting from maternal fish consumption under the four regulatory options as compared to baseline. EPA also estimated changes in the lifetime risk of developing bladder cancer due to exposure to TTHM in drinking water. For this analysis, EPA did not estimate children-specific risks because these adverse health effects normally follow long-term exposure. Finally, EPA estimated changes in air-related adverse health effects resulting from changes in the profile of electricity generation under Option 3 as compared to baseline. The analysis found that the resulting reductions in $PM_{2.5}$ and ozone will benefit children by reducing asthma onset and symptoms, allergy symptoms, emergency room visits and hospital visits for respiratory conditions, and school absences. These analyses show that all the regulatory options presented in this proposal would benefit children.

H. E.O. 13211: Actions That Significantly Affect Energy Supply, Distribution, or Use

This proposed action is not a "significant energy action" because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. EPA analyzed the potential energy effects of the proposed rule relative to baseline and found minimal or no impacts on electricity generation, generating capacity, cost of energy production, or dependence on a foreign supply of energy. Specifically, the Agency's analysis found that the proposed rule would not reduce electricity production by more than 1 billion kWhs per year or by 500 MW of installed capacity, nor would the proposed rule increase U.S. dependence on foreign energy supplies. For more detail on the potential energy effects of the regulatory options in this proposal, see section 10.7 in the RIA, available in the docket.

I. National Technology Transfer and Advancement Act

This rulemaking does not involve technical standards.

J. E.O. 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

E.O. 12898 (59 FR 7629, February 16, 1994) directs Federal agencies, to the greatest extent practicable and permitted by law, to make EJ part of their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations (people of color and/or Indigenous peoples) and low-income populations.

EPA believes that the human health or environmental conditions existing prior to this action result in or have the potential to result in disproportionate and adverse human health or environmental effects on people of color, low-income populations, and/or Indigenous peoples.

EPA believes that this action is likely to reduce existing disproportionate and adverse effects on people of color, low-income populations, and/or Indigenous peoples. A summary of the projected effects on these populations are contained in the EJA, which is available in the docket and summarized in Section XIII of this preamble above.

Appendix A to the Preamble: Definitions, Acronyms, and Abbreviations Used in This Preamble

The following acronyms, abbreviations, and terms are used in this preamble. These terms are provided for convenience to the reader and they are not regulatory definitions with the force or effect of law, nor are they to be used as guidance for implementation of this proposed rule.

Administrator. The Administrator of the U.S. Environmental Protection Agency.

Agency. U.S. Environmental Protection Agency.

BAT. Best available technology economically achievable, as defined by CWA sections 301(b)(2)(A) and 304(b)(2)(B).

BCA. Benefit Cost Analysis.

Bioaccumulation. General term describing a process by which chemicals are taken up by an organism either directly from exposure to a contaminated medium or by consumption of food containing the chemical, resulting in a net accumulation of the chemical over time by the organism.

BMP. Best management practice.

BA. Bottom ash. The ash, including EGU slag, that settles in a furnace or is dislodged from furnace walls. Economizer ash is included when it is collected with BA.

BA purge water. The water discharged from a wet BA handling system that recycles some, but not all, of its BA transport water.

BPT. The best practicable control technology currently available, as defined by CWA sections 301(b)(1) and 304(b)(1).

CBI. Confidential business information.

CCR. Coal combustion residuals.

CWA. Clean Water Act; The Federal Water Pollution Control Act Amendments of 1972 (33 U.S.C. 1251 *et seq.*), as amended, *e.g.,* by the Clean Water Act of 1977 (Pub. L. 95–217) and the Water Quality Act of 1987 (Pub. L. 100–4).

Combustion residuals. Solid wastes associated with combustion-related power plant processes, including fly ash and BA from coal-, petroleum coke-, or oil-fired units; FGD solids; FGMC wastes; and other wastewater treatment solids associated with combustion wastewater. In addition to the residuals associated with coal combustion, this also includes residuals associated with the combustion of other fossil fuels.

Direct discharge. (1) Any addition of any "pollutant" or combination of pollutants to "waters of the United States" from any "point source" or (2) any addition of any pollutant or combination of pollutant to waters of the "contiguous zone" or the ocean from any point source other than a vessel or other floating craft that is being used as a means of transportation. This definition includes additions of pollutants into waters of the United States from surface runoff that is collected or channeled by man; discharges through pipes, sewers, or other conveyances owned by a state, municipality, or other person that do not lead to a treatment works; and discharges through pipes, sewers, or other conveyances that lead into privately owned treatment works. This term does not include addition of pollutants by any "indirect discharger."

Direct discharger. A plant that discharges treated or untreated wastewaters into waters of the United States.

DOE. Department of Energy.

Dry BA handling system. A system that does not use water as the transport medium to convey BA away from the EGU. Dry handling systems include systems that collect and convey the BA without using any water, as well as systems in which BA is quenched in a water bath and then mechanically or pneumatically conveyed away from the EGU. Dry BA handling systems do not include wet sluicing systems (such as remote MDS or complete recycle systems).

Effluent limitation. Under CWA section 502(11), any restriction, including schedules of compliance, established by a state or the Administrator on quantities, rates, and concentrations of chemical, physical, biological, and other constituents that are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean.

EGU. Electric generating unit.

EIA. Energy Information Administration.

EJA. Environmental Justice Analysis

ELGs. Effluent limitations guidelines and standards.

E.O. Executive Order.

EPA. U.S. Environmental Protection Agency.

FA. Fly ash.

Facility. Any NPDES "point source" or any other facility or activity (including land or appurtenances thereto) that is subject to regulation under the NPDES program.

FGD. Flue gas desulfurization.

FGD wastewater. Wastewater generated specifically from the wet FGD scrubber system that contacts the flue gas or the FGD solids, including, but not limited to, the blowdown or purge from the FGD scrubber system, overflow or underflow from the solids separation process, FGD solids wash water, and the filtrate from the solids dewatering process. Wastewater generated from cleaning the FGD scrubber, cleaning FGD solids separation equipment, cleaning FGD solids dewatering equipment, or that is collected in floor drains in the FGD process area is not considered FGD wastewater.

Fly ash. The ash that is carried out of the furnace by a gas stream and collected by a capture device such as a mechanical precipitator, electrostatic precipitator, and/or fabric filter. Economizer ash is included in this definition when it is collected with FA. Ash is not included in this definition when it is collected in wet scrubber air pollution control systems whose primary purpose is particulate removal.

Groundwater. Water that is found in the saturated part of the ground underneath the land surface.

Indirect discharge. Wastewater discharged or otherwise introduced to a POTW.

IPM. Integrated Planning Model.

Landfill. A disposal facility or part of a facility or plant where solid waste, sludges, or other process residuals are placed in or on any natural or manmade formation in the earth for disposal and which is not a storage pile, a land treatment facility, a surface impoundment, an underground injection well, a salt dome or salt bed formation, an underground mine, a cave, or a corrective action management unit.

MDS. Mechanical drag system.

Mechanical drag system. BA handling system that collects BA from the bottom of an EGU in a water-filled trough. The water bath in the trough quenches the hot BA as it falls from the EGU and seals the EGU gases. A drag chain operates in a continuous loop to drag BA from the water trough up an incline, which dewaters the BA by gravity, draining the water back to the trough as the BA moves upward. The dewatered BA is often conveyed to a nearby collection area, such as a small bunker outside the EGU building, from which it is loaded onto trucks and either sold or transported to a landfill. The MDS is considered a dry BA handling system because the ash transport mechanism is mechanical removal by the drag chain, not the water.

Mortality. Death rate or proportion of deaths in a population.

NAICS. North American Industry Classification System.

NPDES. National Pollutant Discharge Elimination System.

NSPSs. New Source Performance Standards.

ORCR. Office of Resource Conservation and Recovery.

Paste. A substance containing solids in a fluid which behaves as a solid until a force is applied that causes it to behave like a fluid.

Paste landfill. A landfill that receives any paste designed to set into a solid after the passage of a reasonable amount of time.

Point source. Any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, vessel, or other floating craft from which pollutants are

or may be discharged. The term does not include agricultural stormwater discharges or return flows from irrigated agriculture. *See* CWA section 502(14), 33 U.S.C. 1362(14); 40 CFR 122.2.

POTW. Publicly owned treatment works. *See* CWA section 212, 33 U.S.C. 1292; 40 CFR 122.2, 403.3.

PSES. Pretreatment Standards for Existing Sources.

Publicly owned treatment works. Any device or system owned by a state or municipality that is used in the treatment (including recycling and reclamation) of municipal sewage or industrial wastes of a liquid nature. These include sewers, pipes, or other conveyances only if they convey wastewater to a POTW providing treatment. *See* CWA section 212, 33 U.S.C. 1292; 40 CFR 122.2, 403.3.

PSC. Public service commission.

PUC. Public utility commission.

RCRA. The Resource Conservation and Recovery Act of 1976, 42 U.S.C. 6901 *et seq*.

Remote MDS. BA handling system that collects BA at the bottom of the EGU, then uses transport water to sluice the ash to a remote MDS that dewaters BA using a similar configuration as the MDS. The remote MDS is considered a wet BA handling system because the ash transport mechanism is water.

RO. Reverse osmosis.

RFA. Regulatory Flexibility Act.

SBA. Small Business Administration.

Sediment. Particulate matter lying below water.

Surface water. All waters of the United States, including rivers, streams, lakes, reservoirs, and seas.

Toxic pollutants. As identified under the CWA, 65 pollutants and classes of pollutants, of which 126 specific substances have been designated priority toxic pollutants. *See* Appendix A to 40 CFR part 423.

Transport water. Wastewater that is used to convey FA, BA, or economizer ash from the ash collection or storage equipment or EGU, and has direct contact with the ash. Transport water does not include low volume, short duration discharges of wastewater from minor leaks (*e.g.,* leaks from valve packing, pipe flanges, or piping) or minor maintenance events (*e.g.,* replacement of valves or pipe sections).

UMRA. Unfunded Mandates Reform Act.

Wet BA handling system. A system in which BA is conveyed away from the EGU using water as a transport medium. Wet BA systems typically send the ash slurry to dewatering bins or a surface impoundment. Wet BA handling systems include systems that operate in conjunction with a traditional wet sluicing system to recycle all BA transport water (*e.g.*, remote MDS or complete recycle systems).

Wet FGD system. Wet FGD systems capture sulfur dioxide from the flue gas using a sorbent that has mixed with water to form a wet slurry, and that generates a water stream that exits the FGD scrubber absorber.

List of Subjects in 40 CFR Part 423

Environmental protection, Electric power generation, Power facilities, Waste treatment and disposal, Water pollution control.

_____

Michael S. Regan,
Administrator.

For the reasons stated in the preamble, the Environmental Protection Agency proposes to amend 40 CFR part 423 as follows:

PART 423— STEAM ELECTRIC POWER GENERATING POINT SOURCE CATEGORY

1. The authority citation for part 423 is revised to read as follows:

AUTHORITY: Secs. 101; 301; 304(b), (c), (e), (g), and (i)(A) and (B); 306; 307; 308 and 501, Clean Water Act (Federal Water Pollution Control Act Amendments of 1972, as amended; 33 U.S.C. 1251 et seq.; 1311; 1314(b), (c), (e), (g), and (i)(A) and (B); 1316; 1317; 1318 and 1361).

2. Amend § 423.11 by:

a. Revising paragraphs (x), (y), and (z);

b. Removing paragraph (bb);

c. Redesignating paragraph (cc) as paragraph (bb) and revising new paragraph (bb);

d. Redesignating paragraph (dd) as paragraph (cc); and

e. Adding new paragraphs (dd) and (ee).

The revisions and additions read as follows:

§ 423.11 Specialized definitions.

* * * * *

(x) The term "early adopter" means the owner or operator certifies under § 423.19(e) that an electric generating unit that generated FGD wastewater on or after October 13, 2020, has installed by **March 24, 2023** biological treatment equipment or zero valent iron treatment equipment to meet all applicable limitations in §423.13(g) or 423.16(e) as those provisions existed on October 13, 2020, and bottom ash handling equipment to meet all applicable limitations in § 423.13(k) or 423.16(g) as those provisions existed on October 13, 2020; that the installed equipment does meet such applicable limitations as of **March 24, 2023**; and that such electric generating unit will and does permanently cease combustion of coal no later than December 31, 2032.

(y) The term "surface impoundment" means a natural topographic depression, man-made excavation, or diked area, which is designed to hold an accumulation of coal combustion residuals and liquids, and the unit treats, stores, or disposes of coal combustion residuals.

(z) The term "tank" means a stationary device, designed to contain an accumulation of wastewater, which is constructed primarily of non-earthen materials (*e.g.,* wood, concrete, steel, plastic) that provide structural support, and which is not a surface impoundment.

* * * * *

(bb) The term "bottom ash purge water" means any water being discharged subject to § 423.13(k)(2)(i) or 423.16(g)(3).

(cc) The term "30-day rolling average" means the series of averages using the measured values of the preceding 30 days for each average in the series.

(dd) The term "surface impoundment decant wastewater" means the layer of a closing surface impoundment's wastewater which is located from the water surface down to the level sufficiently above any coal combustion residuals that, when drained, does not resuspend the coal combustion residuals.

(ee) The term "surface impoundment dewatering wastewater" means the layer of a closing surface impoundment's wastewater which is located below surface impoundment decant wastewater due to its contact with either stationary or resuspended coal combustion residuals.

* * * * *

3. Amend § 423.12 by revising paragraph (b)(11) to read as follows:

§ 423.12 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).

* * * * *

(b)***

(11) The quantity of pollutants discharged in FGD wastewater, flue gas mercury control wastewater, combustion residual leachate, gasification wastewater, bottom ash purge water, surface impoundment decant wastewater, and surface impoundment dewatering wastewater shall not exceed the quantity determined by multiplying the flow of the applicable wastewater times the concentration listed in the following table:

Table 7 to Paragraph (b)(11)

Pollutant or pollutant property	BPT Effluent Limitations	
	Maximum for any 1 day (mg/L)	**Average of daily values for 30 consecutive days shall not exceed (mg/L)**
TSS	100.0	30.0
Oil and grease	20.0	15.0

* * * * *

4. Amend § 423.13 by:

a. Revising paragraphs (g)(1), (2)(ii), (2)(iii), (3)(ii), (k)(1), (2)(i), (2)(iii), (l);

b. Redesignating paragraph (n) as paragraph (p);

c. Redesignating paragraph (m) as paragraph (n) and adding new paragraph (m); and

d. Revising paragraphs (o)(1), and (3).

The revisions and additions read as follows:

§ 423.13 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).

* * * * *

(g)(1)(i) *FGD wastewater*. Except for those discharges to which paragraph (g)(2) or (3) of this section applies, there shall be no discharge of pollutants in FGD wastewater. Dischargers must meet the discharge limitation in this paragraph by a date determined by the permitting authority that is as soon as possible beginning [**DATE 60 DAYS AFTER DATE OF PUBLICATION OF FINAL RULE**], but no later than December 31, 2029. These effluent

limitations apply to the discharge of FGD wastewater generated on and after the date determined by the permitting authority for meeting the effluent limitations, as specified in this paragraph.

(ii) FGD wastewater generated before the date determined by the permitting authority as specified in paragraph (g)(1)(i) of this section.

(A) [Reserved]

* * * * *

(2) * * *

(ii) For any electric generating unit subject to paragraph (g)(2)(i) of this section for which the owner has submitted a certification for the permanent cessation of coal combustion pursuant to § 423.19(f) and has not transferred between subcategories under paragraph (o) of this section, after December 31, 2028, there shall be no discharge of pollutants in FGD wastewater. Any permit issued beginning [**DATE 60 DAYS AFTER DATE OF PUBLICATION OF FINAL RULE**] must contain this no discharge requirement applicable as of January 1, 2029.

(iii) For FGD wastewater discharges from an early adopter electric generating unit, on or before December 31, 2032, the quantity of pollutants in FGD wastewater shall not exceed the quantity determined by multiplying the flow of FGD wastewater times the concentration listed in the table following this paragraph (g)(2)(iii) of this section. After December 31, 2032, there shall be no discharge of pollutants in FGD wastewater. Any permit issued beginning [**DATE 60 DAYS AFTER DATE OF PUBLICATION OF FINAL RULE**] must contain this no discharge requirement applicable as of January 1, 2033.

Table 6 to Paragraph (g)(2)(iii)

	BAT Effluent Limitations	
Pollutant or pollutant property	**Maximum for any 1 day**	**Average of daily values for 30 consecutive days shall not exceed**
Arsenic, total (µg/L)	18	8
Mercury, total (ng/L)	103	34
Selenium, total (µg/L)	70	29
Nitrate/nitrite as N (mg/L)	4	3

* * * * *

(3) * * *

(ii) FGD wastewater generated before December 31, 2028.

(A) For discharges of FGD wastewater generated before December 31, 2023, the quantity of pollutants discharged in FGD wastewater shall not exceed the quantity determined by multiplying the flow of FGD wastewater times the concentration listed for TSS in § 423.12(b)(11).

(B) [Reserved].

* * * * *

(k)(1)(i) *Bottom ash transport water*. Except for those discharges to which paragraph (k)(2) of this section applies, or when the bottom ash transport water is used in the FGD scrubber, there shall be no discharge of pollutants in bottom ash transport water. Dischargers must meet the discharge limitation in this paragraph by a date determined by the permitting authority that is as soon as possible beginning [**DATE 60 DAYS AFTER DATE OF PUBLICATION OF FINAL RULE**], but no later than December 31, 2029. This limitation applies to the discharge of bottom ash transport water generated on and after the date determined by the permitting authority for meeting the discharge limitation, as specified in this paragraph. Except for those discharges to which paragraph (k)(2) of this section applies, whenever bottom ash transport water is used in any other plant process or is sent to a treatment system at the plant (except when it is used in the FGD scrubber), the resulting effluent must comply with the discharge limitation in this paragraph. When the bottom ash transport water is used in the FGD scrubber, it ceases to be bottom ash transport water, and instead is FGD wastewater, which must meet the requirements in paragraph (g) of this section.

(ii) Bottom ash transport water generated before the date determined by the permitting authority as specified in paragraph (k)(1)(i) of this section.

(A) [Reserved]

(2)(i) For early adopter electric generating units:

(A) The discharge of pollutants in bottom ash transport water from a properly installed, operated, and maintained bottom ash system on or before December 31, 2032, is authorized under the following conditions, and after December 31, 2032, there shall be no discharge of pollutants in BA transport water. Any permit issued beginning [**DATE 60 DAYS AFTER DATE OF PUBLICATION OF FINAL RULE**] must contain this no discharge requirement.

(*1*) To maintain system water balance when precipitation-related inflows are generated from storm events exceeding a 10-year storm event of 24-hour or longer duration (*e.g.*, 30-day storm event) and cannot be managed by installed spares, redundancies, maintenance tanks, and other secondary bottom ash system equipment; or

(*2*) To maintain system water balance when regular inflows from wastestreams other than bottom ash transport water exceed the ability of the bottom ash system to accept recycled water and segregating these other wastestreams is not feasible; or

(*3*) To maintain system water chemistry where installed equipment at the facility is unable to manage pH, corrosive substances, substances or conditions causing scaling, or fine particulates to below levels which impact system operation or maintenance; or

(*4*) To conduct maintenance not otherwise included in paragraphs (k)(2)(i)(A)(*1*), (*2*), or (*3*) of this section and not exempted from the definition of transport water in § 423.11(p), and when water volumes cannot be managed by installed spares, redundancies, maintenance tanks, and other secondary bottom ash system equipment.

(B) The total volume that may be discharged for the activities in paragraph (k)(2)(i)(A) of this section shall be reduced or eliminated to the extent achievable using control measures (including best management practices) that are technologically available and economically achievable in light of best industry practice. The total volume of the discharge authorized in this paragraph shall be determined on a case-by-case basis by the permitting authority and in no event shall such discharge exceed a 30-day rolling average of ten percent of the primary active

wetted bottom ash system volume. The volume of daily discharges used to calculate the 30-day rolling average shall be calculated using measurements from flow monitors.

* * * * *

(iii) For any electric generating unit subject to paragraph (k)(2)(ii) of this section for which the owner has submitted a certification for the permanent cessation of coal combustion pursuant to § 423.19(f), and has not transferred to another subcategory under paragraph (o) of this section, after December 31, 2028, there shall be no discharge of pollutants in bottom ash transport water. Any permit issued beginning [**DATE 60 DAYS AFTER DATE OF PUBLICATION OF FINAL RULE**] must contain this no discharge requirement applicable as of January 1, 2029.

(l) *Combustion residual leachate*. The quantity of pollutants in combustion residual leachate shall not exceed the quantity determined by multiplying the flow of combustion residual leachate times the concentration listed in the table following this paragraph (l). Dischargers must meet the effluent limitations in this paragraph by a date determined by the permitting authority that is as soon as possible beginning [**DATE 60 DAYS AFTER DATE OF PUBLICATION OF FINAL RULE**], but no later than December 31, 2029. These effluent limitations apply to the discharge of combustion residual leachate generated on and after the date determined by the permitting authority for meeting the effluent limitations, as specified in this paragraph.

Table 9 to Paragraph (l)

Pollutant or pollutant property	BAT Effluent Limitations	
	Maximum for any 1 day	**Average of daily values for 30 consecutive days shall not exceed**
Arsenic, total (µg/L)	11	8
Mercury, total (ng/L)	788	356

(m)(1) Surface impoundment decant wastewater.

(A) [Reserved].

(2) Surface impoundment dewatering wastewater.

(A) [Reserved].

(3) Bottom ash purge water.

(A) [Reserved].

(n) At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as a concentration limitation instead of any mass-based limitations specified in paragraphs (b) through (m) of this section. Concentration limitations shall be those concentrations specified in this section.

(o)(1) Transfer between subcategories and applicable limitations in a permit. Where, in the permit, the permitting authority has included alternative limitations subject to eligibility requirements, upon timely notification to the permitting authority under §423.19(i), a facility can become subject to the alternative limitations under the following circumstances:

(i) On or before December 31, 2025, a facility may convert:

(A) From voluntary incentives program limitations under paragraph (g)(3)(i) of this section to limitations for electric generating units permanently ceasing coal combustion under paragraph (g)(2)(i) of this section; or

(B) From limitations for electric generating units permanently ceasing coal combustion under paragraphs (g)(2)(i) or (k)(2)(ii) of this section to voluntary incentives program limitations under paragraphs (g)(3)(i) of this section or generally applicable limitations under (k)(1)(i) of this section.

* * * * *

(3) Where a facility seeking a transfer is currently subject to more stringent limitations than the limitations being sought, the facility must continue to meet those more stringent limitations.

(p) In the event that wastestreams from various sources are combined for treatment or discharge, the quantity of each pollutant or pollutant property controlled in paragraphs (a) through (n) of this section attributable to each controlled waste source shall not exceed the specified limitation for that waste source.

5. Amend § 423.16 by revising paragraphs (e)(1) and (g)(1), and adding paragraphs (j) and (k) to read as follows:

§ 423.16 Pretreatment standards for existing sources (PSES).

* * * * *

(e)(1) *FGD wastewater.* (i) Except as provided for in paragraph (e)(2) of this section, for any electric generating unit with a total nameplate generating capacity of more than 50 megawatts, that is not an oil-fired unit, and that the owner has not certified to the permitting authority that it will permanently cease coal combustion pursuant to § 423.19(f), there shall be no discharge of pollutants in FGD wastewater. Dischargers must meet the standards in this paragraph by [**DATE 3 YEARS AFTER DATE OF PUBLICATION OF FINAL RULE]** except as provided for in paragraph (e)(2) of this section. These standards apply to the discharge of FGD wastewater generated on and after [**DATE 3 YEARS AFTER DATE OF PUBLICATION OF FINAL RULE**].

(ii) For any electric generating unit excepted from paragraph (e)(1)(i) of this section because the owner has submitted a certification for the permanent cessation of coal combustion pursuant to § 423.19(f), after December 31, 2028, there shall be no discharge of pollutants in FGD wastewater.

(2) For FGD wastewater discharges from an early adopter electric generating unit, on or before December 31, 2032, the quantity of pollutants in FGD wastewater shall not exceed the quantity determined by multiplying the flow of FGD wastewater times the concentration listed in the table following this paragraph (e)(2) of this section. After December 31, 2032, there shall be no discharge of pollutants in FGD wastewater.

Table 3 to Paragraph (e)(2)

Pollutant or pollutant property	**PSES**	
	Maximum for any 1 day	**Average of daily values for 30 consecutive days shall not exceed**
Arsenic, total (ug/L)	18	8

Mercury, total (ng/L)	103	34
Selenium, total (ug/L)	70	29
Nitrate/nitrite as N (mg/L)	4	3

* * * * *

(g) *Bottom ash transport water*. (1) Except for those discharges to which paragraph (g)(2) of this section applies, or when the bottom ash transport water is used in the FGD scrubber, for any electric generating unit with a total nameplate generating capacity of more than 50 megawatts, that is not an oil-fired unit, and that the owner has not certified to the permitting authority that the electric generating unit will permanently cease coal combustion pursuant to § 423.19(f), there shall be no discharge of pollutants in bottom ash transport water. This standard applies to the discharge of bottom ash transport water generated on and after [**DATE 60 DAYS AFTER DATE OF PUBLICATION OF FINAL RULE**]. Except for those discharges to which paragraph (g)(3) of this section applies, whenever bottom ash transport water is used in any other plant process or is sent to a treatment system at the plant the resulting effluent must comply with the discharge standard in this paragraph.

(2) For any electric generating unit excepted from paragraph (g)(1) because the owner has submitted a certification for the permanent cessation of coal combustion pursuant to § 423.19(f), after December 31, 2028, there shall be no discharge of pollutants in bottom ash transport water.

(3) For early adopter electric generating units:

(i) The discharge of pollutants in bottom ash transport water from a properly installed, operated, and maintained bottom ash system on or before December 31, 2032, is authorized under the following conditions, and after December 31, 2032, there shall be no discharge of pollutants in BA transport water.

(A) To maintain system water balance when precipitation-related inflows are generated from a 10-year storm event of 24-hour or longer duration (*e.g.*, 30-day storm event) and cannot

be managed by installed spares, redundancies, maintenance tanks, and other secondary bottom ash system equipment; or

(B) To maintain system water balance when regular inflows from wastestreams other than bottom ash transport water exceed the ability of the bottom ash system to accept recycled water and segregating these other wastestreams is feasible; or

(C) To maintain system water chemistry where current operations at the facility are unable to currently manage pH, corrosive substances, substances or conditions causing scaling, or fine particulates to below levels which impact system operation or maintenance; or

(D) To conduct maintenance not otherwise included in paragraphs (g)(3)(i)(A), (B), or (C) of this paragraph and not exempted from the definition of transport water in § 423.11(p), and when water volumes cannot be managed by installed spares, redundancies, maintenance tanks, and other secondary bottom ash system equipment.

(ii) The total volume that may be discharged to a POTW for the activities in paragraph (g)(3)(i) of this section shall be reduced or eliminated to the extent achievable as determined by the control authority. The control authority may also include control measures (including best management practices) that are technologically available and economically achievable in light of best industry practice. In no event shall the total volume of the discharge exceed a 30-day rolling average of ten percent of the primary active wetted bottom ash system volume. The volume of daily discharges used to calculate the 30-day rolling average shall be calculated using measurements from flow monitors.

* * * * *

(j) Combustion residual leachate. The quantity of pollutants in combustion residual leachate shall not exceed the quantity determined by multiplying the flow of combustion residual leachate times the concentration listed in the table following this paragraph (j). Dischargers must meet the standards in this paragraph [**DATE 60 DAYS AFTER DATE OF PUBLICATION OF FINAL RULE**].

Table 5 to Paragraph (j)

Pollutant or pollutant property	PSES	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed
Arsenic, total (ug/L)	11	8
Mercury, total (ng/L)	788	356

(k) Surface impoundment decant wastewater, surface impoundment dewatering wastewater, and bottom ash purge water.

(1) Surface impoundment decant wastewater.

(A) [Reserved].

(2) Surface impoundment dewatering wastewater.

(A) [Reserved].

(3) Bottom ash purge water.

(A) [Reserved].

6. Amend § 423.18 by revising paragraph (a) to read as follows.

§ 423.18 Permit conditions.

(a) All permits subject to this part shall include the following permit conditions:

(1) An electric generating unit shall qualify as permanently ceasing the combustion of coal by December 31, 2028, or December 31, 2032, if such qualification would have been demonstrated absent the following qualifying event:

(i) An emergency order issued by the Department of Energy under Section 202(c) of the Federal Power Act;

(ii) A reliability must run agreement issued by a Public Utility Commission; or

(iii) Any other reliability-related order or agreement issued by a competent electricity regulator (*e.g.*, an independent system operator) which results in that electric generating unit operating in a way not contemplated when the certification was made; or

(2)(i) The operation of the electric generating unit was necessary for load balancing in an area subject to a declaration under 42 U.S.C. 5121 *et seq*., that there exists:

(A) An “Emergency”; or

(B) A “Major Disaster”; and

(3) That load balancing was due to the event that caused the “Emergency” or “Major Disaster” in paragraph (a)(2)(i) of this section to be declared.

* * * * *

7. Amend § 423.19 by:

a. Removing paragraph (d);

b. Redesignating paragraph (c) as paragraph (d) and adding a new paragraph (c) and revising the newly designated paragraph (d);

c. Revising paragraphs, (e), (f)(1) and (4), (i), and (j); and

d. Adding paragraph (k).

The revisions and additions read as follows:

§ 423.19 Reporting and recordkeeping requirements.

* * * * *

(c) Publicly accessible Internet site requirements.

(1) Except as provided in paragraph (c)(2) of this section, each facility subject to the requirements of this part must maintain a publicly accessible internet site (ELG website) containing the information specified in paragraphs (d) through (l) of this section, if applicable. This website shall be titled “ELG Rule Compliance Data and Information.” The facility must ensure that all information required to be posted is immediately available to anyone visiting the site, without requiring any prerequisite, such as registration or a requirement to submit a document request. All required information must be clearly identifiable and must be able to be immediately downloaded by anyone accessing the site in a format that enables additional analysis (*e.g.*, comma-separated values text file format). When the facility initially creates, or later changes, the web address (*i.e.*, Uniform Resource Locator (URL)) at any point, they must notify EPA via the “contact us” form on EPA’s Effluent Guidelines website and the permitting

authority or control authority within 14 days of creating the website or making the change. The facility's ELG website must also have a "contact us" form or a specific email address posted on the website for the public to use to submit questions and issues relating to the availability of information on the website.

(2) Combined websites.

(i) When an owner or operator subject to this section already maintains a "CCR Rule Compliance Data and Information" website pursuant to 40 CFR 257.107, the postings required under this section may be made to the existing "CCR Rule Compliance Data and Information" website and shall be delineated under a separate heading that shall state "ELG Rule Compliance Data and Information." When electing to use an existing website pursuant to this paragraph, the facility shall notify EPA via the "contact us" form on EPA's Effluent Guidelines website and the permitting authority or control authority no later than [**DATE 60 DAYS AFTER DATE OF PUBLICATION OF FINAL RULE**].

(ii) When the same owner or operator is subject to the provisions of this part for multiple facilities, the owner or operator may comply with the requirements of this section by using the same Internet site for multiple facilities provided the ELG website clearly delineates information by the name of each facility.

(3) Unless otherwise required in this section, the information required to be posted to the ELG website must be made available to the public for at least 10 years following the date on which the information was first posted to the ELG website, or the length of the permit plus five years, whichever is longer. All required information must be clearly identifiable and must be able to be immediately downloaded by anyone accessing the site in a format that enables additional analysis (*e.g.*, comma-separated values text file format).

(4) Unless otherwise required in this section, the information must be posted to the ELG website:

(i) Within 30 days of submitting the information to the permitting authority or control authority; or

(ii) Where information was submitted to the permitting authority or control authority prior to [**DATE 60 DAYS AFTER DATE OF PUBLICATION OF FINAL RULE**], by [**DATE 60 DAYS AFTER DATE OF PUBLICATION OF FINAL RULE**].

(d) Requirements for early adopter electric generating units discharging bottom ash transport water pursuant to § 423.13(k)(2)(i) or 423.16(g)(3).

(1) *Initial Certification Statement*. For sources seeking to discharge bottom ash transport water pursuant to § 423.13(k)(2)(i) or 423.16(g)(3), an initial certification shall be submitted to the permitting authority by [**DATE 60 DAYS AFTER DATE OF PUBLICATION OF FINAL RULE**].

(2) *Signature and certification*. The certification statement must be signed and certified by a professional engineer.

(3) *Contents*. An initial certification shall include the following:

(i) A statement that the professional engineer is a licensed professional engineer.

(ii) A statement that the professional engineer is familiar with the regulation requirements.

(iii) A statement that the professional engineer is familiar with the facility.

(iv) The primary active wetted bottom ash system volume in § 423.11(aa).

(v) Material assumptions, information, and calculations used by the certifying professional engineer to determine the primary active wetted bottom ash system volume.

(vi) A list of all potential discharges under § 423.13(k)(2)(i)(A)(*1*) through (A)(*4*) or 423.16(g)(3)(i) through (iv), the expected volume of each discharge, and the expected frequency of each discharge.

(vii) Material assumptions, information, and calculations used by the certifying professional engineer to determine the expected volume and frequency of each discharge

including a narrative discussion of why such water cannot be managed within the system and must be discharged.

(viii) A list of all wastewater treatment systems at the facility currently, or otherwise required by a date certain under this section.

(ix) A narrative discussion of each treatment system including the system type, design capacity, and current or expected operation.

(e) Requirements for early adopter electric generating units.

(1) *Notice of Planned Participation*. For sources seeking to qualify as early adopter electric generating units that will achieve permanent cessation of coal combustion by December 31, 2032, under this part, a Notice of Planned Participation shall be submitted to the permitting authority or control authority no later than [**DATE 1 YEAR AFTER DATE OF PUBLICATION OF FINAL RULE**].

(2) *Contents*. A Notice of Planned Participation shall identify the early adopter electric generating unit intended to achieve the permanent cessation of coal combustion. A Notice of Planned Participation shall include:

(i) A statement that the electric generating unit discharged FGD wastewater on or after October 13, 2020;

(ii) A statement that the facility was in compliance with the FGD wastewater limitations of § 423.13(g)(2)(iii) or 423.16(e)(2)(i) as those provisions existed on October 13, 2020, and where applicable the bottom ash transport water limitations of § 423.13(k)(2)(i) or 423.16(g)(2)(i) as those provisions existed on October 13, 2020, by **March 24, 2023** with the following additional details:

(A) A diagram of the treatment chain for FGD wastewater, including the biological treatment or zero valent iron component, with a complete narrative discussion explaining the components of the treatment chain including the flows entering, leaving, or passing through each component, a description of any solids generated by each component, and measurements (or

where necessary, estimates) of both the flows and solids (*e.g.*, gallons per minute, tons per day, etc.);

(B) A diagram of the bottom ash handling system with a complete narrative discussion explaining the treatment chain including the flows entering, leaving, or passing through each component, a description of any solids generated by each component, and measurements (or where necessary, estimates) of both the flows and solids (*e.g.*, gallons per minute, tons per day, etc.);

(C) The dates the treatment chains in paragraph (e)(2)(ii) of this section were commissioned, or where separate components were commissioned on different dates, the commission dates of each;

(D) All effluent monitoring data from the relevant outfall(s) or, where an internal monitoring location(s) was used, from the internal monitoring location(s); and

(E) Where applicable, the data and calculations demonstrating compliance of the diluted FGD wastewater where monitoring data from the relevant outfall captures a diluted wastestream shall include a narrative discussion of all data, assumptions, and calculations such that an independent party could duplicate the work.

(iii) The expected date that each electric generating unit is projected to achieve permanent cessation of coal combustion, whether each date represents a retirement or a fuel conversion, whether each retirement or fuel conversion has been approved by a regulatory body, and what the relevant regulatory body is. The Notice of Planned Participation shall also include a copy of the most recent integrated resource plan for which the applicable state agency approved the retirement or repowering of the unit subject to the ELGs, or other documentation supporting that the electric generating unit will permanently cease the combustion of coal by December 31, 2032. The Notice of Planned Participation shall also include, for each such electric generating unit, a timeline to achieve the permanent cessation of coal combustion. Each timeline shall include interim milestones and the projected dates of completion.

(3) *Annual Progress Report*. Annually after submission of the Notice of Planned Participation in paragraph (e)(1) of this section, a progress report shall be filed with the permitting authority, or control authority in the case of an indirect discharger.

(4) *Contents*. An Annual Progress Report shall detail the completion of any interim milestones listed in the Notice of Planned Participation since the previous progress report, provide a narrative discussion of any completed, missed, or delayed milestones, and provide updated milestones. An annual progress report shall also include one of the following:

(i) A copy of the official suspension filing (or equivalent filing) made to the facility's reliability authority detailing the conversion to a fuel source other than coal;

(ii) A copy of the official retirement filing (or equivalent filing) made to the facility's reliability authority which must include a waiver of recission rights; or

(iii) An initial certification, or recertification for subsequent annual progress reports, containing either a statement that the facility will make the filing required in paragraph (e)(4)(i) of this section or a statement that the facility will make the filing required in paragraph (e)(4)(ii) of this section. The certification or recertification must include the estimated date that such a filing will be made.

(iv) A facility shall not include a certification or recertification under paragraph (e)(4)(iii) of this section in the final annual progress report submitted prior to permanent cessation of coal combustion. Rather, this final annual progress report must include the filing under paragraph (e)(4)(i) or (ii) of this section.

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(f) * * *

(1) *Notice of Planned Participation*. For sources seeking to qualify as an electric generating unit that will achieve permanent cessation of coal combustion by December 31, 2028, under this part, a Notice of Planned Participation shall be made to the permitting authority, or to

the control authority in the case of an indirect discharger, no later than [**DATE 60 DAYS AFTER DATE OF PUBLICATION OF FINAL RULE**].

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(4) *Contents*. An Annual Progress Report shall detail the completion of any interim milestones listed in the Notice of Planned Participation since the previous progress report, provide a narrative discussion of any completed, missed, or delayed milestones, and provide updated milestones. An annual progress report shall also include one of the following:

(i) A copy of the official suspension filing (or equivalent filing) made to the facility's reliability authority detailing the conversion to a fuel source other than coal;

(ii) A copy of the official retirement filing (or equivalent filing) made to the facility's reliability authority which must include a waiver of recission rights; or

(iii) An initial certification, or recertification for subsequent annual progress reports, containing either a statement that the facility will make the filing required in paragraph (f)(4)(i) of this section or a statement that the facility will make the filing required in paragraph (f)(4)(ii) of this section. The certification or recertification must include the estimated date that such a filing will be made.

(iv) A facility shall not include a certification or recertification under paragraph (f)(4)(iii) of this section in the final annual progress report submitted prior to permanent cessation of coal combustion. Rather, this final annual progress report must include the filing under paragraph (f)(4)(i) or (ii) of this section.

* * * * *

(i) Requirements for facilities seeking to transfer between subcategories and applicable limitations in a permit under § 423.13(o).

(1) *Notice of Planned Participation*. For sources which have filed a Notice of Planned Participation under paragraphs (f)(1) or (h)(1) of this section and intend to make changes that would qualify them for a different set of requirements under § 423.13(o), a Notice of Planned

Participation shall be made to the permitting authority, or to the control authority in the case of an indirect discharger, no later than the dates stated in §423.13(o)(1).

(2) *Contents*. A Notice of Planned Participation shall include a list of the electric generating units for which the source intends to change compliance alternatives. For each such electric generating unit, the notice shall list the specific provision under which this transfer will occur, the reason such a transfer is warranted, and a narrative discussion demonstrating that each electric generating unit will be able to maintain compliance with the relevant provisions.

(j) Notice of Material Delay.

(1) *Notice*. Within 30 days of experiencing a material delay in the milestones set forth in paragraphs (e)(2), (f)(2), or (h)(2) of this section, and where such a delay may preclude permanent cessation of coal combustion or compliance with the voluntary incentives program limitations by December 31, 2028, or December 31, 2032, for early adopter electric generating units, a facility shall file a notice of material delay with the permitting authority, or control authority in the case of an indirect discharger.

(2) *Contents*. The contents of such a notice shall include the reason for the delay, the projected length of the delay, and a proposed resolution to maintain compliance.

(k) Requirements for facilities with coal combustion residual landfills or surface impoundments

(1) *Annual Combustion Residual Leachate Monitoring Report*. In addition to reporting pursuant to 40 CFR part 127, each facility treating combustion residual leachate in groundwater to comply with § 423.13(l) or 423.16(j) shall file an annual combustion residual leachate monitoring report each calendar year to the permitting authority or control authority for indirect discharges of the treated CRL.

(2) *Contents*. The annual combustion residual leachate monitoring report shall provide the following monitoring data for each pollutant listed in the table following this section. For paragraphs (k)(2)(ii) and (iii) of this section the report shall also describe the location of

monitoring wells, screening depth, and frequency of sampling. The report shall include summary statistics including monthly minimum, maximum, and average concentrations for each pollutant. The report shall be supported by an appendix of all samples.

(i) Effluent monitoring data reported pursuant to 40 CFR part 127.

(ii) Groundwater monitoring data as the combustion residual leachate leaves each of the landfills and surface impoundments discharging through groundwater.

(iii) Groundwater monitoring at the point the combustion residual leachate enters each surface waterbody.

(iv) Summary statistics for the data described in paragraphs (k)(2)(i) through (iii) of this section including the monthly average and daily maximum of each pollutant and a comparison to any limitation in § 423.13(l) or 423.16(j).

Table 1 to Paragraph (k)(2)(iv)

BAT/PSES Treated Pollutants in Combustion Residual Leachate	
Antimony	Magnesium
Arsenic	Manganese
Barium	Mercury
Beryllium	Molybdenum
Cadmium	Nickel
Chromium	Thallium
Cobalt	Titanium
Copper	Vanadium
Lead	Zinc

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