



ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 423

[EPA–HQ–OW–2009–0819; FRL–8794.2-01-OW]

RIN 2040-AG41

Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category – Unmanaged Combustion Residual Leachate

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule.

SUMMARY: The U.S. Environmental Protection Agency (EPA or Agency) is proposing a Clean Water Act (CWA) regulation to revise the technology-based effluent limitations guidelines and standards (ELGs) promulgated in the 2024 “Supplemental Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category” (2024 ELG).

This proposed regulation for the steam electric power generating point source category applies to unmanaged combustion residual leachate (CRL) at existing sources and is estimated to reduce costs by \$446 to \$1,090 million dollars annually at a 3 percent discount rate.

DATES: Comments must be received on or before **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: You may send comments, identified by Docket ID No. EPA–HQ–OW–2009–0819, by any of the following methods:

Federal eRulemaking Portal: <https://www.regulations.gov/> (our preferred method). Follow the online instructions for submitting comments.

E-mail: ow-docket@epa.gov. Include Docket ID No. EPA–HQ–OW–2009–0819 in the subject line of the message.

Mail: U.S. Environmental Protection Agency, EPA Docket Center, Office of Water, Office of Science and Technology, Docket, Mail Code 28221T, 1200 Pennsylvania Avenue NW, Washington, DC 20460.

Hand Delivery or Courier: EPA Docket Center, WJC West Building, Room 3334, 1301 Constitution Avenue, NW, Washington, DC 20004. The Docket Center's hours of operations are 8:30 a.m. to 4:30 p.m., Monday through Friday (except Federal Holidays).

Instructions: All submissions received must include the Docket ID No. for this rulemaking. Comments received may be posted without change to <https://www.regulations.gov>, including personal information provided. For detailed instructions on sending comments and additional information on the rulemaking process, see the "Public Participation" heading of the **SUPPLEMENTARY INFORMATION** section of this document.

FOR FURTHER INFORMATION CONTACT: Dr. Paul Shriner, Engineering and Analysis Division Office of Water (Mail Code 4303T), Environmental Protection Agency, 1200 Pennsylvania Avenue, NW; Washington, DC 20460; telephone number: 202-566-1076; email address: shriner.paul@epa.gov. Information about the Steam Electric Effluent Limitations Guidelines and Standards (ELGs) is available online at <https://www.epa.gov/eg/steam-electric-power-generating-effluent-guidelines>.

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I. Executive Summary

The EPA is proposing this rule to update requirements that apply to wastewater discharges from steam electric power plants, particularly coal-fired power plants. In 2024, the EPA finalized revisions to the technology-based effluent limitations guidelines and standards (ELGs) for the steam electric power generating point source category that imposed stringent requirements on certain wastewaters from these plants, requiring the facilities not to discharge any pollutants or imposing non-zero numerical limitations on pollutants from certain types of industrial wastewaters (89 FR 40198, May 9, 2024) (hereinafter the “2024 ELG”).

Subsequent to promulgation of the 2024 ELG, the EPA became aware of new information regarding the retirement status of a number of plants as well as updates some dischargers have made to their wastewater treatment in place. The EPA also identified a flaw in the baseline utilized by the 2024 ELG as it pertains to unmanaged combustion residual leachate (CRL) by omitting capture and pumping costs, an important component of the technology basis. The EPA’s revised analysis presented shows these costs imposed by the 2024 ELG are not insignificant. As such, the EPA is concerned about other cost elements that could be impacted by the Agency’s assumptions that 100 percent of the contaminated groundwater could in fact be captured and treated, and the Agency’s assumptions regarding power plants’ ability to achieve the 2024 ELG numerical limitations. The EPA is also concerned that the 2024 ELG may not have fully accounted for the lack of revenue generated by closed utilities, and thus the lack of funding available, to implement treatment in an economically achievable way. In addition, despite the EPA previously acknowledging very little data that characterizes groundwater laden with unmanaged CRL, commenters have not provided any additional data to help characterize this wastestream. In light of the increasing costs, the EPA is now reconsidering the

characterization data gap and how it may impact costs.

In the time following the promulgation of the 2024 ELG, the U.S. has experienced extraordinary increases in energy demand, decreases in energy reserves, difficulties in transmission across the electricity grid, increases in energy prices, and heightened concerns about energy reliability. Consequently, in March 2025, EPA Administrator Zeldin announced that the Agency would reconsider 2024 pollution limitations for coal-fired power plants. The EPA identified additional information that showed that, due to supply chain logistical challenges as well as the unique characteristics of each plant's operational needs, the deadlines to comply with the 2024 ELG were infeasible and impractical on a nationwide basis. In late 2025, the EPA issued a final rule that, in part, extended compliance deadlines for many of the zero-discharge requirements in the 2024 ELG and the deadline for facilities to submit a Notice of Planned Participation for the permanent cessation of coal combustion. These compliance deadline extensions gave utilities and permitting authorities the flexibilities needed to ensure affordable and reliable power (90 FR 61328; December 31, 2025) (hereinafter the "2025 Deadline Extensions Rule"). The 2025 Deadline Extensions Rule did not change the underlying technology bases for the 2024 effluent limitations based on BAT. Subsequent to the 2025 Deadline Extensions Rule, the EPA intended to further evaluate data obtained after the promulgation of the 2024 ELG, as well as data submitted during the 2025 Deadline Extensions Rule public comment period, to determine if further rulemaking for reconsidering the BAT requirements imposed by the 2024 ELG is appropriate.

This proposed rulemaking continues to advance the Trump Administration's commitment to unleash American energy by revising the existing Steam Electric ELG for unmanaged combustion residual leachate to ensure the 2024 ELG does not financially cripple this critical industry or contribute to burdensome energy costs for American families. CRL is leachate from landfills or surface impoundments (collectively called waste management units) that contain coal combustion residuals (CCR). Leachate is composed of liquid, including any suspended or

dissolved constituents in the liquid, that has percolated through waste or other materials emplaced in a landfill or that passes through the surface impoundment's containment structure (e.g., bottom, liner, dikes, berms). CRL is typically managed using a liner and leachate-collection system. The primary function of the leachate-collection system is to collect and convey leachate out of the landfill unit and to control the depth of the leachate above the liner. In contrast, many CCR landfills and surface impoundments also have unmanaged CRL, which is distinct from managed CRL. Unmanaged CRL is leachate that is not captured from a leachate-collection system and instead percolates out of the landfill or impoundment unit and into the subsurface. These CRL wastestreams are defined in the current Steam Electric ELGs, and the EPA is using the same definition of unmanaged CRL as it did in the 2024 ELG.

Unmanaged CRL is a complex wastestream from coal-fired power plants. The extent to which unmanaged CRL exists at any given plant is variable and not well documented, the characterization of the unmanaged leachate significantly varies by location, and unmanaged leachate discharges can fluctuate rapidly and extensively. Additionally, unmanaged CRL is one of the more costly wastestreams for coal-fired power plants to manage effectively because, in addition to the treatment technologies themselves that must be sized to accommodate a large volume of flow, a potentially complex and costly system for extracting large volumes¹ of CRL laden wastewater must be installed. This proposal describes the challenges addressing unmanaged CRL, offers a range of regulatory options based on different known technologies, and solicits comment and data on the availability, performance, feasibility, and costs of each proposed option. This proposal only pertains to unmanaged CRL and does not include any proposed changes to managed CRL requirements imposed by the 2024 ELG.

II. Does this action apply to me?

Entities potentially regulated by this action include:

¹ As discussed later in this preamble, coal ash impoundments containing CRL are typically more than 50 acres in size and more than 20 feet deep. A system for collecting CRL laden groundwater for treatment would need to be sized accordingly.

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 table is not intended to be exhaustive but rather provides a guide for readers regarding entities likely to be regulated by this action. This table includes the types of entities that the EPA is aware could potentially be regulated by this action. Other types of entities not included could also be regulated. To determine whether your entity is regulated by this action, you should carefully examine the applicability criteria found in 40 CFR 423.10 (Applicability). If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the **FOR FURTHER INFORMATION CONTACT** section.

III. What is the Agency’s authority for taking this action?

The authority for this rulemaking is the Federal Water Pollution Control Act, 33 U.S.C. 1251 *et seq.*, including the Clean Water Act (CWA) sections 301, 304(b), 304(g), 307, 402(a), and 501(a); 33 U.S.C. 1311, 1314(b), 1314(g), 1317, 1342(a), and 1361(a).

Unless otherwise provided by law, agencies may reconsider past decisions and revise, replace or repeal a decision so long as the agency provides a reasoned explanation and considers significant reliance interests. *FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 515 (2009); *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 42 (1983); *see also Nat’l Ass’n of Home Builders v. EPA*, 682 F.3d 1032, 1038 & 1043 (D.C. Cir. 2012) (a revised rulemaking based “on a reevaluation of which policy would be better in light of the facts” is “well within an agency’s discretion,” and “[a] change in administration brought about by the people casting their votes is a perfectly reasonable basis for an executive agency’s reappraisal” of its policy choices) (citations omitted). As discussed in section I of this preamble above and as described in further detail below, the EPA is reconsidering the 2024 ELG for unmanaged CRL, in part, because the EPA is concerned that the 2024 ELG may not have relied on appropriately

up-to-date and complete data in reaching its decision to regulate unmanaged CRL using technology that the EPA now proposes, based upon new and more complete information, is economically unachievable.

IV. Background

A. Clean Water Act

Congress passed the Federal Water Pollution Control Act Amendments of 1972, also known as the 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 direct discharge of pollutants from a point source to waters of the United States (WOTUS), except as authorized under the CWA. Under CWA section 402, discharges may be authorized through a National Pollutant Discharge Elimination System (NPDES) permit. 33 U.S.C. 1342. The CWA also authorizes the EPA to establish nationally applicable, technology-based ELGs for discharges from different categories of point sources, such as industrial, commercial, and public sources. 33 U.S.C. 1311, 1314.

Direct dischargers (*i.e.*, those discharging directly to WOTUS rather than through publicly owned treatment works, or POTWs) must comply with effluent limitations in NPDES permits.² Discharges that flow through groundwater before reaching surface waters that are the “functional equivalent” of a direct discharge from a point source to a WOTUS are considered direct discharges and must comply with effluent limitations in NPDES permits. *See Cnty. of Maui v. Haw. Wildlife Fund*, 590 U.S. 165 (2020). Based upon the applicable effluent limitations guidelines (ELGs) promulgated by the EPA, numeric limitations in NPDES permits are implemented through discharger-specific technology-based effluent limitations (TBELs). CWA sections 301 and 304, 33 U.S.C. 1311 and 1314. If an ELG promulgated by the EPA is inapplicable, then the permitting authority sets TBELs based on its best professional judgment

² Indirect dischargers that discharge through POTWs must comply with pretreatment standards.

(BPJ). CWA section 402(a)(1)(B), 33 U.S.C. 1342(a)(1)(B); 40 CFR 125.3(c).

The EPA establishes ELGs by regulation for categories of point source dischargers that are based on the degree of control that can be achieved using various levels of pollution control technology. The EPA promulgates national ELGs for major industrial categories for three classes of pollutants: (1) conventional pollutants (*i.e.*, total suspended solids or TSS, oil and grease, biochemical oxygen demand or BOD₅, 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 CWA section 307(a), 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 or TDS).

B. Relevant Effluent Guidelines

The EPA develops ELGs that are technology-based regulations for a category of dischargers and are not based on a discharge's effect on water quality. *See, e.g., Sw. Elec. Power Co. v. EPA*, 920 F.3d 999, 1005 (5th Cir. 2019) (“[T]he 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). The EPA bases these regulations, in part, on the performance of control and treatment technologies.

There are several TBELs that may apply to a given discharger when issued a NPDES permit 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, the EPA establishes effluent limitations based on best practicable control technology (BPT) by considering the average of the best performances of facilities within the industry, grouped to reflect various ages, sizes, processes, or other common characteristics. The

EPA may promulgate ELGs establishing BPT-based limitations for conventional, toxic, and nonconventional pollutants. In specifying BPT, the EPA looks at a number of factors. The 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 (NWQEI, 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).

2. Best Available Technology Economically Achievable

BAT represents the second level of stringency for controlling direct discharge of toxic and nonconventional pollutants, after BPT. The U.S. Court of Appeals for the Fifth Circuit has referred to this as the CWA's "gold standard" for controlling discharges from existing sources. *Sw. Elec. Power Co.*, 920 F.3d at 1003. In general, BAT represents the best available, economically achievable performance of facilities in the industrial subcategory or category. Consistent with the statutory language, the EPA considers technological availability and 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 the 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, NWQEI (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 each factor. *Weyerhaeuser Co. v. Costle*, 590 F.2d 1011, 1045 (D.C. Cir. 1978). This is especially true for EPA's consideration of NWQEI. *BP Expl. & Oil, Inc. v. EPA*, 66 F.3d 784, 801-02 (6th Cir. 1995). Historically, the EPA has generally determined 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 in

the industry as a whole. *See, e.g., Sw. Elec. Power Co.*, 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). Under this approach, BAT may be based upon process changes or internal controls, even when these technologies are not widespread industry practice. *See Id.* at 132, 140; *Reynolds Metals Co. v. EPA*, 760 F.2d 549, 562 (4th Cir. 1985); *Cal. & Hawaiian Sugar Co. v. EPA*, 553 F.2d 280, 285-88 (2d Cir. 1977). Courts have previously endorsed this approach. *See Kennecott v. EPA*, 780 F.2d 445, 448 (4th Cir. 1985); *see also Sw. Elec. Power Co.*, 920 F.3d at 1031.

3. Best Professional Judgment

In CWA section 301 and the EPA's implementing regulation at 40 CFR 125.3(a) indicate that technology-based treatment requirements under section 301(b) represent the minimum level of control that must be included in an NPDES permit. *See* 33 U.S.C. 1311. Where EPA has not promulgated a BPT or BAT-based limitation applicable to a category or subcategory of dischargers discharging directly into a WOTUS, or where such an EPA-promulgated ELG has been remanded by a court or withdrawn by the EPA, the EPA has provided by regulation that such treatment requirements are to be established by the NPDES permitting authority on a case-by-case basis using the permit writer's BPJ. Under the EPA's regulations, these case-by-case TBELs are developed by permit writers on the basis that CWA section 402(a)(1) authorizes the 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." 33 U.S.C. 1342(a)(1). 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." Furthermore, 40

CFR 125.3(c)(3) states that “[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 as those that the EPA considers when establishing effluent guidelines. *See* 40 CFR 125.3(d)(1)-(3).

C. 2015 Steam Electric ELG

1. Summary of the 2015 ELG

On November 3, 2015, the EPA promulgated a rule revising the regulations for the steam electric power generating point source category at 40 CFR part 423. 80 FR 67838 (2015 ELG). The 2015 ELG set the first Federal limitations on the levels of toxic pollutants (*e.g.*, arsenic) and nutrients (*e.g.*, nitrogen) that can be discharged in the steam electric power generating industry’s largest sources of wastewater based on technology improvements in the industry over the preceding three decades. Before the 2015 ELG, regulations for the industry were last updated in 1982 and contained only limitations on TSS and oil and grease for the industry’s wastestreams with the largest pollutant loadings.

2. Vacatur of Limitations Applicable to CRL and Legacy Wastewater

Electric utilities, environmental groups, and drinking water utilities filed seven petitions for review of the 2015 ELG in various circuit courts. The petitions were consolidated in the U.S. Court of Appeals for the Fifth Circuit as *Southwestern Electric Power Co. v. EPA*, Case No. 15-60821. In early 2017, the EPA received two administrative petitions to reconsider the 2015 ELG: one from the Utility Water Act Group (UWAG) and one from the Small Business Administration.

On August 11, 2017, the EPA announced a rulemaking to potentially revise the new, more stringent BAT effluent limitations and pretreatment standards for existing sources (PSES) in the 2015 ELG that apply to flue gas desulfurization wastewater and bottom ash transport water. The Fifth Circuit subsequently granted the 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 court issued a decision in 2019 vacating those limitations as arbitrary and capricious under the Administrative Procedure Act and unlawful under the CWA, respectively. *Sw. Elec. Power Co.*, 920 F.3d at 1033. In the case of CRL, the court held that the 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 the EPA's rationale was not authorized by the statutory factors for determining BAT. *Id.* at 1026. After the court's decision, the EPA announced plans to address the vacated limitations in a later action.

D. 2020 Steam Electric Reconsideration Rule

1. Summary of the 2020 ELG

On October 13, 2020, the EPA promulgated the Steam Electric Reconsideration Rule, 85 FR 64650 (2020 ELG). The 2020 ELG changed the technology basis for two wastestreams (FGD wastewater and bottom ash transport water) resulting in revised limitations, created three new subcategories, and revised the technology basis for the voluntary incentives program. The 2020 ELG required most steam electric facilities to comply with the revised effluent limitations "as soon as possible" after October 13, 2021, but no later than December 31, 2025. NPDES permitting authorities established the particular applicability date(s) of the new limitations within that range for each facility (except for indirect dischargers) at the time they issued the facility's NPDES permit.

2. 2020 ELG Litigation

Environmental groups filed two petitions for review of the 2020 rule, which were consolidated in the U.S. Court of Appeals for the Fourth Circuit on November 19, 2020, as *Appalachian Voices, et al. v. EPA*, No. 20-2187. An industry trade group and certain energy companies moved to intervene in the litigation, which the court authorized on December 3, 2020. On April 8, 2022, the court granted the EPA's motion to place the case into abeyance as a result

of a new rulemaking announced in July 2021. The case remains in abeyance.

E. 2024 Supplemental Steam Electric Rule

1. Summary of 2024 ELG

On May 9, 2024, as part of a “suite of final rules” imposing new requirements on the power generation sector, the EPA promulgated the Steam Electric Supplemental Rule (89 FR 40198) (2024 ELG). This revision of the regulations at 40 CFR part 423 established a zero-discharge limitation for three wastewaters generated at steam electric power plants: flue gas desulfurization wastewater, bottom ash transport water, and CRL. The 2024 ELG also established non-zero numeric discharge limitations on mercury and arsenic from unmanaged CRL, which is a distinct subset of CRL defined in the ELG to include discharges of CRL that the permitting authority determines are the functional equivalent of a direct discharge to a WOTUS through groundwater or discharges of CRL that have leached from a waste management unit into the subsurface and mixed with groundwater before being captured and pumped to the surface for discharge directly to a WOTUS. These mercury and arsenic limitations also applied to a fourth wastestream called legacy wastewater, which is typically discharged from surface impoundments during the closure process, where those surface impoundments had not commenced closure under the EPA’s coal combustion residuals (CCR) regulations under the Resource Conservation and Recovery Act as of the effective date of the 2024 ELG.

As a general matter, the Clean Water Act addresses instances in which there are discharges to the jurisdictional waters of the United States (“jurisdictional waters” or WOTUS). Accordingly, the proposed Steam Electric ELG is designed to address impacts to surface waters (i.e., a WOTUS) from a subset of leachate from coal-fired electric generating utilities that is discharged to a WOTUS:

- discharges of CRL that are the functional equivalent of a direct discharge to a WOTUS through groundwater; or

- discharges of CRL that have leached from a waste management unit into the subsurface and mixed with groundwater before being captured and pumped to the surface for discharge directly to a WOTUS.

By contrast, the CCR rule deals with the disposal units themselves (where they are located, specific design and operating criteria, structural stability requirements, groundwater monitoring and corrective action, closure of the units, etc.) and primarily with their impacts or potential impacts to groundwater.

Discharges covered by an NPDES permit are excluded from the CCR regulations, because such discharges are not “solid waste” pursuant to RCRA section 1004(27). The RCRA exclusion only applies to “industrial discharges that are point sources subject to permits,” i.e., to the discharges to jurisdictional waters, and not to any activity, including groundwater releases or contaminant migration, that occurs prior to that point. See 40 CFR 261.4(a)(2) (“This exclusion applies only to the actual point source discharge. It does not exclude industrial wastewaters while they are being collected, stored or treated before discharge”). For purposes of the RCRA exclusion, EPA considers the “actual point source discharge” to be the point at which a discharge reaches the jurisdictional waters, and not in the groundwater or otherwise prior to the jurisdictional water. Accordingly, the CCR regulations do not apply to the unmanaged CRL regulated under the proposed Steam Electric ELG.

However, by regulating/preventing the release of leachate to groundwater, or requiring corrective action (remediation) of CCR leachate in the groundwater, the CCR rule may secondarily address impacts to surface waters that:

- would otherwise be addressed by the steam electric ELG proposal, and/or
- fall outside of the proposal, because a permitting authority determines the discharge(s) are not the functional equivalent of a direct discharge to a WOTUS through groundwater, or are discharged to a non-WOTUS.

2. 2024 ELG Litigation

A number of parties challenged the 2024 ELG in various petitions that were consolidated before the U.S. Court of Appeals for the Eighth Circuit as *Southwestern Electric Power Co. v. EPA*, No. 24-2123. Some petitioners, in part, alleged that EPA arbitrarily inflated the costs of the zero-discharge option for unmanaged CRL, and thus, improperly concluded that zero-discharge technology is not achievable for the unmanaged CRL subcategory, where that technology is available and achievable for other types of leachate discharges. Conversely, other petitioners alleged, in part, that that EPA acted arbitrarily and capriciously by adopting a new subcategory for discharges of unmanaged CRL without defining the universe of regulated entities, explaining how the technology would apply to the vast range of circumstances involving these kinds of discharges, or rationally determining the economic achievability of these limitations. Following a change in administrations, litigation in these cases has been paused while EPA reconsiders the 2024 Rule.

3. Administrative Petitions for Reconsideration of the 2024 ELG and Related Requests

The EPA has received two petitions for reconsideration of the 2024 ELG, one from the Edison Electric Institute (EEI) and one from UWAG.

EEI is a trade association that represents U.S. investor-owned electric companies. On November 13, 2024, EEI sent a petition to the EPA, which included recommendations to clarify the definition of a “closed waste management unit,” and to clarify that BPJ limitations continue to apply at retired plants and that new effluent limitations for unmanaged CRL do not apply to landfills closed by the 2024 ELGs effective date of July 8, 2024 (DCN SE11943). This petition was updated with a supplemental letter from EEI on May 8, 2025, which reiterated recommendations for CRL applicability and included additional recommendations relating to unmanaged CRL (DCN SE11948).

The UWAG is a voluntary non-profit group comprised of individual energy companies and two national trade associations of energy companies: the National Rural Electric Cooperative Association (NRECA) and the American Public Power Association (APPA). NRECA represents

nearly 900 local electric cooperatives across the U.S., serving 42 million people and covering 56 percent of the nation’s land area. APPA is the national service organization that represents not-for-profit local, State, or other government-owned electric utilities. On February 21, 2025, UWAG sent the Agency a petition for rulemaking to reconsider and repeal the 2024 ELG, as well as administratively stay the 2024 ELG while it is in litigation (DCN SE11944). The petition requests several reviews of the determinations underlying the 2024 ELG, including the 2024 ELG’s findings with regard to unmanaged CRL. The petition further expresses concerns related to the unique engineering challenges of “completely intercepting and capturing any and all CRL leaks, treating them with chemical precipitation to meet the new limit, then discharging the CRL back...” and the potentially exorbitant costs to do so (DCN SE11944).

In addition to these two petitions, on April 25, 2025, the EPA received a request from America’s Power, a national trade association representing the U.S. steam electric power plants and its supply chain (DCN SE11903A1). The letter requests that the EPA repeal the zero-discharge requirements of the 2024 ELG and return to the 2020 ELG requirements for CRL, flue gas desulphurization wastewater, and bottom ash transport water.

F. 2025 Steam Electric Deadline Extensions Rule

1. Summary of 2025 Deadline Extensions Rule

On December 23, 2025, the EPA announced a final rule extending several wastewater compliance deadlines for coal-fired power plants. The final action was published December 31, 2025 (90 FR 61328)³ and provides electricity producers with more time to comply with the 2020 and 2024 ELG deadlines in light of extraordinary increases in electricity demand associated with the resurgence of manufacturing and the artificial intelligence (AI) and data center revolution, and as necessary to meet the national priorities highlighted in Executive Orders issued by

³ After publication, the EPA became aware of post-signature typographical errors in the published regulatory text concerning compliance deadlines for pretreatment standards and related reporting recordkeeping requirements in the rule. A corrections document was published January 30, 2026, to ensure that the rule’s compliance deadlines and reporting and recordkeeping deadlines match those in the version of the rule signed by the EPA Administrator (91 FR 4016).

President Trump (a discussion of these Executive Orders may be found in the record (DCN SE12125)).

In addition to extending certain compliance deadlines related to zero-discharge standards in the 2024 rule, new provisions in the 2025 Deadline Extensions Rule allow permitting authorities the flexibility to extend certain compliance deadlines on a site-specific basis due, for example, to unexpected electricity demand.

The 2025 Deadline Extension Rule did not change the effluent limitations requirements themselves. However, during the rulemaking process for the 2025 Deadline Extensions Rule, the EPA also requested additional data and information on technologies, performance, and technology-based implementation challenges related to the 2024 ELG. The EPA stated this data would be used to inform a future rulemaking to support practical, feasible, and on-the-ground implementations of wastewater pollution discharge limitations.

As a result of the 2025 data call, the EPA received site-specific performance and costs data from Santee Cooper and Longview Power LLC (EPA-HQ-OW-2009-0819-10769 and EPA-HQ-OW-2009-0819-10702, respectively). Both letters raised concerns that the EPA's costing methodology in the 2024 ELG underestimated costs. The cost methodology has been revised for this proposal.

2. 2025 Deadline Extensions Rule Litigation

Legal advocacy groups filed four petitions for review of the 2025 Deadline Extensions Rule in different U.S. Courts of Appeals. *Waterkeeper Alliance, et al. v. EPA*, No. 26-128 (2d Cir.); *Appalachian Voices v. EPA*, No. 26-1072 (4th Cir.); *Sierra Club v. EPA*, No. 26-752 (9th Cir.); *Ctr. for Biological Diversity v. EPA*, No. 26-426 (9th Cir.). The petitions have been consolidated in the U.S. Court of Appeals for the Second Circuit, and the litigation is ongoing. *In re: Environmental Protection Agency, Effluent Limitations Guidelines and Standards for the Steam Electric Generating Point Source Category, Deadline Extensions*, 90 FR 61328, *Published on December 31, 2025*, MCP No. 199 (J.P.M.L. February 10, 2026).

G. Disposal of Coal Combustion Residuals from Electric Utilities Final Rule

1. 2015 CCR Rule

On April 17, 2015, the EPA promulgated the Disposal of Coal Combustion Residuals from Electric Utilities final rule (2015 CCR rule) (80 FR 21302). This rule finalized national regulations to provide a comprehensive set of requirements for the safe disposal of CCR, commonly referred to as coal ash, from steam electric power plants. The 2015 CCR rule established technical requirements for CCR landfills and surface impoundments under subtitle D of the Resource Conservation and Recovery Act (RCRA), the Nation’s primary law for regulating solid waste.

2. 2020 Holistic CCR Rules

As a result of the D.C. Circuit Court decisions in *Util. Solid Waste Activities Grp. v. EPA*, 901 F.3d 414 (D.C. Cir. 2018) (“*USWAG* decision” or “*USWAG*”), and *Waterkeeper All., 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) (85 FR 53516, August 28, 2020) on July 29, 2020, and *A Holistic Approach to Closure Part B: Alternate Liner Demonstration* (CCR Part B rule) (85 FR 72506, December 14, 2020) on October 15, 2020. The EPA finalized several amendments to the 2015 CCR rule, which are relevant to the management of the wastewaters covered by this proposed ELG for unmanaged CRL because these wastewaters have historically been co-managed with CCR in the same surface impoundments.

As explained in the 2015 and 2020 ELGs, the ELGs and CCR rules may affect the same electric generating unit or activity at a plant. Therefore, when the EPA finalized the 2015 ELG and 2015 CCR rule, as well as revisions to both regulations in 2020, the Agency coordinated the ELGs and CCR rules to minimize the complexity of implementing engineering, financial, and permitting activities. Likewise, the EPA considered the interactions of the ELGs and CCR rules during the development of the 2024 ELG. The EPA’s analytic baseline includes the final

requirements of the 2015 and 2024 ELG and CCR rules using the most recent data provided under the 2015 CCR rule reporting and recordkeeping requirements.

3. 2024 Legacy CCR Rule

Concurrently with the 2024 ELG, in a separate rulemaking the EPA promulgated in 2024 the Legacy CCR Surface Impoundments and CCR Management Units final rule (2024 Legacy CCR rule). The 2024 Legacy CCR rule established regulatory requirements for inactive CCR surface impoundments at inactive utilities (“legacy CCR surface impoundments” or “legacy impoundments”) (80 FR 21302; EPA-HQ-OLEM-2020-0107; FRL-7814-04-OLEM). EPA refers to these rules collectively as the RCRA CCR regulations throughout the remainder of this preamble.

Many of the technical requirements under the RCRA CCR regulations also have associated Internet posting requirements that help ensure transparency and provide citizens with information about CCR units in their state. For example, power companies were required to conduct groundwater monitoring requirements for coal ash impoundments and to make the data publicly available starting in March 2018. The EPA maintains a list of the Internet sites for facilities posting RCRA CCR compliance information organized alphabetically by state (DCN SE12100). These data cover over 300 coal plants or offsite coal ash disposal areas, including over 750 individual coal ash ponds and landfills and more than 4,600 groundwater monitoring wells.

V. Steam Electric Power Generating Industry Description and Processes

A. General Description of Industry

The EPA provided general descriptions of the steam electric power generating industry in the 2015 ELG, the 2020 ELG, and the 2024 ELG. The Agency has continued to collect information and update this 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, the EPA has revised its

description of the steam electric power generating industry (and its supporting analyses) to incorporate changes in the plant population and corresponding waste management units, changes in plant retirement status, and updates to wastewater treatment in place. The analyses supporting this proposed ELG rely on an updated baseline that incorporates these changes in the industry and applies the numerical limitations established in the 2024 ELG. The analyses then compare the effect of each of the proposed option requirements for unmanaged CRL to the effect on the baseline (the industry as it exists today with the requirements of the 2024 ELG).

Of the 858 steam electric power plants in the country identified by the EPA, only those coal-fired power plants that discharge unmanaged CRL are expected to incur costs to comply with this proposal. Coal-fired power plants are expected to continue discharging unmanaged CRL from waste management units after ceasing combustion of coal. Such plants may therefore incur costs to comply with this proposal even after retirement.

The EPA determined that between 63 and 111 power plants may be discharging unmanaged CRL based on whether the plants' waste management units are unlined, not clean-closed, or undergoing corrective action. The EPA does not expect that all these landfills and surface impoundments are discharging unmanaged CRL; permitting authorities would ultimately determine whether unmanaged CRL is discharged on a site-specific case-by-case basis. Of these power plants, the EPA has determined that at least seven power plants are currently pumping and treating unmanaged CRL (that is mixed with groundwater) before being captured for discharge directly to a WOTUS. The EPA did not find evidence from available CCR monitoring reports, data reported on installed treatment technologies to meet compliance, or solicited data from industry that additional power plants exist that are pumping and capturing unmanaged CRL at this time. Therefore, these seven plants likely represent the full universe of power plants that are currently pumping and treating unmanaged CRL, and the remaining 104 plants are likely the upper bound number of power plants potentially discharging unmanaged CRL in a manner that permitting authorities could determine are the functional equivalent of a direct discharge to a

WOTUS through groundwater. The EPA is only aware of a small number of plants where this determination has been completed. For the remaining plants, the EPA assumes that unmanaged CRL is not currently being pumped and captured and that treatment for unmanaged CRL has not been installed. Therefore, the EPA expects that the costs for treating unmanaged CRL will primarily be incurred by those plants that are determined to be discharging unmanaged CRL as a functional equivalent of a direct discharge, which could include all except the seven plants already directly discharging unmanaged CRL.

B. What is Unmanaged Combustion Residuals Leachate?

Under the 2024 ELG, the EPA defined unmanaged CRL at 423.11(ff), which the EPA is continuing to use without change in this proposal. The 2024 ELG specifies two types of unmanaged CRL that are considered distinct from CRL and defined as: (1) discharges of CRL that the permitting authority determines are the functional equivalent of a direct discharge to a WOTUS through groundwater; or (2) discharges of CRL that has leached from a waste management unit into the subsurface and mixed with groundwater before being captured and pumped to the surface for discharge directly to a WOTUS. This section provides a description of how CRL and other wastewaters are generated at a coal-fired power plant.

When a fossil-fuel plant combusts coal, the plant uses a process called flue gas desulfurization (FGD) to remove sulfur dioxide from the exhaust gases. Whether the flue gas desulfurization process is wet or dry, lime or limestone is used to neutralize the acidic gases. The flue gas desulfurization process produces gypsum as a byproduct and generates wastewater. The pollutants in this wastewater vary primarily depending on the coal used as the fuel source, as well as the type of scrubber, the lime composition, and the gypsum-dewatering system. Flue gas desulfurization wastewater is extremely well characterized as discussed further below. After a complex treatment process, the resulting wastewater is discharged to a WOTUS, reused on-site, or evaporated. At plants subject to zero-discharge requirements, treated flue gas desulfurization wastewater is sent to on-site ponds for storage, reused within the plant for other processes such

as ash management, or evaporated with the remaining solids sent to a landfill.

CCR waste management units, including landfills and surface impoundments, are areas used by power plants to store, treat, or dispose of coal ash and related by-products⁴. These waste management units are regulated under RCRA to prevent groundwater contamination. For the purposes of this proposal, surface impoundments are areas designed to store, treat, or dispose of coal ash and wastewater produced by power plants when generating electricity, such as flue gas desulfurization wastewater. The regulatory definition of surface impoundments for purposes of RCRA may be found at 40 CFR 257.53. CCR landfills are defined as “an area of land or an excavation that contains CCR and which is not a surface impoundment, an underground injection well, a salt dome formation, a salt bed formation, an underground or surface coal mine, or a cave.” 40 CFR 257.53. New CCR landfills generally include composite liners and leachate-collection systems. Both types of waste management units can generate wastewater from moisture contained in the material they receive and from precipitation. Wastewater from these waste management units is monitored under various programs, including under the RCRA CCR regulations. For the purposes of assessing unmanaged CRL under this proposed rule the EPA finds that many waste management units have been identified and characterized in public reports available online (see section IV of this preamble for more details).

In addition to the characterization of waste management units, more than 4,600 groundwater monitoring wells have been placed around waste management units under the RCRA CCR regulations, as well as additional monitoring wells attributable to state or local requirements. The RCRA CCR regulations require owners of coal ash units to monitor groundwater for pollutants at least twice a year and annually publish accessible reports detailing the sampling results. These reports must also document statistical analysis, detection monitoring, or corrective actions if levels of ground water contamination are found to be above groundwater

⁴ A mixture of fly ash, bottom ash, gypsum and other coal ash generated by-products, is also known as coal combustion residuals (CCR).

protection standards. Thus, the EPA considers that groundwater in the proximity of a waste management unit should be well characterized.

CRL is the wastewater that has passed through coal combustion residuals, generally while the residuals are stored in waste management units. Managed CRL that has been collected from the leachate-collection system of a lined waste management unit is of a finite volume and has characteristics very similar to the wastewater inputs (usually flue gas desulfurization wastewater) to the waste management unit. By contrast, unmanaged CRL is leachate from a waste management unit that is not captured from a leachate-collection system and instead percolates into the subsurface. As discussed earlier, the 2024 ELG defines two situations in which CRL constitutes unmanaged CRL.

C. 2024 ELG Baseline Was Likely Incorrect and Has Also Significantly Changed

Since the promulgation of the 2024 ELG, the EPA has become aware of new information and data demonstrating (1) the existence of an energy crisis, requiring the full use and operation of these steam electric facilities, and (2) changes in the scope of steam electric facilities that plan to remain operational or incur costs under the 2024 ELG.

Much of the information relied upon by the EPA during the 2024 ELG rulemaking process did not anticipate increases in near-term energy demand projections, while more recent information points to an impending, extraordinary spike in energy demand that cannot currently be satisfied by existing power generation. In 2025, the EPA documented several generating facilities that reversed previously announced plans to cease burning coal. Rather, in light of new rising energy demands, these facilities have now decided to continue burning coal.

Additionally, in 2025, the Department of Energy (DOE) issued over a dozen emergency orders to delay the closure of these coal-fired power plants to meet energy demands. For this proposed rule, the EPA expects that even more planned power plant retirements will be impacted and reversed throughout 2026 as a result of the 2025 Deadline Extensions Rule, additional DOE emergency orders will be issued to coal-fired power plants in 2026 and beyond, and that existing

coal-fired EGUs will increase coal combusting operations to meet higher energy demands. The EPA further expects that for these reasons, more CCR will be produced and transported to landfills and surface impoundments, and fewer landfills and surface impoundments will be capped or closed. Therefore, the EPA expects discharges of unmanaged leachate to increase relative to the amount of unmanaged CRL discharges anticipated when promulgating the 2024 ELG.

D. The Unique Nature of Unmanaged CRL

There are certain compositional differences between and among different unmanaged CRL originating from different dischargers and mixed with varying types of groundwater with its own unique characteristics that could affect treatment needs for any single discharger. The 2024 ELG assumed that managed CRL and unmanaged CRL would each contain the same pollutants and could be treated to the same numeric limitations, using the same technology, at similar costs. However, unmanaged CRL, by its very nature, permeates through groundwater and may react with, and be affected by, the distinct characteristics of that groundwater and any existing pollutants found therein.

Unmanaged CRL most notably differs from managed CRL because the wastewater has mixed with groundwater. As a result, the volume and pollutant concentrations of unmanaged CRL are heavily influenced by the ambient groundwater through which it passes. The groundwater may have background levels of various pollutants that are distinct from the leachate, but these background levels vary widely from site to site. For example, total arsenic concentrations are frequently under 1 ug/L in groundwater, but concentrations above 10 ug/L are found in 7 percent of sampled wells (DCN SE12121). Indeed, the contaminated volume of groundwater is variable, the direction of the groundwater flow may change throughout the year, and the characterization of the groundwater is highly site-specific. For example, in coastal plain aquifers, saltwater intrusion drastically changes the salinity in the groundwater, and total dissolved solids in the groundwater can range from less than a few hundred ppm to more than

several thousand ppm (DCN SE12122).

The extent to which the pollutants that are known to be present in CRL may change through transport in groundwater and, therefore, the actual chemical composition of unmanaged CRL itself is unclear and may vary considerably from any other unmanaged CRL originating from a different discharger. The precise pollutants and concentrations in unmanaged CRL may even vary across different landfills at the same plant. CRL is enriched in oxyanion-forming elements such as arsenic (As), selenium (Se), boron (B), molybdenum (Mo), and vanadium (V), as well as major ions such as sulfate, chloride, and calcium. These pollutants are highly soluble, weakly sorbed under alkaline conditions, and are generally persistent during subsurface transport. CRL itself is typically alkaline and has a pH of 8-12. Interactions with surrounding groundwaters may change the alkalinity, pH, and redox conditions of unmanaged CRL, which may affect its pollutant concentrations. For example, total arsenic has a median concentration of 22 ug/L in impoundment wastewater and a median concentration of 70 ug/L in CRL (DCN SE12123), but the median total arsenic in the CRL/groundwater mix is unknown. The EPA does not have data documenting technology performance with the CRL/groundwater mixture as compared to FGD wastewater or impoundment wastewater. Several comments on the 2024 ELG pointed out this distinction; for example, most of the total arsenic in CRL at three American Electric Power plants is present as arsenate, which is soluble and will not readily settle out after chemical precipitation (EPA-HQ-OW-2009-0819-10671-A1).

Conditions of the site can also contribute to the high variability of pollutants found in unmanaged CRL. Site-specific properties such as site hydrology, hydraulic conductivity, groundwater plume length and age, background contaminants present in groundwater, relative flows and volumes of contributing groundwater, and biogeochemical properties of soils can contribute to high variability in unmanaged CRL composition, and batch laboratory leachate tests to characterize unmanaged CRL often underpredict contaminant release and fail to capture long-term geochemical processes (DCN SE12124). Field-scale monitoring and modeling may

provide site-specific hydrogeological data but vary widely from site-to-site because of variability in local hydrological conditions that cannot be assessed on a national level.

As a result of these pollutant and site variations, pump and capture of unmanaged CRL from the subsurface is difficult and requires a thorough analysis of the wastewater and the site conditions to ensure the maximum amount of unmanaged CRL is captured. Even with site-specific design, a pump and capture system is not guaranteed to collect 100 percent of the unmanaged CRL that has leached into groundwater.

Despite this inherent variability of unmanaged CRL, the EPA made several assumptions about the similarities between FGD wastewater, managed CRL, and unmanaged CRL in the 2024 ELG. In promulgating the 2015 ELG, the EPA first determined that CRL from landfills and impoundments included similar types of pollutants as FGD wastewater, and by extension, to waste management unit wastewaters as discussed above. However, the EPA also determined that the pollutants in CRL could vary more widely in concentrations and volumes compared to those in FGD wastewater. Data from the Electric Power Research Institute (EPRI) on untreated FGD water from 36 power plants showed variability attributed to differences in coal composition, operational conditions at each plant, and water circulation and reuse (DCN SE12101). During development of the 2024 ELG, additional data obtained from EPRI showed wastewater characteristics between CRL and FGD wastewater were similar, but nevertheless varied across CCR waste management units due to different types of fuels burned at the plant, duration of pond operation, addition of bottom ash water, types of air pollution controls employed, and ash types (DCN SE11725). The wastewater characterization in the waste management units had the same pollutants that were in the FGD wastewater, but additional variation was observed due to both the presence of other wastes already in the waste management unit and additional inputs such as bottom ash, precipitation, and storm water. Accordingly, the EPA determined that treatment technologies identified for FGD wastewater were generally applicable to CRL but may in some cases require additional pretreatment or a combination of technologies. Such additional

treatment technologies could be necessary because of changes to the oxidation state of some FGD pollutants as they transition to the CCR impoundment. For example, a chemical precipitation system that would be very effective at removing particulate arsenic found in FGD wastewater would be significantly less effective at removing dissolved arsenic or soluble arsenate that may be present in CRL. Additionally, the EPA previously recognized that the characterization of wastewater differs within the layers of a CCR impoundment as it is dewatered and prepared for closure (88 FR 18835). Therefore, treatment requirements at a unit that is in the process of closure may also change as closure progresses.

Despite the complexities discussed above, the EPA conducted its analyses in the 2024 ELG under the assumption that pollutants in unmanaged CRL were similar to CRL. Additionally, the EPA assumed that pollutant removals through chemical precipitation for CRL were similar to that of flue gas desulfurization wastewater. The EPA then assumed that pollutant removals through chemical precipitation of unmanaged CRL were similar to that of managed CRL. While FGD wastewater and waste management unit wastewaters demonstrate similar types and forms of pollutants, the same cannot necessarily be said for unmanaged CRL once it has mixed with groundwater. The EPA is aware that mixing with groundwater may result in departure from what is otherwise a very well characterized set of wastestreams, and the EPA received comments further asserting such.

The 2024 ELG did not rely on any data specific to unmanaged CRL to conclude that unmanaged CRL mixed with groundwater would fall within the same ranges of managed CRL evaluated by the EPA. While the EPA received general comments in the 2024 ELG about the possibility of interactions of CRL pollutants mixed into groundwater, commenters did not provide data to demonstrate that CRL mixed into groundwater might result in pollutant concentrations extending beyond the ranges evaluated by the EPA for FGDFGD wastewater or CRL. Similarly, in petitions received after the 2024 ELG and in the 2025 Deadline Extensions Rule data call, the EPA received no data demonstrating the pollutant concentrations in

unmanaged CRL were untreatable by the selected BAT technologies. Instead, comments describe “attenuation,” such as through adsorption. As the EPA noted in the 2024 rulemaking, adsorption and other attenuation processes would be expected to *remove* pollutants, which means in some cases that chemical precipitation might not be necessary. In other cases, however, additional stages of chemical precipitation treatment may be necessary if the groundwater contains significant concentrations of pollutants from other sources.

E. Control and Treatment Technologies

In general, control and treatment technologies for some wastestreams have continued to advance. Often, these advancements provide plants with additional or alternative approaches for complying with any effluent limitations. In some cases, these advancements have also decreased the associated costs of compliance. For this proposed ELG, the EPA incorporated updated information and evaluated several technologies available to control and treat unmanaged CRL generated by the steam electric power generating industry. See section VII of this preamble for details on updated cost information.

1. Technologies for treating unmanaged Combustion Residual Leachate

As described above, in the 2024 ELG the EPA assumed, with little available data, that unmanaged CRL from landfills and impoundments includes similar types of pollutants as both flue gas desulfurization wastewater and managed CRL. As such, the EPA further assumed, with little available data, that certain treatment technologies identified for flue gas desulfurization wastewater and managed CRL could also be used to treat unmanaged CRL. The following describes these potential types of treatment and handling practices for unmanaged CRL:

- 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 the solution by coagulation/flocculation followed by clarification and/or filtration. The 2024 ELG focused on a specific design that employs hydroxide precipitation, sulfide precipitation (organosulfide), and iron coprecipitation to remove

suspended solids and 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 2024 ELG. While the EPA's historical record shows that chemical precipitation can be a robust process that can treat most pollutants found in the various coal combustion wastestreams and may be effective at treating heavy metals, the limited data available to the EPA shows that leachate from impoundments that mixes with groundwater must be evaluated as a process differently than managed CRL. Chemical precipitation can be readily tailored (such as by adjusting the pH and the dose of the reagents used to convert dissolved substances into solid particles) to meet the variability encountered in CRL wastewater (DCN SE12168).

- High-hydraulic-residence-time biological reduction. The EPA identified three types of biological treatment systems used to treat flue gas desulfurization 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).
- Low-hydraulic-residence-time biological reduction. This biological treatment system targets removal of selenium and nitrate/nitrite using fixed-film bioreactors in smaller, more compact reaction vessels. The bacteria reduce soluble selenate and selenite to insoluble selenium, which is a filterable solid; nitrate is converted into nitrogen gas. This system differs from the high-hydraulic-residence-time biological treatment system evaluated in the 2015 ELG, in that the low-hydraulic-residence-time 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 high-hydraulic-residence-time) while still achieving significant removal of selenium and nitrate/nitrite. Both systems are sensitive to high total dissolved solids levels, so proper operation is necessary to accommodate

fluctuations in the wastewater.

- Zero-Discharge Technologies
 - Membrane filtration. A membrane filtration system (*e.g.*, microfiltration, ultrafiltration, nanofiltration, forward osmosis, electrodialysis reversal, or reverse osmosis (RO)) is designed specifically for high-TDS and high-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 types of membrane technology to remove a broad array of particulate and dissolved pollutants from flue gas desulfurization 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 a reverse osmosis 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 gases. The hot gases 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 using 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 a reverse osmosis system can then be processed

through the spray evaporation technology to achieve zero discharge by recirculating permeate from the reverse osmosis system back into plant operations.

- Thermal evaporation. Thermal evaporation systems 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 a broad spectrum of pollutants to very low effluent concentrations.

Additionally, the EPA identified the following potential types of *in situ* treatment and handling practices for unmanaged CRL in the subsurface that would not be applicable to flue gas desulfurization wastewater or managed CRL. These *in situ* technologies require careful characterization of site-specific subsurface conditions that may vary widely in terms of biogeochemistry, pollutants present, and facility configurations.

- Impermeable Barriers. Impermeable barriers are underground walls that are designed to prevent or control the flow of groundwater to a certain location. An impermeable barrier placed in the subsurface would prevent the spread of pollutants from discharging to a WOTUS.
- Permeable Reactive Barriers. Permeable reactive barriers (PRB) are permeable barriers containing solid reagents or other reactive materials that are placed into the subsurface. As unmanaged CRL or contaminated groundwaters flow through permeable barriers, pollutants react with the reagents and are subsequently removed or treated.
- Injection. Injection technologies involve injection of liquid reagents or reactive

adsorbents into the subsurface. The liquid reagents or adsorbents then react with and subsequently remove pollutants that may be present in unmanaged CRL or contaminated groundwaters. Injection approaches often require careful characterization of site-specific biogeochemical conditions to ensure effective delivery of reagents.

Additional discussion regarding updates to sources of data and new data obtained by the EPA may be found in the record (DCN: SE1210505).

VI. Proposed Rule

This proposal evaluates three regulatory options and identifies one preferred option (Option 1), as shown in Table VI-1 of this preamble. The three regulatory options address unmanaged combustion residual leachate in different ways and using different technologies and management practices as the basis for doing so. In addition to some specific requests for comment included throughout this proposal, the EPA solicits comment on all aspects of this proposal, including the information, data, and assumptions the EPA relied upon to develop the three regulatory options, as well as the proposed BAT, effluent limitations, and alternate approaches included in this proposal.

Table VI-1. Proposed rule BAT options for unmanaged CRL subcategory

For discharges of unmanaged CRL to a WOTUS that:	Option 1 (Preferred)	Option 2 (2024 ELG)	Option 3
Leached from a landfill or impoundment into the subsurface and mixed with groundwater before being captured and pumped to the surface for discharge directly.	Numerical limits on mercury and arsenic	Numerical limits on mercury and arsenic	Zero-discharge limits
Are the functional equivalent of a direct discharge as determined by the permitting authority.	BAT limits developed on a BPJ basis by the permitting authority	Numerical limits on mercury and arsenic	Zero-discharge limits

This proposal does not seek to define what constitutes the “functional equivalent” of a

direct discharge. Moreover, the EPA is not determining that all potential discharges through groundwater from landfills and surface impoundments are the functional equivalent of a direct discharge to a WOTUS. Rather, the EPA is proposing limitations that would apply to any discharge that is the functional equivalent of a direct discharge through groundwater to a WOTUS and, thus, requires an NPDES permit. The threshold standard for the “functional equivalence” determination is outside the scope of this rule. In this proposed rule, the EPA reaffirms its longstanding position, which is consistent with the *County of Maui* decision: the determination of what constitutes the functional equivalent of a direct discharge is case-specific, and some landfills and surface impoundments may meet the definition of point sources under the CWA.

Thus, to the extent that discharges from landfills, surface impoundments, or other features could be considered the functional equivalent of a direct discharge of unmanaged CRL to a WOTUS, this proposal would inform the permitting authority of the appropriate technology-based effluent limitations that would apply. Determining whether a functional equivalent of direct discharge exists at any particular impoundment or landfill is a task for permitting authorities and outside the scope of this proposed rulemaking.

In all three regulatory options, the EPA proposes to codify additional definitions to clarify applicability of the unmanaged CRL limitations.

- First, for purposes of this subpart, the EPA proposes to define a “closed coal combustion residuals waste management unit” at 40 CFR 423.11(gg) to provide clarity as to which impoundments and landfills meet the criteria of being closed.
- The EPA proposes to further clarify the applicability of the effluent limitations with new provisions at 40 CFR 423.13(1)(3).
 - The first provision states that the effluent limitations in this subcategory do not apply to retired power plants, and that case-by-case BAT limitations based on the permitting authority’s best professional judgment (BPJ) continue to

apply.

- The second provision proposes that unmanaged CRL limitations do not apply to landfills closed by the 2024 ELG's effective date of July 8, 2024, and that case-by-case BAT limitations based on BPJ continue to apply. The EPA solicits comment on these additional provisions.
- The EPA proposes a correction to the CFR text at section 423.13(l)(1)(i) where “(1)(2)” was mistakenly printed instead of “(l)(2).”
- The EPA proposes to clarify in section 423.13(l)(2)(ii)(B) that BAT limitations based on BPJ apply to unmanaged CRL generated before the effective date of the ELG.

A. Description of the Options

The following regulatory options apply to the two types of unmanaged leachate as defined in the 2024 ELG:

Discharges of pumped unmanaged CRL: CRL that has leached from a landfill or impoundment into the subsurface and mixed with groundwater, after which it has been captured and pumped to the surface for discharge directly to a WOTUS.

Functional equivalent of a direct discharge of unmanaged CRL: CRL that has been determined, by the permitting authority, to be the functional equivalent of a direct discharge to a WOTUS through groundwater.

1. Option 1

Functional equivalent of a direct discharge of unmanaged CRL

Option 1 would rely on discretion of the permitting authority to set case-by-case BAT limitations that apply to functional equivalents of a direct discharge of unmanaged CRL, after evaluating site-specific factors relevant to the treatment to of unmanaged CRL.

This option would provide the greatest flexibility to ensure appropriate technology-based requirements are set while giving appropriate consideration to all site-specific factors impacting

a utility's ability to collect and treat unmanaged CRL. This flexibility is appropriate given the fact that permitting authorities (which are typically states) are better situated on a case-by-case basis at the time of permit issuance to assess the difficulty in capturing and treating unmanaged CRL. Similarly, due to the unprecedented, rapidly increasing energy demands throughout the U.S. (as discussed in both the 2025 Deadline Extensions Rule, and section V.A of this preamble), including the extended operations of EGUs due to "must run orders" and the overall need to ensure grid reliability, as well as the resulting likelihood that the 2024 ELG overestimated the number of existing coal-fired power plants that would retire, this flexibility would appropriately allow the permitting authority to select the technologically available and economically achievable treatment method based on plant-specific technological, economic, and other relevant factors.

Over the past decade, whenever the EPA has revised the steam electric ELGs, the Agency has carefully considered the impacts of new requirements on the overall outlook of the industry, including impacts on electricity generation. This proposal continues in that tradition, but is more tailored to the dynamic energy market of today, by providing permitting authorities with the flexibility to make regulatory decisions that reflect the on-the-ground factors that a specific facility may be contending with at the time of issuance or re-issuance of an NPDES permit, and to ensure that proper consideration is given to the unique needs of specific utilities in order to ensure the continued delivery of affordable and reliable power to U.S. families and businesses. While not meant to be a complete list of considerations, the permitting authority should consider the following when evaluating potential model technologies on a BPJ basis:

- site hydrology;
- hydraulic conductivity;
- groundwater plume length and age;
- background contaminants present in groundwater;
- chemical form and concentration of pollutants in mixed CRL and groundwater;

- relative flows and volumes of contributing groundwater;
- biogeochemical properties of soils;
- changes in local energy demand;
- changes in energy costs to consumers;
- non-water quality environmental impacts, such as solid waste generation or air pollution from waste management;
- changes in fuel consumption due to waste management; and
- pending must-run orders or similar demands that a utility stay in operation longer than planned.

Discharges of pumped unmanaged CRL

Option 1 proposes to maintain the existing 2024 ELG mercury and arsenic limitations applicable to discharges of pumped unmanaged CRL. The technology basis for BAT is chemical precipitation, employing hydroxide precipitation, sulfide precipitation (organosulfide), and iron coprecipitation. For further information on this BAT model technology and derivation of these numeric limitations, see the 2024 Steam Electric ELG Technical Development Document (TDD) (DCN SE11757).

Where discharges of pumped unmanaged CRL are occurring, as of the effective date of this ELG, the EPA proposes the limitations must be met as soon as possible, but no-later-than December 31, 2034. This no-later-than date, which is consistent with the latest compliance date for zero-discharge requirements promulgated in the 2025 Deadline Extensions Rule, is being proposed because it would provide permittees with appropriate time to make comprehensive waste management decisions when evaluating how to most efficiently meet the suite of requirements on coal-fired power plants from effluent guidelines. Discharges of pumped unmanaged CRL that commence after the effective date of this ELG must meet these numeric limitations as soon as possible, but no later than the date unmanaged leachate pumping commences or December 31, 2034, whichever is later.

2. Option 2

Functional equivalent of a direct discharge of unmanaged CRL

Option 2 proposes to maintain the existing 2024 ELG mercury and arsenic limitations for functional equivalents of a direct discharge of unmanaged CRL. The technology basis for BAT is chemical precipitation, employing hydroxide precipitation, sulfide precipitation (organosulfide), and iron coprecipitation. For further information on this BAT model technology and derivation of these numeric limitations, see the 2024 Steam Electric ELG TDD (DCN SE11757).

Where such discharges are occurring, as of the effective date of the ELG, the EPA proposes to retain the requirement that these limitations must be met as soon as possible, but no later than December 31, 2029.

Discharges of pumped unmanaged CRL

Option 2 proposes to also maintain the existing 2024 ELG mercury and arsenic limitations for discharges of pumped unmanaged CRL. The technology basis for BAT is chemical precipitation, employing hydroxide precipitation, sulfide precipitation (organosulfide), and iron coprecipitation. For further information on this BAT model technology and derivation of these numeric limitations, see the 2024 Steam Electric ELG TDD (DCN SE11757).

Where such discharges are occurring, as of the effective date of the ELG, the EPA proposes to retain the requirement that these limitations must be met as soon as possible, but no later than December 31, 2029.

3. Option 3

Functional equivalent of a direct discharge of unmanaged CRL

Option 3 proposes to establish a zero-discharge requirement on pollutants from functional equivalents of a direct discharge of unmanaged CRL and would establish BAT limitations for mercury and arsenic based on chemical precipitation treatment as an interim step. The BAT basis for functional equivalents of a direct discharge of unmanaged CRL is the implementation of spray dry evaporators, the same as the 2024 ELG specified for (managed) CRL. See the 2024

ELG Preamble for additional detail on this approach.

Where functional equivalents of a direct discharge of unmanaged CRL that have been identified by a permitting authority are occurring as of the effective date of the ELG, the EPA proposes the zero-discharge limitation must be met as soon as possible, but no later than December 31, 2034. For functional equivalents of a direct discharge of unmanaged CRL commencing after the effective date of the ELG, the limitations must be met as soon as possible, but no later than the date unmanaged leachate pumping commences or December 31, 2034, whichever is later. The 2034 date reflects the deadlines established in the 2025 Deadline Extensions Rule and provides flexibility for those plants seeking to combine wastewater flows for more effective and efficient treatment.

Discharges of pumped unmanaged CRL

Under this option, the EPA proposes to establish a zero-discharge limitation for all pollutants in pumped unmanaged CRL with interim BAT limitations on mercury and arsenic based on chemical precipitation treatment. The BAT basis for discharges of pumped unmanaged CRL is the implementation of spray dry evaporators, the same as the 2024 ELG specified for managed CRL. See the 2024 ELG Preamble for additional detail on this approach.

Where discharges of pumped unmanaged CRL are occurring as of the effective date of the ELG, the EPA proposes the zero-discharge limitations must be met as soon as possible, but no later than December 31, 2034. For discharges of pumped unmanaged CRL commencing after the effective date of the ELG, the limitations must also be met as soon as possible, but no later than the date unmanaged leachate pumping commences or December 31, 2034, whichever is later. The 2034 date reflects the deadlines established in the 2025 Deadline Extensions Rule and furthermore provides flexibility for those plants seeking to combine wastewater flows for more effective and efficient treatment.

B. Rationale for the Proposed Rule

1. Rationale for Not Proposing Option 3 as BAT

Unacceptably High Compliance Costs for Unmanaged CRL

The EPA is not proposing to select Option 3 as the preferred option for BAT for both types of discharges of unmanaged CRL because total costs of the option to the industry as a whole are unacceptably high and not economically achievable. As discussed in the Technical Support memo (DCN SE12105), the EPA has revised its cost estimates for this proposal, and the revised cost estimates for spray dry evaporators to achieve zero discharge for both categories of unmanaged CRL are \$1.1 billion per year in the lower bound and \$2.2 billion in the upper bound (see Table VII-1 and the Technical Support memo (DCN SE12105)).

The costs associated with this option are nearly an order of magnitude higher than total costs of the 2024 ELG to the industry for controlling all of the remaining end-of-pipe discharges from every other wastestream combined. In 2024, the EPA estimated that the total annualized costs to the industry of zero discharge could be as high as \$3.69 billion. At that time, EPA determined these costs were unreasonable. With the revised economic analysis in this proposed rule, the EPA has determined that the annualized cost for the zero-discharge option in the 2024 ELG was likely an overestimation of costs; however, despite more representative cost calculations supporting this proposal, the EPA still proposes that the costs to achieve zero discharge (\$1.1 to \$2.2 billion) are unreasonable. Costs are one of the statutory factors that the EPA must consider, and courts have found that the EPA may properly rely on costs in rejecting potential BAT technologies. *See e.g., BP Expl. & Oil Inc. v. EPA*, 66 F.3d 784, 799-800 (6th Cir. 1995). For further discussion of costs and economic achievability, see the Technical Support memo (DCN SE12105).

Additional Cost Burdens Reflecting the Duration of Discharges for Unmanaged CRL

In addition to the unacceptably high costs of Option 3, the EPA has identified several other areas where the cost analysis was unable to account for potentially significant expenditures by a permittee, which would further exacerbate the economic impacts of this option. Most notably, the duration of the discharges in question and the need for treatment beyond the operating life of

a regulated utility may significantly increase cost burdens for this option. The EPA is concerned that the 2024 ELG did not fully account for the lack of revenue generated by closed utilities, and thus the lack of funding available, to implement treatment in an economically achievable way. Typically, ELGs no longer apply after an entity ceases the industrial operation generating pollutant discharges; however, given the nature of unmanaged CRL, and the influence contaminated groundwater has on the volume and duration of this wastestream, unmanaged CRL discharges that require treatment could incur costs associated with wastewater treatment operations long after the associated utility has retired and ceased generating electricity and revenue. Economic achievability assessments to support ELGs typically evaluate the compliance costs with respect to revenue and closures of facilities due to compliance costs, which would lend itself to further determine these costs are economically unachievable for any facility that has already closed and has no revenue to support these compliance costs. The increased cost of meeting zero-discharge limitations in unmanaged CRL may be unacceptable in light of the unique position of retired facilities with no revenue with which to support costs associated with such limitations.

Furthermore, the EPA acknowledges that the 2024 ELG record describes a spray dry evaporator employed to achieve zero-discharge of legacy wastewater at the Boswell Energy Center in Cohasset, Minnesota (DCN SE11621A1). The 2024 ELG concluded that the spray dry evaporator was not technologically available for this subcategory. In particular, many facilities will dewater and close their ash impoundments after the facility ceases generating electricity or combustion of coal. Without electricity production, there is no slipstream of flue gas with which to operate the same type of evaporator system that is achieving zero discharge at Boswell. No new information is available that rebuts this conclusion. For this reason, the EPA proposes that for facilities that do not have the same plant-wide configuration as Boswell, zero-discharge of unmanaged CRL may not be technologically available. In other instances, the facility may be unable to operate zero-discharge technologies during a planned or unplanned outage (DCN SE

1210303). The EPA has been unable to identify a basis for further subcategorization that would address the many differences between individual plants.

Feasibility of a Zero-Discharge Standard for Unmanaged CRL

As another potential basis supporting the EPA's proposal to reject Option 3 as BAT, the EPA has looked carefully at the feasibility of a zero-discharge standard in light of the unique nature of unmanaged CRL discharges and the influence contaminated groundwater has on the volumes and durations of these wastestreams, which may pose unique challenges for demonstrating the capabilities of zero-discharge technology.

In the 2024 ELG analysis, the EPA made the assumption that the pollutants in unmanaged CRL were similar to (managed) CRL, and by extension also similar to FGD wastewater.. Accordingly, the EPA assumed zero-discharge technologies identified for CRL and FGD could reasonably be applied to unmanaged CRL. The EPA is aware of at least one plant that as employed a zero-discharge technology for all wastestreams at the plant, including unmanaged CRL.

In the 2024 ELG, the EPA did not have performance data demonstrating that the volume of unmanaged CRL as estimated for costing purposes to be pumped from groundwater would result in zero-discharge of all pollutants from unmanaged CRL that is a functional equivalent of a direct discharge (as identified by a permitting authority). As the EPA did not receive or identify performance data to the contrary, the EPA, despite the lack of data, found in the 2024 ELG that discharges of pumped unmanaged CRL could meet a zero-discharge standard by the application of a pump-and-capture treatment system that includes spray dry evaporators (although this option was rejected due to its high costs). In this proposal, the EPA's updated analysis indicates that a zero-discharge limit is still not economically achievable, and it may not be technologically available as applied to all discharges of unmanaged CRL that are the functional equivalent of direct discharges. The volume and pollutant concentration of these functional equivalent discharges are highly dependent on prior groundwater contamination from surface

impoundments or landfills and the depth to the existing groundwater table. Operational conditions, such as the number of times the wastestream needs to be cycled or the accumulation of brine, may vary as a result of fluctuations in the volume required to be treated and changes in pollutant concentrations. Groundwater flows may be variable (such as seasonal aquifer replenishment or due to saltwater intrusion) and the pollutant concentrations may fluctuate such that a volume reduction step or additional storage capacity is needed. The impoundment or landfill may be several miles away from the power plant, requiring additional staff and resources to implement control strategies. On the other hand, under certain conditions, as the EPA acknowledged in the 2024 Rule, absorption and attenuation of pollutants in unmanaged CRL could make treatment easier and, in that case, would likely decrease costs of such treatment. (DCN SE12165). The EPA's cost analysis appropriately reflects the typical range of costs of compliance for the industry nationwide. Nevertheless, these other factors identified above may increase the costs at some sites that markedly depart from the range of costs already considered in the EPA's analysis. As some petitioners have pointed out, completely intercepting and capturing any and all leaks of unmanaged CRL is challenging, if not impossible, for at least some power plants. Even if it were possible to intercept all contaminated groundwater, the energy for evaporation might not be available or could be cost prohibitive.

In summary, it is likely that a subset of utilities subject to a potential zero-discharge requirement would not be able to comply with the requirements, even if they were able to capture and treat the vast majority of a plume before it reaches surface water simply as a function of existing groundwater (previously contaminated with pollutants that resulted from the operation of a generating unit) subsequently reaching a WOTUS in a fashion that a permitting authority determines is still a functional equivalent of a direct discharge of unmanaged CRL. As such, the EPA proposes that setting a broad zero-discharge standard for unmanaged CRL is not only economically unachievable but also has not been demonstrated to be technically feasible for the industry as a whole due to the unique make-up of each unmanaged CRL discharge.

Other Zero-Discharge Technologies for Treating Unmanaged CRL

For the 2024 ELG and for this proposal, the EPA evaluated other zero-discharge technologies that could also eliminate the discharge of unmanaged CRL wastewater such as thermal systems. However, the EPA is not proposing to rely upon them as a basis for BAT limitations because they achieve the same pollutant reductions as the proposed Option 3 BAT technology basis (spray dry evaporators) but typically at a higher cost. The EPA has already rejected Option 3 on the basis of high costs. Nevertheless, the EPA solicits comment on the technologies that could constitute an alternative BAT technology basis for unmanaged CRL.

2. Rationale for Not Proposing Option 2 as BAT

Unacceptably High Compliance Costs for Unmanaged CRL

The EPA is not proposing Option 2 as the preferred option for BAT for both types of discharges of unmanaged CRL because total costs to the industry as a whole are unacceptably high and the EPA proposes that these costs are not economically achievable. As the EPA did not receive or identify performance data to the contrary, the EPA assumes that, despite the lack of data, discharges of pumped unmanaged CRL could meet the numeric limitations for mercury and arsenic. However, as discussed in the Technical Support memo (DCN SE12105), the EPA has revised its costs estimate for this proposal based upon a corrected and updated baseline as compared to the one utilized in the 2024 ELG, and the revised total annualized cost estimates for Option 2 is \$660 million per year in the lower bound and \$1.4 billion per year in the upper bound at 3.76 percent average cost of capital (see Table VII-1 and the Technical Support memo (DCN SE12105)).

These costs are nearly an order of magnitude higher than total costs to the industry to control all of the remaining end-of-pipe discharges from every other wastestream covered by the 2024 Rule combined. The EPA proposes that expecting the industry as a whole to bear these costs is unreasonable. Costs are one of the statutory factors that the EPA must consider, and courts have found that the EPA can properly rely on costs in rejecting potential BAT

technologies. *See e.g., BP Expl. & Oil Inc.*, 66 F.3d at 799-800. For further discussion of costs and economic achievability, see section VII.C of this preamble. Overall, the EPA proposes that the increased costs of imposing stringent national effluent limitations under Option 22 (relative to site-specific costs in Option 1) is unacceptable, particularly in light of the unique position of retired facilities with no revenue with which to support costs associated with meeting the effluent limitations that would apply (see section V.C of this preamble).

For the reasons discussed above, the EPA is not proposing Option 2 as the preferred option for BAT because total costs to the industry as a whole are unacceptably high and the EPA proposes that these costs are not economically achievable. In addition, the EPA has identified other sources of uncertainty that could lead to increased costs beyond those included in the revised cost analysis in certain cases, which are discussed below. These potential additional costs add further support for the EPA's proposed finding that Option 2 presents unacceptably high total costs. The Agency solicits comments on the extent to which these additional considerations should factor into the EPA's final rule.

The Presence of Different Forms and Concentrations of Pollutants at Each Site Could Exacerbate Cost Impacts

The EPA emphasizes that there is a general lack of detailed characterization data for unmanaged CRL, particularly where leachate has mixed with groundwater. As discussed in section V, while there is an abundance of data characterizing the sources of waste and the wastewater itself in impoundments and landfills, data available on leachate is usually modeled, calculated, or estimated, and the characteristics of leachate likely change the moment it mixes with groundwater or undergoes some other physical or chemical change. Without accurate characterization in hand, it is difficult for the EPA to account for uncertainties in additional costs that may be required to meet broadly applicable technology-based limitations in all cases.

Impoundments and landfills reflect anywhere from years to decades of use, with non-homogenous layers reflecting different coal types, precipitation and stormwater, and in some

cases bottom ash. When water seeps through the impoundment and mixes with groundwater, there are changes in the ensuing wastewater, including but not limited to pH, temperature, flow rate, and alkalinity. These parameters can influence the chemical forms of the pollutants that are present (DCN: SE12166).

The EPA notes that in the 2015 ELG rule analysis, the Agency assumed that the pollutants in FGD and (managed) CRL were similar. In addition to FGD wastewater, an impoundment or landfill may also receive FGD leftover materials or residues, fly ash, bottom ash, boiler slag, scrubber residues, and cenospheres⁵. Data available to date show this assumption still holds.

In contrast to (managed) CRL, the EPA finds unmanaged CRL that has mixed with groundwater shows a much higher variability. For example, the pH of coal ash CRL from all coal types ranges from 4.16 to 12.2, with a median of 9.11 (DCN SE11725). Groundwater is usually slightly alkaline and is buffered in the presence of limestone or carbonate. Groundwater can become acidic if it passes through coal, sulfides, organics, or is otherwise affected by certain forms of pollution (DCN SE12120). The EPA has also evaluated facility-specific data showing that pollutants in groundwater laden with CRL, particularly their forms and concentrations, are not always similar to FGD and traditionally managed CRL (DCN SE12167). This is due to both the reaction of the pollutants in CRL with groundwater, and the presence of pollutants in the groundwater itself that may not otherwise be present in the CRL. There is also the possibility, as discussed earlier, of adsorption and attenuation that would change the characterization of unmanaged CRL (DCN SE12165). Although the 2024 Rule acknowledged this possibility and concluded that “to the extent adsorption and other attenuation processes would *remove* pollutants, this would only make it easier” to achieve the chemical precipitation-based limitations, 89 FR 40251, this does not represent a complete picture of the differences that are

⁵ Cenospheres are small, lightweight, ceramic spheres comprised of silica and alumina that result from burning of coal at high temperatures. They are recovered and used for fillers in materials like concrete, polymers, and paints.

expected to exist in unmanaged CRL that has mixed with groundwater and associated difficulties with meeting such limitations. While CRL is typically alkaline, at least three plants have shown arsenate in the unmanaged CRL wastewater (see section V of this preamble). As another example, selenate (selenium VI) favors oxygen-rich, alkaline environments. Analysis of 2025 monitoring data shows untreated CRL has a median pH near neutrality, but it can go as high as pH 9 (DCN SE12135). Should the aquifer be strongly alkaline or weakly buffered, selenate formation cannot be ruled out. To remove selenate in this situation usually requires additional technologies beyond chemical precipitation – which would represent additional costs to a facility – such as biological treatment, membrane filtration (such as reverse osmosis), or ion exchange.

Biological treatment is temperature dependent, pH sensitive, and requires sufficient alkalinity to buffer the system. Biological treatment must also be followed by a disinfection process. If the EPA were to establish chemical precipitation plus membrane filtration as the preferred option, it would cost at least 1.7 times as much as chemical precipitation alone,⁶ but in most cases would not remove further pollutants beyond chemical precipitation alone. The 2024 ELG cost methodology shows membrane filtration and ion exchange are more costly than chemical precipitation (DCN SE11724).

Because of the highly unique nature of each unmanaged CRL wastestream and the unsuitability of chemical precipitation to treat all pollutants potentially present in unmanaged CRL that has mixed with groundwater without adding costs beyond what the EPA has already determined to be too costly, the EPA proposes to reject Option 2 in favor of Option 1, which would authorize the permitting authority to establish BAT limitations based on a BPJ determination that is better suited to handle site-specific factors. The EPA solicits data on the characterization of leachate mixed with groundwater and treatment technology performance, including both concentrations and chemical forms of any pollutants.

⁶ At an average flow rate of 100 gpm, annualized costs (7 percent discount rate over 20 years) of chemical precipitation + membrane filtration costs 1.7 times as much as chemical precipitation alone.

The Need to Collect a Larger Volume of Groundwater Than Estimated to Meet the Limitations Would Exacerbate Cost Impacts and May Not be Feasible

Another fact that supports the EPA's proposal not to prefer Option 2 is that the volume and pollutant concentrations in the functional equivalent direct discharge are highly dependent on prior groundwater contamination from surface impoundments or landfills and the depth to the existing groundwater table. The 2024 ELG analysis assumed that, once an appropriate volume of groundwater laden with unmanaged CRL was removed from the aquifer, it could be treated to meet the numeric limitations for arsenic and mercury. The 2024 ELG analysis conservatively assumed the groundwater and the unmanaged CRL both had the pollutants found in CRL; *i.e.*, the total volume collected was subject to treatment as if the total volume was CRL. The analysis did not consider whether any remaining pollutants not collected would meet the numeric limitations when the remaining groundwater "daylights" or otherwise meets with surface waters. In other words, at issue here is not whether some of the unmanaged CRL mixed with groundwater can feasibly be collected and treated, rather it is an issue of how much unmanaged CRL mixed with groundwater must be collected before there is assurance that the ELG requirements have been met. Even if most of the unmanaged CRL coming from the landfill or impoundment is captured and treated, there could be ongoing exceedances at the functional equivalent direct discharge point. Therefore, in this case, a subset of power plants subject to numeric limitations for mercury and arsenic would not be able to comply with the requirements, even if they were able to capture and treat the vast majority of a plume before it reached surface water, assuming the permitting authority determines the plant still has the functional equivalent of a direct discharge. Neither the 2024 ELG analysis nor this proposal has data identifying how often these situations would occur. When such situations do occur, however, the volume of groundwater with unmanaged CRL collected is potentially underestimated. This could add significant costs for some plants where the EPA is already proposing the total costs to the industry as a whole are too high. As such, the EPA proposes that broadly setting numeric

limitations for unmanaged CRL is not only economically unachievable but also has not been adequately demonstrated to be technically feasible due to the unique make-up of each stream of unmanaged CRL.

Additional Costs Incurred as a Result of Multiple Management Units or Aquifers Would Further Exacerbate Cost Impacts

In 2009, the RCRA CCR rule survey identified 676 impoundments and landfills across 240 facilities (DCN SE12167). At 95 of those facilities, there is only one impoundment or landfill identified; 581 facilities have more than one management unit. In some instances, multiple impoundments are located adjacent to each other or in an adjoining manner. As discussed in section V, the EPA is further aware of 111 power plants that have management units that are unlined, not-clean closed, or are undergoing corrective action. This reflects the upper bound number of plants that may be determined to have the functional equivalent of a direct discharge. Consistent with the RCRA CCR rule, the analysis supporting this proposal considers the costs for wells, collection, capture, and treatment with chemical precipitation based on the groundwaters' flow and direction, thus intending to capture the primary plume of groundwater laden with CRL (DCN SE12169). The EPA is already aware that, in some cases, the waste management unit (especially landfills) may be located some distance away from the electric generating unit. (DCN: SE12104). However, there are likely instances where more than one impoundment would need to be independently managed and controlled to meet the numeric limitations under Option 2; in this case, the estimated costs are likely understated. There may also be instances where the groundwater exhibits changes in direction and flow to the extent a single system of wells is unable to capture the groundwater laden with CRL; in this case, the costs are also likely understated. In both instances, the applicability of Option 2's numeric limitations is a result of the site-specific determination of functional equivalent of a direct discharge, a decision which is beyond the scope of this proposal. The total costs of Option 2, however, are already high enough that any additional costs would further exacerbate the

proposed lack of economic achievability of that option. While the possibility of the costs for collecting, pumping, and treating groundwater could have been underestimated for the 2024 ELG, it was not a concern there because the total costs were not near the range where economic achievability was thought to be an issue.

The EPA is also aware that some facilities may have impoundments or landfills located near more than one aquifer (DCN SE12103). Again, the EPA is not determining here that each impoundment or landfill is located such that where there is a functional equivalent of a direct discharge. However, multiple treatment systems may need to be deployed to meet the proposed limitations, whereas the EPA's cost methodology only presents costs for one treatment system. In light of the revised costs presented in this proposal, the added costs of additional systems could exacerbate the EPA's proposed findings regarding lack of affordability and provide further reason not to prefer Option 2.

The Duration of Discharges of Unmanaged CRL May Increase Cost Burdens

Finally, as with Option 3, the duration of the discharges in question and the need for treatment beyond the operating life of a regulated utility may significantly increase the economic impacts of this option. This may provide additional support in favor of rejecting Option 2.

4. Rationale for Proposing Option 1 as the Preferred Option for BAT

After considering updates to the industry-wide economic analyses, and further analysis of the feasibility of broadly setting numeric limitations on discharges of unmanaged CRL, the EPA is proposing to establish through regulation that, for functionally equivalent direct discharges of unmanaged CRL, BAT limitations must be derived by the permitting authority on a case-by-case BPJ basis. Additionally, the EPA is also proposing to retain the numeric discharge limitations for mercury and arsenic based on chemical precipitation for discharges of pumped unmanaged CRL.

Functional equivalent of a direct discharge of unmanaged CRL

Effluent limitations derived by permitting authorities via BPJ must, by design, be technologically available and economically achievable for a particular facility, after

consideration of all appropriate factors (see section IV.B.3 for additional details). In addition, BPJ limitations have the flexibility necessary to consider highly site-specific factors to each individual plant, such as volumes of surrounding aquifers, feasibility of pumping and capturing groundwater, different hydrogeological conditions of the site, and volumes and locations of discharges of unmanaged CRL, all of which are issues that the EPA identified in connection with rejecting Options 2 and 3.

The EPA's proposed preferred option, Option 1, also complies with the CWA section 301 mandate that BAT limitations result in "reasonable further progress" toward the Act's goal of eliminating the discharge of all pollutants because it represents a step beyond the BPT-level of control, which is based on surface impoundments alone. 33 U.S.C. 1311(b)(2)(A). Under Option 1, for functionally equivalent direct discharges of unmanaged CRL, permitting authorities must consider more stringent limitations beyond those based on surface impoundments, including whether such limitations are available and achievable for the particular facility, as determined in accordance with the section 304 consideration factors. Some of the technology options for BAT that the permitting authority might consider are discussed in section V.E of this preamble, and the EPA's record includes potential limitations that could be attained based on these technologies.

The EPA also notes that the BPJ approach provides appropriate flexibility, given the rapidly increasing energy demands across the U.S. and the newfound pressures put upon these utilities to produce inexpensive and reliable electricity (as discussed in both the Steam Electric 2025 Deadline Extensions Rule and in section V of this preamble), including uncertainty surrounding retirements of existing coal-fired power plants, extended operations of EGUs due to "must run orders," and the overall need to ensure grid reliability.

Discharges of pumped unmanaged CRL

The EPA is proposing to identify chemical precipitation as BAT for plants with discharges of pumped unmanaged CRL because it is both technologically available and

economically achievable for such plants. The EPA identified seven plants with these types of discharges through their corresponding CCR rule Corrective Action Plans pursuant to 40 CFR part 257, subpart D. For these seven facilities, the EPA assumes no additional costs for pumping equipment would be incurred under the proposed options. The EPA did estimate the costs of treatment for these seven facilities using the 2024 ELG cost model for chemical precipitation. Thus, these costs reflect treating a known volume of flow that has been shown to be adequate to meet the proposed numeric effluent limitations for mercury and arsenic. The estimated total annualized cost to industry at 3.76 percent average cost of capital for these facilities is \$121 million under Option 1 (see Table VII-1). The EPA proposes that the costs incurred to meet the proposed arsenic and mercury limitations based on chemical precipitation are economically achievable for plants with existing discharges of pumped unmanaged CRL. Finally, for discharges of pumped, unmanaged CRL, chemical precipitation treatment represents reasonable further progress over the BPT-level of control (surface impoundments).

VII. What are the Benefits, Costs and Economic Impacts of the Proposed Revisions?

The EPA conducted two main types of analyses: economic impact analysis addressing how many regulated entities are affected, and benefit-cost analysis addressing the social benefits and costs associated with the proposed ELG. This section provides an overview of the methodology the EPA used to assess the social benefits and costs, and the economic impacts and summarizes the results of these analyses. “The Economic Analysis Memorandum for the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category - Unmanaged Combustion Residual Leachate” (hereafter, the Economic Analysis memo) in the docket provides additional detail (DCN SE12127).

A. Introduction and Overview

In developing ELGs, and as required by CWA section 301(b)(2)(A), the EPA evaluates the economic achievability of regulatory options to assess the impacts of applying the limitations and standards to the industry as a whole. For this proposal, the EPA compared the values to a

baseline that reflects implementation of existing environmental regulations (as of this proposal), including the 2024 ELG. Like the prior analyses of the 2015, 2020, and 2024 ELGs, the cost and economic impact analysis for this proposed ELG focuses on understanding the magnitude and distribution of compliance costs across the industry. With respect to broader market impacts, because of data and methodological limitations, the EPA conducted a screening analysis that assesses the direction and magnitude of changes relative to other regulations that the EPA determined would have small impacts and be economically achievable. Specifically, the EPA analyzed the ratio of compliance costs to revenue to see how the three 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 proposed regulatory options, the EPA conducted other analyses to (1) characterize other potential impacts of the regulatory options (*e.g.*, on electricity rates), (2) determine the social benefits and costs, and (3) determine broad impacts to small businesses to meet the requirements of E.O.s or other statutes (*e.g.*, E.O. 12866, Regulatory Flexibility Act, Unfunded Mandates Reform Act).

B. Method for Estimating Compliance Costs

Compliance costs are the foundation for both economic achievability and the cost side of the benefit-cost analysis. The EPA estimated plant-specific compliance costs to control unmanaged CRL discharges at steam electric plants to which the ELGs apply. The 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 2024 ELG and the 2015 CCR rule), identified equipment and process changes that plants would likely make under each of the three regulatory options presented in Table VI-1 of this preamble, and estimated the capital and O&M costs to implement those changes.

Because of uncertainty regarding which steam electric plants have unmanaged CRL discharges and may therefore incur costs to meet effluent limitations in this proposed ELG, the

EPA used a bounding approach for developing plant-level costs that considers factors indicative of the potential for an unmanaged CRL discharge to be present, including (1) the presence of landfills or surface impoundments that are not clean closed or composite lined, (2) a total estimated groundwater pumping rate greater than 0.5 gallons per minute (gpm), and (3) whether the facility was undergoing corrective action for groundwater exceedances based on the site's most recent groundwater monitoring reported in the CCR database. The EPA solicits comment on all aspects of its groundwater pumping rates estimates, including the use of single groundwater pumping systems. See the Technical Support memo for additional details (DCN SE12105).

The lower bound scenario considers a population of 63 plants containing waste management units (landfills or surface impoundments) that do not have a composite liner, are not clean closed, and report undergoing corrective action for groundwater exceedances based on the site's most recent groundwater monitoring reported in the CCR database. All waste management units that fit these criteria from these 63 plants were accounted for in the EPA's cost analysis and assumed a separate treatment system for unmanaged CRL. For the upper bound scenario, the EPA considered 111 plants with reported waste management units that are not clean closed or composite lined but did not limit the waste management units to those with corrective action. As a conservative estimate and to better compare the upper and lower bound estimates, the EPA calculated costs for all waste management units associated with the 111 plants and assumed a separate treatment system for each waste management unit. In both scenarios, the EPA identified seven plants where pumping and treatment of groundwater was selected as the corrective remedy. These seven plants only received costing estimates for treatment of unmanaged CRL and did not incur costs for pumping and capturing unmanaged CRL in either the upper and lower bound estimations, whereas the EPA calculated costs for the remaining 56 to 104 plants to include both pumping and treating unmanaged CRL.

Together, the results represent a reasonably estimated range of nationwide costs of

treatment for unmanaged CRL, but as discussed in the following paragraphs, it could overestimate costs at some facilities and underestimate costs at others. These modeling assumptions should not be interpreted as a finding that any specific site is subject to the unmanaged CRL limitations. Rather, these assumptions should be considered as assisting in a reasonable estimation of costs nationwide, with actual site-specific costs under- or overestimated. While the EPA believes that using waste management units that have triggered corrective action is a reasonable proxy for estimating waste management units most likely to incur costs associated with unmanaged CRL under this proposed ELG, the EPA notes that a facility in corrective action for its groundwater contamination does not mean that the waste management unit at issue would necessarily be found to be a point source with a functional equivalent of a direct discharge of unmanaged CRL to a WOTUS. Thus, in some cases, these costs will be overestimated for specific facilities. At the same time, it may be possible that unmanaged CRL may be subject to CWA permitting but does not trigger corrective action under the 2015 CCR regulations.

In estimating private compliance costs, the EPA used the estimated weighted average cost of capital for the industry of 3.76 percent to annualize one-time costs and costs recurring on other than an annual basis. For this analysis, the EPA annualized capital costs over the useful life of the longest-lived technology installed at any plant (20 years) and annualized costs incurred on a non-annual, periodic basis using the recurrence period (*e.g.*, over 6 years for costs incurred every six years). The EPA then calculated total industry costs by summing plant-specific annualized costs.

The cost estimates presented in Table VII-1 are the total annualized compliance costs associated with unmanaged CRL for the industry as a whole. In comparison to similar estimates for the 2024 ELG, the Option 2 costs are higher than those presented in 2024, reflecting the updates to the EPA's cost model and industry profile.

Table VII-1. Total Annualized Compliance Costs for Unmanaged CRL (in millions, 2024\$, at 2026)

	Total Annualized Compliance Costs for Unmanaged CRL (in millions)					
	Option 1		Option 2		Option 3	
	Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound	Upper Bound
Total Costs (Pre-Tax)	\$121	\$121	\$658	\$1,437	\$1,076	\$2,240

For the assessment of industry costs, the 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 because they incorporate approximate capital depreciation and other relevant tax treatments that reduce the net compliance burden on entities that own the plants. Since taxes are transfers, pre-tax costs reflect the real cost to society and are appropriate for benefit-cost analysis. Similarly, after-tax costs are reflective of private costs, which drive private decision-making, and are therefore appropriate for use in economic impact analysis.

The cost estimates shown in Table VII-1 are an intermediate step to producing the estimated incremental costs associated with this proposal relative to the baseline which is full implementation of the 2024 ELG. Table VII-2 summarizes the incremental costs of the three options as compared to baseline; these costs represent the costs of this proposed rule. Relative to the baseline, the preferred proposed ELG (Option 1) results in after-tax annualized savings of \$462 million and \$1,104 million for the lower and upper bound scenarios, respectively. Option 2 results in no incremental costs because it represents the same technology basis as the baseline.

Table VII-2. Estimated Incremental Costs Relative to the Baseline

Tax Basis	Annualized Incremental Costs (in millions)					
	Option 1		Option 2		Option 3	
	Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound	Upper Bound
Pre-Tax	-\$537	-\$1,315	\$0	\$0	\$418	\$803

After-Tax	-\$462	-\$1,104	\$0	\$0	\$350	\$668
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The EPA may, if new and relevant data are received on this proposed ELG, quantify the costs of any final rule using the same models and methodologies used here and in the 2020 and 2024 ELGs.

C. Method for Estimating Economic Impacts

The EPA assessed the economic impacts of this proposed ELG on existing EGUs at steam electric plants and the entities that own those plants, based on comparison of costs to revenue. The Economic Analysis memo in the record (DCN SE12127) discusses these methods and results in greater detail.

The EPA conducted the cost and economic impact analyses at both the plant and parent company level. The first level provides insight on the magnitude of compliance costs relative to the plant revenue derived from electricity generation. The second level of analysis adds insight on the impact of compliance requirements for entities that own multiple plants. Having both levels of analysis is important because the impacts could differ between these two levels. The cost and economic impact analyses—at both the plant and parent company level—provide screening-level indicators of the impacts of costs for unmanaged CRL controls relative to historical operating characteristics of steam electric plants incurring those costs (*i.e.*, level of electricity generation and revenue). The EPA conducted these analyses for baseline and for the three regulatory options presented in Table VI-1 of this preamble, then compared these impacts to understand the incremental effects of the regulatory options in this proposal.

For each of the two levels of analysis (plant and parent entity), the Agency assumed, for analytic convenience, 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 (or cost savings), as steam electric plants that operate in a regulated market may pass on changes in

production costs to consumers through changes in electricity prices. If the impacts are found to be economically achievable under the assumption that no costs are passed to consumers, then the impacts will be reduced – and also economically achievable – if entities have the ability to pass along some costs to consumers.

1. Plant-Level Cost-to-Revenue Analysis

The EPA developed revenue estimates for this analysis using Energy Information Administration (EIA) data. The EPA then calculated the change in the annualized after-tax costs of the three regulatory options presented in Table VI-1 of this preamble as a percent of baseline annual revenues. The after-tax costs incorporate approximate capital depreciation and other relevant tax treatments and are therefore a more meaningful measure of the compliance impacts on privately owned for-profit plants. 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 Regulatory Flexibility Act (RFA) (U.S. EPA 2006). The EPA used this guidance as the basis for also looking at impacts at the level of the plants, following the approach used in previous ELG regulatory analyses. 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 preferred proposed ELG (Option 1), the EPA estimated that four plants, for both lower and upper bound scenarios, would incur costs greater than or equal to one percent of revenue, including three plants that have costs greater than or equal to three percent of revenue. This represents a burden reduction when compared to the 2024 ELG baseline, for which 33 and 78 plants are estimated to incur unmanaged CRL costs greater than one percent of revenue, for the lower and upper bound scenarios, respectively. The Economic Analysis memo in the record (DCN SE12127) provides results for the other regulatory options the EPA analyzed.

This proposed rulemaking does not cause adverse impacts on small entities. In fact, Option 1, the preferred option, is estimated to result in fewer small entities incurring significant impacts. Between 5 and 11 fewer small entities will experience impacts exceeding one percent of revenue as a direct result of this rule if finalized, and between 4 and 6 fewer small entities will experience impacts exceeding three percent of revenue.

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

The EPA also assessed the economic impact of the regulatory options presented in Table VI-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 at the level of entities that own 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, the EPA compared the incremental change in the total annualized after-tax costs and the total revenue for the entity to baseline. Following the methodology employed in the analyses for the 2015, 2020 and 2024 ELGs, the 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. The EPA estimated that the number of entities owning existing EGUs at steam electric plants ranges from 209 to 373, depending on the assumed ownership structure of those plants not likely to incur ELG costs and not explicitly analyzed. The EPA estimates that under the preferred proposed ELG (Option 1) and for the lower and upper bound cost scenarios, two parent entities would incur annualized unmanaged CRL costs representing one percent or more of their revenues, with both of these entities incurring costs representing more than three percent of revenue. This represents a burden reduction when compared to the 2024 ELG baseline, for which nine and 22 parent entities are estimated to incur

unmanaged CRL costs greater than one percent of revenue, with seven and 11 of these parent entities estimated to incur costs greater than three percent of revenue.

Therefore, this proposed rulemaking does not have adverse impacts on small entities or parent entities and Option 1, the preferred option reduces impacts relative to the baseline option.

D. Estimated Annual Costs of the Proposed Regulatory Options/Scenarios

The estimated annual costs of the proposed ELG refers to social costs, which are the costs of the proposed ELG 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, the EPA used the pre-tax costs, as these costs represent the total expenditures irrespective of any adjustments to reflect depreciation and other relevant tax treatments. The EPA tabulated these costs in the year they are estimated to be incurred, which varies across plants based on the estimated compliance year. These estimated annual costs are also the costs used in the benefit-cost analysis.

For the analysis of social costs, the EPA estimated a plant- and year-explicit schedule of technology implementation cost outlays that reflects the “no later than date” for each option. For the baseline and Option 2, the schedule is based on plant owners installing technologies to meet the applicable limitations no later than the end of 2029. For Options 1 and 3, the deadline is December 2034. As described in section 3.1, of the Economic Analysis Memo, the EPA assumed that plants would implement technologies over several years leading to this deadline as their permits are renewed to incorporate the applicable limitations. For the baseline and Option 2, technology implementation years run from 2027 through 2029. For Options 1 and 3, the technology implementation years run from 2030 through 2034. The useful life of the technology extends for 20 years past the last year of technology installation. Thus, the full analysis period for all options for the estimation of social costs is 28 years: 2027-2054. As described further in the Economic Analysis memo to the record (DCN SE12127), the increases in the cost to state governments to develop NPDES permits based on the permitting authority’s BPJ instead of the

limitations specified in the baseline are small, particularly when compared to compliance costs. Consequently, the social costs are predominantly based on the pre-tax costs estimated for steam electric plants.

Table VII-3 of this preamble presents the incremental total annualized social costs of the three regulatory options, compared to baseline and calculated using three percent and seven percent discount rates. The preferred proposed ELG (Option 1) has estimated social costs savings of \$446 million to \$1,090 million using a three percent discount rate and \$532 million to \$1,286 million using a seven percent discount rate.

Table VII-3. Estimated Incremental Total Annualized Social Costs Relative to the Baseline

Discount Rate	Annualized Social Costs (in millions)					
	Option 1		Option 2		Option 3	
	Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound	Upper Bound
3% Discount Rate	-\$446.2	-\$1,089.8	\$0	\$0	\$375.6	\$715.7
7% Discount Rate	-\$531.9	-\$1,286.3	\$0	\$0	\$250.5	\$475.2

E. Economic Achievability

In developing ELGs, and as required by CWA section 301(b)(2)(A), the EPA evaluates economic achievability to assess the impacts of applying the limitations and standards on the industry as a whole. As described in more detail below, the proposed rule is expected to allow flexibility for permitting authorities to develop BAT limitations for certain discharges of unmanaged CRL using their best professional judgment, considering site-specific factors. The EPA estimates that this flexibility will result in cost savings when compared to the baseline and will allow compliance decisions that impose minimum economic impact across the industry and customers. As noted in section VI.B, the same approach cannot be used to assess economic achievability for open and closed facilities; nonetheless, it is the combination of effects that determines economic achievability to the industry as a whole.

The EPA cannot prospectively determine how many or which instances of unmanaged CRL discharged through groundwater may ultimately be found to require CWA permits. As described above, to be covered by the NPDES Program, there must be a discharge (or functionally equivalent discharge) of a pollutant from a point source into a WOTUS. To ensure that technology costs are economically achievable for the proposed options, the EPA assumed a worst-case costing scenario based on the upper bound set of facilities. The EPA's assumption for the purposes of a worst-case costing analysis does not mean the EPA views all of these potential discharges as requiring CWA permitting. Instead, total costs (and pollutant loadings) provide the range within which actual costs (and pollutant loadings) are expected to fall. The EPA acknowledges that a best estimate would be helpful, but in the absence of determinations on which discharges are subject to CWA permitting, the EPA cannot definitively define the ultimate scope of coverage. This position is consistent with the position outlined above. In this proposal, the EPA has made a reasonable estimation of costs, fulfilling the Agency's rulemaking requirements. Using these costs, the EPA then conducted a screening-level analysis of economic impacts, which helps inform the EPA's proposed determination that the unmanaged CRL limitations reflected in the preferred proposed option (Option 1) are economically achievable. For further discussion of the screening-level analysis and economic achievability, see sections VII.A through VII.D of this preamble.

Impacted Businesses

Relative to the baseline, the proposed ELG is estimated to reduce compliance costs for steam electric plants that have unmanaged CRL discharges determined to be the functional equivalent of a direct discharge to a WOTUS by their permitting authority. Under the baseline, the EPA estimates that a total of 808 plants are subject to the steam electric point source category overall and that, in the baseline, 20 to 41 plants would incur cost-to-revenue ratios greater than 3 percent for unmanaged CRL costs under the lower and upper bound cost scenarios, respectively. Of these plants, seven to 10 plants are owned by small entities under the lower and upper bound

scenarios, respectively. An additional 13 to 37 plants incur unmanaged CRL costs greater than 1 percent (but less than 3 percent) of revenue in the baseline under the lower and upper bound cost scenarios.

The preferred proposed ELG (Option 1) significantly reduces these baseline impacts. As detailed in section VIII below, the EPA estimated that, under the proposed ELG, a total of three plants (*i.e.*, 17 to 38 fewer plants than in the baseline for the corresponding scenarios) may incur compliance costs greater than three percent of revenue, including two plants owned by small entities. Only one plant, owned by a large entity, incurs unmanaged CRL costs between 1 and 3 percent of revenue. The Economic Analysis memo in the docket provides additional detail (DCN SE12127).

F. Impacts on Residential Electricity Prices

The EPA presents the effects of the proposed ELG on consumers in the Economic Analysis memo to the record (DCN SE12127). While the CWA section 304(b) “consideration” factors do not require these details, the EPA presents them for informational purposes. To consider all scenarios where cost savings are passed on partially to electricity consumers, the EPA made an inclusive assumption based on all cost savings being passed on to electricity consumers, even though this is unlikely in reality. If all annualized compliance cost savings were passed on to residential consumers of electricity instead of being retained by the operators and owners of power plants (following the same assumption the EPA has made for analytic convenience for all prior steam electric rulemaking analyses), the average yearly electricity bill for a typical household would be \$1.38 to \$3.37 lower under the preferred proposed ELG (Option 1) as compared to the baseline. These results represent the largest cost savings that would be realized by households.

G. Benefit-Cost Analysis

The proposed rule is estimated to result in avoided social costs of \$446 million to \$1,090 million in 2024 dollars under the lower and upper bound scenarios (at a three percent discount

rate). The proposed rule will also lead to forgone benefits in cases where site-specific considerations result in the permitting authority developing less stringent limitations using its BPJ than the limitations that apply under the baseline, but the EPA expects the forgone benefits to be lower than the cost savings and therefore estimates the proposed rule to provide net benefits. More details on benefits are provided in section XI.

VIII. Pollutant Loadings

In developing ELGs, the EPA typically evaluates the pollutant loading reductions of regulatory options to assess the impacts of the compliance requirements on discharges from the whole industry. The EPA took the same approach to the one described above for plant-specific costs for estimating pollutant reductions associated with this proposal. That is, the EPA compared the values to a baseline that reflects implementation of existing environmental regulations, namely the 2024 ELG for unmanaged CRL.

The general methodology that the EPA used to calculate pollutant loadings in this proposed ELG is the same as that described in the 2024 ELG. The EPA first estimated—on an annual, per plant basis—the pollutant discharge load associated with the technology basis evaluated for plants to comply with the 2024 ELG requirements for unmanaged CRL. The 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 proposed rule. For each regulatory option, the 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 loadings for unmanaged CRL.

A. Unmanaged Combustion Residual Leachate

For unmanaged CRL, the EPA used the average pollutant effluent concentrations and plant-specific discharge flow rates to estimate the mass pollutant discharge per plant for the baseline and the proposed options. The EPA used plant population data compiled for the 2024 ELG as the initial basis for estimating discharge flow rates and updated the population to reflect

changes in plant retirement status. As discussed in the Technical Support memo (DCN SE12105), the plants that indicated retirement by the end of 2025 were not included in the analysis. The EPA solicits comment on the exclusion of retired plants from the analysis given that such plants are still expected to incur costs associated with treatment of unmanaged CRL.

The EPA also used utilities' "CCR Rule Compliance Data and Information" websites to identify waste management units that may discharge unmanaged CRL. For discharges of unmanaged CRL, the EPA estimated the volume of leachate-laden groundwater captured from pumping systems that draw down the groundwater elevation along the hydraulically downgradient cross-sectional width of the CCR management unit. See the Technical Support memo for additional details (DCN SE12105).

The EPA assigned pollutant concentrations based on current operating conditions or treatment in place for baseline and the operation of a treatment system designed to comply with the proposed options. To represent the average pollutant concentrations for unmanaged CRL, the EPA used average pollutant concentrations for CRL calculated from data compiled from the 2015 ELG and 2024 ELG. However, due to the lack of pollutant concentration data available for each analyte in unmanaged CRL, as well as the highly variable impact of ambient groundwaters on pollutant concentrations in unmanaged CRL, only total suspended solids (TSS) and total dissolved solids (TDS) were calculated for pollutant loadings. The selection of TSS and TDS ensures that the sum of these two metrics does not double count other pollutants that potentially may be present in unmanaged CRL, which the EPA is unable to numerically quantify due to lack of available data. The EPA did not make assumptions about ambient TSS and TDS concentrations in groundwater when calculating the pollutant loadings; however, data collected from groundwater monitoring reports suggest that TDS concentrations for CRL and groundwater are generally similar (DCNs SE12135 and SE12105).

To estimate pollutant removal associated with chemical precipitation, the EPA first transferred the average flue gas desulfurization effluent concentrations for chemical precipitation

to CRL, as it did in the 2015 ELG. The EPA then transferred the untreated and chemical-precipitation treated average pollutant concentrations for TSS and TDS from CRL to unmanaged CRL. For the spray dry evaporator treatment option, the EPA assumed that the pollutant loadings would be reduced to zero since the technology would facilitate zero-discharge.

B. Summary of Incremental Changes of Pollutant Loadings

Table VIII-1 of this preamble summarizes the net reduction to annual pollutant loadings, compared to baseline, associated with each regulatory option in Table VI-1 of this preamble. The estimated pollutant loading in Option 1 includes only calculations from seven plants that the EPA identified as discharging unmanaged CRL that is mixed with groundwater before being captured and pumped to the surface before discharge directly to a WOTUS. The EPA did not include estimates from plants that may have discharges of unmanaged CRL that the permitting authority determines are the functional equivalent of a direct discharge to WOTUS, which would be subject to BAT limitations based on BPJ under Option 1. The EPA cannot predict which plants will be determined to have a functional equivalent direct discharge or the resulting requirements based on the permitting authority’s BPJ. Thus, the EPA cannot estimate pollutant loadings post implementation at those plants and cannot include those plants in these estimates.

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

	Incremental change in pollutant loading					
	Option 1		Option 2		Option 3	
	Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound	Upper Bound
Pollutant Loading (millions of pounds/year)	-12.9	-29.8	0	0	584	1,190

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

IX. 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 the EPA to consider non-water quality environmental impacts (including energy requirements) associated with ELGs. These non-water quality environmental impacts are especially important due to the energy crisis and rising demands for energy and reliability in the U.S., as discussed in section V.C. Accordingly, the EPA has considered the potential impacts of this proposed ELG on energy consumption, air emissions, solid waste generation, and changes in water use. In general, to conduct this analysis, the EPA used the same methodology (with updated data as applicable) as it did for the analyses supporting the 2024 ELG. The following sections summarize the methodology and results. See the Technical Support Memo for additional details (DCN SE12105).

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.*, pumping, chemical precipitation, spray dry evaporators), or operating ash handling systems. For this proposal, the EPA considered whether there would be an associated change in the incremental energy requirements for treatment of unmanaged CRL compared to the baseline. Energy requirements vary depending on the regulatory option evaluated and the current operations of the facility. Therefore, as applicable, the EPA estimated the energy usage in MWh for treatment equipment added to the plant systems or in gallons of fuel consumed for transportation/operating equipment and summed the facility-specific estimates to calculate the net change in energy requirements from baseline for the regulatory options.

The EPA estimated the amount of energy needed to operate wastewater treatment systems based on the horsepower ratings of the pumps and other equipment. The EPA also estimated any changes in the fuel consumption associated with transporting solid waste from steam electric power plants to landfills (on- or off-site). The frequency and distance of transport depend on a plant's operation and configuration; specific factors include 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 IX-1 of this preamble shows the net change in annual electrical energy usage associated with the regulatory options compared to the baseline, as well as the net change in annual fuel consumption requirements associated with the three regulatory options compared to the baseline. The estimated energy and fuel usage in Option 1 includes only calculations from seven plants that the EPA identified as discharging unmanaged CRL that is mixed with groundwater before being captured and pumped to the surface and discharged directly to a WOTUS. The EPA did not include estimates from plants that may have discharges of unmanaged CRL that the permitting authority determines are the functional equivalent of a direct discharge to WOTUS, which would be subject to BAT limitations based on BPJ under Option 1.

Table IX-1. Estimated Incremental Change in Annual Energy Requirements Compared to the Baseline Associated With Regulatory Options

Non-water quality environmental impact	Energy use associated with regulatory options					
	Option 1		Option 2		Option 3	
	Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound	Upper Bound
Incremental change in electrical energy usage (MWh)	-133,000	-319,000	0	0	2,050,000	4,160,000
Incremental change in fuel (thousand gallons)	-185	-296	0	0	766	1,054

B. Air Pollution

The three proposed regulatory options are expected to affect air pollution through two main mechanisms: (1) changes in auxiliary electricity use by steam electric power plants due to the need to operate wastewater treatment; and (2) changes in transportation-related emissions due to the trucking of solid waste to landfills. This section discusses air emission changes associated with these mechanisms as they relate to treatment of unmanaged CRL and presents the corresponding estimated total and net changes in air emissions.

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

To estimate the air emissions associated with changes in electrical energy use projected as a result of the regulatory options in this proposal compared to baseline, the EPA combined the energy usage estimates with air emission factors associated with electricity production to calculate air emissions associated with the incremental energy requirements. The EPA estimated nitric oxide + nitrogen dioxide (NO_x) and sulfur dioxide (SO₂) emissions using plant- or NERC-specific emission factors (tons/MWh) obtained from a 2024 Rule run of IPM for run year 2035.

To estimate air emissions associated with the operation of transport vehicles, the EPA used the MOVES4.0 model to identify air emission factors (tons/mile) for the air pollutants of interest. The EPA estimated the annual number of miles that dump trucks moving wastewater treatment solids to on- or off-site landfills would travel for the regulatory options. The EPA used these estimates to calculate the net change in air emissions for the three regulatory options. Table IX-2 presents the estimated net change in air emissions associated with auxiliary electricity and transportation for the proposed options. The estimated air emissions in Option 1 include only calculations from seven plants that the EPA identified as discharging unmanaged CRL that is mixed with groundwater before being captured and pumped to the surface before discharge directly to a WOTUS. The EPA did not include estimates from plants that may have discharges of unmanaged CRL that the permitting authority determines are the functional equivalent of a direct discharge to WOTUS, which would be subject to BAT limitations based on BPJ under Option 1.

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

<p>Non-water quality environmental impact</p>	<p>Air Emissions associated with regulatory options</p>
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	Option 1		Option 2		Option 3	
	Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound	Upper Bound
Incremental change in NO _x (thousand tons/year)	-0.01	-0.02	0	0	0.12	0.23
Incremental change in SO ₂ (thousand tons/year)	-0.01	-0.02	0	0	0.10	0.21

C. Solid Waste Generation

Steam electric power plants generate solid waste associated with sludge from wastewater treatment systems when treating unmanaged CRL (e.g., chemical precipitation, SDE). The EPA estimated the total and incremental change in the amount of solids generated for each plant compared to baseline under each regulatory option. Table IX-3 of this preamble shows the net change in annual solid waste generation, compared to baseline, associated with the three regulatory options. The estimated solid waste generation in Option 1 includes only calculations from seven plants that the EPA identified as discharging unmanaged CRL that is mixed with groundwater before being captured and pumped to the surface and discharged directly to a WOTUS. The EPA did not include estimates from plants that may have discharges of unmanaged CRL that the permitting authority determines are the functional equivalent of a direct discharge to WOTUS, which would be subject to BAT limitations based on BPJ under Option 1.

Table IX-3. Estimated Incremental Changes to Solid Waste Generation Compared to the Baseline Associated With Regulatory Options

Non-water quality environmental impact	Solid waste generation associated with regulatory options					
	Option 1		Option 2		Option 3	
	Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound	Upper Bound
Incremental change in solids generated (tons/year)	-1,320,000	-3,030,000	0	0	4,320,000	8,780,000

D. Changes in Water Use

The EPA does not expect a change in water use associated with the treatment technology options (chemical precipitation, spray dry evaporation) considered for the treatment of unmanaged CRL for the proposed regulatory options. However, treatment of unmanaged CRL associated with Option 2 and Option 3 requires pumping and capturing the unmanaged CRL before treatment can be implemented. Furthermore, in some cases, additional wellheads would be installed to pump clean water into the groundwater to help push the groundwater in the desired direction. Because the nature of unmanaged CRL is highly site-specific, pumping unmanaged CRL could potentially involve large amounts of groundwaters that are mixed with unmanaged CRL. As a result, groundwater reservoirs could be depleted through treatment of unmanaged CRL, which may impact downstream drinking water sources that rely on groundwater reservoirs. For this proposed ELG, the EPA estimated the total volume of leachate-laden groundwater that could be pumped annually across the industry may be between 20 billion to 41 billion gallons for the lower and upper bound estimations, respectively, for Options 2 and 3. Furthermore, as discussed earlier in section VI, this volume could be an underestimation, as the EPA does not have data to determine the exact volume of groundwater that might need to be pumped to fully address the functional equivalent of a direct discharge. Therefore, the proposed Options 2 and 3 could have a substantial impact on water usage by depleting groundwater reservoirs when capturing unmanaged CRL for treatment. Option 1 is based on site-specific BPJ analyses conducted by the permitting authority, and plants may have very different sets of requirements that impact their potential water usage. As a result, the EPA cannot accurately predict post-implementation water usage for Option 1.

X. Environmental Assessment and Benefits

A. Introduction

This section summarizes the potential environmental and human health effects and benefits due to changes in unmanaged CRL discharges from steam electric power plants. An

environmental assessment memo in the record provides additional details on these analyses (DCN SE12102), including a qualitative comparison of the change in impacts associated with the proposed rule regulatory options to those projected under the baseline; specifically, it presents information from the EPA's review of the scientific literature of impacts of pollutants discharged from unmanaged CRL on human health and the environment. The 2015 EA (EPA-821-R-15-006), 2020 EA (EPA 821-R-20-002), and 2024 EA (EPA-821-R-24-005) provide information from the EPA's earlier review of the scientific literature and of documented cases of the impacts on human health and the environment associated with the wider range of steam electric power plant wastewater discharges addressed in earlier rules.

Current scientific literature indicates that untreated steam electric power plant wastewaters, including unmanaged CRL, contain large amounts of a wide range of pollutants, some of which are toxic and bioaccumulative and cause detrimental environmental and human health impacts. To the extent that the proposed rule results in less stringent treatment of unmanaged CRL from certain facilities than under the 2024 baseline, there would be forgone benefits from forgone water quality improvements and the associated human health, ecological and use and non-use effects, and market and productivity benefits.

For additional information, see section X of the environmental assessment memo (DCN SE12102). The EPA also considered environmental and human health effects associated with changes in air emissions, solid waste generation, and energy usage.

B. Updates to the Environmental Assessment Methodology

For this proposal, the EPA updated the environmental assessment methodology to focus on a qualitative evaluation of potential environmental and human health impacts associated with unmanaged CRL. This approach reflects the nature of the available data and the objectives of the environmental assessment, which are to identify pathways of exposure, characterize potential receptors, and evaluate the relative magnitude of impacts under existing regulations and the proposed regulatory options.

The qualitative assessment integrates information from multiple lines of evidence, including facility operating practices, hydrogeologic settings, reported monitoring data, peer reviewed literature, and prior EPA analyses of coal combustion residuals. Due to the unique nature of unmanaged CRL mixing with subsurface groundwater, site-specific concentrations are limited or variable, therefore EPA relied on bounding analyses to assess the likelihood and direction of potential impacts.

C. Outputs from the Environmental Assessment

The EPA evaluated the potential environmental and ecological changes associated with anticipated changes in pollutant loadings under the proposed rule. As described in the environmental assessment memo to the record, the analysis focuses on changes in environmental and human health impacts resulting from exposure to toxic and bioaccumulative pollutants, with particular attention to surface water pathways and groundwater to surface water connections. The environmental assessment memo provides a qualitative summary of the potential environmental and human health effects of the proposed limitations on discharges of unmanaged CRL, including summaries of the potential pollutant effects of total dissolved solids (TDS) and total suspended solids (TSS) in receiving and downstream waters. The EPA also evaluated environmental and human health effects of other environmental changes such as changes to air emissions, solid waste generation, and energy usage.

D. Benefits

This section summarizes the national environmental benefits due to changes in unmanaged CRL discharges from steam electric power plants. The Economic Analysis memo in the record provides additional details on the benefits analyses (DCN SE12127).

Following the approach used in prior steam electric rulemakings, the benefit categories associated with the proposed rule regulatory options fall into four broad categories: (1) human health benefits from surface water quality improvements, (2) ecological conditions and recreational use effects from surface water quality changes, (3) market and productivity benefits,

and (4) air-related effects. Data limitations, modeling limitations, and gaps in the understanding of how society values certain environmental changes expected to result from changes to unmanaged CRL discharges prevented the EPA from quantifying and monetizing the benefits of this proposed rule. The EPA assessed benefits qualitatively, indicating their direction and potential magnitude where possible.

The following section summarizes the EPA's analysis of the benefit categories the Agency was able to identify to various degrees. The analysis builds on the environmental assessment summarized in section IX and detailed in the record (see DCN SE12102).

1. Qualitative Analysis of Benefits

The EPA estimates that the proposed rule may change the incidence of adverse health effects from exposure to metals and toxic pollutants in unmanaged CRL through the ingestion of self-caught fish (*e.g.*, arsenic, mercury, lead) or drinking water (*e.g.*, trihalomethanes from bromide in source waters). The EPA did not quantify changes in loadings for metals and toxic pollutants, but the environmental assessment identifies resources affected by unmanaged CRL discharges that indicate potential pathways of human exposure to unmanaged CRL pollutants. The proposed rule is expected to result in surface water quality changes including changes in aquatic and wildlife habitat, water-based recreation (*e.g.*, fishing, swimming, boating, and near-water activities), aesthetic value, and nonuse value from changes in ecosystem health. For some receiving waters, where a permitting authority establishes case-by-case BAT limitations based on technologies more advanced than chemical precipitation, the proposed rule may result in changes in improved habitat conditions for plants, invertebrates, fish, and amphibians, and the wildlife that prey on aquatic organisms, including enhanced protection of threatened and endangered species.

By changing discharges of total suspended sediment that contribute to turbidity, the proposed rule may also result in changes in water treatment costs for municipal drinking water systems located downstream from steam electric plant impoundments or landfills that have

unmanaged CRL. Changes in sediment discharge may affect sedimentation in reservoirs and navigable waters and alter the frequency of maintenance dredging.

Under the preferred option (Option 1), effluent limitations would be established on a site-specific basis using the permitting authority's BPJ, and resulting compliance measures and costs may differ from those assumed in the 2024 ELG baseline and the regulatory options analyzed for this proposal. In some cases, permitting authorities may determine that less extensive controls are appropriate given site-specific conditions, which could lower compliance costs as compared to the baseline but also reduce pollutant load reductions and the associated environmental benefits (*i.e.*, result in forgone benefits when compared to the baseline). In other cases, site-specific information may support more stringent controls, particularly where unmanaged CRL discharges have a clear connection to surface water exposure pathways, potentially resulting in greater environmental and human health benefits than previously anticipated (as well as possibly greater compliance costs).

The magnitude of potential benefits is uncertain and depends on the number of plants with unmanaged CRL discharges that meet the definition of a functionally equivalent discharge under the ELGs, and any eventual limitations set by permitting authorities based on BPJ. However, even to the extent that the proposed rule results in less stringent limitations for all plants where BPJ will apply, as EPA conservatively assumed under both the lower and upper bound cost scenarios, the EPA estimates the forgone benefits of the proposed rule to be less than the substantial cost savings the Agency estimated.⁷

XI. Implementation

A. Continued Implementation of Existing Limitations and Standards

The EPA has continually stressed since the announcement of the proposed supplemental

⁷ The proximity analysis similarly indicates that differences in potential impacts to sensitive receptors (impaired waters, drinking water resources, and habitats for threatened and endangered species) are minimal or uncertain relative to the baseline. In contrast, the costs associated with maintaining to expanding treatment requirements (chemical precipitation or zero discharge) are more quantifiable and substantial.

2024 ELG that the existing 40 CFR part 423 limitations and standards in effect continue to apply. In the sections below, the EPA discusses considerations for permitting authorities and regulated entities as they continue to implement existing regulations and look ahead to any final rule.

B. Implementation of New Limitations and Standards

Under the preferred option, EPA would modify section 423.13 to clarify that any new unmanaged CRL BAT requirements would not extend to retired plants closed by the effective date of the 2024 ELG. A new definition at section 423.11(gg) would define the term “closed coal combustion residual waste management unit” as a landfill or impoundment that no longer receives coal combustion residuals or other wastes as of the effective date of the 2024 ELG (*i.e.*, July 8, 2024). The term closed coal combustion residual waste management unit is defined to provide clarity and help avoid confusion over what “closed” means in this situation. For example, precipitation could enter impoundments and lead to the generation of unmanaged CRL long after the EGU has ceased coal combustion and the impoundment has stopped receiving coal combustion residuals. In these instances, the proposed rule would direct the permitting authority to establish BAT limitations on a case-by-case basis using BPJ. The EPA is proposing these updates to the regulation in response to stakeholder input. This definition reflects the EPA’s previous implementation of the 2015 and 2024 ELGs, and codifying it in the regulatory text would provide clarity to permitting authorities and certainty for the regulated community.

C. Reporting and Recordkeeping Requirements

As discussed in section VI of this preamble, CRL can be discharged not only as an end-of-pipe discharge, but also through groundwater, and the EPA is proposing revised BAT limitations for a subcategory of electric generating units that includes those with discharges of CRL that a permitting authority determines are the functional equivalent of direct discharges of CRL to a WOTUS. The requirements in the 2024 ELG for annual reporting and recordkeeping requirements will continue to facilitate the permitting authorities’ review of such discharges.

These existing requirements also facilitate compliance monitoring and make compliance information available to the public. The existing information collection request (ICR) that was published along with the 2024 ELG already includes all of the information necessary to comply with the proposed revised BAT limitations. The EPA expects that the burden of this ICR will decrease as fewer facilities will be subject to its requirements.

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. The 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. The EPA also stated its recommendation that the permitting authority notify any downstream drinking water treatment plants of the discharge of bromide. To the extent there are covered discharges of unmanaged CRL to a WOTUS, the EPA continues to recommend that permitting authorities carefully consider whether water quality-based effluent limitations are appropriate.

E. Severability

The purpose of this section is to clarify the EPA's intent with respect to the severability

of provisions of any final rule based on this proposed rule. In the event of a stay or invalidation of part of any final rule based on this proposed rule, the Agency's intent is to preserve the remaining portions of the rule to the fullest extent possible. The EPA notes the following existing regulatory text at 40 CFR 423.10(b) that would not be altered by this proposed rule: "The provisions of this part are separate and severable from one another. If any provision is stayed or determined to be invalid, the remaining provisions shall continue in effect." Moreover, to dispel any doubt regarding the EPA's intent and to inform how any final regulation would operate if severed, the Agency proposes to find that it would adopt each portion of this proposed rule independent of the other portions. As explained below, the EPA carefully crafted this proposed rule so that each provision or element of a final rule based on this proposed rule can operate independently. Moreover, the EPA has organized the proposed rule so that if any provision or element of a final rule based on this proposed rule is determined by judicial review or operation of law to be invalid, that partial invalidation would not render the remainder of the rule invalid.

The three options in this proposed rule propose to regulate discharges associated with two types of unmanaged CRL discharges. Each proposed option would, if finalized, provide limitations and standards associated with each type of unmanaged CRL, which are independent of one another. This is because the EPA considers the BAT statutory factors for each type of discharge independently. For example, if proposed Option 1 were finalized and the limitations established for functionally equivalent direct discharges of unmanaged CRL were deemed invalid, the EPA's view is that this would not impact the separate limitations established for discharges of unmanaged CRL that is captured and pumped to the surface.

XII. Data Request

The EPA solicits comment providing specific data and information to the Agency to support the analysis of other wastestreams in any subsequent reconsideration action. Specifically, the EPA solicits comment on facilities or electric generating units missing from the industry profile, updated flue gas desulfurization flow rates, CRL flow rates at new post-2015 waste

management units, and pilot test performance data as further described below.

Industry Profile

Some electric utilities have suggested that the industry profile utilized in the 2024 ELG was missing facilities or electric generating units for one or more wastestreams. The EPA solicits information for any facility or electric generating unit with one or more of the 2024 ELG wastewaters but was not evaluated for costs and pollutant loadings for that wastewater in the 2024 ELG rule record. Specifically, the EPA solicits comment on the facility name, the relevant electric generating unit, the wastewater(s) missing from the 2024 ELG rule analysis, and an explanation of why the Agency's 2024 ELG rule record information and assumptions were either incorrect or are no longer accurate.

Updated Flue Gas Desulfurization Flow Rates

The Electric Power Research Institute comments on the 2025 Deadline Extension proposed rule suggest that the EPA's flow rate data may be stale and in need of updating. The EPA solicits comment providing information that would confirm or refute this statement. Specifically, to ensure that the EPA can compare, and potentially replace, data collected as part of the 2010 survey, for each wet flue gas desulfurization scrubber in service at a plant, the Agency solicits comment on the following updated information:

- The steam electric generating units, and nameplate capacity, serviced by the flue gas desulfurization scrubber.
- The amount of flue gas desulfurization scrubber purge (or slurry discharge) sent to wastewater treatment or discharge for the last two years (2024 and 2025), specifically:
 - Typical flowrate in gpm or gallons per day (gpd), including duration and frequency of flue gas desulfurization scrubber purge (or slurry discharge) generation (hours per day and days per year).
 - Design (i.e., maximum) flowrate (gpm or gpd) for existing wastewater treatment, including the number of days the wastewater treatment system operated at the design

flowrate (if the system had not operated at design flow rate during this time period, a comment should characterize the highest flow rate observed and other relevant information for characterizing operations above the typical flow rate).

- The flue gas desulfurization maximum design chlorides (for the flue gas desulfurization system) in parts per million (ppm) and operating chlorides (in the flue gas desulfurization purge/slurry) in ppm.

Where a plant is taking any steps to minimize the amount of flue gas desulfurization scrubber purge (or slurry discharge) sent to treatment or discharge, the EPA solicits comment describing the processes utilized, or considered, to minimize flow. For example, several stakeholders have suggested that replacement of water-based seals with mechanical seals has been evaluated or conducted at a number of facilities.

CRL Flow Rates at New Waste Management Units

Since the effective date of the 2015 CCR rule, many facilities have constructed new landfills, landfill cells, and surface impoundments with composite (or alternative composite) liners. Since these liners and associated leachate-collection systems may differ from pre-2015 practices, the EPA solicits comment on CRL flow rate information from these new waste management units. Specifically, to ensure that the EPA can compare, and potentially replace, data collected as part of the 2010 survey, for each waste management unit constructed post-2015 the Agency solicits comment on the following updated information:

- A description of the leachate-collection system.
- The typical and maximum gallons per day volume of leachate (including leaks, seepage, toe drains, or similar releases) collected in 2024 and 2025.
- The frequency of process wastewater generation in 2024 and 2025 (days per year).
- A description of the estimation method where not directly measured.
- A description of how the collected leachate is managed (e.g., transferred to an on-site treatment system, commingled and treated with flue gas desulfurization wastewater,

rerouted back to the impoundment).

The EPA also solicits comment on any waste management units which have closed since the 2010 survey where collected CRL flows at these waste management units now differ from the 2010 survey data, including where such waste management units have clean closed and no longer generate CRL.

Pilot Tests

Utilities and vendors have described the limitations in 423.13(g)(3) and 423.15(b)(13) as unnecessarily tight, requiring additional pre-treatment or post-treatment from the treatment chain described in prior rulemakings. The EPA solicits comment providing pilot testing data on FGDFGD wastewater and CRL that would suggest a relaxation of these limitations might be warranted when applied to discharges from existing sources. Specifically, the EPA solicits comment providing draft or final pilot studies (whether on-site or off-site), including any influent and effluent data and associated laboratory reports. While the existing limitations utilize indicator pollutants, the EPA solicits comment providing information on any relevant pollutants so that the Agency might consider whether similar removals are attainable with less treatment across a range of such pollutants.

XIII. Statutory and Executive Order Reviews

Additional information about these statutes and Executive Orders can be found at <https://www.epa.gov/laws-regulations/laws-and-executive-orders>.

A. Executive Order 12866: Regulatory Planning and Review and Executive Order 13563: Improving Regulation and Regulatory Review

This proposed action is an economically significant regulatory action as defined under section 3(f)(1) of Executive Order 12866. Accordingly, it was submitted to the Office of Management and Budget (OMB) for review. Any changes made in response to E.O. 12866 interagency review have been documented in the docket. The potential impacts of this rule are summarized in section VII of this preamble. This analysis, “Economic Analysis Memorandum

for the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category - Unmanaged Combustion Residual Leachate” (DCN SE12127), is available in the docket. From a 2024 ELG baseline, the EPA estimated that the proposed action would result in annualized cost savings of \$446 million and \$1,090 million in 2024 dollars at a three percent discount rate, for the lower and upper bound cost scenarios, respectively. Similarly, the EPA estimated that the proposed action would save \$532 million and \$1,286 million annually (in 2024 dollars), for the lower and upper bound cost scenarios, respectively, at a seven percent discount rate.

B. Executive Order 14192: Unleashing Prosperity Through Deregulation

This action is expected to be an Executive Order 14192 deregulatory action, based on the preferred option, Option 1.

C. Paperwork Reduction Act (PRA)

This action does not impose any new information collection burden under the PRA. OMB has previously approved the information collection activities contained in the existing regulations under OMB control number 2040-0313.

D. Regulatory Flexibility Act (RFA)

I certify that this action will not have a significant economic impact on a substantial number of small entities under the RFA. In making this determination, the EPA concludes that the impact of concern for this rule is any significant adverse economic impact on small entities and that the agency is certifying that this rule will not have a significant economic impact on a substantial number of small entities because the rule relieves regulatory burden on the small entities subject to the rule. Of the estimated 111 to 191 small entities that own steam electric plants subject to these ELGs, the EPA estimated that two small entities (one cooperative and one nonutility) will incur unmanaged CRL compliance costs equal to or greater than one percent of revenue and the same two entities’ compliance costs also exceed three percent of revenue.

This proposed rule does not cause adverse impacts on small entities. In fact, Option 1, the preferred option, is estimated to result in fewer small entities incurring significant impacts. Between 5 and 11 fewer small entities will experience impacts exceeding one percent of revenue as a direct result of this rule if finalized, and between 4 and 6 fewer small entities will experience impacts exceeding three percent of revenue.

Therefore, relative to baseline, the proposed rule significantly reduces the burden on small entities compared to the baseline where an estimated seven to 13 small entities incur unmanaged CRL costs equal to or greater than one percent of revenue. The EPA detailed its analysis in the Economic Analysis memo in the record (DCN SE12127). I have therefore concluded that this action will not impose a regulatory burden on any regulated small entities while relieving burden on between 7 and 13 small entities.

E. Unfunded Mandates Reform Act (UMRA)

This proposed action does not contain an unfunded mandate as described in UMRA, 2 U.S.C. 1531-1538, and does not significantly or uniquely affect small governments. The proposed action imposes no enforceable duty on any State, local or Tribal governments or the private sector.

F. Executive Order 13132: Federalism

This action does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

G. Executive Order 13175: Consultation and Coordination with Indian Tribal Governments

This proposed action would not have Tribal implications as specified in Executive Order 13175. It does 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 Executive Order 13175. The EPA's analyses show that no plant subject to the proposed ELGs is owned by

Tribal governments. Thus, Executive Order 13175 does not apply to this action.

H. Executive Order 13045: Protection of Children from Environmental Health Risks and Safety Risks

The EPA interprets Executive Order 13045 as applying only to those regulatory actions that concern environmental health or safety risks that the EPA has reason to believe may disproportionately affect children, per the definition of “covered regulatory action” in section 2-202 of the Executive Order. Therefore, this proposed action is not subject to Executive Order 13045. Since any health effects of this proposed action would not fall disproportionately on children, the EPA’s Policy on Children’s Health also does not apply.

I. Executive Order 13211: Actions Concerning Regulations 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. The proposed rule is estimated to reduce costs to the industry. The annualized cost savings are small relative to the estimated total electricity generation across the power sector (equivalent to 0.01 to 0.03 cents per kWh).

J. National Technology Transfer and Advancement Act (NTTAA)

This rulemaking does not involve technical standards.

List of Subjects in 40 CFR Part 423

Environmental protection, Electric power generation, Power facilities, Waste treatment and disposal, Water pollution control.

Lee Zeldin,
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 continues to read as follows:

Authority: 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 adding paragraph (gg) to read as follows:

§ 423.11 Specialized definitions

(gg) The term *closed coal combustion residual waste management unit* means a landfill or surface impoundment which does not receive coal combustion residuals on or after July 8, 2024. Removal of coal combustion residuals from the waste management unit does not affect that unit's closure status under this part. Any *closed coal combustion residual waste management unit* that receives coal combustion residuals is no longer defined as *closed* under this part.

- 3. Amend § 423.13 by:
 - a. Revising paragraphs (l)(1)(i) and (l)(2)(ii);
 - b. Redesignating paragraph (l)(2)(iii) as (l)(2)(iv);
 - c. Adding a new paragraph (l)(2)(iii);
 - d. Removing the table heading “Table 12 to Paragraph (l)(2)(iii)” and adding in its place “Table 12 to Paragraph (l)(2)(iv)”; and
 - e. Adding paragraph (l)(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).

(1) ***

(1) * * *

(i) Except for those discharges to which paragraph (l)(1)(i)(B) or (C) or (l)(2) of this section applies, there shall be no discharge of pollutants in *combustion residual leachate*.

(2) ***

(ii) For discharges of *unmanaged combustion residual leachate* as defined at § 423.11(ff)(2), the quantity of pollutants in *unmanaged combustion residual leachate* shall not exceed the quantity determined by multiplying the flow of *unmanaged combustion residual leachate* times the concentration in table 11 to paragraph (l)(2)(i)(A) of this section.

(A) Dischargers must meet the effluent limitations for *unmanaged combustion residual leachate* in this paragraph (l)(2)(ii) by a date determined by the permitting authority that is as soon as possible beginning July 8, 2024, but no later than December 31, 2034. The effluent limitations in this paragraph (l)(2)(ii) apply to the discharge of *unmanaged combustion residual leachate* generated on and after the date determined by the permitting authority for meeting the effluent limitations, as specified in this paragraph (l)(2)(ii).

(B) For discharges of *unmanaged combustion residual leachate* before the date determined in paragraph (l)(2)(ii)(A) of this section, the EPA is declining to establish BAT limitations and is

reserving such limitations to be established by the permitting authority on a case-by-case basis using the permitting authority's best professional judgment.

(iii) For discharges of *unmanaged combustion residual leachate* as defined at § 423.11(ff)(1), site-specific BAT effluent limitations shall be established by the permitting authority after reviewing the information in paragraph (1)(2)(iii)(A). The site-specific BAT effluent limitations must reflect the permitting authority's determination of the maximum warranted reduction in pollutant discharges after consideration of factors relevant for determining the best available technology at each facility.

(A) To determine the site-specific BAT effluent limitations, the permitting authority shall consider:

- (1) the annual leachate monitoring report and data collected under § 423.19(k);
- (2) groundwater monitoring, corrective action, closure plans, and reports conducted under the Coal Combustion Residuals Disposal Regulations at 40 CFR part 257 subpart D including the magnitude of residual contaminant mass, if any, that may remain in groundwater following implementation of a required remedy;
- (3) other readily available groundwater monitoring data upstream and downstream of each impoundment or landfill owned or operated by the facility, including the relevant state's department of water quality monitoring data and characterization of background groundwater quality that has not been affected by leakage from a disposal of Coal Combustion Residuals unit as defined in 40 CFR 257.53;
- (4) results of any modeling of leachate fate and transport conducted for the facility; and,
- (5) whether the facility is already complying with the numeric limitations for mercury and arsenic for unmanaged combustion residual leachate where that leachate has been captured and pumped to the surface for discharge directly to a waters of the United States.

(6) The permitting authority may consider impacts of site-specific BAT effluent limitations that result in unacceptable changes in local energy demand, energy costs to consumers, solid waste generation, air pollution, and fuel consumption.

(7) The permitting authority may consider pending must-run orders that a utility remain in operation longer than planned.

(B) The permitting authority must provide a written explanation of the site-specific best available technology determination in the fact sheet or statement of basis for the draft permit under 40 CFR 124.7 or 124.8. The written explanation must describe why the permitting authority has rejected any technologies or measures that perform better than the selected technologies or measures.

(C) The site-specific best available technology put forth in the fact sheet or statement of basis may include consideration of any additional information deemed appropriate by the permitting authority including the statutory factors listed in the Clean Water Act section 304(b). The weight given to each factor is within the permitting authority's discretion based upon the circumstances of each facility.

(D) The permitting authority may require additional information or monitoring from the permit applicant to support the site-specific determination of best available technology, including an inspection.

(E) Prior to any permit reissuance after December 31, 2031, the permitting authority must review the monitoring results and other performance measures of the facility to determine whether it continues to meet the requirements of paragraphs (1)(1) and (2) of this section.

(3) *Facilities permanently ceasing combustion of coal.*

(i) Paragraphs (1)(1) and (2) of this section do not apply to *combustion residual leachate* generated by electric generating units at facilities that meet the applicability at § 423.10(a) as of

July 8, 2024, but where the facility has permanently ceased generation of electricity from a process utilizing fossil type fuel. Instead, BAT effluent limitations for *combustion residual leachate* shall be established by the permitting authority on a case-by-case basis using best professional judgment.

(ii) Paragraphs (l)(1) and (2) of this section do not apply to *combustion residual leachate* generated by a *closed coal combustion residual waste management unit* as defined at § 423.11(gg). Instead, BAT effluent limitations for *combustion residual leachate* shall be established by the permitting authority on a case-by-case basis using best professional judgment.

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