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RE: COMMENTS OF THE LARGE PUBLIC POWER COUNCIL ON THE PROPOSED REVISIONS TO THE EFFLUENT LIMITATIONS GUIDELINES RULE
Docket ID No. EPA-HQ-OW-2009-0819

The Large Public Power Council (LPPC) appreciates the opportunity to submit to the U.S. Environmental Protection Agency (EPA or Agency) the following comments on the proposed rule to revise the Effluent Limitations Guidelines (ELG) rules that apply to coal-fired electric generating units (EGUs) under the Clean Water Act (CWA).[1] Those proposed revisions would extend key compliance deadlines for implementation of the zero-liquid discharge (ZLD) limitations imposed by 2024 ELG rule and establish a new mechanism for providing site-specific flexibility under both the 2024 and 2020 ELG rules. In addition, the proposal requests information on a variety of technical matters relating to the availability and costs of ZLD technologies, which the Agency intends to consider in a separate, future rulemaking to revise or even repeal the ZLD limitations.

LPPC is an association consisting of the 29 largest, non-federal public power systems in the nation. Together, our members serve 30.5 million American consumers across 22 states and territories. As not-for-profit utilities owned by and accountable to the communities we serve, our members deliver some of the cleanest, most reliable, most affordable electricity in the nation. LPPC supports strong federal and state action to expand generation technology options, support advanced grid capabilities, and enhance end-user services. Continued federal and state

[1] *Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category—Deadline Extensions*, 90 Fed. Reg. 47,693 (Oct. 2, 2025).

investments in research, development, and demonstration of the full range of technologies are needed to achieve a reliable, clean energy grid.

Many LPPC members are expanding electricity supply to meet soaring demand from data centers and advanced manufacturing, while leading the nation in decarbonizing electric generation and adopting innovative technologies, fuels, and investments in beneficial electrification and grid modernization. However, another critical element of the strategy for LPPC members meeting future electricity demand is to retain and maximize the production of their existing generating facilities. This effort is especially important with respect to LPPC's members' existing dispatchable and most affordable generation, including the coal-fired electric generating units (EGUs) that are subject to the zero discharge limitations under the 2024 ELG rule.

I. OVERVIEW OF THE LPPC COMMENTS

LPPC is submitting the following comments on EPA's proposed rule to revise the ELG rules. The LPPC comments are divided into two parts. The first part provides comments on EPA's proposal to extend compliance deadlines and provide limited site-specific flexibility for implementing the ELG requirements. For the reasons discussed below, LPPC believes the adoption of those proposed changes—which do not weaken the stringency of the current ELG control requirements—would establish several important implementation measures that will enhance the workability and effectiveness of the current ELG regulatory program. Notable benefits of those implementation measures include minimizing electric grid reliability risks posed by the zero-discharge control requirements and addressing several technical challenges that electric utilities are now encountering in installing control equipment capable of meeting the ZLD limitations adopted by the 2024 ELG rule.

The following is an overview of specific matters that LPPC will address in its comments in support of the proposed ELG rule:

- The deadline for submitting the Notice of Planned Participation (NOPP) should be extended because electric utilities need additional time to make critical planning decisions on how affected EGUs can best comply with the 2024 ELG rule while also ensuring electric grid reliability.

- The ZLD compliance deadlines for all three wastewater streams should be extended to ensure electric grid reliability and address growing resource adequacy concerns raised by the Federal Energy Regulatory Commission, the North America Electric Reliability Corporation, grid operators, the electric utility industry, and other grid reliability experts.

- Supply chain disruptions and a very short amortization period further justify an extension of the ZLD compliance deadline.

- The Agency's proposal to provide site-specific flexibility is essential for minimizing unavoidable or unexpected challenges that could force the premature shutdown of coal-fired EGUs or impose excessive and burdensome ELG compliance costs.

The second part of the LPPC comments responds to EPA's request to provide technical information on the achievability and cost of meeting ZLD limitations for flue gas desulfurization (FGD) wastewater, bottom ash (BA) transport water, and combustion residual leachate (CRL). The gathering of this information is critically important for informing the Agency in making threshold statutory determinations on whether ZLD technologies are "available" and "economically achievable" to treat large volumes of wastewater that typically occur at baseload generating facilities. The LPPC comments below provide technical information that raises questions on the technical and economic feasibility of the control requirements upon which the Agency relied to establish the ZLD limitations under the 2024 ELG rule.

II. THE NOPP ELECTION DEADLINE SHOULD BE EXTENDED SO THAT ELECTRIC UTILITIES HAVE SUFFICIENT TIME TO MAKE CRITICAL PLANNING DECISIONS FOR ENSURING ELECTRIC GRID RELIABILITY.

The proposed rule provides an additional six years (from December 31, 2025, to December 31, 2031) for each affected coal-fired EGU to make its NOPP election on whether to retire or otherwise permanently cease coal combustion by December 31, 2034. The Agency's rationale for providing the NOPP election at the time the 2024 ELG was adopted was based on the finding that "around 50 EGUs" had announced plans to retire by 2034.[2]

The NOPP election essentially provided electric utilities with two regulatory alternatives. One alternative was to comply with the ZLD limitations by 2029. The other alternative was to make a federally enforceable commitment to retire the affected EGU by 2034 instead of installing by 2029 the additional costly zero discharge technologies. One important reason for establishing this ELG regulatory off-ramp was that the electric utilities would have less than five years to amortize major capital costs of installing those expensive zero discharge technologies on affected coal-fired EGUs prior to their planned retirement date (which would occur sometime between 2030 and 2034).

[2] 90 Fed. Reg. at 47,703.

As EPA correctly acknowledges in the proposed rule, this rationale is no longer valid. Surging electricity demand has forced numerous electric utilities to reverse their plant retirement decisions and extend the life of their existing coal plants, in many cases for another ten to fifteen years. Other utilities also have started to reevaluate their previous plant retirement decisions to address growing concerns about electric reliability and resource adequacy for their systems. This fundamental shift on these energy matters therefore justifies EPA to reevaluate its original plan to use the NOPP election as an opportunity to incentivize the retirement of coalfired generating capacity.

One notable example for LPPC is Santee Cooper, a public power system in South Carolina, that has been forced to reassess its current Integrated Resource Plan (IRP) adopted in May 2024 and updated earlier this year.[3] The Santee Cooper IRP reflects significant uncertainties on whether Santee Cooper will be able to retire its Winyah Generating Station by its targeted retirement date of 2033. This uncertainty results from confluence of several factors relating to Santee Cooper's ability to develop sufficient new replacement generation for the Winyah Generating Station (which is comprised of four coal-fired EGUs with a generating capacity of 1,260 MW). These factors include unanticipated increases in electricity demand due to the explosive growth of energy-intensive manufacturing and data centers, electrification of the transportation sector, as well as substantial challenges and timing uncertainties in the development of new replacement generation and other related energy infrastructure, including the permitting and buildout of new natural gas combustion turbines, natural gas pipelines, transmission lines, and large transformers. As result of these uncertainties, it is very difficult, if not impossible, for Santee Cooper now to establish a firm retirement date for the four Winyah units, which would be reflected in a federally enforceable commitment through the NOPP election by the end of this year.

An effective way for Santee Cooper and other electric utilities to address these electricity planning uncertainties is to extend the deadline for making NOPP elections under the proposed rule. This time extension is appropriate because it provides electric utilities with additional time to make critical resource planning decisions on the future operation of existing dispatchable electric generation. The extra time will effectively enable electric utilities to evaluate whether to retire or continue operating their existing coal-fired generating capacity to meet unprecedented increases in electricity demand in order to assure local and regional resource adequacy and grid reliability needs.

In addition, the length of the NOPP submission is aligned with the time frame for making key resource planning decisions for electric utilities. Most importantly, the proposed NOPP

[3] South Carolina Public Service Authority (Santee Cooper), 2024 Integrated Resource Plan (2024, September) available here.

submission date of December 31, 2031, is three years prior to the 2034 deadline for either compliance with the ZLD limitation or the unit's permanent cessation of coal combustion. As a result, this extended timeframe enables electric utilities to make their energy resource planning decisions based on the most current and accurate energy matters, including the "three-year capacity auctions in deregulated regions (*e.g.*, PJM) or the typical two- to three-year IRP cycle" that will conclude prior to a plant electing to make a retirement decision.[4]

Another related justification in support of EPA adopting the proposed extension is the fact EPA has indicated that the Agency may initiate a future rulemaking to reconsider the zero-discharge limitations adopted by the 2024 ELG rule. As a result, electric utilities need to know whether and how EPA may revise the current ZLD limitations before they can make a reasonably informed assessment on whether to comply with those discharge limitations or elect to cease coal combustion. EPA has announced its intention to decide on whether to initiate such an ELG rulemaking sometime next year to reconsider the ZLD limitations and, if initiated, this rulemaking would most likely not be completed until several years after the current NOPP election deadline of December 31, 2025. Due to major uncertainties on the availability, design, and cost of the zero-discharge technologies, it is reasonable for the Agency to provide additional time for electric utilities to understand the extent to which those ZLD limitations might be revised by this future ELG rulemaking before making a NOPP election on compliance with those limitations.

III. ELECTRIC RELIABILITY RISKS AND OTHER TECHNICAL AND ECONOMIC CHALLENGES SUPPORT THE PROPOSED EXTENSION OF THE ZLD DEADLINES.

The proposed rule provides an additional five years (from December 31, 2029, to December 31, 2034) for affected EGUs that elect not to cease coal combustion and instead comply with the ZLD limitations imposed for FGD wastewater, BA transport water, and CRL under the 2024 ELG rule. For the reasons discussed below, EPA has strong technical and legal grounds for providing the proposed five-year compliance extension to affected coalfired EGUs for all three wastewater streams.

A. Additional Time Is Necessary to Design, Pilot, Engineer, Construct, and Fine Tune ZLD Control Equipment.

The current ZLD compliance deadline of December 31, 2029, does not provide enough time to complete all the steps that many electric utilities will need to design, engineer, construct, and bring online the ZLD control equipment. This is illustrated by one LPPC member, Santee

[4] 90 Fed. Reg. at 47,703

Cooper, who has developed a detailed timeline for bringing online the necessary control equipment for eliminating the discharge of FGD wastewater from the Cross Generating Station. This timeline indicates that the earliest date by which Santee Cooper could bring online its zero-discharge wastewater treatment system (consisting of thermal evaporation and membrane treatment) would fall sometime in 2032, which is many years after the current 2029 compliance deadline.

Table 1 below provides a time estimate that Santee Cooper will need to complete each step of the ZLD construction process. Notably, these steps entail Santee Cooper having to perform extensive site-specific technical analyses, pilot testing, and engineering design before Santee Cooper can begin work on permitting, detailed engineering of the ZLD control system, solicitation and selection of a vendor, and the construction and tuning fo the ZLD wastewater treatment system. The estimated time durations in Table 1 for completing all these steps in succession is approximately 94 months (7.8 years), which extends out the end of the ZLD construction schedule until sometime just prior to 2034.

Table 1

ESTIMATED ZLD CONSTRUCTION SCHEDULE FOR CROSS GENERATING STATION

Work Activity	Approximate Duration
Technology Evaluation and Brine Disposition Alternatives Analysis	4 months
Testing and Piloting	14 months
Project Funding	2 months
Conceptual Design Estimates	4 months
Preliminary Engineering Design	3 months
Site Investigation	2 months
Technology Bid Preparation, Award, and Evaluation	8 months
Detailed Engineering and Permitting	11 months
Construction Bid Preparation, Award, and Evaluation	7 months
Construction	30 months
Commissioning, System Tuning	9 months
System In Service	-
TOTAL	**94 MONTHS**

LPPC recognizes that the construction schedule outlined above in Table 1 may be shortened by concurrently performing several of the above work activities (such as those tasks relating to project funding and construction bids). However, there are practical limitations regarding the extent to which electric utilities may be able to compress their ZLD construction schedules. For example, many of the preliminary work activities (such the initial technology evaluation, testing

and piloting, preliminary engineering design) must first be completed in succession before the electric utility may begin to undertake substantive project design and permitting activities. Furthermore, these time estimates do not reflect the many delays that electric utilities could very likely encounter. Notable examples include delays in scheduling or performing project tests, securing vendors for performing detailed engineering design analyses, obtaining the necessary permits, selection of a vendor for the fabrication and installation of control equipment, supply chain delays of key components, and other construction delays due to weather or other problems that are beyond the control of the utility.

In light of these considerations, the proposed five-year compliance extension appears reasonable and appropriate to ensure affected electric utilities have sufficient time for installing the technologies required for meeting the ZLD limitations under the 2024 ELG rule.

B. Electric Grid Reliability Risks and Resource Adequacy Challenges Provide Strong Justification for the Extension.

Another compelling reason for extending the compliance extension is that the additional time will allow many affected EGUs to continue operating for at least another five years until the end of 2034, instead of being forced to retire by 2029 due to the unachievablity of the ZLD limitations for many coal-fired EGUs. In effect, the extension will provide many electric utilities with additional time that is needed to operate their existing generating capacity as they work to develop and bring online reliable affordable supplies of replacement generation that are necessary for ensuring electric grid reliability. As EPA correctly notes in the proposed rule, the extension "better effectuates the ability of facilities to transfer out of the permanent cessation of coal combustion by 2034 pathway and continue to generate electricity using coal resources as necessitated by local or regional resource adequacy and reliability needs and to mitigate an impending national energy emergency."[5]

The importance of providing this extension cannot be overstated. The unprecedented increases in electricity demand in many regions of the country are forcing electric utilities to rethink their plans to retire existing coalfired generation even in those cases when the electric utilities have publicly announced the planned retirement for particular coal-fired power plants. The proposed five-year extension will provide electric utilities with extra time that allows these reliable and dispatchable energy resources to remain online to ensure electric grid reliability and resource adequacy.

[5] 90 Fed. Reg. at 47,704.

In the alternative, the extension also provides electric utilities with additional time to develop technologies that may be able to achieve the zero-discharge limitations by the proposed 2034 compliance deadline. As noted below in Section 5.B, membrane control systems and other zero-discharge technologies are still under development and require additional pilot studies and engineering analyses to demonstrate the capability of these technologies to treat large volumes of wastewater that typically occur at baseload generating facilities. The extension, therefore, will provide additional time for attempting to develop and refine technologies for achieving the zero-discharge limitations in the interim before the 2034 compliance deadline.

Notably, EPA has ample legal authority to extend the compliance deadline to address significant electric grid reliability risks. EPA's legal authority is based on express statutory language in the CWA. This language expressly identifies non-water quality environmental impacts that EPA may consider when setting effluent discharge limitations for affected point sources coalfired EGUs under CWA section 304(b). One such non- water quality impact expressly identified- in the statute pertains to "energy requirements."[6] The phrase "energy requirements" provides the Agency with ample authority to consider potential adverse impacts to electric grid reliability and resource adequacy that could result from setting zero-discharge limitations for coal-fired power plants.

B. Potential Supply Chain Disruptions Support the Extension.

The ZLD limitations may not be achievable for all affected facilities nationwide due to the unavailability of the ZLD control technologies or their component parts caused by ongoing problems with global supply chains. As EPA has correctly recognized in the proposed rule, many electric utilities have been unable to move beyond initial engineering work and pilot testing as a result of "disruptions" in global supply chains. These disruptions are making it difficult, as a practical matter, for electric utilities "to procure relevant technologies on the timelines" necessary for meeting the 2029 compliance deadline set under the 2024 ELG rule.[7]

Importantly, the Agency's consideration of these real-world procurement, engineering, and supply chain challenges is supported by the "other factors" clause in CWA section 304(b). This clause gives EPA broad authority to consider "such other factors as the [EPA] Administrator deems appropriate" when setting the effluent limitations for coalfired EGUs. By invoking the "other factors" clause, EPA has exercised lawful discretion to extend the compliance deadlines

[6] *See* CWA Sections 301(b)(2)(A) and 304(b)(2)(B).
[7] 90 Fed. Reg. at 47,704.

for the EGU source category because of supply chain disruptions and other procurement or construction challenges now being encountered by electric utilities.

C. Short Amortization Period Strongly Weighs in Favor of an Extension.

Electric utilities can incur capital costs exceeding $100 million to meet the stringent effluent discharge limitations established for coal-fired EGUs under the 2020 ELG rule. As a general matter, EPA has projected that the useful service life of the newly installed control equipment to be 20 years and, consequently, concluded that 20 years is "an appropriate basis for cost and economic impact analyses" that EPA should use to amortize annualized capital costs of the control equipment.[8]

A 20-year amortization period is also consistent with electric utility industry's typical practices to issue bonds to recover capital investment costs incurred for pollution control projects over a 20-year period. The issuance of bonds enables electric utilities to spread large capital expenses over several decades, thereby lowering the monthly electricity rates that consumers must pay.[9] Shortening the amortization period for financing a major capital investment will necessarily increase the annualized capital costs incurred by electric utilities. The ELG rulemaking record indicates the annualized capital costs will approximately double when the amortization period is shortened from the typical 20-year period to eight years.[10]

In the case of the major capital costs incurred for meeting the effluent discharge limitations set by the 2020 ELG rule, those affected EGUs could have as little as four years (2025 to 2029) to amortize the capital cost incurred for meeting the 2025 compliance deadline under the 2020 ELG rule. As a result, the proposed five-year extension of the compliance deadline will provide a longer period (from four to nine years) to amortize the capital costs incurred for installing the

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[8] Supplemental Technical Development Document for Revisions to the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category, 5-14 (Aug. 2020) (discussing the estimated incremental compliance costs for estimating costs of achieving zero discharge limitations at coal-fired EGUs) (2020 STDD).

[9] One recent report is the approval of bonds for Appalachian Power to cover ELG compliance costs. In this cases, the Public Service Commission approved a plan for Appalachian Power to issue $2.4 billion in expense-recovery bonds. According to the new report, the issuance of these bonds will result in an average residential surcharge of only about $7 per month. This is a much smaller increase than the $24 per month that would have occurred without bond financing over an extended 20-year period. *See* WV Public Broadcasting System, *PSC Says Appalachian Power Can Issue Bonds to Cover Expenses* (Sept. 2, 2025), available here.

[10] *See* 84 Fed. Reg. at 64,640; 90 Fed. Reg. at 47,704.

control equipment for meeting the 2020 ELG rule, thereby significantly reducing the annualized costs of the ELG program to electric utilities and, ultimately, to their customers.[11]

Given that EPA has adopted a 20-year amortization period (which is both a typical and reasonable period for determining the useful life and amortization of major control equipment), EPA has strong grounds for extending the ZLD compliance deadline. Extending the compliance deadlines (and the amortization period) are necessary to avoid disproportionately high annual capital costs, prevent sharp increases in electricity prices, and support prudent investment recovery that minimizes stranded investments.

IV. SITE-SPECIFIC FLEXIBILITY IS NECESSARY FOR AVOIDING COMPLIANCE CHALLENGES THAT COULD FORCE PREMATURE SHUTDOWN OF EXISTING GENERATING CAPACITY.

EPA is proposing to adopt a site-specific flexibility mechanism that would authorize permitting authorities to extend the deadlines for making NOPP elections and meeting the ELG compliance deadlines. These proposed changes do not reduce the stringency of current CWA control requirements; rather they would allow affected EGUs more time to meet those requirements on a plant-by-plant basis. For the reasons discussed below, LPPC supports the adoption of this mechanism to improve the workability and effectiveness of ELG program.

A. Timing Flexibility on Making NOPP Elections Is Needed to Address Unexpected Circumstances and Unavoidable Compliance Challenges.

The EPA proposal makes two important changes to the NOPP election. The first change is the establishment of a new "transfer flexibility" provision that allows electric utilities to make changes in their NOPP elections up until the 2034 deadline regarding whether they intend to permanently retire or comply with the ZLD limitations applicable under the 2024 ELG rule. This increased timing flexibility in making NOPP elections will enhance the workability of the 2024 ELG rule by providing electric utilities with the maximum amount of time to switch from the 2034 retirement option to the 2034 ZLD compliance option (or vice versa). Such increased timing flexibility will prevent electric utilities from being locked into their initial NOPP elections and allow them to freely change their compliance strategies at any time prior to the 2032

[11] Although not making a specific recommendation in these comments, LPPC urges EPA to evaluate whether the compliance deadline should be further extended to provide sufficient time for fully amortizing the control costs incurred for installing the control equipment.

compliance date due to increased load demands or other important changes while also achieving compliance with the applicable ELG requirements.

The proposed rule also authorizes permitting authorities to extend the deadlines for electric utilities making other NOPP elections under both the 2020 and 2024 rule based on "site-specific factors." The circumstances in which NOPP extensions are allowed are specifically enumerated in the proposed rule and generally involve those situations in which electric utilities encounter unavoidable or unexpected challenges that are beyond the control of the electric utilities. Examples enumerated in the proposed rule include situations in which an electric utility has committed to retire a coal-fired EGU by December 31, 2028, but now needs to operate that unit beyond that federally enforceable 2028 retirement date due to various electric grid reliability concerns. One notable example involves situations in which the projected local electricity demand "materially exceeds projections made in the recent iterations of integrated source plans or other planning documents."[12]

Such increased flexibility in the NOPP elections will help to ensure that facilities facing unexpected changes in operations are not unfairly penalized due to unavoidable or unexpected developments that are beyond their control. Most importantly, this flexibility is critically important for many of the 74 affected coal-fired EGUs at the 33 power plants that had previously made NOPP elections to retire or cease coal combustion by 2028.[13] Without being allowed to withdraw their NOPP elections, many of these coal-fired power plants would be subject to a federally enforceable requirement mandating their retirement even though their continued operation is critically important for ensuring electric grid reliability and meeting resource adequacy obligations.

B. Authority to Adjust Compliance Deadlines Will Avoid Unnecessary Forced Closure of Affected EGUs That Cannot Achieve the ZLD Limitation Due to Extenuating Circumstances.

The proposed rule also would allow permitting authorities to extend the deadlines for meeting the effluent discharge limitations under both the 2020 and 2024 ELG rules. Authorizing such plant-specific compliance extensions will provide another effective regulatory tool for ensuring the continued operation of existing coal-fired generation.

[12] 90 Fed. Reg. at 47,712 (proposed revisions to current federal regulations codified at 40 C.F.R. §423.18).
[13] 2024 TDD at 13-14.

For example, permitting authorities could extend the 2025 compliance deadline for meeting the "generally applicable" standards for FGD wastewater and BA transport water under the 2020 rule and the 2028 deadline for meeting the standards under the Voluntary Incentive Program for FGD wastewater due to extenuating circumstances. Similarly, the mechanism would allow for the extension of the ZLD limitations established under the 2024 rule on unit-specific basis. The EGUs may obtain a compliance extension if they encounter unavoidable or unexpected challenges that are beyond their control of the electric utilities. Examples of such extenuating circumstances qualifying for compliance extensions include unexpected increases in local electricity demands, changes in regional capacity market prices, unavoidable supply chain delays, and any other situation in which the delay "is wholly outside both the facility's control and the facility's ability to plan for."

V. PERFORMANCE AND COST INFORMATION RAISE QUESTIONS ABOUT THE ACHIEVABILITY AND COST OF THE ZLD TECHNOLOGIES.

This section responds to EPA's request for technical information on the achievability and cost of meeting ZLD limitations for FGD wastewater, BA transport water, and CRL. The technical information provided below is intended to help inform the Agency on the performance and costs of the three reference control technologies—specifically, membrane systems, thermal evaporators, and spray-dry evaporators—upon which EPA relied on to establish ZLD limitations under the 2024 ELG rule. For the reasons discussed below, this information raises important questions regarding whether these reference control technologies satisfy the threshold statutory requirement that the ELG limitations must be based on "available" and "economically achievable" technologies across the entire EGU source category.[14]

A. Significant Gaps and Technical Shortcomings Exist regarding EPA's Finding on the Availability of ZLD Technologies for Large Baseload Power Plants.

The biggest question on availability of a zero-discharge technologies pertains to controlling FGD wastewater. The preamble to the 2024 ELG rule refers to 40 coal-fired EGUs that have achieved

[14] *See* CWA Sections 301(b)(2)(A), 304(b)(2). Courts have interpreted this statutory mandate to mean that EPA "must set discharge limits that reflect the amount of pollutant that would be discharged by a point source employing the best available technology that the EPA determines to be economically feasible *across the category or subcategory as a whole*" (which, here, is consists of all coal-fired EGUs nationwide). *Texas Oil & Gas Ass'n v. EPA*, 161 F.3d 923. 928 (5th Cir. 1998) (emphasis added). This mandate is further underscored by the CWA provision that prohibits the adoption of ZLD limitations eliminating all effluent discharges unless EPA finds that "such elimination is technologically *and* economically achievable *for a category or class of point sources*." CWA Section 301(b)(2)(A) (emphases added).

zero discharge of their FGD wastewater.[15] The vast majority of those coal-fired EGUs (35 power plants) are not operating one of the three technologies—membrane systems, thermal evaporators, or spray-dry evaporators—on which EPA relied to establish the ZLD limitations for FGD wastewater under the 2024 ELG rule. Rather, these plants employ other plant-specific control measures or techniques for achieving zero discharge that are unique to those particular plants and therefore cannot be applied at most units across the entire EGU source category.

As explained below, EPA lacks a sufficient technical foundation to set ZLD limitations based on the unique, plant-specific applications of these control measures or techniques for FGD wastewater.

Complete Recycling of Wastewater. EPA has identified only 18 instances where affected generating plants are able to use all their treated FGD wastewater within the plant system without having to purge any portion of the wastewater stream into surface waters. Rather, most affected plants are unable to recycle their treated FGD wastewater because of high levels of chloride that would foul their plant systems. Of the 139 plants with wet FGD systems surveyed by EPA, only eighteen plants burned coals containing unusually low amounts of chloride and, consequently, are able to operate complete recycling systems that reuse all the treated FGD wastewater within the plant system.

Evaporation Ponds in Dry Geographic Regions. Another control measure identified by EPA is the use of ponds or other impoundments to eliminate all FGD wastewater through evaporation into the atmosphere without discharging into surface waters. The Agency has identified only nine affected EGU plants where the application of evaporation ponds is used as the control option. Those nine plants are located in the southwestern United States where the evaporation rates from the impoundment are greater or equal to the flow rate of the FGD wastewater and the amount of direct precipitation.

Dry Fly Ash Conditioning. Another ZLD technique identified by EPA involves applying or mixing the dry fly ash with FGD wastewater and then disposing of that fly ash mixture in landfills. This control option is limited to only those affected plants that have a sufficient supply of dry fly ash as well as sufficient landfill capacity to dispose of that fly ash mixture. EPA

[15] 40 Fed. Reg. at 40,216 (noting that 40 coal-fired EGUs operating in the U.S. are achieving zero-discharge of their FGD wastewater).

identified only six plants with this capacity and has provided no analysis on how this measure could be used across the entire EGU source category.

Underground Injection of Wastewater. Only two plants have attempted to inject all the FGD wastewater into underground wells, in lieu of discharging the wastewater into surface waters. According to EPA, the use of underground injections is limited to only those geographic areas where geologic formations are suitable for the injection and long-term storage of wastewater in large amounts. For example, the continuous injection of the wastewater proved to be not technically feasible due to pressure issues as a result of limitations in the geologic formation.

Evaporative Technologies. EPA has identified only five coal-fired power plants operating in the entire United States that have actually implemented some form of the technology on which EPA relied to establish ZLD limitations in the final 2024 ELG rule. Two of the plants have installed thermal treatment technologies (specifically brine concentrator systems) that use heat to evaporate FGD wastewater and concentrate solids as well as other contaminants.[16] The other three plants identified by EPA have used spray evaporation technologies that spray fine misted FGD wastewater into the hot flue gases from the plant.[17] Neither of these evaporative technologies provide an adequate basis for the establishment of ZLD limitations due to major technical problems encountered by the electric utilities in using both of these technologies.

As documented by the Electric Power Research Institute (EPRI) as well as various industry stakeholders, these evaporative systems cannot reliably achieve zero discharge on a continuous basis. Many of these major technical problems stem from the fact that neither thermal treatment nor spray evaporation technologies can keep up with high volumes of wastewater flows at typical baseload coalfired EGUs. Major problems encountered by the operation of evaporative systems include scaling and line plugging, flow obstructions, high amounts of salts in the feedwater, and equipment not meeting design characteristics. Furthermore, even when the evaporative systems can effectively operate, they still cannot achieve zero discharge due to the need to purge some of distillate wastewater to keep the system's chemistry in balance.

Membrane Systems. Membrane treatment systems are the third type of control technology on which EPA relied in setting the zero-discharge limitations. The membrane technologies use a semi-permeable filter to filter and remove a broad range of particulate and dissolved pollutants.[18] Although used in various applications in other industrial sectors over many years, membrane

[16] 2024 TDD at 28.
[17] 2024 TDD at 27-28.
[18] EPA, EPA-821-R-24-004, Technical Development Document for Final Supplemental Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category at 25-26 (Apr. 2024), EPA-HQ-OAR-2009-0819-10337 (2024 TDD).

technologies are not well suited to treat large volumes of wastewater that typically occur at baseload power plants. Membrane systems are slow at removing pollutants and, as a result, require the installation of numerous membrane modules to keep up with the high volume and high flow waste streams occurring at the facility. Installing such an extensive configuration of membrane equipment is both impractical and technically challenging. Furthermore, membrane systems are prone to rapid fouling and scaling that can impair the performance of the membrane technology, thereby requiring increased maintenance as well as the extensive pretreatment measures of the wastewater.

Due to the unsuitability of membrane technology for treating large volumes of wastewater, no power plant in the United States has been installed with a membrane system at full operational scale to treat FGD or other wastewater stream generated at the facility. The Agency itself conceded this fact in the two prior ELG rulemakings completed in 2020 and 2024.[19] In effect, these previous EPA findings expressly confirm that none of the 40 coal-fired EGUs employs full commercial scale membrane systems, which the EPA relied on in setting the ZLD limitations under the 2024 ELG rule. This technology gap further underscores the Agency's lack of a technical foundation for imposing zero-discharge performance standards on affected baseload power plants.

EPA similarly cannot rely on a few pilot projects to conclude that membrane systems are available and, therefore, provide a technical basis for setting ZLD limitations for the EGU source category. Pilot projects are technical studies that by definition are not intended to demonstrate commercial availability of large coal-fired EGUs. Nor can the pilot projects demonstrate the ability of membrane systems to achieve zero discharges at full scale under a wide-range of foreseeable operating conditions. For example, one pilot project cited by EPA in the 2024 ELG rule sought to test the performance of a membrane system that operated at very low volumes of wastewater (264 to 793 gallons per day), whereas large coal-fired power plants typically discharge much higher volumes of wastewater (ranging well over 1 million gallons per day). In addition, the pilot projects only tested the performance of membrane systems under narrowly defined circumstances that do not reflect the typical parameters and normal operating conditions at a large coal-fired EGU. In effect, a few successful pilot projects have no bearing on the

[19] In the 2020 ELG rulemaking, EPA found that membrane technologies are not available for deployment when the Agency declined to adopt ZLD limitations for the regulated wastewater streams. *See* 85 Fed. Reg. at 64,663. And EPA even acknowledged in the 2024 ELG rule that there have still been no deployments of full commercial-scale membrane systems even though the Agency went on to set ZLD limitations based on the claim of the availability of the technologies. *See* 89 Fed. Reg. at 40,216 (stating: "In the 2020 rule, the EPA rejected membrane filtration as a standalone BAT technology basis due in part to the *lack of a single full-scale domestic installation*, *which is still the case today*.") (emphasis added).

overwhelming weight of the evidence that membrane systems are not available to treat large volumes of wastewater that typically occur at baseload coal-fired EGUs.[20]

B. EPA Significantly Underestimates the Costs and Overlooks the Minimal Environmental Benefits of the ZLD Requirement.

Control cost is another key statutory criterion that the Agency must consider when setting effluent discharge limitations for affected EGUs under the 2024 ELG rule. The CWA directs EPA to select only those control technologies that are "economically achievable," while also directing EPA to consider "the cost of achieving such effluent reduction"[21] and expressly prohibiting the Agency from establishing zero discharge limitations unless EPA finds that such elimination is "economically achievable" for the entire affected EGU source category.[22]

This section begins by discussing notable examples of when EPA has not accurately or meaningfully considered costs when it adopted the ZLD limitations for all three wastewater streams under the 2024 ELG rulemaking. These examples illustrate the high costs of achieving zero-discharge levels and raise important questions regarding the economic feasibility of installing those control technologies on affected EGUs and meeting the ZLD limitations. The section ends with an assessment of the cumulative economic impacts and minimal environmental benefits of the ZLD regulatory requirement on the EGU source category.

1. Shortcomings in EPA's Cost Analysis of Control Technologies

Flawed Cost Model. Both the 2020 and 2024 ELG rules relied on a cost model that systematically and significantly underestimated the real-world costs based on actual contractor

[20] The 2024 ELG refers to a few foreign power plants using membrane technologies to achieve zero discharge of wastewater. However, a close review of the rulemaking record indicates that significant gaps remain in the performance of the membrane systems installed at these foreign plants. For example, the Agency has provided scant information regarding "how these systems are configured or operated," "what levels of reductions they achieve," "whether there are any particular performance difficulties that result from continuous operation," or "importantly, how applicable these operations would be to plants across the United States." EPA, Response to Public Comments for Revisions to the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category at 2-108 (Aug. 2020), EPA-HQ-OW-2009 0819-9015. Without answers to these highly relevant performance matters, the current rulemaking record supports the conclusion that the apparent use of membrane systems at a few foreign power plants do not demonstrate the availability of membrane technologies capable of achieving zero discharge.

[21] *See* CWA Sections 301(b)(2).

[22] *See* CWA Section 301(b)(2)(A).

bids informed by months of on-the-ground engineering and design work at individual coal-fired plants. One major flaw was that the Agency used the wrong flow figure for sizing equipment, using average flow instead of peak flow. Sizing and designing ZLD technologies for peak flow—which can substantially increase both capital and operational costs—is essential to ensure compliance at all times, not only during average flow conditions. Another example is EPA's failure not to include in its cost estimates the "balance of plant" costs associated with the installation of the ZLD equipment. These costs can be quite significant and include those for site preparation, bonding and insurance, and tie-ins of the new vendor equipment to existing facilities.

As a result of these flaws in the cost model, EPA has substantially underestimated the control costs of complying with discharge limitations established under both the 2020 ELG rule and the 2024 ELG rule. The consequence of the Agency's flawed cost model is clearly evident in the case of the ELG cost estimates that Santee Cooper has prepared for the Cross Generating Station.

Table 2 provides a comparison of the cost estimates to install the wastewater treatment system (consisting of physical chemical precipitation and biological treatment) at the Cross Generating Station for meeting the effluent limitations set under the 2020 ELG rule. This comparison indicates that Santee Cooper had estimated costs of approximately $138 million based on the average vendor cost estimates contained in competitive bid proposals submitted by three vendors. Notably, Santee Cooper's cost estimate proved to be conservative given that the total costs actually incurred for installing the control equipment at the Cross Generating Station were almost $155 million (which is $17 million higher than Santee Cooper's original estimate). By contrast, EPA had estimated under its flawed cost model that ELG compliance costs for the Cross Generating Station would only be just over $5.9 million, which amounts to only 4.3% of Santee Cooper's estimate and 3.9% as compared to the actual installed costs.

Table 2

Cross Generating Station
Cost Estimate Comparison for 2020 ELG Rule

	EPA Estimate	Santee Cooper Estimate	Santee Cooper Actual Costs	Percentage (EPA to Actual)
Vendor Equipment	-	$54,742,247	$52,550,700	-
Engineering, Installation, Startup, and Oversight	-	$83,484,415	$102,318,198	-
Total Installed Costs	$5,971,518	$138,226,662	$154,868,898	3.9%

Table 3 provides a similar comparison of cost to install a membrane filtration system that Santee Cooper would install at the Cross Generating Station for meeting ZLD limitations under the 2024 ELG rule. This comparison indicates that Santee Cooper's estimated costs would be almost $248

million. This estimate is based on a vendor's competitive bid exceeding $84 million for the filtration system, combined with estimated costs of almost $164 million for the construction costs to be incurred for installing ZLD membrane treatment system (specifically, the costs for engineering, installation, startup, and oversight).[23] By contrast, EPA has estimated under its flawed cost model that ELG compliance costs for the Cross Generating Station would only be $25.3 million, which amounts to only 10.2% of Santee Cooper's total estimated costs for installing the membrane filtration system.

Table 3

Cross Generating Station
Cost Estimate Comparison for 2024 ELG Rule

	EPA Estimate	**Santee Cooper Estimate**	**Percentage Difference (EPA to Estimated)**
Vendor Equipment	-	$84,116,000	-
Engineering, Installation, Startup, and Oversight	-	$163,777,031	-
Total Installed Costs	$25,300,00	$247,893,031	10.2%

Other Reasons for EPA's Underestimation of ZLD Compliance Costs. EPA overlooked several other factors that significantly increase the construction costs for installing membrane filtration systems or other control technologies that electric utilities must install for meeting the zero-discharge limitations. One EPA oversight is the need for electric utilities to install redundant equipment due to the substantial risk of membranes and evaporators fouling or experiencing other technical problems that will force them to go offline for maintenance and repair. Notably, EPRI has estimated that due to these risks, it will require a minimum of 50% additional (redundant) equipment to use as backup to ensure compliance and power plants' ability to provide continuous, reliable production of electricity.[24]

Another important oversight is the lack of proven control technologies to achieve zero discharge of wastewater from power plants. This lack of proven technologies for which extensive performance data exists requires electric utilities to perform additional extensive engineering and design work at the front end when selecting and designing the membrane and/or evaporator

[23] The vendor also provided an estimate of $24M in 2022 for installation costs with exclusions noted in the proposal. However, the variation between Santee Cooper's estimate of $160 million and Mitsubishi's $24 million estimate are unknown until detailed pilot testing and additional engineering design can be performed.
[24] *See* Electric Power Research Institute (EPRI) Comments on EPA's Proposed Rule for the Supplemental Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category at 39 (May 26, 2023).

treatment system. In addition, the performance testing is frequently necessary through pilot studies due to relatively novel application of membrane systems on large coal-fired power plants.

Increased Production of Waste Products. Membrane and evaporator technologies produce brine or waste byproducts that must be handled and treated at a site, such as by combining those byproducts with fly ash to allow landfill disposal, further adding to total system complexity. EPA did not adequately reflect the increased costs that electric utilities would incur for the management and disposal of these wastes.

Lost Revenues for Sale of Fly Ash. Many coal plants produce fly ash that can be sold as a useful byproduct for the manufacture of concrete or other such beneficial purposes. The use of the fly ash required for disposal of the brine and waste products from the wastewater treatment system can reduce or even eliminate the substantial annual revenue that is generated by the sale of the fly ash. In 2023, EPRI conducted an analysis demonstrating that many facilities would be required to forfeit all fly ash sales in order to encapsulate brine.[25]

Another complicating factor is that many electric utilities have entered into long-term sales contract agreements for fly ash beneficial use that predate the 2024 rule.[26] Those long-term contracts may effectively prevent many electric utilities from using their fly ash on site for fixation purposes. The pressure to use fly ash as a useful byproduct will only continue to increase. The American Coal Ash Association reports that coal ash use has risen from nearly 50% in 2020 to 69% in 2023 and continues to grow and adapt due to the decline in coal-fired electricity generation.[27]

2. Cumulative Economic Impacts and Minimal Environmental Benefits of the ZLD Requirement

EPA's failure to fully and accurately consider costs has resulted in a significant underestimation of the costs that affected EGUs would incur by installing and operating zero discharge technologies under the 2024 ELG rule. EPRI documented this significant cost estimation by comparing the costs for 22 large power plants based on EPA's flawed cost estimate methodology

[25] Electric Power Research Institute, Comments of EPRI on Environmental Protection Agency. Docket ID: EPA–HQ–OW–2009–0819; FRL–8794–01-OW (May 2023).
[26] EPA, 2024 Steam Electric Supplemental Final Rule: Fly Ash Analysis – DCN SE11692. Document ID EPA-HQ-OW-2009-0819-10355 (May 2024).
[27] *See* American Coal Ash Association News Release available here.

discussed above to the more realistic cost estimates that EPRI prepared for those same 22 plants based on real-world assumptions and informed by best available vendor information.[28]

In the case of FGD wastewater, EPRI's capital cost estimate is **nine times higher** than EPA's capital cost estimate for these 22 plants.[29] EPA's cost estimates for operation and maintenance (O&M) are even further off the mark. EPRI's O&M cost estimates are **43 times higher** than EPA's O&M cost estimates.[30] When these two cost estimates are combined into a total annualized cost level, EPRI has estimated these 22 plants will incur total annual costs that are **27 times higher** than EPA's annualized cost estimates.[31]

Furthermore, the compliance costs of the 2024 ELG rule are wholly disproportionate to the human health and environmental benefits of eliminating those discharges. This conclusion is reflected by fact that the environmental benefits of eliminating the wastewater discharges are extremely minimal as compared to the exceedingly high costs (as discussed above) that affected EGUs would incur to install the ZLD technologies mandated under the 2024 ELG rule.

This is best illustrated in the case of FGD wastewater for which the 2020 ELG rule already requires the installation of state-of-the-art wastewater treatment systems based physical, chemical, and biological treatment of the FGD wastewater that can typically cost on an affected EGU facility over a hundred million dollars. In the case of the Cross Generating Station, for example, Santee Cooper has already spent over $150 million to install this wastewater treatment system. As a result, Santee Cooper and other affected utilities will have already installed treatment system that will, by the end of this year, begin discharging wastewater that meets the maximum contaminant levels (MCL) set for finished water supplied to consumers under the Safe Drinking Water Act (SDWA). Table 4 below provides a comparison of the 2020 FGD discharge limitations to the MCL levels set for drinking water supplied to the general public under the SDWA.

Table 4

Comparison of
2020 FGD Discharge Limitations to SDWA Standards

Pollutant	Drinking Water MCL	Discharge Limitations
Arsenic (mg/L)	10	8

[28] Electric Power Research Institute (EPRI) Comments on EPA's Proposed Rule for the Supplemental Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category at 32- 60 (May 26, 2023) ("EPRI Comments").
[29] EPRI Comments at 32-40.
[30] EPRI Comments at 32-35,41-51.
[31] EPRI Comments at 32-38.

Pollutant	Drinking Water MCL	Discharge Limitations
Mercury (mg/L)	200	34
Selenium (mg/L)	50	29
Nitrate/ Nitrite (mg/L)	10	3

Although meeting the MCL levels set under the SDWA, affected EGUs would nonetheless be required to install additional control technologies for entirely eliminating the discharge of wastewater that is already clean enough to drink. In the case of Santee Cooper, those costs for achieving zero-discharge for FGD wastewater will be $248 million. Moreover, these costs only include those for purchasing the ZLD membrane filtration system along with construction costs for engineering, installation, startup, and oversight. Santee Cooper would incur substantial additional annual costs for the operation and maintenance of the treatment system.

The imposition of these additional control costs appears to be unnecessary and inappropriate given that the elimination of clean and drinkable wastewater would yield scant environmental benefits while the costs of installing zero discharge technologies are extremely burdensome. Furthermore, the imposition of wholly disproportionate compliance costs provides a strong basis for determining that EPA failed in the 2024 ELG rule to meaningfully consider costs, as expressly required by the CWA and the Supreme Court in *Michigan v. EPA*.[32] In this case, the Supreme Court underscored that meaningful and accurate consideration of costs is essential to federal agencies making reasoned rulemaking decisions and that, as a result, EPA must give careful attention to cost impacts when establishing- new regulatory requirements under any federal environmental statute, including the CWA.[33] To ensure that the costs are not disproportionate to the benefits, the Agency therefore has a legal duty to reevaluate the zero-discharge limitations that impose compliance costs that vastly exceed the environmental gains based on the current rulemaking record.

V. CONCLUSION

LPPC appreciates the opportunity to submit the preceding comments on the key implementation matters regarding the workability and effectiveness of the ELG program for reducing wastewater from affected EGU facilities. These comments have focused on two key matters.

The first matter pertains to EPA's proposal to extend compliance deadlines and provide limited site-specific flexibility for implementing the ELG requirements. For the reasons discussed above, LPPC believes the adoption of those proposed changes—which do not weaken the stringency of

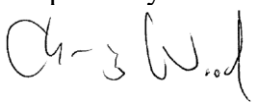
[32] 576 U.S. 743 (2015).
[33] *Id.* at 750-54.

the current ELG control requirements—would establish several important implementation measures that will enhance the workability and effectiveness of the current ELG regulatory program.

The second matter provides LPPC's response to EPA's request for technical information on the achievability and cost of meeting ZLD limitations for the three regulated wastewater streams. As reflected in the preceding comments, LPPC urges EPA to reexamine its prior determinations on the technical and economic feasibility of the control requirements upon which the Agency relied to establish the ZLD limitations under the 2024 ELG rule.

Should you have any questions about these comments, please do not hesitate to contact me at (970) 266-7906 or woodc@prpa.org.

Respectfully Submitted,



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