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FPSC - COMMISSION CLERK

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Environmental cost recovery clause
_____________________________________/

Docket No. 20190007-EI
Filed: October 1, 2019

SIERRA CLUB'S
UNOPPOSED MOTION TO INTERVENE

Sierra Club hereby moves for leave to intervene in this case in which Gulf Power Company ("Gulf Power") seeks more than $23 million from its customers—including Sierra Club members—to clean up the waste from burning coal at a power plant in Mississippi. Sierra Club and its members share substantial interests in reducing pollution from—and avoiding imprudent expenditures on—coal-burning power plants, which are some of the worst polluters. To protect these substantial interests, Sierra Club monitors and regularly participates in cases concerning clean-up activities at coal-burning power plants. In fact, Sierra Club is a party in a Mississippi case concerning the very same clean-up activities that are under review here. Sierra Club seeks party status in this case to protect the substantial interests of its Florida members who buy electric service from Gulf Power, and to offer, as appropriate, relevant information that has been developed in the Mississippi case.

INTRODUCTION

1. This case is governed by section 366.8255, Florida Statutes (2019). Subject to Commission[1] review and approval, the statute allows recovery of a "utility's *prudently* incurred environmental compliance costs."[2] "Environmental compliance costs" are "all costs or expenses incurred by an electric utility in complying with environmental laws or regulations."[3] The corresponding prudence standard can equally be articulated as "what a reasonable utility manager

[1] "Commission" refers to the Florida Public Service Commission unless otherwise noted.

[2] § 366.8255(2), Fla. Stat. (2019) (emphasis added).

[3] Id. § 366.8255(1)(d).

would have done, in light of the conditions and circumstances that were known, or should [have] been known, at the time the decision was made,"[4] or as whether the utility "minimize[d]" its expenditures through a "timely" analysis and pursuit of a "range of alternat[ives]."[5] Either inquiry boils down to whether the utility reviewed relevant factors and, so informed, rendered a decision to minimize the costs that it seeks to pass onto its customers.

2. Gulf Power filed a petition under section 366.8255, Fla. Stat., for approval of costs that it expects to incur in 2020, among other things. The costs include $23,234,491 for "Gulf's ownership portion" of projects to clean up the waste from burning coal at Plant Daniel in Mississippi. Gulf Power's petition, and the accompanying pre-filed testimony, do not specify the meaning of "Gulf's ownership portion" or address whether the underlying costs actually are "prudently incurred environmental compliance costs" that may be recovered under section 366.8255. To be sure, it is a matter of public record that Gulf Power owns a 50% share of two aging, coal-burning units at Plant Daniel, while Mississippi Power Company ("Mississippi Power") owns the other 50% share.[6] But Gulf Power has not yet provided the information that is necessary for meaningful review, such as the specific provisions in environmental laws or regulations that compel it to incur the above costs, and the steps, if any, that Gulf Power has taken to minimize its "ownership portion."

3. Approximately two months before Gulf Power filed its petition, Mississippi Power petitioned the Mississippi Public Service Commission for approval of the very same activities that are covered by Gulf's petition. Sierra Club is a party in the Mississippi case (docket no. 2019-

[4] Southern All. for Clean Energy v. Graham, 113 So. 3d 742, 750 (Fla. 2013) (internal citation omitted).

[5] Gulf Power Co. v. Fla. Pub. Serv. Comm'n, 453 So. 2d 799, 802, 804 (Fla. 1984).

[6] See Gulf Power Company's Form 423 Fuel Report at 1, No. 20190001-EI (Fla. Apr. 30, 2019); Direct Testimony of Mark P. Loughman on Behalf of Mississippi Power Company at 3, No. 2019-UA-116 (Miss. July 9, 2019).

UA-116), where it is pursuing the information that is necessary for meaningful review, but also is missing from Mississippi Power's pleadings.[7]

4. Per Rule 28-106.205 of the Florida Administrative Code, "[p]ersons other than the original parties to a pending proceeding whose substantial interest will be affected by the proceeding and who desire to become parties may move the presiding officer for leave to intervene." Such motions must be filed at least 20 days before the final hearing, and must contain the information required by Rule 28-106.205(2), including allegations to show that the substantial interests of the movant will be affected by the proceeding.

5. The Commission has consistently allowed Sierra Club to intervene in its proceedings, including in last year's environmental cost recovery clause proceeding.[8] Sierra Club should likewise be allowed to intervene here because this motion is timely, as the final hearing is in more than 20 days, and all of the required information is set forth below. In particular, this information shows that Sierra Club's Florida members have precisely the types of substantial interests—in reducing pollution from, and avoiding imprudent expenditures on, coal-burning power plants—that will be affected by this proceeding. And, as noted, Sierra Club is prepared to offer, as appropriate, relevant information that is developed in the Mississippi case.

INFORMATION REQUIRED BY RULE 28-106.205, FLA. ADMIN. CODE.

6. Agency's name and address. The affected agency is the Commission and its address is 2540 Shumard Oak Boulevard, Tallahassee, FL 32399-0850.

7. Intervenor's name and addresses. The intervenor is Sierra Club and its local address is 1990 Central Avenue, St. Petersburg, FL 33712. Its headquarters address is 2101 Webster Street, Suite 1300, Oakland, CA 94612.

[7] See Sierra Club, Motion to Require Supplementation of the Petition and a Revised Scheduling Order, No. 2019-UA-116 (Miss. Sept. 23, 2019), enclosed as Exhibit 1.

[8] See Order Granting Intervention, No. PSC-2018-0344-PCO-EI (Fla. July 10, 2018).

8. Petitioner's representatives. Copies of all notices, pleadings, orders and other communications in this docket should be directed to Sierra Club's qualified representatives:

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9. Notice of docket. Sierra Club monitors Commission dockets, including the environmental cost recovery clause dockets.

10. Statement of substantial interest. Sierra Club is the nation's oldest and largest grassroots environmental nonprofit. It is registered with the Florida Secretary of State and, thus, is authorized to conduct nonprofit activities on behalf of itself and its members, including over 1,000 members who buy electric service from Gulf Power. As relevant here, Sierra Club and its members share substantial interests in reducing pollution from, and avoiding imprudent expenditures on, coal-burning power plants.[9] Not only are these plants some of the worst polluters, as noted, but they are also putting upward pressure on electric rates due to their high operating costs—costs that include clean-up activities like those Gulf Power expects will add up to more than $23 million in 2020 alone. Sierra Club therefore regularly participates in matters concerning coal-burning power plants, such as those before the Commission and the Florida Department of Environmental Protection ("Department"), to advocate minimizing the pollution

[9] See SIERRA CLUB ET AL., CLOSING THE FLOODGATES: HOW THE COAL INDUSTRY IS POISONING OUR WATER AND HOW WE CAN STOP IT (2013), enclosed as Exhibit 2; SIERRA CLUB, DANGEROUS WATERS: AMERICA'S COAL ASH CRISIS (2014), enclosed as Exhibit 3.

and the costs associated with these plants and retiring them as quickly as possible.[10]

11. To determine whether an association like Sierra Club may intervene in an administrative proceeding like this one, Florida courts apply both a general test and an associational test. Sierra Club meets the general test because it and its members face (1) an injury in fact of sufficient immediacy to entitle one to a section 120.57, Fla. Stat., hearing, and (2) a substantial injury of a type or nature that this case is designed to protect.[11] Likewise, Sierra Club meets the associational test because (1) the Commission's final action will affect the substantial interests of a substantial number of Sierra Club members; (2) the subject matter of this proceeding is within Sierra Club's general scope of interest and activity; and (3) the requested relief will be appropriate for Sierra Club to receive on its members' behalf.[12] In determining whether a party may intervene in an ongoing proceeding, courts "must accept all the material allegations as true, and construe them in favor of the challenged party."[13]

a. The general test's first prong is met because, if the Commission approves Gulf Power's petition, Sierra Club members who buy electric service from Gulf Power could very well face higher electric rates as early as January of next year. The Commission has consistently recognized such adverse rate impacts as sufficiently immediate injuries-in-fact for intervention.

b. The general test's second prong is met because this proceeding is governed by

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[10] See Sierra Club, Letter to Chairman Brown and Comm'rs. Brisé, Edgar, Graham and Patronis Re: Planning for Least-Cost Electric Service in Florida, enclosed as Exhibit 4; Sierra Club, Letter to Florida Department of Environmental Protection Re: Bringing Florida Coal Plants into Compliance with the New Effluent Limitations Guidelines, enclosed as Exhibit 5.

[11] Agrico Chem. Co. v. Dep't of Envtl. Regulation, 406 So. 2d 478, 482 (Fla. Dist. Ct. App. 1981), reh'g denied, 415 So. 2d 1359 (Fla. 1982).

[12] The test was established in Fla. Home Builders Ass'n v. Dep't of Labor and Employment Sec., 412 So. 2d 351, 353-54 (Fla. 1982), and extended to proceedings under section 120.57 in Farmworker Rights Org., Inc. v. Dep't of Health and Rehab. Servs., 417 So. 2d 753, 754-55 (Fla. 1st DCA 1982).

[13] Maverick Media Group, Inc. v. State, Dep't of Transp., 791 So. 2d 491, 495 (Fla. 1st DCA 2001) (internal citation omitted).

section 366.8255, Fla. Stat., and it allows recovery of only “prudently incurred environmental compliance costs.” Thus, according to plain statutory language, this proceeding is designed to protect interests like those shared by Sierra Club and its members: to secure the benefits of prudent environmental compliance costs—such as reduced pollution from Plant Daniel—while avoiding imprudent costs—such as costs that a reasonable utility would not sink into projects merely to extend the life of this aging power plant.

c. The associational test’s first prong is met because more than 1,000 of its members—a substantial number—buy electric service from Gulf Power. As noted, these members’ electric rates could rise as soon as next January if the Commission approves Gulf Power’s petition. Alternatively, if Gulf Power does not undertake prudent, legally required environmental compliance measures, Sierra Club members who live, work, and recreate in the vicinity of Plant Daniel may be harmed by pollution emanating from the waste generated by the plant. Both of these potential outcomes would affect the substantial interests of Sierra Club members.

d. The associational test’s second prong is met because clean-up costs for burning coal at Plant Daniel are under review in this proceeding, and the same falls within Sierra Club’s above-described interests and activities, as demonstrated by Sierra Club’s past advocacy before the Commission and the Department, as well as its participation in the above-described Mississippi case.

e. The associational test’s third prong is met because Sierra Club, while reserving its right to develop its request for relief after completing discovery, will either seek denial or approval with conditions, not money damages.[14]

12. In sum, Sierra Club’s intervention in this proceeding is integral to safeguarding its

[14] See Fla. Home Builders, 412 So.2d at 354 (“[T]his type of proceeding [can]not involve association or individual claims for money damages.”).

and its members' substantial interests in paying prudently low electric rates that reflect Gulf's use of environmentally responsible and economically efficient generation sources.

13. Statement of disputed facts. Sierra Club reserves its right to identify disputed facts after completing discovery in this proceeding.

14. Statement of ultimate facts. Sierra Club reserves its right to identify ultimate facts after completing discovery in this proceeding.

15. Statement required by Rule 28-106.204(3), Fla. Admin. Code. Sierra Club conferred with the parties and is authorized to represent that Duke Energy Florida, Gulf Power Company, Florida Power & Light Company, the Office of Public Counsel, PCS Phosphate, and Tampa Electric Company take no position on Sierra Club's intervention.

16. Wherefore, Sierra Club respectfully requests the entry of an order granting it leave to intervene in this case.

Respectfully submitted this 1st day of October, 2019,

*/s/ Diana A. Csank*

Diana A. Csank
*Qualified Representative for Sierra Club*

## CERTIFICATE OF SERVICE

I, Diana A. Csank, hereby certify that a true and correct copy of Sierra Club's Unopposed Motion to Intervene was served on this 1st day of October, 2019, via electronic mail, upon:

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**BEFORE THE MISSISSIPPI PUBLIC SERVICE COMMISSION**

**MISSISSIPPI PUBLIC SERVICE COMMISSION** **2019-UA-116**

**IN RE:** **PETITION OF MISSISSIPPI POWER COMPANY FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR ENVIRONMENTAL COMPLIANCE ACTIVITIES AUTHORIZING THE CLOSURE OF THE ASH POND, CONSTRUCTION OF LOW VOLUME WASTEWATER TREATMENT FACILITIES, AND CONVERSION OF BOTTOM ASH COLLECTION FACILITIES FOR THE PLANT VICTOR J. DANIEL ELECTRIC GENERATING FACILITY IN JACKSON COUNTY MISSISSIPPI**

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# SIERRA CLUB'S MOTION TO REQUIRE SUPPLEMENTATION OF THE PETITION AND A REVISED SCHEDULING ORDER

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1. Introduction

Mississippi Power Company's ("MPC" or "Mississippi Power") petition seeks permission to spend a total of between $44.49 million and $96.8 million on three different projects at Plant Victor J. Daniel Units 1 and 2. [1]

Between $23.45 million and $56.95 [2] million is for the closure of the ash pond at Daniel, which under the Environmental Protection Agency's Coal Combustion Residuals ("CCR") rule is going to have to happen at some point between 1 year and 6 years from now. Between $17.89 million and $32.2 million, however, is for a dry bottom ash handling system which will be unnecessary if the plant is retired. Between $14.88 and $36.13 million is for a system to treat low volumes of contaminated waste water from operations at the plant, and at least some of this amount could be avoided if the plant ceases operations.

The publicly available information strongly indicates that Plant Daniel is uneconomic to operate, and a burden to the MPC ratepayer. MPC's petition in fact all but admits that Plant Daniel is uneconomic to operate, and the company's last Reserve Margin Plan directly states that Units 1 and 2 are unnecessary to satisfy customer energy demand.[3]

MPC's filings nonetheless do not contain the data on economics, alternatives and other issues necessary to assess whether the public convenience and necessity actually requires plowing tens of millions of additional dollars into Plant Daniel. The unexamined alternatives include retiring Units 1 and 2, which would trigger the alternative extended closure provisions of

[1] In this memorandum, "Plant Daniel" is used to refer to Plant Daniel Units 1 and 2, exclusive of Units 3 and 4.

[2] Exhibit MPL-3 to Testimony of Mark Loughman. MPC's cost estimates are "feasibility" with an accuracy range of -25% to +35% and "screening," with an accuracy range of -30% to +70%. The ash pond closure is a screening level estimate. The numbers used here reflect MPC's 50% share of the total cost.

[3] MSPC Docket No. 2017-AD-112, Mississippi Power Company, Reserve Margin Plan Filing at 15 (Aug. 6, 2018) (noting the Daniel units "have value only as capacity (as compared to energy value)").

the CCR rule, and render approximately $20-40 million of the proposed $44.49-96.8 million in capital expenditures unnecessary. MPC's filings also do not address the impact of Gulf Power Company's decision to retire its 50% interest in these units by 2024.[4] Instead, the company's original filings assert summarily that transmission constraints, and the need to treat low volume wastewater, require the company to keep Daniel operating "regardless of the long term economics of the units."[5]

Some information about MPC's evaluation of the economics of the Daniel units, and the claimed transmission constraints, was supplied at 6:30 PM on Friday, September 20, in the form confidential data responses to data requests. No party has had the opportunity to perform even minimal due diligence on this critical information, but it clearly indicates that many of the expenditure proposed in this petition are improvident.

The CCR rule requires – absent an alternative closure plan – that the ash pond stop receiving CCR by October 2020. This deadline has been in place for nearly five years, and MPC has had more than adequate opportunity to provide the appropriate data and analysis to support its petition. By waiting to file this petition until July 2019, MPC effectively asserted that the Commission has only two options: decide immediately to allow the company to spend tens of millions on unnecessary systems for a plant that is to all appearances uneconomic, or shut the plant down in the next 12 months and cause unspecified instability in the grid.

MPC's inadequate petition and recent disclosures leave the Commission and the parties in a legally untenable posture. MPC's petition did not address the matters required by the Commission's rules and administrative law to make a *prima facie* case, and even with responses

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[4] *See* Exhibit ___ (NextEra discovery response).

[5] Testimony of Mark Loughman, p. 11.

to data requests, the parties still do not know MPC's position on key issues such as the unspecified transmission constraints. After the parties submit testimony, MPC may attempt to make its case in rebuttal, with no opportunity for further testing of its claims.

In order to make a reasoned, legally-sound decision on MPC's petition, the Commission must require an adequate petition from MPC, and an opportunity for the parties and the public to evaluate and respond to that petition. The need for a sound process is particularly acute for Plant Daniel, because the factual underpinnings Mississippi Power has presented for other recent and massive investments in the plant have proven erroneous.

2. <u>The recent massive investment in Plant Daniel' scrubbers was based on inaccurate projections, and the available data indicates the Plant is uneconomic for ratepayers.</u>

The recent history of Plant Daniel is relevant to this motion. As this Commission is well aware, coal-fired power plants can be very expensive for ratepayers, and add a lot of money to rate base for utilities. Seven years ago Mississippi Power Company petitioned to add $313 million in sulfur dioxide scrubbers to Plant Daniel. At the time the company had options other than investing in expensive scrubbers. It could have replaced one or both of Plant Daniel's coal-burning boilers with more cost-effective, affordable renewable energy, or it could have converted the boilers into gas-burning peakers, which could have served spikes in demand. Instead, the Company insisted that the $313 million scrubber investment was necessary to comply with impending environmental compliance obligations, asserting that:

- Plant Daniel is critical as a baseload resource and would provide 20% of the company's energy needs;[6]

[6] Order, Miss. Pub. Serv. Comm'n Docket No.2010-UA-79, *Petition of Mississippi Power Company for a Certificate of Public Convenience and Necessity Authorizing the Acquisition, Construction, and Operation of Environmental Control Equipment and Related Facilities on the Victor J. Daniel Electric Generating Facility in Jackson County, Mississippi*, 2012 WL 1484068, at *11-12 (Miss. PSC. Apr. 3, 2012).

- The company's reserve margin calculation is "very conservative" and not nearly as big as it looks;[7]
- Natural gas prices in 2020 will be at a minimum 100% higher than they are today;
- The scrubbers will actually work as they were supposed to.

Just as it does in this petition, when MPC petitioned the Commission for the scrubbers, the company warned the Commission that "an immediate decision is required." At the time Commissioner Presley correctly expressed serious concerns about the "false" and "misleading[]" economic and fuel diversity premises underlying the Daniel scrubber retrofit, Mississippi Power's uncertain "need for capacity that is four times [its] actual requirement," and a future of "intensive environmental compliance requirements for Daniel."[8]

MPC's key predictions regarding the Plant Daniel scrubber investment have proven to be incorrect.

As noted above, MPC predicted in the $313 million Daniel scrubber docket that *low* natural gas prices in 2020 would be approximately $6 per mcf in 2020.[9] Instead natural gas prices are presently about $2.90 per mcf at the Henry Hub.

Mississippi Power's optimistic projections about increasing energy demand were similarly mistaken. Mississippi Power's filings in other Commission dockets confirm that the Company does not even need the Daniel plant to reliably serve its demand. In fact, Mississippi Power's most recent Reserve Margin Plan indicates that by 2020, the Company will have

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[7] Second Rebuttal Testimony of David Schmidt, p. 3, Docket No. 2010-UA-79.

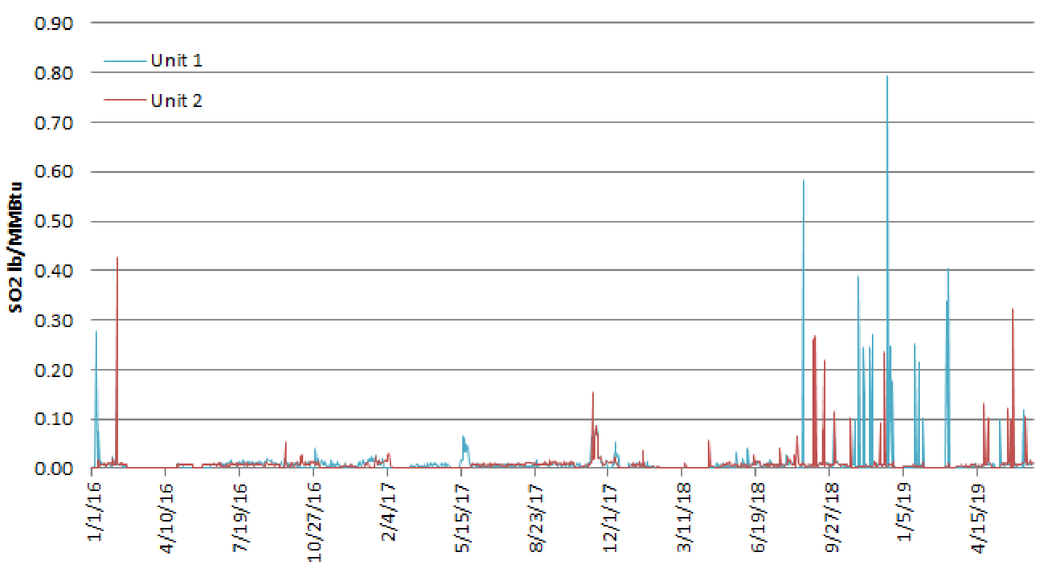
[8] MPSC Docket No. 2010-UA-279 (Commissioner Presley, dissenting), *In re: Petition of Mississippi Power Company for a Certificate of Public Convenience and Necessity Authorizing the Acquisition, Construction, and Operation of Environmental Control Equipment and Related Facilities on the Victor J. Daniel Electric Generating Facility in Jackson County, Mississippi*, 2012 WL 1484069, at *2-3 (Miss.P.S.C. Apr. 4, 2012).

[9] February 2, 2012 Supplemental Filing, MPSC Docket No. 2010-UA-279.

approximately 1,400 MW more generation capacity than needed, well in excess of their required reserve margin of under 400 MW. In fact, the Reserve Margin Plan confirms Sierra Club's assessment that the Daniel power plant has little to no energy value,[10] and that the Company could retire its share of both Daniel units and still have more than enough capacity to meet its required reserve margin.

Based on recent increases in harmful sulfur dioxide ("SO2") pollution at Plant Daniel, the Company appears to be operating its new $313 million scrubbers only periodically or inefficiently.

**Figure 1: Sulfur Dioxide Emission Rates for Daniel[11]**




[10] MSPC Docket No. 2017-AD-112, Mississippi Power Company, Reserve Margin Plan Filing at 15 (Aug. 6, 2018) (noting the Daniel units "have value only as capacity (as compared to energy value)").

[11] As reflected in the figure, in the last year, Daniel has emitted more than eight times the SO2 than the $300 million scrubbers were designed to achieve. Mississippi Power's self-reported data is available at https://ampd.epa.gov/ampd/.

MPC also admits that Daniel's compliance with the Clean Air Act's Regional Haze program continues to be a risk,[12] which could require additional operations and maintenance costs, increasing the total cost of operating the plant.

MPC also originally asserted that the plant was critical as baseload capacity and would supply 20% of the company's energy needs. Instead, the capacity factor has dropped precipitously over the last decade, and it now operates only 25 percent of the time. [13]

**Figure 2: Plant Daniel Capacity Factor[14]**


MPC had not supplied any economic analysis in this docket until its recent confidential data responses. However, Sierra Club's initial economic analysis, using publicly available data,

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[12] *See* Southern Company, Form 10-k, Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934, for the fiscal year ended December 31, 2018, at page II-33, http://d18rn0p25nwr6d.cloudfront.net/CIK-0000092122/5a130524-afbe-4cc0-9af2-62900083e57d.pdf (noting Plant Daniel continues to be evaluated under the Clean Air Act's regional haze program, which "could increase compliance costs").

[13] It is important to note that the increase in Plant Daniel's *hourly* SO2 emission rate is independent of Plant Daniel's reduced capacity factor. In other words, the plant's reduced utilization is not correlated with increased emissions or inefficient function of pollution controls.

[14] Graph based on Mississippi Power's self-reported data available at EPA Air Markets Database, https://ampd.epa.gov/ampd/.

indicates that Daniel should not be operating at all.[15] Based on a comparison of prevailing energy market prices[16] and Mississippi Power's publicly-available production costs (*i.e*., fuel, pollution control operating costs, and other variable operation and maintenance costs), Daniel should only be operating approximately seven percent of the time. In other words, *it is uneconomic to operate Daniel (i.e., its variable production cost exceeds energy market costs) during 93% of the hours of the year*. Without going into material designated confidential in a public filing, the recent information supplied by MPC underscores the need to closely examine the viability of the Daniel coal units.

That bleak economic outlook does not even account for the additional $62.5 million in capital and subsequent operational costs associated with Mississippi Power's proposed CCR retrofit. Nor does it account for Daniel's other environmental compliance liabilities like regional haze compliance. And Mississippi Power's own groundwater monitoring shows pollution levels around the ash pond are five times the federal drinking water safeguards, requiring remediation.[17]

MPC's 2018 Reserve Margin Plan predicts that Plant Daniel has some present value for ratepayers. However, the publicly available information indicates that if Daniel operated through 2040, it would cost customers $1.2 billion (in net present value terms) *more* to operate than the

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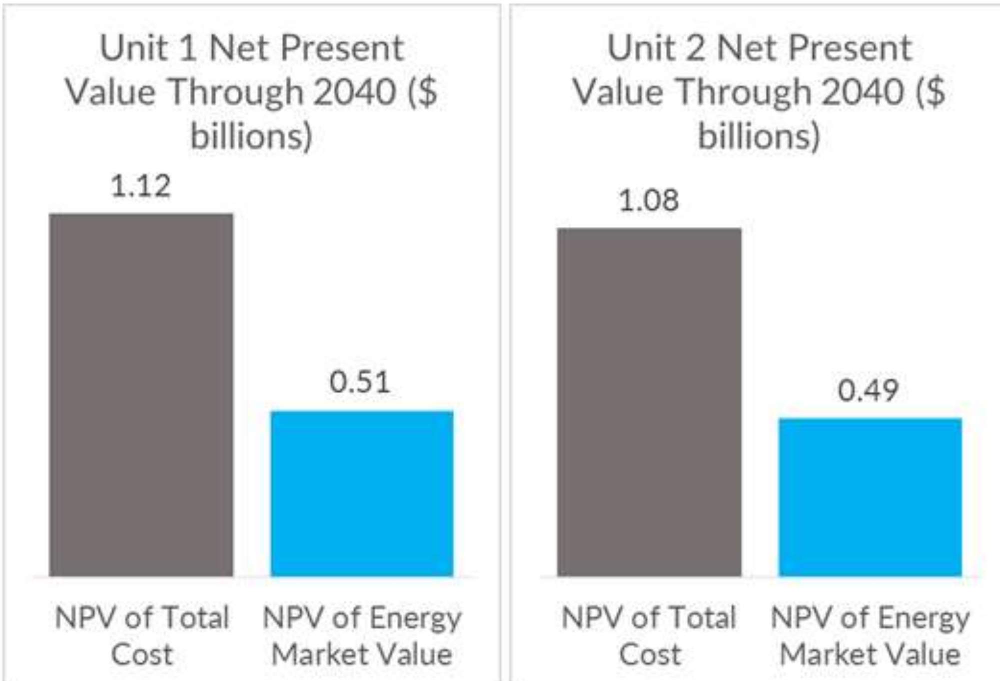
[15] Because Mississippi Power's Application failed to include basic information about the economics of Plant Daniel, Sierra Club's initial analysis is based on publicly-available data. Sierra Club reserves the right (and fully intends) to update this analysis based on any discovery it is able to timely obtain from Mississippi Power over the next six weeks, before the Company intends to begin construction.

[16] Based on 2016-2018 historical prices at the MISO-SOCO interface.

[17] Mississippi Power Company's 2018 Annual Groundwater Monitoring and Corrective Action Report at 13-14, 256 (Jan. 31, 2019), *available at* https://www.mississippipower.com/content/dam/mississippi-power/pdfs/company/plant-daniel-ash-pond-b/groundwater/AshPondB2018_AnnualRpt_FINALrev1.pdf. Mississippi Power's Application also appears to assume, again without analysis or support, that it can, in fact, adequately decontaminate the area affected by the ash pond, as required by the CCR rule, 40 C.F.R. § 257.102(c).

estimated value of the energy produced. As noted the recent data request responses also bring into question Daniel's value to ratepayers.

**Figure 3: Plant Daniel Net Present Value through 2040[18]**




In fact, the net going-forward cost of the plant *after* accounting for its energy market value is roughly $100/kW-year on an annualized basis, and this is without considering repayment and return on capital already sunk into the plant. For comparison, this is more than enough to

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[18] Estimate based on the following assumptions and sources:

1) 2016-18 average capacity factor, fuel cost, variable O&M, fixed O&M from S&P Global (EIA and FERC Form 1 Reported Data). Costs assumed to escalate at a rate of 2% per year.

2) Incremental capital investment estimated based on EIA's Annual Energy Outlook modeling assumption, as a function of unit age and presence of FGD equipment. See: https://www.eia.gov/outlooks/aeo/assumptions/pdf/electricity.pdf

3) A discount rate of 7% was applied, and costs were evaluated across the period of 2020-2040.

4) Energy market value based on historical, generation-weighted average 2016-18 MISO-SOCO interface prices, escalated at an inflation rate of 2% per year. Given increasing wind penetration in southern MISO and SPP, along with continued low gas prices, forward pricing in the region is expected to be flat or declining over the next 10 years, so an escalating price makes the NPV of net cost a conservative estimate.

cover the fixed costs of buying a new, similarly-sized generation resource. By continuing to prop up the Daniel power plant, ratepayers are effectively paying as much as they would if the Company owned an *additional* power plant. This is due, in part, to the fact that natural gas prices have remained very low over the past five years, contrary to the Company's overly optimistic projections when it chose to install the $313 million scrubbers.

The Sierra Club does not suggest that MPC has to be right all the time in its predictions. No party is. But this history emphasizes the need for the Commission to evaluate this petition deliberately and on a full record.

3. <u>Mississippi Power bears the burden of providing evidence in its Application supporting each element of their *prima facie* case.</u>

Under Mississippi Law, "[n]o person shall construct, acquire, extend or operate equipment for manufacture, generating, transmitting or distributing electricity for any intrastate or interstate sale to or for the public for compensation without first having obtained from the commission a certificate that the present and future public convenience and necessity require or will require the operation of such equipment or facility."[19] Where, as here, a utility seeks approval to expand an existing facility it must submit an Application that meets the minimal filing requirements of Commission Rule 7.102 and Schedule 3 to Appendix A.

In analogous circumstances, the Commission has recognized that utilities cannot demonstrate that a project is in the public interest by simply "relying upon the wisdom of management."[20] Rather, the utility bears the burden of demonstrating that it "went through a

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[19] Miss. Stat. § 77-3-11.

[20] *See* MPSC Docket No. 2013-UA-189, *In re: Petition of Mississippi Power Company for Finding of Prudence in Connection with the Kemper County Integrated Gasification Combined Cycle Generating Facility*, 2013 WL 6044209, at *1 (Miss. PSC. Oct. 15, 2013) [hereinafter *Kemper*] (citing *Entergy Gulf States, Inc. v. Pub. Utility Com'n of Texas*, 112 S.W.3d 208, 214 (Tex.App.-Austin, 2003)).

reasonable decision making process to arrive at a course of action and, given the facts as they were or should have been known at the time, responded in a reasonable manner."[21] Moreover, the utility must present "contemporaneous documentation of its decision-making process, thereby enabling the Commission to review the *actual investigations and analyses* leading to the utility's decision."[22]

This Commission and Mississippi courts have rejected utility requests for rate recovery that fail to meet those standards, and the Commission should do the same in a certificate proceeding.

Mississippi Power's application also omits core information required by the Commission's rules and necessary to establish a *prima facie* case. Where, as here, a utility seeks to construct or expand upon an existing facility, it must, among other requirements, include:

- A detailed description of the facilities proposed;
- A complete set of engineering plans and specifications;
- An estimate of the impact of the cost of facilities upon rate base and rates; and
- All testimony to be relied upon at the hearing.

Mississippi Power's petition fails to adequately address these basic informational requirements. Though some of this information has been supplemented through discovery responses, MPC did not and has not submitted the necessary information supporting the certificate application as required.

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[21] Kemper, 2013 WL 6044209, at *2.

[22] *Id.; see also Entergy Gulf States, Inc. v. La. Pub. Serv. Comm'n,* 726 So. 2d 870, 876 (La. 1999) (quoting *Gulf States Util. Co. v. La. Pub. Serv. Comm'n.,* 578 So. 2d 71, 84 (La.1991)) (quoting *In Re Cambridge Electric Light Co.,* 86 P.U.R.4th 574 (Mass.D.P.U. 1987)).

In light of the declining economics of Plant Daniel, the 50% co-owner's intent to retire its share of the plant in just a few years, and uncertainty about whether Mississippi Power's retrofit plans are even necessary to reliably serve customers, it would be arbitrary and capricious and contrary to law for the Commission to grant Mississippi Power's Application without requiring the Company to meet the minimum filing requirements for any Certificate of Public Convenience and Necessity.

MPC's recent data responses clearly indicate that the company's testimony in this docket is inadequate and must be supplemented. Those data responses also state that MPC has not finished evaluating key issues such as the impact of Gulf Power's decision to shutter its 50% interest in Plant Daniel.

4. MPC's petition does not contain the information necessary for a valid decision on the public convenience and necessity, and the late filing of that petition should not force an arbitrary decision.

Prudent decision-making requires evaluation of a proposed retrofit project to other feasible alternatives, including retirement, replacement, or other less costly compliance alternatives. In fact, in analogous retrofit approval proceedings, this Commission and virtually every other Commission across the country have recognized that prudent decision-making typically requires a comparison of the "net present value" to customers from retrofitting a power plant versus retiring or replacing it with various alternatives, including renewable energy or market purchases. This would include critical assumptions and forecasts, including, among others, natural gas and coal prices, energy market prices, demand forecasts, costs of procuring replacement generation, and future environmental compliance costs.

Mississippi Power originally bypassed this whole process with the statement that Plant Daniel must continue to operate "regardless of the economics." For the Commission to accept this statement without proof would be arbitrary and capricious on its face. MPC has now provided at least some information on the viability of Plant Daniel, but the parties have not had the opportunity to test or request information on the inputs used to reach the conclusions.

MPC has known since 2015 that the company will have to close the ash pond at Plant Daniel. The final regulations, even after all appeals and remands, were in place in July 2018. The company nonetheless waited until July 2019 to file this petition, and has requested an immediate decision on not just the ash pond closure, but also the dry bottom ash handling system and the low volume wastewater system.

Under the CCR rule's alternative closure provisions, Mississippi Power could continue to operate its current ash pond until October 2023, if the Company commits to cease burning coal by that date.[23] A 2023 retirement would comply with the rule, and avoid significant ratepayer costs including the dry bottom ash handling and potentially low volume waste water treatment. The rule provides for an extension of time if necessary to coordinate and obtain necessary approvals, among other factors.[24]

MPC's petition states that to meet the deadline the dry bottom ash handler must be constructed so the ash pond can be closed, and the low volume wastewater treatment pond placed on its site. In effect MPC is telling the Commission it has only two choices on this incomplete record: approve the whole ~$65 million package immediately, or shut down Plant Daniel in the next 12 months and cause unspecified instability in the electrical grid. MPC's position may be changing, but that is as yet unclear.

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[23] 40 C.F.R. § 257.103.

[24] 40 CF.R. § 102(f)(2)(i).

MPC waited for 4 years after the regulations came out to file this petition, and even waited a year after the amended regulation. Had MPC filed this petition earlier, the Commission and the parties could have fully evaluated the economics of the plant in the context of this request, as well as the claimed transmission constraints. Even with the lead time necessary to close the ash pond and repurpose it for use as a low volume wastewater pond, a valid decision could have been made on the need for tens of millions in additional expenditures on the dry bottom ash system. In effect, Mississippi Power – at least until recently – has been telling the Commission that its late filing has foreclosed all other choices.

The Sierra Club finally notes that the transmission constraints that MPC asserts require continued operations at Plant Daniel "regardless of economics" are at best uncertain, according to the public version of the Company's responses to data requests. An additional review of those constraints, according to the public response, are being carried out by SES.[25] Thus some of the claimed constraints may be beyond the MPC service area altogether, or beyond the control of MPC.

The recent confidential data responses address this issue, and underscore that even now the asserted constraints require close review, including whether the customers of MPC should be required to continue to support an uneconomic plant as a consequence of constraints on other systems. This simply makes the point that MPC's skeletal petition is inadequate as a basis for multi-million dollar expenditures.

5. <u>An evidentiary hearing on the petition is required by statute, and consideration of the economic viability of Plant Daniel cannot be deferred to some other proceeding.</u>

The Commission's September 13, 2019, order in this docket directs Mississippi Power to submit a proposed order approving the CCR retrofit project, and allows intervenors seven days to

[25] Mississippi Power Company Response to MPUS 1-8, August 16, 2019.

file comments in response. The Sierra Club will provide comments, but notes for the Commission that those comments will necessarily be constrained by Mississippi Power's deficient application.

In addition, comments are not a substitute for a full evidentiary hearing on this matter. The law provides that the Commission "shall hold a public hearing on each application" for a Certificate of Public Convenience and Necessity.[26] In a case like this one, that public hearing must necessarily be on the basis of a full record, with full opportunity for discovery, testimony and cross examination.

As the Commission is aware, once a decision is made on the certificate, expenditures by MPC are presumed to be prudent.[27] This emphasizes the need for a full consideration of the relevant facts, including how Plant Daniel came to be in a position in which ratepayers have to continue to invest tens of millions to continue operations "regardless of the long term economics of the units." Full consideration of the economics of the plant cannot be deferred to a later prudency docket, or to a Reserve Margin Planning Process. A valid finding on the public convenience and necessity of the proposed retrofits demands that those matters be fully developed in this docket.

6. Conclusion

For the reasons above, Sierra Club respectfully requests that the Commission determine that Mississippi Power's Application fails to meet the utility's initial burden to produce *prima facie* evidence supporting a finding of public convenience and necessity. MPC has not provided the basic information necessary to determine whether there are better alternatives to retrofitting

[26] Miss. Stat. § 77-3-14.

[27] In re: Petition of Mississippi Power Company for Finding of Prudence in Connection with the Kemper County IGCC Generating Facility, Order of October 15, 2013.

Plant Daniel. Mississippi Power has basically avoided this kind of hard look by asserting that retirement of Daniel is off the table regardless of the Plant's economics. The proper course is for the Commission to require a supplemental petition, and adequate opportunity for discovery and preparation for a hearing on that petition. The Sierra Club suggests that requiring supplementation by October 1, 2019, with a hearing in December 2019 would be appropriate.[28]

Respectfully submitted this 23rd day of September, 2019.

Respectfully submitted,
Mississippi Chapter Sierra Club

By: ______________________________

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[28] *See* Miss. Stat. § 77-3-13

## CERTIFICATE OF SERVICE

I, Robert B. Wiygul, counsel for Sierra Club do hereby certify that in compliance with RP6.122(2) of the Commission's Public Utilities Rules of Practice and Procedure (the "Rules").

(1) An original and twelve (12) true and correct copies of the filing have been filed with the Commission by United States Postal Service this date to:

Katherine Collier, Executive Secretary
Mississippi Public Service Commission
501 N. West Street, Suite 201-A
Jackson, MS 39201

(2) An electronic copy of the filing has been filed with the Commission via e-mail to the following address: efile.psc@psc.state.ms.us

(3) An electronic copy of the filing has been served via e-mail to the following address:

| | |
|---|---|
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This the 23rd day of September, 2019.

Robert Wiygul

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# CLOSING THE FLOODGATES:

## HOW THE COAL INDUSTRY IS POISONING OUR WATER AND HOW WE CAN STOP IT

WATERKEEPER® ALLIANCE · EIP ENVIRONMENTAL INTEGRITY PROJECT · CLEAN WATER ACTION · EARTHJUSTICE · BEYOND COAL · SIERRA CLUB FOUNDED 1892

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## ABOUT THE SPONSORING ORGANIZATIONS

**THE ENVIRONMENTAL INTEGRITY PROJECT** (EIP) is a nonpartisan, nonprofit organization dedicated to the enforcement of the nation's anti-pollution laws and the prevention of political interference with those laws. The EIP provides objective analysis of how the failure to enforce or implement environmental laws increases pollution and harms public health, and helps local communities obtain the protection of environmental laws.

**THE SIERRA CLUB** is the nation's oldest and largest grassroots environmental group, with 2.1 million members and supporters. The Sierra Club's Beyond Coal Campaign works to address the pressing public health threat from coal-fired power plants and toward clean energy.

**CLEAN WATER ACTION** is a one-million member organization of diverse people and groups joined together to protect our environment, health, economic well-being, and community quality of life. Its goals include clean, safe and affordable water; prevention of health threatening pollution; creation of environmentally safe jobs and businesses; and empowerment of people to make democracy work. Clean Water Action organizes strong grassroots groups and coalitions and campaigns to elect environmental candidates and solve environmental and community problems.

**EARTHJUSTICE** is a non-profit public interest law organization dedicated to protecting the magnificent places, natural resources, and wildlife of this earth, and to defending the right of all people to a healthy environment.

**WATERKEEPER ALLIANCE** was founded in 1999 by environmental attorney and activist Robert F. Kennedy, Jr., and several veteran Waterkeeper Organizations. It is a global movement of on-the-water advocates who patrol and protect more than 100,000 miles of rivers, streams, and coastlines in North and South America, Europe, Australia, Asia, and Africa. Waterkeeper Organizations combine firsthand knowledge of their waterways with an unwavering commitment to the rights of their communities and to the rule of law.

## ACKNOWLEDGMENT

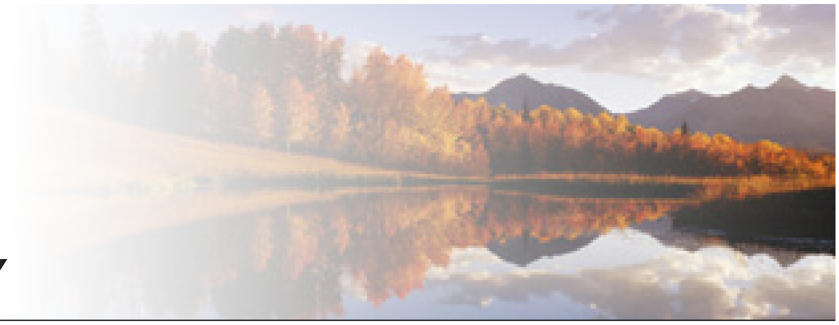
This report was primarily composed and edited by EIP Managing Attorney Jennifer Duggan and Sierra Club Staff Attorney Craig Segall. Others contributing to this report include: EIP Research Analysts Tom Lyons and Troy Sanders, Sierra Club Associate Attorney Casey Roberts, Sierra Club Analysts and Fellows Sherri Liang, Toba Pearlman, Maggie Wendler, Stephanie Grebas, and Hina Gupta, Clean Water Action National Water Campaigns Coordinator Jennifer Peters, Earthjustice Coal Program Director Abigail Dillen, Waterkeeper Alliance Staff Attorney Peter Harrison and Waterkeeper Alliance Global Coal Campaign Coordinator Donna Lisenby.

## DATA LIMITATIONS

The information contained in this report is based on company self-reported data obtained through publicly accessible U.S. Environmental Protection Agency websites and Freedom of Information Act requests. Occasionally, government data may contain errors, either because information is inaccurately reported by the regulated entities or incorrectly transcribed by government agencies. This report is based on data retrieved prior to July 2013, and subsequent data retrievals may differ slightly as some companies correct prior reports.

We are committed to ensuring that the data we present are as accurate as possible. We will correct any errors that are verifiable.

**QUESTIONS AND COMMENTS** can be directed to Jennifer Duggan at jduggan@environmentalintegrity.org



# EXECUTIVE SUMMARY

Coal-fired power plants are the largest source of toxic water pollution in the United States based on toxicity, dumping billions of pounds of pollution into America's rivers, lakes, and streams each year.[1] The waste from coal plants, also known as coal combustion waste, includes coal ash and sludge from pollution controls called "scrubbers" that are notorious for contaminating ground and surface waters with toxic heavy metals and other pollutants.[2] These pollutants, including lead and mercury, can be dangerous to humans and wreak havoc in our watersheds even in very small amounts. The toxic metals in this waste do not degrade over time and many bio-accumulate, increasing in concentration as they travel up the food chain, ultimately collecting in our bodies, and the bodies of our children.

Existing national standards meant to control coal plant water pollution are thirty-one years old and fail to set any limits on many dangerous pollutants. Only now has the U.S. Environmental Protection Agency (EPA) proposed to update these outdated standards, in order to curb discharges of arsenic, boron, cadmium, lead, mercury, selenium, and other heavy metals from coal plants. Although the Clean Water Act requires the EPA and states to set pollution limits for power plants in the absence of federal standards,[3] states have routinely allowed unlimited discharges of this dangerous pollution.

Our review of 386 coal-fired power plants across the country demonstrates that the Clean Water Act has been almost universally ignored by power companies and permitting agencies. Our survey is based on the EPA's Enforcement and Compliance History Online (ECHO) database and our review of discharge permits for coal-fired power plants. For each plant, we reviewed permit and monitoring requirements for arsenic, boron, cadmium, lead, mercury, and selenium; the health of the receiving water; and the permit's expiration date. Our analysis reveals that:

- Nearly 70 percent of the coal plants that discharge coal ash and scrubber wastewater are allowed to dump unlimited amounts of arsenic, boron, cadmium, mercury, and selenium into public waters, in violation of the Clean Water Act.
- Only about 63 percent of these coal plants are required to monitor and report discharges of arsenic, boron, cadmium, mercury, and selenium.
- Only about 17% of the permits for the 71 coal plants discharging into waters impaired for arsenic, boron, cadmium, lead, mercury, or selenium contained a limit for the pollutant responsible for degrading water quality.
- Nearly half of the plants surveyed are discharging toxic pollution with an expired Clean Water Act permit. Fifty-three power plants are operating with permits that expired five or more years ago.

In short, coal plants have used our rivers, lakes, and streams as their own private waste dumps for decades.

These dangerous discharges have serious consequences for communities that live near coal-fired power plants and their dumps across the United States. Tens of thousands of miles of rivers are degraded by this pollution.[4] The EPA has identified more than 250 individual instances where coal plants have harmed ground or surface waters.[5] Because many coal power plants sit on recreational lakes and reservoirs, or upstream of drinking water supplies, those thousands of miles of poisoned waters have an impact on people across the country. Coal water pollution raises cancer risks, makes fish unsafe to eat, and can inflict lasting brain damage on our children.[6]

Americans do not need to live with these dangerous discharges. Wastewater treatment technologies that drastically reduce, and even eliminate, discharges of toxic pollution are widely available, and are already in use at some power plants in the United States.[7] According to the EPA, coal plants can eliminate coal ash wastewater entirely by moving to dry ash handling techniques.[8] Scrubber discharges can also be treated with common sense technologies such as chemical precipitation, biological treatment, and vapor compression to reduce or eliminate millions of tons of toxic pollution.[9]

The EPA's recent proposal to set long overdue standards contains multiple options, including strong standards that would require the elimination of the majority of coal plant water pollution using technologies that are available and cost-effective. The strongest of these options, called "Option 5" in the proposal, would eliminate almost all toxic discharges, reducing pollution by more than 5 billion pounds a year, and should be the option EPA selects for the final rule. The next strongest option, called Option 4, would eliminate ash-contaminated discharges, and apply rigorous treatment requirements for scrubber sludge, however it would only reduce pollution by 3.3 billion pounds a year, 2 billion less than Option 5. By eliminating or significantly reducing toxic discharges from coal plants, a strong final rule would create hundreds of millions of dollars in benefits every year in the form of improved health and recreational opportunities for all Americans, in addition to the incalculable benefits of clean and healthy watersheds.[10] The EPA estimates that ending toxic dumping from coal plants would cost less than one percent of annual revenue for most coal plants and at most about two pennies a day in expenses for ordinary Americans if the utilities passed some of the cleanup costs to consumers.[11]

Unfortunately, the proposal also includes illegal and weak options inserted by political operatives, rather than EPA scientists. These options would preserve the status quo or do little to control dangerous pollution dumping. Weak options are a giveaway to polluters and Americans deserve better. It is time for the EPA to set strong, national standards to end decades of toxic water pollution, and protect public health and our waters.

# PART ONE
## YEARS OF NEGLECT AND A CHANCE FOR CHANGE

### INTRODUCTION

All across the United States, millions of gallons per day of water pollution — laced with toxic pollutants including arsenic, mercury, selenium, and lead — gush from coal-fired power plants into our rivers, lakes, and streams. Pollution flows from the aging, leaky "ponds" that many plants use to store their toxic slurries of coal ash and smokestack scrubber sludge. Toxic chemicals also seep from unlined ponds and dry waste landfills into ground and surface waters, leaving behind a persistent lethal legacy. All in all, at least 5.5 billion pounds of water pollution is released into the environment by coal power plants every year, and a significant portion of that pollution is made up of toxic chemicals.[12]

These power plants are the largest source of toxic water pollution in the United States, dumping more toxics into our waters than the other top nine polluting industries *combined*.[13] This harmful pollution, including nearly 80,000 pounds per year of arsenic alone,[14] makes its way into waterbodies across the country, into fish and other aquatic life — and into our bodies, though fish and water consumption, swimming, boating, and other activities.[15] Thousands of miles of rivers and streams are already harmed by this pollution, and every year the problem gets worse.

This report, an independent review of hundreds of coal plant wastewater permits, shows that nearly 70 percent of power plant permits set no effluent limits on how much arsenic, boron, cadmium, lead, mercury, and selenium these plants can discharge.[16] Indeed, many permits do not even require monitoring, so regulators, and the public, do not know for certain what poisons are finding their way into the water. Our review focused on these pollutants because they are almost always found in coal ash and scrubber waste and are particularly harmful to health or aquatic life.

The Clean Water Act, when it became law, established a national goal of *ending* all water pollution by 1985.[17] Nearly three decades later, the largest industrial source of toxic water pollution continues to foul our waters essentially unchecked because it is only regulated by minimal standards that were established in 1982. An update is long overdue. Existing rules contain essentially no limits on the amounts of toxic pollutants — including arsenic, mercury, selenium, and lead — that coal plants can dump into our water.[18] The EPA itself admits that these standards "do not adequately address the toxic pollutants discharged from the electric power industry."[19]

Based on toxicity, these power plants are the largest source of toxic water pollution in the United States, dumping more toxics into our waters than the other top nine polluting industries combined. Many plants have nothing more than rudimentary "settling" ponds, which do almost nothing to remove the dissolved heavy metals that make coal water pollution poisonous and dangerous.[20]

Decades of unchecked pollution have put our waterways, our environment, and our health at risk. But now there is an opportunity to change all that. After years of work by research scientists and engineers — as well as determined advocacy by citizens across the country — the EPA has finally proposed to update its outdated standards. The EPA's proposal lays out a menu of options that vary significantly in the amount of pollution they would control. Some of those options are inexcusably and illegally weak. But the strongest options — Option 5, which sets "zero discharge" standards that would require plants to clean up almost entirely and Option 4, which eliminates most discharges and requires comprehensive treatment for the remainder — would cost-effectively move the fleet of coal power plants toward zero discharge of pollutants, protecting our public health and our environment.

In addition to the incalculable benefits of thousands of miles of cleaner rivers and streams that would result from removing these discharges of toxic metals, the rule would also create thousands of jobs and hundreds of millions of dollars in monetary benefits every year in the form of improved health and recreational opportunities across the United States.[21] The coal industry, which has long imposed the costs of its pollution on all of us, can readily absorb the relatively modest cost of cleaning up its pollution, rather than freely dumping it into rivers. The common-sense treatments required by the EPA's proposed rules are remarkably affordable, amounting to substantially less than one percent of revenue for almost all coal plants, and no more than two pennies a day in expenses for ordinary Americans, if utilities passed costs onto consumers in their electricity bills.[22] In exchange for two cents a day, we could end most toxic water pollution in this country.

The EPA must finalize a zero discharge rule and put us on a path to solving one of our most widespread and harmful pollution problems. It is time to move forward and protect public health and environment.

## 1. THE TOXIC LEGACY OF COAL PLANT WATER POLLUTION

The 5.5 billion pounds of water pollution from coal power plants every year include at least 1.79 billion pounds of metals, including arsenic, selenium, cadmium, chromium, and mercury.[23] These toxics are hazardous to humans or aquatic life in very small doses (measured in parts per billion) because they do not degrade over time and bio-accumulate, meaning they increase in concentration as they are passed up the food chain. Much of the remaining pollution consists of "nutrients" such as nitrogen and phosphorus, which contribute to thick, soupy algal blooms that can choke watersheds, such as the Chesapeake Bay.[24]

This dumping occurs in astonishing volumes. The EPA estimates that, each year, up to 14.5 billion gallons of fly ash transport water and up to 6.6 billion gallons of bottom ash transport water may be produced at just one power plant and dumped into ash ponds.[25] Making water pollution worse, many plants either have installed, or will soon install, smokestack "scrubbers"—systems that can prevent toxic metals from going up the smokestack into the air. The problem is that scrubbers often concentrate the metals they remove into a wet, toxic, sludge that generally does not undergo any effective treatment.[26] Thanks to stricter air pollution rules, scrubber use has increased by 900 percent since 1982.[27] Yet, there are no standards to ensure protective wastewater treatment of the scrubber sludge, and so this especially toxic new wastewater stream is ending up in settling ponds where it then makes its way into rivers, streams, and lakes.

And that's not all: Toxic pollution also occurs when leachate systems for landfills and ash impoundments discharge untreated or inadequately treated wastewaters.[28] In some cases, coal ash landfills or ponds cover hundreds of acres, fill in local wetlands, and turn streams into drainage ditches for waste that either leak or discharge from these sites.[29] Many of these waste dumps or ponds have no liners to prevent pollution from leaking out of them.[30]

According to the EPA, tens of thousands of miles of rivers are degraded by this pollution.[31] The EPA has already identified 132 separate cases where a power plant contaminated surface waters and another 123 cases where groundwater was damaged. With respect to arsenic, boron, cadmium, iron, lead, manganese, nickel, selenium, and thallium, the 290 coal plants surveyed by EPA put as much of a burden on the environment as thousands of sewage plants.

In addition to those listed opposite, the EPA has identified many other dangerous substances in coal plant wastewater, including chromium, molybdenum, and thallium.[64] In almost every instance, coal plants are the largest source of *each* of these water pollutants nationally.

The EPA calculates that the annual pollution from coal power plants translates into more than eight million TWPE or toxic weighted pound equivalents, indicating a huge toxic burden on the nation's waters.[65] That figure dwarfs the pollution from any other industrial category in the United States and is more than the other top nine polluting industries *combined*—more than all the paper mills in the country, more than all the refineries, more than all the chemical plants and fertilizer facilities and ore mills and incinerators.[66] The waste is also far more toxic than any discharge from a typical publicly-owned treatment works, the sort of sewage plant that serves cities and towns. Scrubber waste alone contains 80 times more selenium than a typical sewage plant's waste.[67] With respect to toxic pollution, the 290 coal plants surveyed by EPA put as much of a burden on the environment as thousands of sewage plants.[68] With hundreds of coal power plants across the country, it is no surprise that coal plant pollution poses such a serious threat to our waterways.

### HOW COAL PLANT WATER POLLUTION AFFECTS US

Coal power plants can use millions of gallons of water every day, so most power plants sit on or near a water body. This means that coal plants discharge into hundreds of rivers, lakes, and streams all across the United States. These waters are often popular recreational spots for boating, swimming, and fishing and are drinking water sources for nearby communities. Fishing provides an inexpensive, reliable, and healthy food source, but when fish are contaminated, communities that depend on fishing are far more vulnerable than the general population.

There is no question that harm to fish and other wildlife from coal waste discharges is widespread and

# WHY IS COAL PLANT WATER POLLUTION SO TOXIC?

Although coal waste streams contain a varying mixture of pollution, all of them are toxic. Below are summaries of some of the most dangerous poisons they contain.

**ARSENIC**

Arsenic is a potent poison. Power plants[32] discharge at least 79,200 pounds of arsenic every year–which the EPA calculates to be 320,000 "toxic weighted pound equivalents" (TWPE), the normalized unit that EPA uses to compare the relative toxic effects of different pollutants.[33] According to the EPA, arsenic is "frequently observed at elevated concentrations" near coal waste sites, where it has been found in groundwater, and can also build up, or "bio-accumulate," in ecosystems affected by these discharges.[34] According to the Agency for Toxic Substances Control and Disease Registry (ATSDR), arsenic in drinking water is linked to miscarriages, stillbirths, and infants with low birth weights.[35] Arsenic can also cause cancer, including skin tumors and internal organ tumors,[36] and is also connected to heart problems, nervous system disorders, and intense stomach pain.[37]

**MERCURY**

As the EPA explains, even though mercury concentrations in coal plant waste can be relatively low, "mercury is a highly toxic compound that represents an environmental and human health risk even in small concentrations," and the conditions at the bottom of coal waste pools are particularly likely to convert mercury into its most toxic forms.[38] Mercury is a bio-accumulating poison that impairs brain development in children and causes nervous system and kidney damage in adults.[39] A fraction of a tea-spoon of mercury can contaminate a 25-acre lake,[40] and coal plants dump 2,820 pounds — or 330,000 TWPE — into our water every year.[41] Mercury also accumulates in fish, making them unsafe to eat.[42]

**SELENIUM**

Coal power plants discharge 225,000 pounds of selenium each year,[43] resulting in severe environmental harm.[44] High levels of selenium can kill people, and lower levels can cause nervous system problems, brittle hair, and deformed nails.[45] Selenium may take its most serious toll in our rivers and streams, where it is acutely poisonous to fish and other aquatic life in even small doses. Concentrations below 3 micrograms per liter can kill fish,[46] and lower concentrations can leave fish deformed or sterile.[47] Selenium also bio-accumulates and interferes with fish reproduction, meaning that it can permanently destroy wildlife populations in lakes and rivers as it works its way through the ecosystem over a period of years.[48]

**LEAD**

Lead is a highly toxic poison that can cause severe brain damage, especially in children.[49] Coal plants dump 64,400 pounds of lead into the water each year.[50] Although the EPA reports that much of this lead settles out fairly quickly, if it winds up passing into river sediment, it will persist. Once lead enters the river ecosystem, it can enter the food chain and bio-accumulate, leading to serious harm to wildlife, as well as threatening people.[51]

**CADMIUM**

Cadmium is yet another bio-accumulating heavy metal.[52] Power plants send 31,900 pounds each year into our water, or 738,000 TWPE, due to cadmium's high toxicity.[53] ATSDR warns that drinking water with elevated cadmium levels can cause kidney damage, fragile bones, vomiting and diarrhea — and sometimes death.[54] Cadmium also likely causes cancer.[55] Fish exposed to excess cadmium become deformed.[56]

**BORON**

Boron is rare in unpolluted water, meaning that even very small concentrations can be toxic to wildlife not usually exposed to this pollutant.[57] Coal plants discharge more than 54 million pounds of boron annually, converting a rare contaminant into a common-place pollutant downstream of their discharge points.[58] Boron's effect on people is unclear, but some studies suggest that it can cause nausea, vomiting, and diarrhea, even at low concentrations.[59]

**BROMIDES**

Coal plant waste contains bromide salts, which are very hard to remove short of evaporating wastewater to crystallize out these pollutants.[60] Bromides interact with disinfectant processes in water treatment plants to form disinfection byproducts, including a class of chemicals called trihalomethanes, which are associated with bladder cancer.[61]

**NITROGEN AND PHOSPHORUS**

These nutrients are important in small quantities, but can readily overpower ecosystems in larger quantities, converting clear waters into algae-choked sumps.[62] Because coal plants dump more than 30 million pounds of nitrogen and 682,000 pounds of phosphorus annually, they are a substantial contributor to harmful nutrient loadings in the Chesapeake Bay and other watersheds.[63]

serious. Scientists have documented coal pollutants, such as selenium and arsenic, building up to "very high concentrations" in fish and wildlife exposed to coal waste discharges, and that those accumulating toxics can ultimately deform or kill animals.[69]

The more than 250 documented incidents of damage to water resources from coal plant pollution have resulted in lasting environmental harm.[70] One survey focusing on reported fish and wildlife damage caused by coal waste discharges alone shows at least 22 such incidents over the last few decades, causing damage of more than $2.3 billion.[71] Incredibly, 12 of the 22 cases were caused by *permitted* discharges, further showing the need for strong updated national standards.[72]

The same alarming story repeats itself again and again. In North Carolina, Belews Lake, a popular fishing and recreation spot, was contaminated by just over a decade of coal waste dumping. Just ten years of discharges was enough to eliminate 18 of the 20 fish species in the lake, and to leave dangerous levels of contamination in fish and birds more than ten years later.[73] In Hyco Reservoir, also in North Carolina, coal plant dumping led to an $864 million fish kill that left selenium levels in blue gill 1,000 times greater than ordinary water concentrations.[74] In Texas, at Martin Creek Reservoir, a coal plant discharged wastewater for just eight months; within two years, 90 percent of plankton-eating fish in the lake had died, and largemouth bass and bluegill could no longer reproduce.[75] Even a few years later, fish in the lake were riddled with dead or dying tissue in their internal organs.[76] Poisoned fish turned up in the Welsh Reservoir in Texas, too, forcing the state to warn against consuming fish from the lake.[77] Texas's Brandy Branch Reservoir was placed under the same advisory once it started receiving ash pond discharges.[78]

A recent survey of waters affected by nine power plants, based on intensive water sampling in North Carolina, found contamination all across the state.[79] One sampling showed concentrations of arsenic in discharges from two of the plants at levels four to nine times greater than the EPA's drinking water standards. Discharges from other plants showed selenium concentrations up to 17 times greater than the EPA's recommended chronic exposure level for aquatic life.[80] Discharges from these plants also exceeded human and aquatic life standards for antimony, cadmium, and thallium.[81] The lakes and rivers receiving this waste, predictably, showed elevated levels of toxics, including arsenic and selenium, even though they are large bodies of water. Fish in at least one of the lakes are deformed in ways that indicate selenium poisoning.[82]

Even in large lakes, coal plant pollution persists and accumulates. Researchers have discovered that arsenic, in particular, accumulates in the sediments on lake bottoms, and then erupts from sediments as water warms and stratifies in the summer, emerging back into the lake during the same summer days when many people are likely to be out fishing and swimming.[83]

These are just some of the reported incidents of damage from coal plant pollution. As the EPA has documented, the scope of this pollution is staggering. According to the EPA, two-thirds of the waterways receiving coal plant waste have reduced water quality as a direct result of that pollution.[84] Nearly half of those waterways (49 percent) have water quality worse than the EPA's National Recommended Water Quality Criteria, and a fifth of them violate standards for drinking water.[85] Standards for arsenic, selenium, cadmium, and thallium are the most frequently violated. For instance, 147 out of the 297 waterbodies receiving coal waste exceed human health water quality standards for arsenic.[86] Seventy-eight power plants discharge directly into a water body that has been formally listed as having water quality impaired by a pollutant in coal waste (with mercury being the most common pollutant of concern).[87]

The EPA estimates that 11,200 miles of rivers exceed recommended water quality levels for human health as a result of coal plant water pollution. Nearly 24,000 miles of river exceed recommended water quality levels for recreation.[88] In many of these waterways, fish are not safe to eat. Mercury in fish poses a threat to people fishing for food in nearly two-thirds of receiving waters, and 38 percent of those waters have formal fish advisories.[89]

Drinking water is affected too. The EPA reports that almost 40 percent of plants discharge within five miles of a public water intake, and 85 percent of plants discharge within five miles of a public well.[90]

Human health impacts from this pollution are serious. The EPA estimates, for instance, that nearly 140,000 people per year experience increased cancer risk due to arsenic in fish from coal plants; that nearly 13,000 children under the age of seven each year have reduced IQs because of lead in fish they eat; and that almost 2,000 children are born with lower IQs because of mercury in fish their mothers have eaten.[91]

This nationwide poisoning of our rivers is particularly unjust for communities that depend heavily on fish for food. According to the National Environmental Justice Advisory Council, families in many communities of color, including those of African-American and Native peoples, rely on fishing to supply basic nutritional needs.[92] As the Council wrote, "[p]ut simply, communities of color, low-income communities, tribes, and other indigenous peoples *depend* on healthy aquatic ecosystems and the fish, aquatic plants, and wildlife that these ecosystems support."[93] Fishing provides an inexpensive, reliable, and healthful food source, but when fish are contaminated, reliance on fishing for food makes communities far more vulnerable to water pollution and contaminated fish than the general population.

Nutrient pollution is also a serious problem, contributing to algal blooms and other ecological imbalances across the country. For example, power plants discharge approximately 2.2 million pounds per year of nitrogen to the Chesapeake Bay – 30% of the total nitrogen load *from NPDES permitted sources discharging industrial wastewaters* in that struggling watershed, which is among the most ecologically and economically important estuaries in the country.[94]

In sum, from coast to coast, and in rivers, lakes, and streams all across the country, coal plant water pollution accumulates, poisoning waters, fouling sediment, and contributing to large-scale ecological disruption across tens of thousands of miles of waterways—nearly three decades after the Clean Water Act's target date to *eliminate* water pollution.[95]

## 2. EPA AND STATES FAIL TO CONTROL TOXIC DISCHARGES IN THE ABSENCE OF FEDERAL STANDARDS

New national standards are urgently needed in large part because EPA and the states have almost entirely failed to control toxic metal pollution from coal power plants. Where the EPA fails to set strong national discharge standards for polluters (as is the case here), state permitting agencies are required by the Clean Water Act to set limits in discharge permits for individual plants that reflect the best available treatment technology and protect water quality.[96] And technologies are available to significantly reduce and even eliminate toxic discharges from power plants.[97] Yet our review of 386 coal-fired power plants indicates that this law has been almost universally ignored by electric utilities and the permitting agencies that issue and enforce Clean Water Act discharge permits.

Our survey is based on the EPA's Enforcement and Compliance History Online (ECHO) database, which includes permitting information for coal power plants across the country, and our review of discharge permits. For each plant surveyed, we recorded whether the permit contained limits or monitoring requirements for six representative toxic metals (arsenic, boron, cadmium, lead, mercury, and selenium); whether the plant listed ash or scrubber waste among its discharges; whether the plant discharges into a waterway impaired for one or more of the six representative toxic metals; and whether the plant's permit was expired.[98] At least 274 of the 386 coal plants discharge coal ash and/or scrubber wastewater. *See* Appendices I–III for the complete results of our analysis. Our analysis shows that EPA and states have routinely turned a blind eye to these dangerous discharges while power plants have used our nation's waters as their own private dumping grounds.

**The majority of the 274 coal plants (out of 386 reviewed) that report discharging coal ash or scrubber wastewater are not required to limit toxic metal discharges.**[99] Of the 274 power plants in this review that discharge coal ash or scrubber wastewater, only 86 had at least one limit on arsenic, boron, cadmium, lead, mercury, and selenium discharges.[100] In other words, the permits for 69 percent of the plants allowed unlimited discharges of these pollutants in violation of the Clean Water Act.

| COAL PLANTS WITHOUT METAL LIMITS | |
|---|---|
| Sites without a limit for at least one of the metals below | 188 |
| Arsenic | 255 |
| Boron | 267 |
| Cadmium | 263 |
| Lead | 251 |
| Mercury | 235 |
| Selenium | 232 |

Moreover, permit limits vary by stringency and by completeness. Very few, if any, plants have protective limits for all relevant metals; most have limits for only a subset of these poisons. For example, far more plants have limits for selenium than they do for arsenic, cadmium, boron, or lead.

**No state consistently issues comprehensive toxic metals limits for all plants discharging ash or scrubber waste in its jurisdiction.** State permitting practices are inconsistent, and do not afford citizens a predictable or complete level of protection for all dangerous pollutants in coal waste water.

**Approximately 63 percent of the power plants with coal ash and scrubber discharges surveyed are required to monitor and report discharge concentrations of toxic pollution.** Monitoring and reporting requirements are critical because without monitoring data, the EPA and state agencies and downstream communities have no way of knowing the actual

| STATE | NUMBER OF PERMITS REVIEWED[101] | LIMIT FOR AT LEAST ONE POLLUTANT | ARSENIC | BORON | CADMIUM | LEAD | MERCURY | SELENIUM |
|---|---|---|---|---|---|---|---|---|
| AL | 9 | 5 | 5 | 0 | 0 | 0 | 1 | 0 |
| AR | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CO | 3 | 2 | 0 | 0 | 1 | 1 | 0 | 2 |
| DE | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FL | 7 | 7 | 3 | 0 | 2 | 5 | 4 | 4 |
| GA | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IA | 15 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| IL | 18 | 5 | 0 | 5 | 0 | 0 | 0 | 0 |
| IN[102] | 16 | 3 | 0 | 0 | 1 | 1 | 2 | 1 |
| KS | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| KY | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| LA | 4 | 3 | 0 | 0 | 0 | 3 | 0 | 0 |
| MA | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MD | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MI | 16 | 7 | 0 | 0 | 0 | 0 | 7 | 1 |
| MN | 5 | 2 | 0 | 0 | 0 | 0 | 2 | 0 |
| MO | 15 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| MS | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MT | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NC | 10 | 5 | 1 | 1 | 2 | 2 | 2 | 2 |
| ND | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NE | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NH | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NJ | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NM | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NY | 3 | 3 | 2 | 0 | 2 | 3 | 3 | 2 |
| OH | 18 | 10 | 0 | 0 | 0 | 0 | 8 | 3 |
| OK | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PA | 12 | 8 | 0 | 1 | 2 | 6 | 5 | 7 |
| SC | 10 | 3 | 3 | 0 | 0 | 0 | 1 | 2 |
| TN | 8 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| TX | 13 | 12 | 1 | 0 | 1 | 1 | 1 | 12 |
| VA | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WI | 7 | 3 | 0 | 0 | 0 | 0 | 3 | 0 |
| WV | 5 | 4 | 3 | 0 | 0 | 0 | 0 | 3 |
| WY | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |

amount of toxics discharged into a watershed. Yet only 172 of the 274 plants were required to monitor for at least one of the metals analyzed in this report.

| COAL PLANTS WITH MONITORING | |
|---|---|
| Monitoring for at least one of the metals below | 172 |
| Arsenic | 97 |
| Boron | 45 |
| Cadmium | 78 |
| Lead | 81 |
| Mercury | 126 |
| Selenium | 102 |

Monitoring requirements vary: Although some plants are required to monitor for several toxic pollutants, consistent and careful monitoring for all relevant pollutants is a rarity. In other words, not only do many permits lack limits on the quantity of toxic metals being discharged, they fail even to require monitoring of exactly *what* and *how much* is discharged into our water, leaving communities in the dark.

**Power plants discharge toxics into impaired waters without limits.** Under the Clean Water Act, states must assess whether waters are "impaired" (i.e. not meeting water quality standards) and create plans to clean them up. The EPA estimates that 25 percent of surface waters that receive power plant discharges are impaired for a pollutant that is discharged by the plant.[103] And "38 percent of surface waters are under a fish advisory for a pollutant associated with [power plant wastewater]."[104] Where discharges could cause or contribute to an exceedance of water quality standards in the receiving waters, states are required to set pollution limits to prevent the exceedance.[105] The EPA has identified at least 78 plants discharging into waters impaired by coal waste pollutants.[106] Our review of 71 such power plants discharging to waters impaired for arsenic, boron, cadmium, lead, mercury, or selenium found that only twelve, or approximately 17%, had limits for at least one of the pollutants responsible for causing the impairment. It is likely that even more waters are impaired by these discharges than this survey reflects because most states do not regularly assess all waters, and the EPA ECHO database did not always list the cause of impairment.

The chart below identifies those plants discharging into waters impaired by arsenic, boron, cadmium, lead, or mercury that have at least one limit for the six pollutants. In some cases, the plant's permit restricts discharges of one pollutant, but allows unlimited discharges of the pollutant damaging water quality. For example, the permit for the Bay Shore plant in Ohio limits discharges of mercury, but the receiving water is impaired for arsenic.

| DISCHARGES INTO IMPAIRED WATERS | |
|---|---|
| 71 POWER PLANTS | |
| Limits for at least one of the metals below | 18 |
| Arsenic | 3 |
| Boron | 2 |
| Cadmium | 3 |
| Lead | 5 |
| Mercury | 11 |
| Selenium | 8 |

Appendix III identifies power plants discharging into impaired waters.

**Power plant permits are not regularly reviewed and strengthened as required by law.** The Clean Water Act only allows discharge permits to be issued for a period of five years.[107] At the end of the five-year period, the discharger must submit a new application and obtain approval from the permitting agency. This requirement is meant to ensure that effluent limits are regularly reviewed to account for new advances in wastewater treatment technologies. In addition, certain plants may also need to meet more stringent limits if they are polluting waters that are not meeting water quality standards. However, the reality is that many discharge permits for power plants are "administratively" extended, which means the plant continues to discharge under the old permit for years and sometimes even decades. Our review identified 187 (out of 382[108]) coal plants operating with expired permits as of March 13, 2013.

Of the 187 plants with expired permits as of March 13, 2013, 144 are for permits that discharge coal ash and/or scrubber wastewater. Only 41 of these plants have at least one limit on arsenic, boron, cadmium, mercury, or selenium discharges; 72 percent contain no limits on these pollutants. Only 75 plants, or about 52 percent, are required to monitor and report toxic discharges of these pollutants.

| COAL PLANTS WITH EXPIRED NPDES PERMITS AS OF MARCH 13, 2013 | | |
|---|---|---|
| | MONITORING | METAL LIMITS |
| Monitoring / limit for at least one of the metals below | 75 | 41 |
| Arsenic | 37 | 9 |
| Boron | 21 | 6 |
| Cadmium | 25 | 5 |
| Lead | 33 | 10 |
| Mercury | 54 | 20 |

| | | |
|---|---|---|
| Selenium | 35 | 16 |

**A significant number of coal plants are operating with permits that expired five or more years ago.** Specifically, fifty-three permits expired on March 13, 2008 or earlier. Of these fifty-three plants, forty-three discharge coal ash and/or scrubber wastewater. Only six of these plants had a limit for one of the six metals; 86 percent had no limits on these pollutants. Thirteen plants were required to monitor and report concentrations of discharges of at least one of the metals.

| COAL PLANTS WITH EXPIRED NPDES PERMITS MORE THAN FIVE YEARS | | |
|---|---|---|
| | MONITORING | METAL LIMITS |
| Monitoring / limit for at least one of the metals below | 13 | 6 |
| Arsenic | 8 | 1 |
| Boron | 4 | 2 |
| Cadmium | 6 | 0 |
| Lead | 7 | 2 |
| Mercury | 6 | 2 |
| Selenium | 4 | 1 |

The administrative extension of these expired permits has serious consequences for public health and the environment. The failure to timely renew permits for power plants means that plants do not keep up with advances in wastewater treatment technologies to reduce toxic discharges. In addition, this practice effectively prohibits the public from weighing in on permits that affect their communities and watersheds—a right that the Clean Water Act guarantees.

The bottom line is that, in the absence of a binding federal backstop, EPA and the states are failing to protect the public from the toxic threat posed by coal plant water pollution; plants across the country have been allowed to pollute without limit.

## 3. COAL PLANTS CAN CLEAN UP THEIR WATER POLLUTION

We do not have to live with dangerous pollutants in our water. Coal plant operators have no excuse for using rivers and streams as waste dumps when the industry can readily afford to install modern pollution controls that will keep our waterways clean. The strongest regulatory options proposed by the EPA (Options 4 and 5 in its proposed rule) would compel this long overdue cleanup, though only Option 5 would result in "zero discharge" of toxic pollutants.

### TIME TO STOP SETTLING FOR UNLINED "PONDS" INSTEAD OF GENUINE TREATMENT SYSTEMS

Historically, power plants have pooled their wastewater streams into massive, often unlined, pits called settling ponds that provide only rudimentary "treatment." As contaminated water is allowed to sit, some solids settle to the bottom of the ponds, but dissolved heavy metals and other harmful pollutants remain in the pond waters that are eventually discharged straight into rivers and streams.[109] Meanwhile, unlined ponds allow pollutants to leach into the water table, contaminating groundwater and the connected surface waters.[110]

Further, the structural instability of many ponds is a major hazard, as a collapse in Tennessee made tragically clear in December of 2008.[111] When the 84-acre surface impoundment at the Tennessee Valley Authority's Kingston Plant burst, it dumped more than a billion gallons of coal ash slurry into the Emory River, destroying the watershed and covering more than 300 acres of surrounding land. This spill devastated an entire community, and cleanup efforts costing more than a billion dollars have yet to fully restore the watershed in the Emory and Clinch rivers.

In its proposed rule, the EPA provides detailed analysis confirming that coal plants can make a shift away from settling ponds to better, safer, pollution controls. By transitioning to dry ash management systems and employing superior wastewater treatment technologies such as chemical precipitation, in combination with biological treatment or vapor compression, it is possible to reduce pollution from coal plants by millions of tons each year, even achieving zero liquid discharge.[112]

### DRY ASH HANDLING

Much coal water pollution comes from using water to clean out bottom ash and fly ash from coal plant systems. But there is no need to use good, clean water to move this hazardous waste. Instead, simple mechanical systems can be used to move the ash. This "dry handling" technology takes plant discharges of millions or billions of gallons per year down to zero.

Dry handling of fly ash should be required to eliminate one of the most polluted wastewater streams at coal plants. In "wet" management systems, fly ash from coal combustion is transported to ash ponds using water as a sluicing agent, but it is also possible to convey the ash pneumatically, without water, to silos, where it can be loaded onto trucks or rail cars for transport to a properly constructed, lined landfill.[113] Already, 66 percent of coal and petroleum coke plants employ dry ash handling methods that eliminate all discharges,[114] and there is no reason why all plants should not employ the best dry handling methods exclusively. The conversion is readily achievable as evidenced by the fact that "power companies have converted at least 115 units at more than 45 plants to dry fly ash handling systems since 2000."[115]

Coal plants should also be required to install dry ash management systems for their bottom ash, as approximately 22 percent of U.S. power plants burning coal, coke, and oil already are doing.[116] Bottom ash is the heavier ash that collects at the bottom the boiler and generally drops by gravity to a hopper located below the boiler. Most of the hoppers contain water for quenching hot ash. In many wet management systems, ash exiting the hopper is sluiced into ash ponds. In contrast, dry systems use a drag chain to remove bottom ash out of the boiler, dewatering the ash as it is pulled up an incline and draining the water back into the boiler. The bottom ash is then ready for transport to a landfill or commercial sale as a building material.[117]

## BEST WATER TREATMENT TECHNOLOGIES FOR SCRUBBER SLUDGE AND LEACHATE

The waste from scrubber sludge and the contaminated liquids leaching out from dry ash dumps also pose significant pollution problems. Those problems, too, can be solved with demonstrated controls. These highly-contaminated waste streams are amenable to treatment with chemical precipitation in combination with biological treatment systems, which can achieve extremely high rates of pollutant removal, or in combination with vapor compression evaporation, which can achieve zero liquid discharge. These technologies are particularly important to use for scrubber sludge, because, as discussed above, so many coal plants are at last installing scrubbers to address long-standing air pollution problems.[118]

CHEMICAL PRECIPITATION: At least 40 U.S. power plants already use chemical precipitation to achieve significantly lower effluent concentrations of metals compared to what settling ponds can achieve. In a chemical precipitation system, chemicals are added to the wastewater to facilitate the settling and removal of solids.[119] However, this technology cannot effectively remove selenium, boron, or bromides, which are typically present in coal plant wastewaters in high concentrations.[120] To remove these harmful pollutants and enhance removal of mercury and other metals, additional treatment is necessary after chemical precipitation—usually biologically treatment, except for bromides, which can only be removed by vapor compression evaporation..

BIOLOGICAL TREATMENT: In a biological wastewater treatment system, microorganisms are used to consume organic contaminants, most notably dissolved forms of selenium.[121] These systems can and should be used after chemical treatment to remove remaining dangerous metal pollution. In typical systems, the bioreactor alters the form of selenium, reducing selenate and selenite to elemental selenium, which becomes enmeshed in the biomass residuals, leaving discharged wastewaters with very low concentrations of selenium.[122] The conditions in the bioreactor also can facilitate substantial removal of mercury, arsenic, and other metals.[123] The EPA estimates that at least six power plants in the U.S. are successfully utilizing biological treatment.[124]

VAPOR COMPRESSION EVAPORATION: Even combined biological/chemical treatment leaves some discharge behind, but it is possible to eliminate scrubber discharges completely. Successful evaporation systems have been installed at three coal-fired power plants in the U.S. and at four plants in Italy.[125] This type of system uses a "brine concentrator" to reduce wastewater volumes and produce a concentrated wastewater stream that can be treated in a further evaporation process. That process then yields a solid waste product that can be landfilled and a pollutant-free distilled water that can be reused within the plant or safely discharged to surface waters.[126] Using vapor compression evaporation, power plants can stop discharging pollutants in scrubber sludge altogether, including bromides, which can form dangerous disinfection byproducts when they interact with disinfectant processes in water treatment plants. And vapor compression evaporation is just one of many zero discharge options available and in use at coal plants today.

## AVAILABLE TECHNOLOGIES CAN SOLVE A NATIONAL POLLUTION PROBLEM

To the EPA's great credit, it has recognized the availability of these technologies and the importance of using them to cost-effectively reduce, and perhaps completely eliminate, toxic water pollution from coal plants.

The EPA's proposed update to the 1982 standards contains several options, two of which would go a long way toward solving the problem. These two strongest options, labeled Options 4 and 5 in the proposed new rule, work to address the most toxic waste streams, including liquids contaminated by fly ash, bottom ash, scrubber sludge, and leachate from waste dumps. Importantly, only Option 5 meets the Clean Water Act's mandate to achieve zero liquid discharge, and because it appears that Option 5 is readily achievable it should be selected. Option 5 would achieve the greatest progress toward eliminating pollutant discharges by requiring dry handling of fly ash and bottom ash and requiring vapor compression evaporation for scrubber wastewaters, along with chemical treatment for leachate.[127] Only Option 5 would require power plants to use vapor compression evaporation to control for bromides, which are known to form carcinogenic disinfection byproducts when exposed to disinfectant processes in drinking water plants, resulting in increased exposure and health risk to those drinking that water. Overall, Option 5 would eliminate nearly 5.3 billion pounds of pollution per year.[128] Option 4 would achieve lesser but still significant pollution reductions — more than 3.3 billion pounds[129] — by requiring dry ash handling and a combination of chemical precipitation and biological treatment for scrubber wastewaters.[130]

Both of these options could be achieved without putting any significant burden on the coal industry. The EPA has calculated that Option 4 controls would remove pollution at a cost of about $70 per lb.; Option 5 would cost about $111 per lb. of pollution.[131] These costs translate into far less than one percent of annual revenues for the vast majority of coal power plants and power companies; a tiny additional expense that could eliminate a huge amount of pollution.[132]

Costs to ratepayers are equally small: the EPA estimates that Option 4 would, at most, add $3.89 to the average power bill *per year* — just over a penny per day to eliminate hundreds of thousands of pounds of toxic water pollution from our water.[133] Option 5 would add $6.46 to the average annual bill — a bit less than two cents per day.

The rules would also create jobs because skilled workers are needed to install and manage water pollution controls. The EPA expects that Option 4 would create 1,253 jobs, while Option 5, which requires more work, would create 2,112 jobs.[134]

The bottom line is that there is no reason Americans should have to cope with coal plant water pollution. Installing controls will cost companies almost nothing, and perhaps cost ordinary Americans a few pennies a day. Yet, in the absence of strong leadership, coal plants have skated by for years without installing these basic protections.

## 4. MUDDYING THE WATERS: POLITICAL INTERFERENCE PUTS PROTECTIONS AT RISK

Although Options 4 and 5 would eliminate most toxic water pollution from coal plants, the proposed rule does not designate them as "preferred" options. Instead, the EPA's proposal includes so-called "preferred" options that would do next to nothing about scrubber sludge discharges, and which would leave other major waste streams unregulated– including large amounts of toxic fly ash and bottom ash waste.

The EPA has warned for years that the 1982 standards are not adequate to protect the public, especially because they fail to control toxic metals in scrubber sludge.[135] How could the EPA nonetheless favor such weak options? The answer is that the *EPA* did not come up with these options. The White House's Office of Management and Budget (OMB) took the highly unusual and improper step of writing new weak options into the draft rule prepared by the EPA's expert staff.

The rule that initially went to OMB basically reflected the EPA's core priorities. The EPA was looking to significantly tighten the 1982 standards because, as the EPA has stressed since at least 2009, "[s]tudies have shown that the pollutants present in discharges from coal-fired power plants can affect aquatic organisms and wildlife, resulting in lasting environmental impacts on local habitats and ecosystems."[136] The EPA long viewed regulatory updates as critical, admitting that "[t]he current regulations, which were last updated in 1982, do not adequately address the pollutants being discharged and have not kept pace with changes that have occurred in the electric power industry over the last three decades."[137]

As a result, the EPA developed two "preferred" options in *its* version of the proposal, which presented five options in all as part of its discussion.[138] Under the first, which the EPA called Option 3, scrubber sludge would be treated with combined biological and chemical treatment, and fly ash would have to be dry-handled, eliminating the discharge. Bottom ash, meanwhile, could still be handled in ponds, as could leachate from ash landfills.[139]

The second option, called Option 4, which the EPA described as the "more environmentally protective" of its preferred options, would contain all the treatment options of the first option and would also require dry handling for bottom ash as well, and require chemical treatment for leachate.[140] Thus, as the EPA explained, the two preferred options both addressed scrubber sludge and fly ash thoroughly, and differed in their handling of "bottom ash transport water and … leachate."[141] (EPA, unjustifiably, proposed not to implement the strongest possible proposed option, Option 5, which would have required zero discharge standards for scrubber sludge — though the EPA could still select that option in the final rule).

The proposed rule that emerged from OMB looked very different. OMB is meant to play a "traffic cop" role in the Administration, and is charged with coordinating administrative action, which includes reviewing agency rulemakings. Because OMB is the last stop before rules are proposed or finalized, powerful industry groups have come to see OMB review as an opportunity to delay, weaken, or block public health protections that would impose costs on polluters.[142] Here, the power sector's lobbying was successful.

OMB review of the new coal plant water standards began in winter 2013, and carried on until just before the rule was signed by the EPA in April that same year. During that time, the proposal was dramatically weakened. A redline of the rule, showing the original EPA version and OMB's version reveals the changes: OMB refused to let the EPA choose more protective options as "preferred" regulatory paths going forward, and inserted weaker options instead.[143]

Visitor logs and other records show that industry representatives met with OMB, with the White House, and with other agencies. What is clear is that OMB — whether on its own or, more likely, at the behest of industry players — acted to weaken the proposed rule. OMB would not let the EPA select Option 4, the most protective of the EPA's preferred options, and instead inserted new, weaker, options into the rule as "preferred."[144] Suddenly, the rule had four "preferred" options — three of them the products of the OMB process.[145]

To begin with, OMB added options "3a" and "3b", which are both weaker than the EPA's original preferred option.[146] Option 3a has no limits for the scrubber sludge discharges that the EPA prepared the rule to control. Instead, it leaves those limits to the states — the same states that have failed to set permit limits for decades — for determination on a case-by-case basis.[147] Option 3b is just as bad: It would require sludge controls only for plants using scrubbers on more than 2000 MW of capacity — a group consisting of a very few enormous plants — leaving most scrubbed plants totally uncontrolled.[148] OMB's preferred options are far weaker than the EPA's. While the weaker of the EPA's original preferred options would eliminate 1.623 *billion* pounds of pollution annually, OMB's Option 3a would control just about 460 *million* pounds of pollution per year, and Option 3b would control just 914 million pounds.[149]

Options 3a and 3b are not independently analyzed in the EPA's technical supporting documents because they were not created by the EPA and are not supported by technical analysis: They are political options, created to protect industry.[150]

Having created new options that are contrary to the EPA's view of what the best technology is, OMB went on to rewrite the EPA's proposal, taking positions that are directly opposed to the expert opinions formerly expressed by EPA staff. For instance, the EPA had written, correctly, that "surface impoundments" — settling ponds — "do not represent the best available technology for controlling pollutants in [scrubber sludge]" in almost all circumstances.[151] OMB deleted this sentence, and instead announced that "EPA" was proposing options that would keep using "surface impoundments for treatment of [scrubber sludge]" — exactly the opposite of what the EPA's scientists had proposed.[152]

OMB added other language endorsing ponds[153] and parroting industry concerns about the biological treatment that the EPA had proposed in Option 4.[154] OMB added paragraph after paragraph of rationales for why Option 4 was *not* preferred, inventing "concerns" that warranted dropping that protective option.[155] None of this language was in the EPA's original proposal.

Apparently in response to this interference, the EPA did manage to salvage some of Option 4 by creating a new Option "4a," which resembles its original Option 4 in requiring bottom ash and leachate treatment, but which is weakened by exempting plants smaller than 400 MW from the requirement to treat their bottom ash waste.[156] That exemption makes a big difference: While Option 4 would control 3.3 billion pounds of pollution annually, Option 4a would control only 2.6 billion pounds, a 700 million pound difference.[157]

The result is that the EPA's original two preferred options — Option 3 and 4 — turned into *four* preferred options: Options 3a, 3b, 3, and 4a, three of them the direct result of the OMB process. All of these rules are weaker than Option 4, meaning that the proposal has shifted away from the stringent controls that the EPA has repeatedly recognized to be available and protective. If the EPA finalizes any of these lesser options (or is forced to do so by OMB), it will fail to control billions of pounds of pollution, possibly for decades to come.

The EPA can still choose to finalize the stronger standards contained in Options 4 and 5. These options would comply with the letter and spirit of the Clean Water Act, and are well-supported by the EPA's technical and scientific analysis. The damage, however, has still been done: OMB put weaker options on the table as "preferred" courses of action, and big polluters will no doubt try to persuade EPA to finalize those dangerously lax proposals. But Americans deserve better. After thirty-one years of delay, and billions upon billions of pounds of toxic pollution, the public deserves strong, national standards that protect downstream communities and are based on science — not a weak rule based on politics.

# PART TWO
## LIVING DOWNSTREAM: COAL WATER POLLUTION ACROSS THE COUNTRY

The hundreds of plants lacking permit limits are not just numbers: Each one puts a waterway at risk. Most Americans live, work, or play downstream from a coal-fired power plant, which means we are all at risk from the failure to control this toxic pollution, and we all can benefit from finally cleaning it up. A journey to downstream communities across the United States reveals poisoned rivers, imperiled communities, and a network of toxic waste sites that may take years to fully remediate.

### 1. BIG PLANTS: BIG PROBLEMS

Not surprisingly, the largest coal plants are among the worst polluters, and yet even these behemoths often lack real pollution controls.

#### LABADIE: LEAKS, SEEPS, AND GUSHING DISCHARGES INTO THE MISSOURI

The huge, approximately 2400 MW, **Labadie Power Station**, which sprawls across the Missouri River bottoms just upstream of St. Louis, is one of the worst water polluters in the country.

The Labadie plant, the largest coal power plant in Missouri, burns huge amounts of coal every day—so much so that it is the fourth largest greenhouse gas source in the entire country.[158] The waste from all that coal—more than half a million tons of it each year[159]—is dumped in two ponds, including a 154-acre unlined coal ash pond in use since 1970.[160] Fine alluvial soil under the pond poses little barrier to contaminants, which can make their way into nearby wells. But Ameren, the company that owns the plant, has yet to conduct comprehensive groundwater testing, and the state has not required it. The failure to conduct groundwater monitoring and testing is particularly troublesome given Ameren's history of dangerous leaks from its ash ponds just across the border in Illinois, where such testing is required. This means danger and uncertainty for residents since the rural communities around the plant depend on well water, and the Missouri River itself is a drinking water source for St. Louis residents.

Underground leaks are only the beginning of the problem, though. Amazingly, one of Labadie's ponds was allowed to leak massive streams of waste for at least nineteen years.[161] The leak spilled up to 35 gallons per minute—which works out to 50,000 gallons per day, or about 350 million gallons over the years that it went uncorrected.[162] It took action by concerned citizens, the Labadie Environmental Organization, and the Washington University law clinic to compel the company and the state into finally addressing this river of waste, at least superficially.

But even that egregious leak is not the biggest of Labadie's waste problems. The plant dumps far more waste into the river everyday than it leaks. The ash pond is allowed to directly dump waste into a trench leading to the Missouri River, and every day it dumps 25 million gallons or more, on average.[163] The plant's discharge permit was issued in 1994 and has no limits for *any* toxic metal in this discharge. In fact, it does not even require the Labadie plant to monitor for metals in its ash pond waste.[164]

That failure doesn't sit well with citizens of the area. As Christine Alt, the mother of two small children, and a life-long resident of Labadie, says, "Our family is really concerned that the leaking ash ponds and massive discharges from the ash ponds are affecting the health of family members. We have eaten fish from the Missouri River and local streams that have likely been affected by the lack of regulation."

Despite these concerns, Missouri has failed to act. The state has never updated Labadie's permit; it briefly issued a draft permit in early 2013, but then withdrew it.[165] That wasn't much of a loss: the draft permit was little better than the old one. The new permit also had *no* limits on toxic metals in the ash pond waste stream, instead requiring quarterly monitoring of boron and molybdenum, but not of arsenic, mercury, or selenium, among other toxics in coal ash.[166] To make matters worse, Ameren has proposed to build a new ash landfill in the floodplain (an area with standing water for much of the year).

Patricia Schuba, the president of the Labadie Environmental Organization, describes the threat to her family, friends, and neighbors this way:

> *"Families surrounding the Labadie Power Plant and ash dumps are afraid that decades of exposure to unmonitored coal waste dumping has increased their risks of cancer, asthma, auto-immune diseases, cardiovascular disease, neurological impairment, and premature death. Why are we dumping toxic waste in our drinking water and floodplains? Floodplains are for food production, flood protection, and, most importantly, filtering our drinking water."*

### MONROE: SWIMMING IN COAL PLANT WASTE

The town of Monroe, south of Detroit, Michigan, on Lake Erie, does not really have a waterfront. Instead, DTE's **Plant Monroe** cuts the town off from the water, sitting where the River Raisin flows into the lake. Plant Monroe, at over 3200 MW, is the ninth worst greenhouse gas polluter in the country, and produces coal waste to match.[167] The plant's vast ash ponds stretch out around it, bordering the lake. Just across the river, north of the plant, Sterling State Park hosts a popular swimming beach. Many swimmers also congregate on a sandbar at the head of the plant's discharge channel itself, bathing in water flowing out of the ash ponds.

That could be a risky thing to do. Until 2010, Plant Monroe had no limits on the six toxic metals discussed in this report, meaning that those metals have flowed into the lake and its underlying sediments unchecked for decades.[168] Although the plant makes some efforts to treat its scrubber sludge, its permit requirements are extremely lax, and ash waste winds up in ponds that drain to the lake. Only in the last three years has the state of Michigan added a single limit to the permit[169] for mercury, which is an annual rolling limit, rather than a more stringent daily, or even monthly, limit. The permit does not even require monitoring for other toxic metals, including arsenic, selenium, and lead.[170]

As a result, the plant is authorized to dump 57.5 million gallons per day of wastewater contaminated by fly ash, bottom ash, and scrubber sludge into Lake Erie.[171] That water flows by the swimmers on the sandbar, and into the lake, where others play at the state park. Summer fun, in Monroe, comes along with coal plant waste.

## 2. COAL RIVERS: DUKE ENERGY'S TOXIC LEGACY IN NORTH CAROLINA

The largest plants are not the only serious water polluters. The combined pollution of hundreds of plants in many states also fouls our waters. North Carolina's toxic burden — caused in significant part by decades of pollution from Duke Energy power plants — demonstrates how coal pollution can make its way into river after river across the country.

Duke Energy operates ten coal-burning power plants in North Carolina. Three of the state's signature rivers, the Catawba River, the French Broad River and the Cape Fear River, are seriously affected by pollution from these coal plants and the ash ponds in their shadows. The damage extends beyond the waters in which North Carolinians swim, paddle, and fish; recent groundwater monitoring revealed that coal ash ponds are leaking at every single one of these power plants.[172]

The Catawba River runs along the western edge of the booming city of Charlotte, providing drinking water for more than 1.5 million people, stunning recreational opportunities, and habitat for abundant native species, including bald eagles, osprey, and other raptors. Unfortunately, at least three reservoirs on this river are heavily polluted by coal ash and scrubber discharges from Duke Energy power plants.

The trouble begins as the Catawba River flows from the mountains of western North Carolina into the rolling red clay hills of the piedmont. Lake Norman hosts a state park, excellent swimming and fishing opportunities, and Duke Energy's **Marshall** coal-burning plant. The four units at the nearly 2000 MW plant burn coal mined at mountaintop removal sites in Appalachia, and produce approximately eight million gallons per day of scrubber sludge and ash water in the process.[173] Duke Energy is allowed to dump this wastewater into Lake Norman with no limits on arsenic or mercury.[174] Lake Norman provides drinking water for many nearby towns, including Davidson and Mooresville, and this valuable resource is in jeopardy due to the ash pond at the Marshall plant and the daily burden of unregulated coal combustion wastewaters.[175]

Just a few miles down the Catawba River, another drinking water reservoir was long used as a pollution dumping ground for a Duke Energy coal plant. At the **Riverbend Station**, which came offline in April of 2013 after years of pollution, coal ash was pumped into two unlined ash ponds that are leaking toxic metals into Mountain Island Lake, the sole drinking water source for more than 800,000 people in the Charlotte area.[176] Although Riverbend is no longer operating, its pollution remains. Large volumes of coal ash water can still flow from these ponds into Mountain Island Lake with no limits on arsenic, selenium, or mercury. Monitoring for these metals, which might tell the public just how dangerous these discharges are, is limited to a single sample done four times a year.[177] The permit requires testing for these metals in fish tissue concentrations, but only once in the entire five-year permit term.[178] In

May 2013, the state of North Carolina brought a Clean Water Act enforcement action against Duke Energy for contamination of Mountain Island Lake caused by the seepages from its massive unlined ash ponds.[179]

Further down the Catawba River, another Duke Energy coal-burning power plant, **G.G. Allen**, is authorized to discharge an unlimited amount of coal ash wastewater into Lake Wylie.[180] The massive Allen plant has five boilers equipped with wet scrubber systems, creating a large scrubber sludge waste stream. Although the Allen plant has implemented a treatment system for the scrubber waste, the permit contains no enforceable limits on discharges of arsenic, mercury, or other coal combustion waste metals, so it is impossible to know whether this treatment system is working as intended.[181]

The Catawba River has taken enough chronic mistreatment by Duke Energy. Sadly, it is not the only river in North Carolina damaged by the coal industry.

The Cape Fear River is North Carolina's largest river basin, with impressive ecological diversity encompassing salt marshes where the river meets the Atlantic, inland blackwater swamps, and ancient cypress trees. Just a few miles upstream from the coastal estuaries that provide rich habitat for shellfish, bird life, and threatened species such as loggerhead and Atlantic green sea turtles,[182] the Duke Energy **L.V. Sutton** power plant dumps its ash waste into two unlined ponds on the banks of Sutton Lake, an impoundment of a Cape Fear tributary. Approximately 160,000 tons of coal ash is generated each year and stored in these two ponds.[183] This ash water receives no treatment other than settling before it is discharged into Sutton Lake, and the state-issued discharge permit for the Sutton plant imposes no limits on the concentration of metals that may be discharged.[184] According to the plant's own discharge monitoring reports, it discharged 603 pounds of arsenic to the river, along with 526 pounds of selenium in 2012 alone.

Fish in the Atlantic Ocean at the mouth of the Cape Fear River contain dangerous levels of mercury, and residents and tourists are warned not to consume them.[185] The river below the Sutton Plant violates water quality standards for nickel and copper, and is unsafe for harvesting aquatic life.[186] Sutton Lake, and which is required by the state to be managed as a public fishery, is a very popular sportfishing lake, especially during winter months when the water is kept warm by the plant's cooling water discharges. Unfortunately, in recent years the largemouth bass population in the lake has fluctuated wildly, and the North Carolina Wildlife Resources Commission has identified selenium contamination from the coal ash ponds as a significant contributor to that problem. Levels of selenium in fish tissue are three to five times higher than levels known to result in fish reproductive failure, and are extremely high in fish eggs and lake sediments.[187] Duke Energy has gone so far as to pump additional water into Sutton Lake from the Cape Fear River to dilute additional discharges from the ash ponds so that metals like selenium will be less likely to accumulate in fish tissues.[188]

Although Duke Energy is in the process of converting the Sutton plant to run on natural gas rather than coal, the risks posed by these coal ash ponds will persist unless the ponds are properly closed and cleaned up. Leaks from the ponds into groundwater have been thoroughly documented—the groundwater in the vicinity of the plant and the riverbed is already contaminated with arsenic, iron, boron, barium, manganese and other metals and salts.[189] Moreover, the sediments at the bottom of Sutton Lake are heavily contaminated with selenium that will continue to taint the fish population for decades to come. Simply capping the ponds and stopping discharges to Lake Sutton is far from an adequate solution. There is currently no plan for how this massive source of coal ash pollution will be cleaned up.

In the meantime, Sutton Lake and Cape Fear River bear the burden, along with nearby residents who must live with the severe health risks associated with the plant's toxic discharges. Seeking to address illegal pollution at Sutton, citizen groups initiated enforcement proceedings against Duke in June of 2013.[190]

From the Catawba to the Cape Fear, and from the ocean to the mountains, North Carolinians bear the burden of Duke Energy's waste. Their plight is not unusual.

## 3. RIVERS OF WASTE: WATERSHEDS IN DANGER

The rivers of North Carolina are not alone in carrying a toxic burden. Across the country, citizens are in similar straits. Many of the nation's watersheds are imperiled by water pollution from coal power plants.

### THE ILLINOIS RIVER: PRAIRIE STREAM UNDER PRESSURE

The Illinois River, flowing southwest across farmland and prairie from near Chicago to the Mississippi, was once one of the healthiest rivers in the United States, supporting migrating waterfowl, and huge populations of fish and mussels.[191] Today, at least 10 coal-fired power plants dump millions of gallons per day of contaminated waste into the river and its tributaries, and the river is suffering. The state of Illinois has formally listed the river as impaired by mercury pollution, and advises its citizens to be wary of eating fish from the river.[192]

Despite these warnings, Illinois has not required coal plants to eliminate their toxic metal discharges, or even to consistently monitor them. Of the 10 coal-fired power plants on the Illinois and its tributaries, only two of them have numeric limits for boron; *none* of them have mercury limits, much less limits for arsenic, selenium, cadmium, lead, or other toxic substances found in coal ash and scrubber sludge.[193] Indeed, not all of these plants are even required to monitor their discharges for mercury, and only one of them monitors for arsenic. Most of these rogue plants are owned by just two companies: Dynegy/Ameren[194] and Midwest Generation.

Dynegy/Ameren plants on the Illinois River or its tributaries (including the Des Plaines River and the Chicago Area Waterway System) include the E.D. Edwards and Havana facilities. The Illinois River passes by Hennepin, receives discharges from the E.D. Edwards facility at Peoria, and then gets another dose of ash-contaminated water downstream at Havana. *None* of these plants have limits for their discharges of mercury and other ash contaminants.

Illinois has not put a ceiling on the volume of waste these plants can discharge, or the concentration of toxic metals in those wastes. At the upstream end, the Hennepin plant reports that it may dump as much as three million gallons of fly-ash and bottom-ash waste into the river (though there is no upper limit on how much it may discharge).[195] There are no limits on what toxic metals may be in the waste, and the company doesn't have to test for most of them. At best the facility is to monitor for mercury in a single "grab" sample from its millions of gallons of waste, once every three months.[196] The E.D. Edwards plant, next downstream, has an 89-acre, 32-foot-high unlined coal ash pond located dangerously close to the Illinois River and just upstream from recreation areas where families gather, including Pekin Lake and fishing sites along both sides of the river. That plant reports that it can discharge more than 4 million gallons per day of ash pond wastewater, containing a mixture of fly-ash and bottom ash-contaminated waste.[197] That plant was required to monitor only for mercury on a monthly basis, and only had to do that 12 times before stopping indefinitely.[198] Further downstream, the Havana plant dumps at least another 2.8 million gallons per day of ash waste from *its* ash ponds into the river even further downstream—once again without even monitoring for most metals.[199]

Midwest Generation, meanwhile, owns four plants dumping into the Illinois River and its tributaries: Upstream of the Illinois River, Midwest Generation's **Joliet 9** facility reports it can discharge close to 7 million gallons per day of ash-contaminated water[200] and the **Joliet 29** facility adds another 2.6 million gallons per day.[201] The **Will County Plant**, located on the Chicago Sanitary & Ship Canal, adds almost another million gallons per day of ash-contaminated waste.[202]

Further downstream, Midwest Generation's **Powerton** plant—near Pekin, just south of Peoria—can dump 7 million gallons per day or more of its ash-contaminated wastes into the Illinois River itself.[203] There's no telling exactly what is in that wastewater because the company is not even required to monitor for toxic metals, including arsenic and mercury, which are contained in coal ash waste.[204] Leaks from Powerton's ash ponds add to the problem: Midwest Generation's own monitoring at Powerton shows hundreds of test reports documenting leaking toxics such as arsenic and selenium that are contaminating groundwater at levels exceeding federal and state standards. In 2012, the Illinois EPA issued Notices of Violation for ground water contamination after testing of wells showed numerous exceedances of heavy metals including arsenic and selenium. Several environmental organizations such as the Sierra Club, Environmental Integrity Project, and Prairie Rivers Network filed suit over many of the same violations of groundwater standards and violations of the state's "open dumping" law[205] Incredibly, the plant sits just upstream of the Powerton Lake State Fish & Wildlife Area,[206] a state-managed reservoir that experiences heavy fishing pressure from the public despite its double use as a receptacle for cooling waters and the power plant's wastewater.

All this pollution affects people up and down the river. Joyce Blumenshine, for instance, lives near the Peoria plants, and worries about what's happening to her river.

> *"The tons of pollutants these power plants are putting in our river every year have to be stopped," she says. "Dumping pollution into our river is antiquated. I live in Peoria and half of our water supply is withdrawn from there. The public and wildlife depend on the Illinois River. There is scientific information now on how small amounts of these heavy metals can harm public health, especially for children. We need to require that these power plants stop using the Illinois River as a dump for their pollution."*

Robin Garlish, who lives near the Powerton plant in the community of Pekin, also wants to see the pollution stop. She says

> *"My family moved here to the Peoria area in 1986. It is a beautiful area with the bluffs, trails, and the Illinois River. We own a campsite along the river and have spent every summer camping and boating along the water. I have*

*photographs of my son learning to waterski in the river, with the E.D. Edwards coal plant looming in the background. I never knew the millions of gallons of pollution that were being discharged into the river every single day. Where were the warning signs?"*

Ms. Garlish has questions: "As spring and summer approach, I wonder if it will be safe for my family to enjoy the outdoors? Will we be able to enjoy camping and water sports on our boat without fear of pollution in the water?"

### THE BLACK WARRIOR RIVER: TOXIC METALS IN ALABAMA'S WATERWAYS

Every year when the long, hot days of summer arrive in Alabama, anglers come from miles around to fish Bankhead Lake, a reservoir on the Black Warrior River near Birmingham that is known for spotted and largemouth bass. These anglers may not know that nearby, two massive Alabama Power Company power plants, **Plant Miller** and **Plant Gorgas**, are constantly pumping their coal ash refuse and scrubber sludge into huge waste lagoons next to the lake. Further downstream in Greene County, a third plant dumps even more pollution into the river. Alabama Power is allowed to dump almost unlimited amounts of toxic wastewater from its coal ash lagoons straight into Bankhead Lake, a public drinking water source for the city of Birmingham and surrounding areas. The largest of these Black Warrior River power plants, the Miller Generating Station, dumped more toxic ash into its ash pond than any other plant in the country in 2010. Waste from the Miller ash pond flows right into Bankhead Lake, contaminating the water downstream where people often go boating and fishing.[207]

The two plants that dump their wastewater into Bankhead Lake are both owned by a subsidiary of the multi-billion dollar Southern Company, but Southern has resisted any investment in cleaning up its ash pollution at these two plants. In 2010, Alabama plants dumped more dangerous heavy metals into their ash ponds than any other plants in the country: more than 14 million pounds of toxic waste.[208] The Miller plant alone was responsible for more than five million pounds of that waste, making it the biggest ash polluter in the country that year.[209] Plant Gorgas was the 15th worst out of hundreds of coal-fired power plants nationwide.[210]

Despite this pollution, the state of Alabama does not require these plants to monitor for numerous toxic heavy metals typically discharged into the Black Warrior, much less to control them. Miller ordinarily discharges at least eight million gallons per day of polluted water from its toxic ash pond into the Locust Fork of the Black Warrior, though its discharges can be much greater.[211] Its permit does not require monitoring or have discharge limitations for poisons like arsenic, mercury, and lead.[212] But even though Alabama doesn't know exactly what is in the wastewater from Miller, pollution from this power plant is having an impact. Some of those impacts are easy to see: The rocks from the water below the discharge are blanketed with a hard white gunk that cements them together.[213] Other impacts, like the toxic metals that are likely building up in the river system, are harder to see but no less real.

The same story is happening over on the Mulberry Fork, where Plant Gorgas dumps its millions of gallons of waste into a huge pond euphemistically named "Rattlesnake Lake."[214] The venom that lurks in that "lake" flows into the river, at an average volume of 20 million gallons per day. That plant does have a monthly (but not a stringent daily) limit on arsenic pollution, but lacks any limits or monitoring for selenium, mercury, lead, thallium, cadmium, or many other toxic heavy metals found in coal waste.[215]

The Black Warrior is not free from coal plant pollution further downstream, either. After leaving Bankhead Lake and passing by Tuscaloosa, the river winds through small towns and farm country where, near the town of Demopolis, Alabama Power's **Greene County** plant sits. It, too, has been among the dirtiest plants in the country based on its dumping of toxic coal ash in some years,[216] and it lacks limits on toxics other than a lenient, monthly average arsenic limit.[217]

As we discuss elsewhere in this report, metals pollution stays in rivers. It makes its way into the sediment, and then into the fish and the other creatures using the water—including the people. The Black Warrior is an Alabama treasure, flowing from the sandstone gorges of northern Alabama through the old fishing spots and reservoirs around Birmingham and Tuscaloosa, and out into the lowlands of the Gulf Coast. It's time to treat the river like the treasure it is, and keep the millions of gallons of coal ash-tainted wastewater from Alabama Power's plants out of it.

## 4. ENVIRONMENTAL INJUSTICE: COAL PLANT WATER POLLUTION AND INEQUALITY

Coal plants with water pollution problems are often located in communities of color and communities with lower-than-average incomes. Members of these communities are often more dependent on fishing for food than the national average, meaning that contaminated water and fish are a particularly serious threat, according to the EPA's National Environmental Justice Advisory Council.[218] Several plants across the country illustrate this troubling national failure.

### WAUKEGAN: INDUSTRIAL POLLUTION ON THE LAKE

The city of Waukegan, on the coast of Lake Michigan north of Chicago, is a working class city with a proud industrial heritage. With large Hispanic and African-American communities, Waukegan has a diverse population and an enviable location on Lake Michigan. Unfortunately, its industrial history has left it with serious pollution problems that coal-fired power is making worse.

That legacy of pollution includes a Superfund site in Waukegan's harbor due to severe PCB contamination—the residue of a manufacturing business.[219] That PCB contamination alone makes fish from certain parts of the city's lakefront unsafe to eat,[220] but it is not the only water quality problem the city faces. Another lurks just along the coast from downtown, at Midwest Generation's **Waukegan Generating Station**, an aging coal power plant whose first units began operating in the 1920s and whose current boilers are more than fifty years old.[221]

According to a recent NAACP report, the Waukegan plant is one of the worst environmental justice offenders in the nation.[222] People of color comprise 72 percent of the population within three miles of the plant, and the average income of that community is just over $16,000 per year.[223] Schools and a hospital located near the plant must contend with its pollution, which causes tens of millions of dollars' worth of public health harm every year.[224]

The Waukegan power plant's ash ponds sit just off the shoreline of the lake, and are responsible for serious groundwater contamination. According to the state, "[g]roundwater flow" is "highly dependent on the water level in the ash ponds," meaning that contaminants from the ponds appear to be flowing into the groundwater.[225] In 2012, the Illinois Environmental Protection Agency issued the plant a Notice of Violation for violations of arsenic, boron, manganese, iron, sulfate, chloride, total dissolved solids, pH, and antimony standards in groundwater near the ponds, concluding that the violations had been caused by waste leaking from the ash ponds.[226] Several environmental organizations such as the Sierra Club, Environmental Integrity Project, and Prairie Rivers Network filed suit over many of the same violations of groundwater standards and violations of the state's "open dumping" law.[227]

Yet, even as the state of Illinois begins to address leaks in the ash ponds, it continues to allow contaminated water in those ponds to flow directly into Lake Michigan. Waukegan's discharge permit, which is more than a decade old, sets only copper and iron limits for the 3.2 million gallons per day of ash-contaminated waste which Waukegan is authorized to discharge, failing to set any limits for poisons like arsenic, mercury, and selenium.[228] A more recent draft permit, issued for public comment in late 2013 repeats this mistake, again setting no limits on the toxic heavy metals in Waukegan's ash waste stream.[229] Yet the plant is clearly a large water pollution source: Waukegan reported to the EPA that it discharged more than 1,000 pounds of chemicals listed on the Toxic Release Inventory into surface waters near the plant ever year between 2002 and 2010.[230] Because Waukegan is not even required to monitor toxic metal discharges, actual figures may be higher.

This water pollution is only part of the plant's toxic legacy. The plant emitted more than 11,000 tons per year of asthma-causing sulfur dioxide (SO2) between 2007 and 2010, and has yet to clean up its air pollution. Midwest Generation has said it will clean up this pollution, but even that may not be good news for the people of Waukegan. For one thing, the company will likely use "Dry Sorbent Injection" to address SO2 pollution, a technology whose waste can greatly increase the solubility and mobility of toxics in coal ash, including arsenic and selenium.[231] If that waste winds up in Waukegan's ash, the plant's discharges will be all the more potent.

### NORTH OMAHA & RIVER ROUGE: VULNERABLE COMMUNITIES AND LAX PERMITS

Other power plants on the NAACP's worst offenders list follow this dangerous pattern of neglect, including the **North Omaha** plant in Nebraska and the **River Rouge** plant in Michigan. Although these plants may opt to ship their ash elsewhere (where it may harm other communities), their permits continue to allow direct discharges into nearby waterways. There is no reason these permits should allow unchecked dumping.

The **North Omaha** power plant, on the NAACP's list of the worst environmental justice offenders,[232] is located in a predominantly African-American community with an asthma rate of 20 percent. It is an old, poorly-regulated facility, with some parts of the plant dating back to the 1950s.[233] The plant emits more than 300 pounds of mercury each year. Of the 51 coal plants located in cities the size of Omaha or bigger, the North Omaha plant is the single biggest mercury emitter.[234]

The plant's legacy of air pollution, asthma, and mercury poisoning is compounded by serious permitting failures with regard to water pollution. Although the plant's owner, the Omaha Public Power District, says it now sends its ash off-site for dry storage, the state's water permit for the plant allows it to send water from its bottom ash and coal pile runoff ponds straight into the Missouri River, not far from the city's water intakes.[235] The plant is only required to monitor for toxic substances, including mercury and arsenic, once a year.[236] There are no limits on how much of these toxic metals it can discharge.[237]

Nebraska does not need more water pollution. Already, 73 waterbodies in Nebraska are already so contaminated with mercury that the state has warned people about eating fish from them.[238] The non-profit Environmental Working Group has already rated Omaha's drinking water as among the worst in the country, based on its chemical content and safety.[239] Any bottom ash waste from the North Omaha plant will only add to these problems. There is no reason to continue to allow the plant to dispose of *any* ash-contaminated wastewater in the Missouri River.

DTE's **River Rouge Plant**, on the Detroit River, also has an unduly lax permit. The plant is one of many huge industrial facilities — from oil refineries to steel plants — that dot the banks in River Rouge near Detroit. The cumulative pollution from all these facilities fouls the air and water for many communities along the river. The River Rouge Plant, though, stands out as a particularly serious pollution source in its own right.

The smokestacks of the River Rouge plant rise directly behind a playground, on the banks of the river. Two-thirds of people living near the plant are minorities, and their income is barely above half of the average income in Michigan.[240] Over 1.6 million pounds of hazardous chemicals are released in the River Rouge community every year by the many heavy industrial facilities there.[241]

Water pollution from the plant could add to this burden, thanks to a weak permit. The River Rouge Plant is authorized to discharge more than 654 million gallons per day of wastewater into the river.[242] The permit lists "treated bottom ash transport water" and "treated coal pile runoff" as constituents of this wastewater flow — though it is not clear how much of this pollution is in the wastewater, and there are no limits and no monitoring required for arsenic, selenium, mercury, boron, or other constituents of ash waste.[243]

Although some large portion of the ash may be taken offsite and dumped elsewhere, this permissive permit is yet another danger for residents of the River Rouge. Indeed, according to the Detroit Riverkeeper,[244] at least some of this bottom ash is not travelling far: It is being dumped next to the river not far south of the River Rouge at another DTE Energy plant, Trenton Channel.

Many citizens of the River Rouge community and surrounding towns fish the Detroit River.[245] People of color go fishing more often, according to a University of Michigan study, and they are more likely to take fish home for food.[246] Not all of these fish are safe to eat: The state of Michigan warns against eating sturgeon and freshwater drum because of mercury contamination, for instance, and has issued a blanket warning against eating most other fish in the river.[247]

The bottom line is that coal waste has no place anywhere near the water people depend upon, and regulators need to make sure that these power plants can never release their waste into the public's waterways. River Rouge's and North Omaha's dangerously lax permits, and the ongoing pollution from the Waukegan plant, are just one more injustice in communities already overburdened with environmental threats.

## 5. TRANSFERRING POLLUTANTS FROM AIR TO WATER

Without new water pollution protections, efforts to clean the air will transfer air pollutants into the water as scrubber sludge.

Nobody should be asked to make a tradeoff between clean air and clean water. Technologies exist that enable coal plants to reduce the amount of metals in their scrubber waste streams and eliminate all discharges of this waste stream to surface water,[248] but very few plants currently use these systems. Instead they discharge scrubber wastewater to rivers and lakes after the most minimal treatment. Scrubbed plants in Pennsylvania and North Carolina illustrate the magnitude of the problem.

A prime example of the risks posed to the nation's waters by uncontrolled discharge of wet scrubber wastewater is the **Bruce Mansfield** plant in Shippingport, Pennsylvania. This massive 2740 MW plant, operated by FirstEnergy, has three boilers equipped with wet scrubbers to reduce sulfur dioxide air pollution, and a wet handling system for bottom ash and fly ash. For many years, FirstEnergy has sent all of the scrubber wastewater and ash handling water through a seven-mile pipeline to the Little Blue Run Coal Ash Impoundment — the largest unlined ash pond in the United States.[249] In 2011, FirstEnergy dumped 79,500 pounds of arsenic and 26,190 pounds of selenium into that impoundment.[250] These pollutants and other toxic metals such as boron and molybdenum are then dumped into Little Blue Run Stream and Mill Creek, ultimately making their way to the Ohio River. Pennsylvania regulators have identified Little Blue Run, Mill Creek and stretches of the Ohio River as waterways that are not safe for aquatic life due to siltation, pH and metals.[251] Pennsylvania officials have advised community members to limit their consumption of fish caught in the Ohio River, in part due to concerns about heightened levels of mercury.[252]

The Bruce Mansfield plant operates under an expired NPDES permit that imposes no discharge limits or monitoring requirements for any of these metals where water enters Little Blue Run Stream and Mill Creek.[253] FirstEnergy's own monitoring reports reveal concentrations of boron at the Little Blue Run Stream surface water monitoring station location immediately downstream of the impoundment discharge (SW-3) higher than the chronic Pennsylvania water quality criterion for boron in all quarters between 2006 and 2012.[254] During this same time period, concentrations of boron even exceeded the acute Pennsylvania water quality criterion for boron at SW-3 in 9 of 22 quarters.[255] And in the one quarter of available data for selenium from SW-3 in the last five years, selenium exceeded the chronic Pennsylvania water quality criterion.[256] Notably, FirstEnergy is not required to monitor for all coal ash and scrubber sludge pollution at this monitoring location.

Outraged by the water contamination at Little Blue Run, the community organized to fight an expansion of the disposal site and filed a lawsuit under the Clean Water Act. In response, Pennsylvania regulators have required closure of the leaking impoundment by 2016 and some cleanup of seeps and groundwater. FirstEnergy now plans to transport coal ash and scrubber wastewater nearly 100 miles upriver on thousands of uncovered barges per year to another unlined, active coal ash dumpsite in LaBelle, Pennsylvania.[257] LaBelle's groundwater and surface water are already contaminated by leaks from this coal ash dump, and because many of the working class residents of that town hunt for food, they are also exposed to bio-accumulating metals such as selenium through what they eat.[258]

The incredible volume and toxicity of wastewater generated by the scrubbers at the Bruce Mansfield plant demands close scrutiny and careful handling, but Pennsylvania permitting authorities have not imposed any limits or required any kind of effective treatment to protect the Ohio. Shifting the problem to a different community upriver is no solution.

Another plant that already barges its coal ash waste to LaBelle is the 50-year old **Mitchell Power Station** near New Eagle, Pennsylvania. In July 2013 FirstEnergy announced plants to retire the Mitchell plant, but the facility has been polluting local waterways for decades. The Mitchell plant has a wet scrubber system and discharges scrubber wastewater into the Monongahela River several miles upstream from the intake for the Pennsylvania-American Water Company. The "Mon," as it is affectionately known by thousands of residents along its length, flows out of the mountains of West Virginia and joins the Ohio River in Pittsburgh. This river is the heart of southwestern Pennsylvania, the engine of the region's economic growth for hundreds of years, and the source of drinking water for more than 800,000 people. Sadly, a legacy of abandoned mines and uncontrolled industrial discharges means that for most of the river's length, water quality is not safe for drinking and recreation.[259]

The Mitchell plant's water discharge permit expired in 1996 — nearly 20 years ago. It is perhaps not surprising then, that this permit utterly fails to protect the Monongahela from the toxic wastewater produced by the Mitchell plant and its wet scrubber system. The outfall that sends the plant's scrubber wastewater into the Monongahela has no limits on metals commonly found in coal combustion wastes, nor any monitoring requirements.[260] Another outfall at the Mitchell plant dumps leachate from an ash landfill into Peters Creek, a tributary of the Monongahela. While the Mitchell plant's expired permit requires monitoring of boron and aluminum discharges, the permit imposes no limit on the amount of these metals that can be discharged into Peters Creek.[261] The EPA's proposed rule finalized in its strongest form would require the operator to significantly reduce metals concentrations in this discharge stream rather than merely monitor those pollutants.

The approximately 400 MW **Asheville** plant, on North Carolina's French Broad River, provides a test case for how a wet scrubber system increases the toxicity of a coal plant's wastewater discharges. In 2005 and 2006, Duke Energy added wet scrubbers to the two units at the Asheville plant for sulfur dioxide control. The wastewater from the scrubbers is treated in an onsite artificial wetland, and then sent to a holding pond where it is mixed with fly ash and bottom ash handling waters. The wastewater permit allows the Asheville plant to dump from this holding pond into the French Broad River with no limits on the metals commonly found in scrubber sludge and coal ash wastewaters, other than mercury.[262] According to the plant's own reporting, it discharged 324 pounds of arsenic and 564 pounds of selenium in 2012.[263]

The only way to understand how well the artificial wetland treatment system is working is a monitoring program of toxic metals where the ash pond dumps into the French Broad — just a single sample taken once a month.[264] In fact, the water pollution problem at Asheville has significantly worsened since the scrubbers were added. A study done by scientists at Duke University compared pollutant load in the ash pond discharge at Asheville before and after the wet scrubbers began operating, and found that the amount of pollutants such as arsenic and selenium discharged to the French Broad River dramatically increased after the scrubbers were installed.[265] The study reported that samples collected during the summer of 2011 from mingled scrubber and coal ash waste flowing to the French Broad River contained arsenic at levels four times higher than the EPA drinking water standard, and selenium levels 17 times higher the agency's standard for aquatic life. Cadmium, antimony, and thallium were also detected in the wastewaters at levels above human and aquatic life benchmarks.[266]

Clearly, more must be done to reduce pollution from the Asheville scrubber system. The EPA has identified treatment methods that can eliminate or at least achieve much lower levels of toxic metals from scrubber waste streams, and must apply them to all coal-burning plants with scrubber systems, including relatively small plants like Asheville that have an outsized impact on a treasured river.

These plants are just examples: All across the country, scrubbers are going in and increased water pollution follows, without efforts to tighten permit limits. Smokestack scrubbers are good news for the air, and they can be good news for the water, too, if the EPA puts strong controls in place for treatment of this waste. No community should have its watershed contaminated by the same pollution that it once was forced to breathe.

## 6. POLLUTING WATER IN THE ARID WEST

The crisis of groundwater and surface water contamination by uncontrolled discharges of toxic metals is not limited to the wetter eastern half of our country. The waters of the western United States are also burdened by these toxic discharges, which is all the more troubling considering the scarcity of water in the region and the rapidly growing population. Plants in Colorado and Montana illustrate the problem of coal water pollution in the West.

The Xcel **Comanche** plant in Pueblo, Colorado, has three large coal-burning boilers. Two of these boilers were built in the 1970s, and the third was built in 2010. All of the boilers burn coal brought in from massive strip mines in Wyoming, producing more than 300,000 tons of coal ash in a single year.[267] The plant uses a wet ash handling system to collect fly ash and bottom ash and then moves this coal ash water through a series of three settling ponds.[268] Despite evidence that ash handling water contains significant amounts of toxic metals and solids, there are no limits on any of these metals in the wastewater discharged into the small St. Charles River.[269] The lack of limits on selenium discharges is even more appalling considering that the St. Charles is impaired for selenium, meaning that the river is not meeting water quality standards for this pollutant.[270] Within a few miles of the Comanche plant, the St. Charles flows into the Arkansas River, and that portion of the Arkansas River is also failing to meet water quality standards for selenium and sulfates.[271]

The water discharge permit for the Comanche plant requires monitoring for some metals at the main ash outfall, but imposes no limits on the concentrations of those metals in the discharge.[272] While monitoring is an important first step, uncontrolled discharge of these metals into an impaired stream is dangerous and contrary to the Clean Water Act. Once a waterbody is designated as impaired, the state must determine the "total maximum daily load" (TMDL) of the particular pollutant that the waterbody is able to absorb and still comply with water quality standards. However, the state of Colorado has not yet developed a TMDL for selenium in the St. Charles River or in the Arkansas River downstream of the confluence with the St. Charles, and is allowing the Comanche plant to discharge coal ash wastewaters into this impaired river with no limits at all on selenium.

The Arkansas River is a major fly-fishing destination in Colorado, and a source of tourism income and recreation for area residents. Because high levels of selenium severely impairs reproduction in fish, selenium limits must be imposed on major sources like Comanche so that the St. Charles and Arkansas Rivers can continue to support abundant fish populations. Moreover, water resources in this part of Colorado are incredibly precious, especially considering the exceptional drought the area is now experiencing. These rivers should be treated like the indispensable resources they are.

Another prime fishing destination, the Yellowstone River in Montana, is also threatened by coal ash discharges. The Yellowstone runs for more than 500 miles through the heart of the state, providing drinking water for its cities, irrigation for farms, and superior fishing opportunities. As the river approaches Billings, it flattens out, warms up, and provides excellent warm-water angling for walleye, northern pike, and catfish. Indeed, a large stretch of the river downstream of the **J.E. Corette** plant is classified as a blue ribbon stream for fishing. This stretch of the Yellowstone River brings substantial tourism revenue to the region through duck- and goose-hunting outfitters and trips to Pompey's Pillar National Monument, a sandstone bluff on the banks of the river bearing the engraved signature of Captain William Clark, of the Lewis and Clark expedition.

Unfortunately, the Yellowstone is contaminated by ash pond discharges from the Corette power plant, operated by Pennsylvania Power & Light's Montana subsidiary, PPL Montana. The Corette plant burns a rail train car full of Wyoming coal every hour,[273] producing approximately 32,000 tons of bottom ash each year, containing 38 tons of heavy metals.[274] The bottom ash water is stored onsite in ponds before being discharged to the Yellowstone without any limits on any toxics or metals that may be contained in that bottom ash water. The Montana Pollutant Discharge Elimination System permit — which is eight years overdue for renewal — imposes limits only on oil and grease, and total suspended solids.[275]

The Montana Department of Environmental Quality has assessed the Yellowstone River upstream and downstream of the Corette plant. This entire section of the Yellowstone has been deemed not suitable for aquatic life and primary contact recreation, such as swimming.[276] Below the Corette plant, the river does not meet water quality standards for arsenic, rendering the river unsuitable as a drinking water supply. Although Montana DEQ attributes the arsenic impairment to natural causes, the section of the river that is impaired begins right around the Corette plant,[277] which is releasing untreated bottom ash wastewater — known to contain arsenic — directly into the river.

The Yellowstone River provides drinking water and irrigation supply for millions of acres of farmland downstream of Billings. Contamination of the river with arsenic and other coal ash constituents increases treatment costs for drinking water, and degrades one of Montana's most treasured resources.

## 7. TVA'S TOXIC LEGACY: THE ASH POND CLEAN-UP PROBLEM

Hundreds of coal waste ponds, holding millions of pounds of toxic ash and scrubber sludge, dot the country, posing a real and present danger to public health.[278] Over a hundred of these sites have been shown to have damaged groundwater resources, and this known damage is probably just the tip of the iceberg.[279] The EPA's proposed coal water pollution rules could, if finalized in their strongest form, stop companies from dumping any more waste into these ponds. But even if they do, the ponds themselves will remain an ever-present threat to communities across America. The EPA can and should begin to fix this problem by stopping continuing use of the ponds, but waste rules, focused on pond closure, will ultimately be needed to solve it.

Nowhere is this pressing problem clearer than among the plants of the Tennessee Valley Authority (TVA). TVA has continued to use aging ponds throughout its system despite causing the biggest coal ash spill in U.S. history in December 2008, when a dredge cell at its ash pond complex at TVA's **Kingston**, Tennessee, plant failed, spilling roughly 5.4 million cubic yards of ash into the Emory River and burying 26 homes.[280] According to TVA's own Inspector General, TVA might have been able to prevent the spill had it heeded decades of warning about the pond's stability.[281] A federal court recently held TVA liable for its careless failure to protect the public.[282] Recovery at Kingston slowly continues, with formal cleanup activities recently concluding, but the waters around the plant remain contaminated, with ash remaining in sediment at the river bottom.

One might think TVA and the state regulators watching over its plants would have learned from this experience. But change has been slow in coming. Incredibly, the State of Tennessee continues to allow TVA to discharge waste from Kingston to the river without any permit limits for dangerous metals in the ash and scrubber sludge at the site.[283]

This cavalier attitude toward coal ash is the rule, not the exception. The TVA Inspector General reports that TVA's internal culture was "resistant to treating ash management as much more than taking out the garbage," failing to treat it like the hazardous waste that it really is.[284] State regulators have been just as lax. Although independent structural engineers have found substantial seeps and leaks at the majority of TVA's remaining ash ponds,[285] TVA has not closed its ponds, and state regulators continue to allow the ponds to dump their wastes into rivers through *permitted* discharges.

These plants include TVA's **Colbert** facility in northern Alabama, where bright orange, toxic-filled, leaks from the ash ponds are flowing into a tributary of the Tennessee River, prompting concerned citizens to start legal proceedings against TVA for its carelessness.[286] In addition to its unpermitted leaks, Colbert is actually authorized by the state of Alabama to dump ash pond waste through a pipe right into a stream, with no limits on heavy metals.[287] Another *permitted* wastewater outfall discharges into the Tennessee River within about fifty feet of a county drinking water intake. (Although TVA has recently indicated that it will remove Colbert from service in 2016, those discharges may continue for years afterwards, unless TVA properly closes the plant's dangerous ash ponds.)

Permitted dumping is going on throughout the TVA system, including at TVA's **Gallatin Plant**, which is just upriver of Nashville and discharges wastes from its ponds into a popular reservoir, Old Hickory Lake.[288] TVA's **Shawnee Plant** sends nearly 20 million gallons per day of ash-fouled water into the Ohio River near Paducah, Kentucky, without limits on any toxic heavy metal.[289] The **Allen Plant** in Memphis disposes of some ash offsite, but is still authorized to send its millions of gallons of ash ponds waste into the Mississippi River, again with no permit limits on toxic metals.[290] Discharge reports from many other TVA plants show levels of mercury and selenium, among other poisons, well above water quality standards.[291]

These permitted discharges need to stop, and the EPA's Clean Water Act rules can stop them. But even if they do, TVA's ash ponds may remain behind — leaking, seeping sources of continuing groundwater and surface water pollution. Gallatin's ponds, for instance, were constructed directly on top of a landscape dotted with sinkholes. Although TVA has filled some of them, a new sinkhole opened up as recently as 2010, and the entire pond complex continues to sit on fragile terrain and has developed stability problems in its containment walls.[292] In fact, TVA itself reported that by the late 1980s, it had identified as many as 111 sinkholes beneath Gallatin's active ash ponds — a terrain so filled with holes that it was hard to keep the pond from draining into them.[293] Several sinkholes have also opened over the years at the Colbert facility, and independent engineers have determined that some of its containing walls should be repaired to prevent them from collapsing.[294]

Many other TVA ash ponds sit on similarly dangerous ground. Some TVA facilities continue to leach and leak even long after closure. At the Allen plant, TVA acknowledges that leaks from its ash facilities have contaminated groundwater wells along the shore of nearby Lake McKellar.[295] That problem arises in part from a long-closed, now mostly dry pond which TVA maintains is still covered by a discharge permit — which means, under Tennessee's interpretation of its waste laws, that TVA need not ever show that the drying ash dump complies with the state's landfill safety standards.[296] The result is that both the "closed" pond and the active ponds continue to contaminate water supplies, without meaningful controls under either waste or rules.

Other TVA facilities are even more precarious: its soon-to-close **Johnsonville** plant, for instance, dumps its ash on an artificial "Ash Island" in the middle of the Tennessee River, ringed by unstable dikes — a situation so unacceptable that TVA has prioritized the site for cleanup to avert a potential Kingston-like disaster.[297] Even without a spill, contaminated ash water leaches straight into the river from the ponds, and will keep doing so even if the ponds are closed.[298] There, and throughout the system, ash ponds raise serious public safety concerns.

TVA has said that it intends to close its ponds sometime in the next decade and is already working toward that goal at some plants. But TVA officials said the same thing more than twenty years ago and failed to take action — leaving open the Kingston pond that eventually collapsed and spilled into the Emory River.[299] Because there are not strong federal standards for waste handling, and TVA's closure plans haven't been submitted to the public for comment and review, it's far from clear that pond closures will be safe and secure, or that they will happen quickly, to protect the public. The water pollution standards will help dry these huge waste sites up, but there's more work to do to clean them up permanently.

## 8. COAL IN THE WATER, COAST TO COAST

These stories of contaminated rivers and fouled beaches, leaky waste sites and permitted poisonings, are just a small sample of the national coal plant water pollution problem that decades of state and federal neglect and industry callousness have caused. No community should have to worry about the safety of its water or the health of its river. That is the guarantee that Congress set out in the Clean Water Act, but that promise has long been deferred. For the sake of the hundreds of thousands of Americans who suffer because of that indefensible delay, it is time, now, for the EPA to at last clean up this toxic industry.

## CONCLUSION

Clean water is a basic human right. We all deserve safe water to drink, clean lakes and rivers to boat and play in, flourishing watersheds, and healthy fish to eat. For too long, the coal industry has polluted our precious waters with impunity. For 31 years, state regulators and the EPA have mostly looked the other way, allowing toxic dumping to continue even though it could have been cleaned up years ago. Decades of pollution and thousands of miles of damaged waterways are the result.

It's time to put this dark history behind us. There is no reason to tolerate continued dumping, and the Clean Water Act mandates cleanup. We can eliminate most, if not all coal plant water pollution for pennies a day. The strongest of the EPA's proposed options will get us to that future. But it won't happen unless ordinary people demand controls to clean up these dangerous discharges from the president and the EPA. Industry lobbyists seek to weaken the basic protections that the EPA has proposed, and the industry lobby is well-funded and well-connected. But industry's voice is not louder than that of the millions of Americans who have a right to clean water. It's time for all of us to stand up and be heard.

## ENDNOTES

1 EPA, *Environmental Assessment for the Proposed Effluent Limitation Guidelines and Standards for the Steam Electric Power Generating Point Source Category* 3-13 (April 2013) [hereinafter, EA].
2 EA 3-34, 3-38.
3 33 U.S.C. § 1314(b); 40 C.F.R. §§ 122.44(a)(1), 123.25, 125.3.
4 78 Fed. Reg. at 34,512.
5 EA 3-34, 3-38.
6 *See* EA.
7 *See*, *e.g.*, EPA, T*echnical Development Document for the Proposed Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category* (April 2013) [hereinafter, TDD]
8 *Id.* at 7-4–7-16.
9 *Id.* at 7-26–7-29; 7-36–7-38.
10 EPA, *Benefit and Cost Analysis for the Proposed Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category* 12-2 (April 2013) [hereinafter, BCA].
11 *See* 78 Fed. Reg. at 34, 501, table Xi-9 (noting that the average annual cost to ratepayers for the most stringent option is $6.46).
12 EA at 3-13.
13 *See id.* at 3-14 (total toxic-weighted pollution from steam electric power plants is 8.3 million TWPE; total pollution from remaining top ten industries is 5.78 million TWPE).
14 *Id.*
15 *See id.* at 5-7 – 5-17.
16 *See infra*.
17 33 U.S.C. § 1251(a)(1).
18 *See* 78 Fed. Reg. 34,432, 34,435 (June 7, 2013).
19 *Id.*
20 EPA, *Steam Electric Power Generating Point Source Category: Final Detailed Study Report* (2009) at 1-2, 4-26, 6-11 ("Coal combustion wastewater is commonly discharged directly to surface waters following treatment in settling ponds.") [hereinafter "2009 Study"].
21 BCA at 12-2.
22 78 Fed Reg. at 34,501, Table Xi-9 (total average annual cost to ratepayers for the most stringent option is $6.46)
23 *See* EA at 3-13, Table 3-2.
24 EA at 3-13, Table 3-2, 3-20 – 3-21.
25 *Id.* at 5-6, 5-7.
26 TDD at 6-6, Table 6-3.
27 *See id.* at 4-33.
28 *Id.* at 6-11.
29 *Id.* at 6-8, 6-11; see *also* 75 Fed. Reg. at 35,150.
30 *See* TDD at 7-22 – 7-41.
31 78 Fed. Reg. at 34,512.
32 EPA figure are for power plants generally, regardless of fuel, but coal power plants are by far the principal source of the toxics we discuss.
33 EA at 3-13.
34 2009 Study at 6-5.
35 ATSDR, *Toxicological Profile for Arsenic*, at 18.
36 *Id.*
37 *Id.* at 20-22.
38 2009 Study at 6-5.
39 *See* ATSDR, *Public Health Statement: Mercury* at §§ 1.5-1.6.
40 Union of Concerned Scientists, *Environmental Impacts of Coal Production: Air Pollution*, available at: http://www.ucsusa.org/clean_energy/coalvswind/c02c.html
41 EA at 3-13.
42 *See* ATSDR, *Public Health Statement: Mercury* at § 1.2.
43 EA at 3-13.
44 2009 Study at 6-4.
45 *See* ATSDR, *Public Health Statement: Selenium* at § 1.5.
46 2009 Study at 6-4.
47 *See* A. Dennis Lemly, *Selenium Impacts on Fish: An Insidious Time Bomb*, 5 Human and Ecological Risk Assessment 1139 at 5 (1999).
48 *See generally id.*
49 *Id.*
50 *Id.* at 3-13.
51 *Id.* at 3-8.
52 EA at 3-7.
53 *Id.* at 3-13.
54 ATSDR, *Public Health statement: Cadmium* at 5.
55 *Id.*
56 EA at 3-8.
57 *Id.* at 3-8 – 3-9.
58 *See id.* at 3-13.
59 *See id.*
60 *See* 78 Fed. Reg. at 34,477.
61 *Id.* 34,505.
62 *See* EA at 3-9 – 3-10.
63 *Id.* at 3-10.
64 *Id.*at 3-13.
65 *Id.* at 3-14.
66 *Id.*
67 *Id.* at 3-15 – 3-16.
68 *See id.*3-16 -3-17.
69 *See* Christopher Rowe *et al.*, *Ecotoxicological Implications of Aquatic Disposal of Coal Combustion Residues in the United States: A Review*, 80 Env. Monitoring and Assessment 207 (2002) at 215,231-236.
70 EA at 3-34 – 3-40.
71 A. Dennis Lemly, *Wildlife and the Coal Waste Policy Debate: Proposed Rules for Coal Waste Disposal Ignore Lessons from 45 Years of Wildlife Poisoning*, Env. Sci. Tech. (2012).
72 *Id.*
73 Lemly, *Selenium Impacts on Fish* at 4-6; *see also* A. Dennis Lemly, *Symptoms and implications of selenium toxicity in fish: the Belews Lake case example*, 57 Aquatic Toxicology 39 (2002).
74 Rowe *et al.* at 231.
75 Lemly, *Selenium Impacts on Fish* at 6-7.
76 Rowe *et al.* at 241.
77 ATSDR, *Health Consultation: Welsh Reservoir, Mount Pleasant, Titus County, Texas*.
78 ATSDR, *Health Consultation: Brandy Branch Reservoir, Marshall, Harrison County, Texas*.
79 Laura Ruhl, Avner Vengosh *et al.*, T*he Impact of Coal Combustion Residue Effluent on Water Resources: A North Carolina Example* (2012).
80 *Id.*
81 *Id.*
82 *Id.*
83 *Id.*
84 EA at 5-8,
85 *Id.* at 5-9.
86 *Id.* at 5-8.
87 *Id.* at 6-36.
88 EA at Table 6-15.
89 EA at 6-22; 78 Fed. Reg. at 34,505.
90 EA at 3-33.
91 BCA at 3-6 – 3-14.
92 NEJAC, *Fish Consumption and Environmental Justice* (2002) at iii – iv.
93 *Id.* at 2.
94 *See* EA at 3-20.
95 *See* 33 U.S.C. § 1241(a)(1)
96 33 U.S.C. § 1314(b); 40 C.F.R. §§ 122.44(a)(1), 123.25, 125.3.
97 *See* section III, *infra*; 2009 Report at 4-50.
98 We provide a more complete description of our methodology in Appendix I. Appendix II reports the main results themselves.
99 EPA states that "[t]here are 277 plants that generate and discharge FGD wastewater, fly ash transport water, bottom ash transport water, and/or combustion residual landfill leachate based on responses to the Questionnaire for the Steam Electric Power Generating Effluent Guidelines." RIA, at 3-4 n. 39.
100 We have not determined whether the limits that do exist have been set to reflect best available technology or to protect water quality in individual cases. However, because essentially all of the permits allow continued discharge of effluent contaminated by ash or scrubber waste, it is clear that states are not setting the zero discharge limits which the best technology allows.
101 Counts include only permits listing ash or scrubber waste discharges.
102 Two additional Indiana plants have metals limits which take effect in 2015. We have not included those limits in this count of currently applicably limits, but they demonstrate that states can and should set such limits going forward.
103 78 Fed. Reg. at 34,505.
104 *Id.*
105 33 U.S.C. § 1312(a); 40 C.F.R. § 122.44(d)(1)(i).
106 EA at 6-36.
107 33 U.S.C. § 1342(b)(1)(B).
108 Several plant information summaries in the ECHO database did not identify a permit expiration date.
109 78 Fed. Reg. at 34,459.

110 *See, e.g.*, Environmental Integrity Project and Earthjustice, *Out of Control: Mounting Damages from Coal Ash Waste Sites* http://earthjustice.org/sites/default/files/library/reports/ej-eipreportout-of-control-final.pdf; *Coal Combustion Waste Damage Case Assessments*, U.S. EPA, July 9, 2007, available at http://earthjustice.org/sites/default/files/EPA-Damage-Case-Assessment-2007.pdf.)

111 78 Fed. Reg. at 34,441; *see also id.* at 34,516 (monetizing the annual benefits of reduced impoundment failures under Option 4 at $295.1 million).

112 This technology review is by no means exclusive. Many other technologies exist which can help reduce or eliminate coal plant discharges.

113 78 Fed. Reg. at 34,439; TDD at 4-19-4-23.

114 78 Fed. Reg. at 34,473; TDD at 4-21, Table 4-7.

115 *Id.* at 4-22.

116 *Id.* at 4-24-25.

117 *Id.* at 4-23-4-25.

118 78 Fed. Reg. at 34,439.

119 *Id.* at 34,459-60.

120 *Id.* at 34,460.

121 TDD at 7-9.

122 *Id.* at 7-9-7-13; 78 Fed. Reg. at 34,460.

123 78 Fed. Reg. at 34,460.

124 *Id.*

125 *Id.*

126 TDD at 7-13.

127 78 Fed. Reg. at 34,458 (Table VIII-1).

128 *Id.* at 34,485-34,486 (Table IX-4).

129 *Id.*

130 78 Fed. Reg. at 34,458 (Table VIII-1).

131 *Id.* at 34,504 (Table XII-1).

132 *See id.* at 34,494 (Table IX-4).

133 *Id.* at 34,501 (Table XI-9).

134 *Id.* at 34,503 (Table XI-11).

135 *See, e.g.*, Memorandum from James Hanlon, EPA, Director of the Office of Wastewater Management to EPA Water Division Directors, Regions 1-10 & Attachment A: Technology Based Effluent Limits, Flue Gas Desulfurization (FGD) at Steam Electric Facilities (June 7, 2010) (explaining that EPA is conducting a rulemaking to “address” this wastestream and that current controls are not adequate); 74 Fed. Reg. 55,837, 55,839 (Oct. 29, 2009).

136 74 Fed. Reg. at 55,839.

137 *Id.*

138 *See* Redline at 15.

139 78 Fed. Reg. at 34,458.

140 *Id.*

141 Redline at 186.

142 *See, e.g.*, Lisa Heinzerling, *Who Will Run the EPA?*, 30 Yale Journal on Regulation 39 (2013), available at: http://jreg.commons.yale.edu/who-will-run-the-epa/.

143 *See generally* EPA, *Documentation of OMB Review Under Executive Order 12866* (June 2013) [hereinafter “Redline”].

144 EPA, *Summary of the Substantive Changes Made During Interagency Review Under EO 12866* (June 2013) [hereinafter “Summary Memo”].

145 *See id.*

146 *See id.*

147 78 Fed. Reg. at 34,458.

148 *See id.*

149 78 Fed. Reg. at 34,485, Table IX-4.

150 *See, e.g.*, Redline at 338-39.

151 Redline at 137.

152 *See id.*

153 Redline at 144.

154 *Id.* at 226-27; *see also* Redline at 278-80 (OMB drafted section inviting further criticisms of EPA’s data from industry).

155 *Id.* at 213-14.

156 *See* Summary Memo; *see also* 78 Fed. Reg. at 34,458. In doing so, EPA was forced to change its conclusions on whether it was appropriate to have different standards for different sizes of plants. EPA had originally planned to have less stringent standards for plants smaller than 50 MW, and had concluded that such standards were appropriate for “small generating units.” Redline at 79. When EPA was forced to expand its exemption to 400 MW, it also deleted its conclusion about “small” units, instead endorsing different standards “based on size” generally. *See id.* at 80.

157 *See* 78 Fed. Reg. at 34,485, Table IX-4.

158 EPA Greenhouse Gas Reporting Program Data for 2011, available at: http://ghgdata.epa.gov.

159 Missouri Department of Natural Resources, *Fact Sheet for the Purpose of Renewal of MO-0004812, Ameren Missouri-Labadie Energy Center* (Feb. 8, 2013) at 1.

160 Jeffrey Tomich, St. Louis Post-Dispatch, *Leaking Coal Ash at Missouri Plant Stirs Fear for Water Safety* (Sept. 1, 2011).

161 *See id.*

162 *Id.*

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## APPENDIX I: METHODOLOGY AND DATA LIMITATIONS

We identified 386 operating coal-fired power plants using the EPA's Clean Air Markets Program database. Using EPA's Enforcement and Compliance History Online (ECHO) database, we reviewed effluent limits and monitoring requirements for arsenic, boron, cadmium, lead, mercury, and selenium and expiration dates for each of the coal-fired power plants. Our review focused on these pollutants because they are almost always found in coal ash and scrubber waste and are particularly harmful to health or aquatic life. In addition, we reviewed whether each power plant discharged into impaired waters and included the cause of impairment if it was identified in the ECHO database. Our review focused on these pollutants because they are almost always fund in coal ash and scrubber waste and are particularly harmful to health or aquatic life. Where available, we reviewed individual permits for coal-fired power plants to identify waste streams discharged at the plant and any effluent limits and monitoring requirements for arsenic, boron, cadmium, lead, mercury, and selenium. Where data related to effluent limits and monitoring requirements in the ECHO database conflicted with the plant's current permit, the data in the plant's permit was used in the analysis. We did not have access to permits for all 386 plants.

In some cases, multiple power plants are regulated under a single permit. For example, the HMP&L Station 2, R.D. Green, and Robert Reid power plants in Kentucky are regulated under one discharge permit. These power plants are identified as three separate plants in our analysis (as opposed to one plant).

DATA LIMITATIONS: The information contained in this report is based on company self-reported data obtained through publicly accessible U.S. Environmental Protection Agency websites and Freedom of Information Act requests. Occasionally, government data may contain errors, either because information is inaccurately reported by the regulated entities or incorrectly transcribed by government agencies. This report is based on data retrieved in March of 2013, and subsequent data retrievals may differ slightly as some companies correct prior reports.

# APPENDIX II

## US COAL-FIRED POWER PLANTS

| STATE | COUNTY | FACILITY NAME | OPERATOR | NAMEPLATE CAPACITY (MW) | NPDES PERMIT ID | PERMIT EXPIRATION DATE | POLLUTANTS MONITORED | POLLUTANTS WITH A LIMIT | COAL ASH OR SCRUBBER OUTFALL? | IMPAIRED WATER | CAUSE OF IMPAIRMENT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AL | Mobile | Barry | Alabama Power Company | 1770.7 | AL0002879 | 10/31/2013 | Arsenic, Mercury | Arsenic, Mercury | Ash | | |
| AL | Washington | Charles R Lowman | PowerSouth Energy Cooperative, Inc. | 538 | AL0003671 | 2/28/2010 | Lead | None | Ash & Scrubber | Tombigee River | |
| AL | Colbert | Colbert | Tennessee Valley Authority | 1350 | AL0003867 | 5/31/2010 | Arsenic, Lead | None | Ash | | |
| AL | Shelby | E C Gaston | Alabama Power Company | 2012.8 | AL0003140 | 6/30/2012 | Arsenic | Arsenic | Ash | | |
| AL | Etowah | Gadsden | Alabama Power Company | 138 | AL0002887 | 1/31/2008 | Arsenic | Arsenic | Ash | Coosa River (Neely Henry Lake) | Ph; Phosphorus |
| AL | Walker | Gorgas | Alabama Power Company | 1416.7 | AL0002909 | 9/5/2012 | Arsenic | Arsenic | Ash | | |
| AL | Greene | Greene County | Alabama Power Company | 568.4 | AL0002917 | 9/30/2012 | Arsenic | Arsenic | Ash | | |
| AL | Jefferson | James H Miller Jr | Alabama Power Company | 2822 | AL0027146 | 1/31/2012 | None | None | Ash | | |
| AL | Jackson | Widows Creek | Tennessee Valley Authority | 1968.6 | AL0003875 | 3/31/2010 | Arsenic | None | Ash | | |
| AR | Benton | Flint Creek Power Plant | Southwestern Electric Power Company | 558 | ARR00B277 | 6/30/2014 | None | None | Ash | Swepco Lake | Ph; Phosphorus; Total Suspended Solids |
| AR | Independence | Independence | Entergy Corporation | 1700 | AR0037451 | 6/30/2017 | Arsenic, Cadmium, Mercury, Lead, Selenium | None | Ash & Scrubber | | |
| AR | Mississippi | Plum Point Energy Station | Plum Point Energy Associates, Inc. | 720 | AR0049557 | 1/31/2012 | Selenium | None | Ash | | |
| AR | Jefferson | White Bluff | Entergy Corporation | 1700 | AR0036331 | 6/30/2017 | None | None | Ash | | |
| AZ | Cochise | Apache Station | Arizona Electric Power Cooperative | 408 | AZ0023795 | 2/21/2005 | Arsenic, Selenium | None | | | |
| AZ | Navajo | Cholla | Arizona Public Service Company | 1128.8 | AZ0023311 | 8/10/2003 | None | None | | | |
| AZ | Pima | Irvington Generating Station | Tucson Electric Power Company | 173.3 | AZS000013 | None | None | None | | | |
| AZ | Coconino | Navajo Generating Station | Salt River Project | 2409.3 | AZU000010 | None | None | None | | | |
| CO | Denver | Arapahoe | Public Service Company of Colorado | 152.5 | CO0001091 | 12/31/2012 | Mercury, Lead, Selenium | Selenium | Ash | South Platte River | |
| CO | Adams | Cherokee | Public Service Company of Colorado | 676.3 | CO0001104 | 4/30/2014 | Boron, Cadmium, Mercury, Lead, Selenium | Cadmium, Lead, Selenium | Ash | South Platte River | Cadmium |
| CO | Pueblo | Comanche | Public Service Company of Colorado | 1635.3 | CO0000612 | 10/31/2013 | None | None | | St. Charles River | Selenium |
| CO | Moffat | Craig | Tri-State Generation & Transmission | 1427.6 | COR900399 | 6/30/2017 | None | None | | Unnamed tributary -Johnson Gulch | |
| CO | Routt | Hayden | Public Service Company of Colorado | 438.6 | COR900429 | 6/30/2017 | None | None | | Marshall Roberts Ditch -Yampa River | |
| CO | Prowers | Lamar | Lamar Utilities Board | 43.5 | COR900436 | 6/30/2017 | None | None | | Arkansas River | |
| CO | El Paso | Martin Drake | Colorado Springs Utilities | 257 | CO0000850 | 10/31/2010 | Lead, Arsenic, Selenium | None | | Fountain Creek | |
| CO | Montrose | Nucla | Tri-State Generation & Transmission | 113.8 | CO0000540 | 10/31/2011 | Mercury, Lead, Boron, Arsenic | None | | San Miguel River | |
| CO | Larimer | Rawhide Energy Station | Platte River Power Authority | 293.6 | COR900559 | 6/30/2017 | None | None | | Boxelder Creek South Platte River | |
| CO | El Paso | Ray D Nixon | Colorado Springs Utilities | 207 | COR900550 | 6/30/2017 | None | None | | Unnamed Tributary - Little Fountain Creek | |
| CO | Boulder | Valmont | Public Service Company of Colorado | 191.7 | CO0001112 | 10/31/2017 | Cadmium, Boron, Mercury, Arsenic | None | Ash | Tributaries to St. Vrain Creek | Selenium |

## US COAL-FIRED POWER PLANTS

| STATE | COUNTY | FACILITY NAME | OPERATOR | NAMEPLATE CAPACITY (MW) | NPDES PERMIT ID | PERMIT EXPIRATION DATE | POLLUTANTS MONITORED | POLLUTANTS WITH A LIMIT | COAL ASH OR SCRUBBER OUTFALL? | IMPAIRED WATER | CAUSE OF IMPAIRMENT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **CT** | Fairfield | Bridgeport Harbor Station | PSEG Power Connecticut, LLC | 400 | CT0030180 | 12/29/2010 | Lead | None | | Cedar Creek/ Long Island Sound; Brideport Harbor | Nutrients |
| **DE** | Sussex | Indian River | Indian River Power, LLC | 782.4 | DE0050580 | 12/31/2016 | None | None | Ash | | |
| **DE** | Kent | NRG Energy Center Dover | NRG Energy, Inc | 18 | DE0050466 | 8/31/2013 | None | None | | | |
| **FL** | Hillsborough | Big Bend | Tampa Electric Company | 1822.5 | FL0000817 | 12/29/2016 | Arsenic, Mercury, Lead, Selenium | Mercury | Scrubber | Big Bend Bayou | |
| **FL** | Polk | C D McIntosh Jr Power Plant | City of Lakeland - Lakeland Electric | 363.8 | FL0026301 | 12/5/2015 | None | None | | | |
| **FL** | Duval | Cedar Bay Generating Co. LP | Cedar Bay Operating Services LLC | 291.6 | FL0061204 | 11/4/2015 | None | None | | Broward River | |
| **FL** | Escambia | Crist Electric Generating Plant | Gulf Power Company | 1135.1 | FL0002275 | 1/27/2016 | Arsenic, Cadmium, Mercury, Lead, Selenium | Arsenic, Cadmium, Mercury, Lead, Selenium | Ash | | |
| **FL** | Citrus | Crystal River | Florida Power Corporation | 2442.7 | FL0000159 | 3/11/2017 | Arsenic, Cadmium, Mercury, Lead, Selenium | Arsenic, Cadmium, Mercury, Lead, Selenium | | | |
| **FL** | Orange | Curtis H. Stanton Energy Center | Orlando Utilities Commission | 929 | FL0681661 | 6/23/2016 | None | None | | | |
| **FL** | Alachua | Deerhaven | Gainesville Regional Utilities | 250.7 | FLR05B392 | 2/2/2016 | None | None | | | |
| **FL** | Martin | Indiantown Cogeneration, LP | Indiantown Cogeneration Limited Partnership | 395.4 | FLR05B625 | 4/28/2015 | None | None | | | |
| **FL** | Bay | Lansing Smith Generating Plant | Gulf Power Company | 340 | FL0002267 | 12/1/2014 | Arsenic, Cadmium, Mercury, Lead, Selenium, Boron | Lead | Ash | Alligator Bayou | |
| **FL** | Duval | Northside | JEA | 595 | FL0001031 | 5/8/2017 | Arsenic, Cadmium, Mercury, Lead, Selenium | Arsenic, Mercury, Lead, Selenium | | | |
| **FL** | Polk | Polk | Tampa Electric Company | 326.3 | FL0043869 | 3/30/2014 | Arsenic, Cadmium, Lead, Selenium | Arsenic, Cadmium, Lead, Selenium | Ash | | |
| **FL** | Jackson | Scholz Electric Generating Plant | Gulf Power Company | 98 | FL0002283 | 9/22/2015 | Cadmium, Lead | Lead | Ash | Apalachicola River | |
| **FL** | Putnam | Seminole | Seminole Electric Cooperative, Inc. | 1429.2 | FL0036498 | 8/28/2017 | Arsenic, Cadmium, Lead, Mercury | Selenium, Lead, Mercury | Scrubber | Rice Creek | Cadmium; Iron; Lead; Nickel; Silver |
| **FL** | Duval | St. Johns River Power | JEA | 1358 | FL0037869 | 2/9/2011 | Arsenic, Mercury, Lead | Arsenic, Mercury, Selenium | Ash | | |
| **GA** | Bartow | Bowen | Georgia Power Company | 3498.6 | GA0001449 | 6/30/2012 | None | None | Scrubber | Etowah River | |
| **GA** | Floyd | Hammond | Georgia Power Company | 953 | GA0001457 | 6/30/2012 | None | None | Ash & scrubber | Coosa River | |
| **GA** | Putnam | Harllee Branch | Georgia Power Company | 1746.2 | GA0026051 | 2/28/2010 | None | None | Ash | | |
| **GA** | Chatham | Kraft | Georgia Power Company | 207.9 | GA0003816 | 5/31/2004 | Arsenic, Lead, Mercury, Selenium, Cadmium | None | Ash | | |
| **GA** | Effingham | McIntosh (6124) | Georgia Power Company | 177.6 | GA0003883 | 5/31/2004 | Arsenic, Lead, Mercury, Selenium, Cadmium | None | Ash | | |
| **GA** | Dougherty | Mitchell | Georgia Power Company | 163.2 | GA0001465 | 2/28/2015 | None | None | Ash | | |
| **GA** | Monroe | Scherer | Georgia Power Company | 3564 | GA0035564 | 11/30/2006 | None | None | Ash | | |
| **GA** | Heard | Wansley | Georgia Power Company | 1904 | GA0026778 | 8/31/2011 | None | None | | | |
| **GA** | Coweta | Yates | Georgia Power Company | 1487.3 | GA0001473 | 8/31/2011 | None | None | Ash & Scrubber | Chattahoochee River | |
| **IA** | Story | Ames | City of Ames | 108.8 | IA0033235 | 7/22/2006 | None | None | Ash | South Skunk River | |
| **IA** | Des Moines | Burlington | Interstate Power & Light Company | 212 | IA0001783 | 9/4/2011 | None | None | Ash | | |

| US COAL-FIRED POWER PLANTS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **STATE** | **COUNTY** | **FACILITY NAME** | **OPERATOR** | **NAMEPLATE CAPACITY (MW)** | **NPDES PERMIT ID** | **PERMIT EXPIRATION DATE** | **POLLUTANTS MONITORED** | **POLLUTANTS WITH A LIMIT** | **COAL ASH OR SCRUBBER OUTFALL?** | **IMPAIRED WATER** | **CAUSE OF IMPAIRMENT** |
| **IA** | Clay | Earl F Wisdom | Corn Belt Power Cooperative | 33 | IA0004570 | 3/26/2007 | None | None | | | |
| **IA** | Muscatine | Fair Station | Central Iowa Power Cooperative | 62.5 | IA0001562 | 10/20/2014 | None | None | Ash | | |
| **IA** | Woodbury | George Neal North | MidAmerican Energy Company | 1046 | IA0004103 | 11/30/2016 | None | None | Ash | Missouri River | Mercury (Fish Consumption Advisory) |
| **IA** | Woodbury | George Neal South | MidAmerican Energy Company | 640 | IA0061859 | 3/30/2014 | None | None | Ash | Missouri River | Mercury (Fish Consumption Advisory) |
| **IA** | Allamakee | Lansing | Interstate Power & Light Company | 312 | IA0003735 | 10/1/2003 | Lead | Lead | Ash | | |
| **IA** | Louisa | Louisa | MidAmerican Energy Company | 811.9 | IA0063282 | 3/31/2017 | None | None | Ash | | |
| **IA** | Clinton | Milton L Kapp | Interstate Power & Light Company | 218.5 | IA0001759 | 7/15/2004 | None | None | Ash | | |
| **IA** | Muscatine | Muscatine | Muscatine Power and Water | 293.5 | IA0001082 | 5/22/2008 | None | None | Ash | | |
| **IA** | Wapello | Ottumwa | Interstate Power & Light Company | 725.9 | IA0060909 | 3/4/2008 | None | None | Ash | | |
| **IA** | Marion | Pella | City of Pella | 38 | IA0032701 | 12/19/2009 | None | None | Ash | | |
| **IA** | Linn | Prairie Creek | Interstate Power & Light Company | 213.4 | IA0000540 | 7/31/2015 | None | None | Ash | | |
| **IA** | Scott | Riverside | MidAmerican Energy Company | 141 | IA0003611 | 12/31/2016 | None | None | Ash | | |
| **IA** | Black Hawk | Streeter Station | Cedar Falls Municipal Electric | 51.5 | IA0002534 | 8/31/2017 | None | None | | | |
| **IA** | Marshall | Sutherland | Interstate Power & Light Company | 119.1 | IA0000108 | 11/12/2011 | None | None | Ash | | |
| **IA** | Pottawattamie | Walter Scott Jr. Energy Center | MidAmerican Energy Company | 1778.9 | IA0004308 | 2/26/2008 | None | None | Ash | | |
| **IL** | Randolph | Baldwin Energy Complex | Dynegy Midwest Generation Inc. | 1894.1 | IL0000043 | 4/30/2010 | None | None | Ash | | |
| **IL** | Montgomery | Coffeen | Ameren Energy Generating Company | 1005.4 | IL0000108 | 1/31/2013 | Boron, Mercury | None | Ash | Coffeen Lake | Phosphorus; Total Suspended Solids; Total Dissolved Solids; Ph |
| **IL** | Sangamon | Dallman | City of Springfield, IL | 667.7 | IL0024767 | 12/31/2006 | Boron | Boron | Ash & Scrubber | Illinois River | Mercury; Silver; Nitorgen; Phosphorus; Total Suspended Solids; Fish Consumption Advisory |
| **IL** | Fulton | Duck Creek | Ameren Energy Resources Generating Company | 441 | IL0055620 | 2/28/2013 | Boron, Mercury | Boron | Ash | Illinois River | Silver, Boron, Iron, Mercury |
| **IL** | Peoria | E D Edwards | Ameren Energy Resources Generating Company | 780.3 | IL0001970 | 1/31/2011 | None | None | Ash | South Branch of the Chicago River | Fish Consumption Advisory |
| **IL** | Mason | Havana | Dynegy Midwest Generation Inc. | 488 | IL0001571 | 9/30/2017 | Mercury | None | Ash & Scrubber | Illinois River | Mercury; Silver; Nitorgen; Phosphorus; Total Suspended Solids; Fish Consumption Advisory |
| **IL** | Putnam | Hennepin Power Station | Dynegy Midwest Generation Inc. | 306.3 | IL0001554 | 4/30/2016 | Mercury | None | Ash | Illinois River | Mercury (Fish Consumption Advisory) |
| **IL** | Will | Joliet 29 | Midwest Generation EME, LLC | 1320 | IL0064254 | 11/30/2000 | None | None | Ash | Des Plaines River | Mercury (Fish Consumption Advisory) |
| **IL** | Will | Joliet 9 | Midwest Generation EME, LLC | 360.4 | IL0002216 | 3/31/2001 | None | None | Ash | Des Plaines River | Fish Consumption Advisory |
| **IL** | Massac | Joppa Steam | Electric Energy, Inc. | 1099.8 | IL0004171 | 7/31/2014 | Boron, Mercury | None | Ash | Ohio River | |
| **IL** | Christian | Kincaid Station | Dominion Energy Services Company | 1319 | IL0002241 | 4/30/2005 | None | None | Ash | Lake Sangchris | Nutrients |
| **IL** | Williamson | Marion | Southern Illinois Power Cooperative | 272 | IL0004316 | 2/29/2012 | Boron, Mercury | Boron | Ash & Scrubber | | |
| **IL** | Jasper | Newton | Ameren Energy Generating Company | 1234.8 | IL0049191 | 1/31/2012 | Boron, Mercury | Boron | Ash & Scrubber | Newton Lake | Nutrients |
| **IL** | Tazewell | Powerton | Midwest Generation EME, LLC | 1785.6 | IL0002232 | 10/31/2010 | None | None | Ash | | |
| **IL** | Washington | Prairie State Generating Company | Prairie State Generating Company | 245 | IL0076996 | 11/30/2010 | Arsenic, Cadmium, Mercury, Lead, Selenium | None | Ash | Illinois River | Mercury |
| **IL** | Lake | Waukegan | Midwest Generation LLC | 681.7 | IL0002259 | 7/31/2005 | None | None | Ash | | |
| **IL** | Will | Will County | Midwest Generation EME, LLC | 897.6 | IL0002208 | 5/31/2010 | None | None | Ash | Chicago Sanitary & Ship Canal | Iron; Oil; Nitrogen; Phosphorus; Fish Consumption Advisory |

## US COAL-FIRED POWER PLANTS

| STATE | COUNTY | FACILITY NAME | OPERATOR | NAMEPLATE CAPACITY (MW) | NPDES PERMIT ID | PERMIT EXPIRATION DATE | POLLUTANTS MONITORED | POLLUTANTS WITH A LIMIT | COAL ASH OR SCRUBBER OUTFALL? | IMPAIRED WATER | CAUSE OF IMPAIRMENT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **IL** | Madison | Wood River Power Station | Dynegy Midwest Generation Inc. | 500.1 | IL0000701 | 12/31/2014 | Arsenic, Cadmium | Boron | Ash | Wood River | Copper; Manganese; Total Dissolved Solids; Phosphorus; Total Suspended Solids; Ph |
| **IN** | Posey | A B Brown Generating Station | Southern Indiana Gas and Electric Company | 530.4 | IN0052191 | 9/30/2016 | Arsenic, Boron, Cadmium, Mercury, Selenium | None | Ash | Ohio River - Evansville to Uniontown | Mercury (fish tissue) |
| **IN** | Warrick | Alcoa Allowance Management Inc | Alcoa Allowance Management, Inc. | 777.6 | IN0055051 | 3/31/1991 | None | None | Ash & Scrubber | Ohio River - Cannelton to Newburgh | Mercury (fish tissue) |
| **IN** | Porter | Bailly Generating Station | Northern Indiana Public Service Company | 603.5 | IN0000132 | 7/31/2017 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | None | Ash | Lake Michigan Shoreline - Dunes | Mercury |
| **IN** | Marion | C. C. Perry K Steam Plant | Citizens Thermal | 23.4 | IN0004677 | 12/31/2016 | Mercury | None | | | |
| **IN** | Vermillion | Cayuga | Duke Energy Corporation | 1062 | IN0002763 | 7/31/2012 | Arsenic, Cadmium, Selenium, Mercury | Mercury | Ash | Wabash River | Mercury (fish tissue) |
| **IN** | Jefferson | Clifty Creek | Indiana Kentucky Electric Corp | 1303.8 | IN0001759 | 1/31/2017 | Arsenic, Boron, Cadmium, Mercury, Selenium, Lead | None | Ash | | |
| **IN** | Warrick | F B Culley Generating Station | Southern Indiana Gas and Electric Company | 368.9 | IN0002259 | 11/30/2016 | Arsenic, Boron, Cadmium, Mercury, Selenium | Cadmium, Mercury | Ash | | |
| **IN** | Pike | Frank E Ratts | Hoosier Energy REC, Inc. | 233.2 | IN0004391 | 9/30/2017 | Arsenic, Mercury, Selenium | None | Ash | White River | Mercury (fish tissue) |
| **IN** | Morgan | IPL - Eagle Valley Generating Station | Indianapolis Power & Light Company | 301.6 | IN0004693 | 9/30/2017 | Arsenic, Cadmium, Lead, Mercury, Selenium, Boron | None | Ash | White River | Mercury (fish tissue) |
| **IN** | Marion | IPL - Harding Street Station (EW Stout) | Indianapolis Power & Light Company | 698 | IN0004685 | 9/30/2017 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | Cadmium, Lead, Mercury (effective Aug. 28, 2015) | Ash & Scrubber | White River | Mercury (fish tissue) |
| **IN** | Pike | IPL - Petersburg Generating Station | Indianapolis Power & Light Company | 2146.7 | IN0002887 | 9/30/2017 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | Boron, Cadmium, Lead, Mercury, Selenium (effective Sept. 28, 2015) | Ash & Scrubber | White River | Mercury (fish tissue) |
| **IN** | Sullivan | Merom | Hoosier Energy REC, Inc. | 1080 | IN0050296 | 12/31/2015 | Arsenic, Cadmium, Mercury, Lead, Selenium | None | Scrubber | | |
| **IN** | LaPorte | Michigan City Generating Station | Northern Indiana Public Service Company | 540 | IN0000116 | 2/29/2016 | Cadmium, Mercury, Lead | None | Ash | Lake Michigan Shoreline-Dunes | Mercury (Fish Consumption Advisory) |
| **IN** | Floyd | R Gallagher | Duke Energy Corporation | 600 | IN0002798 | 8/31/2015 | Arsenic, Cadmium, Selenium | None | Ash | | |
| **IN** | Jasper | R M Schahfer Generating Station | Northern Indiana Public Service Company | 1943.4 | IN0053201 | 4/30/2015 | Arsenic, Cadmium, Mercury, Lead, Selenium | None | | | |
| **IN** | Spencer | Rockport | Indiana Michigan Power Company | 2600 | IN0051845 | 11/30/2015 | Boron, Mercury, Lead, Selenium | Lead, Selenium | Ash & Scrubber | Ohio River - Cannelton to Newburgh | Mercury (fish tissue) |
| **IN** | Dearborn | Tanners Creek | Indiana Michigan Power Company | 1100.1 | IN0002160 | 5/31/2015 | Arsenic, Cadmium, Mercury | None | Ash | Ohio River and Tanners Creek | Mercury in fish tissue |
| **IN** | Vigo | Wabash River Gen Station | Duke Energy Corporation | 860.2 | IN0063134 | 10/31/2013 | Arsenic, Mercury | None | Ash | Wabash River - Wabash Gen Sta to Lost Creek | Mercury (Fish Consumption Advisory) |
| **IN** | Wayne | Whitewater Valley | City of Richmond | 93.9 | IN0063151 | 11/30/2013 | None | None | | Short Creek and other Tribs | |
| **KS** | Finney | Holcomb | Sunflower Electric Power Corporation | 348.7 | KS0080063 | 12/31/2011 | Arsenic, Cadmium, Lead, Selenium | None | | | |
| **KS** | Pottawatomie | Jeffrey Energy Center | Westar Energy, Inc. | 2160 | KS0080632 | 5/31/2013 | Arsenic, Cadmium, Mercury, Lead, Selenium | Mercury | | Deep Creek | Phosphorus |

## US COAL-FIRED POWER PLANTS

| STATE | COUNTY | FACILITY NAME | OPERATOR | NAMEPLATE CAPACITY (MW) | NPDES PERMIT ID | PERMIT EXPIRATION DATE | POLLUTANTS MONITORED | POLLUTANTS WITH A LIMIT | COAL ASH OR SCRUBBER OUTFALL? | IMPAIRED WATER | CAUSE OF IMPAIRMENT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **KS** | Linn | La Cygne | Kansas City Power & Light Company | 1578 | KS0080071 | 10/31/2009 | None | None | Ash & Scrubber | | |
| **KS** | Douglas | Lawrence Energy Center | Westar Energy, Inc. | 566 | KS0079821 | 3/31/2013 | Arsenic, Cadmium, Mercury, Lead, Selenium | None | Ash & Scrubber | | |
| **KS** | Wyandotte | Nearman Creek | Kansas City Board of Public Utilities | 261 | KS0119075 | 12/31/2008 | None | None | Ash | | |
| **KS** | Wyandotte | Quindaro | Kansas City Board of Public Utilities | 239.1 | KS0080942 | 12/31/2008 | None | None | | | |
| **KS** | Cherokee | Riverton | Empire District Electric Company | 87.5 | KS0079812 | 12/31/2013 | Lead | None | Ash | Spring River | |
| **KS** | Shawnee | Tecumseh Energy Center | Westar Energy, Inc. | 232 | KS0079731 | 7/31/2017 | None | None | Ash | Kansas River | Lead |
| **KY** | Lawrence | Big Sandy | Kentucky Power Company | 1096.8 | KY0000221 | 3/31/2006 | None | None | Ash | Big Sandy River | Iron |
| **KY** | Jefferson | Cane Run | LGE and KU Energy LLC | 644.6 | KY0002062 | 10/31/2007 | None | None | Ash | | |
| **KY** | Hancock | Coleman | Big Rivers Electric Corporation | 602 | KY0001937 | 2/28/2005 | None | None | Ash | Ohio River | Mercury in fish tissue |
| **KY** | Ohio | D B Wilson | Big Rivers Electric Corporation | 566.1 | KY0054836 | 10/31/2004 | None | None | Scrubber | | |
| **KY** | Mercer | E W Brown | LGE and KU Energy LLC | 757.1 | KY0002020 | 2/28/2015 | None | None | Ash | Herrington Lake | Methylmercury (Fish Consumption Advisory); Ph; Total Suspended Solids |
| **KY** | Boone | East Bend | Duke Energy Corporation | 669.3 | KY0040444 | 7/31/2007 | None | None | Ash & Scrubber | | |
| **KY** | Daviess | Elmer Smith | Owensboro Municipal Utilities | 445.3 | KY0001295 | 3/31/2005 | None | None | Ash & Scrubber | Ohio River (Cannelton to Newburgh) | Mercury (Fish Consumption Advisory) |
| **KY** | Carroll | Ghent | Kentucky Utilities Company | 2225.9 | KY0002038 | 6/30/2007 | None | None | Ash | | |
| **KY** | Muhlenberg | Green River | Kentucky Utilities Company | 188.6 | KY0002011 | 10/31/2004 | None | None | Ash | | |
| **KY** | Mason | H L Spurlock | East Kentucky Power Cooperative | 1608.5 | KY0022250 | 4/30/2004 | None | None | Ash | | |
| **KY** | Henderson | HMP&L Station 2 | Big Rivers Electric Corporation | 405 | KY0001929 | 11/30/2009 | None | None | Ash | | |
| **KY** | Pulaski | John S. Cooper | East Kentucky Power Cooperative | 344 | KY0003611 | 10/31/2013 | None | None | Ash & Scrubber | Lake Cumberland | Methylmercury |
| **KY** | Jefferson | Mill Creek | LGE and KU Energy LLC | 1717.2 | KY0003221 | 10/31/2007 | None | None | Ash & Scrubber | Ohio River/Mill Creek/Pond Creek | |
| **KY** | Muhlenberg | Paradise | Tennessee Valley Authority | 2558.2 | KY0004201 | 10/31/2009 | None | None | Ash | | |
| **KY** | Webster | R D Green | Big Rivers Electric Corporation | 586 | KY0001929 | 11/30/2009 | None | None | Ash | | |
| **KY** | Webster | Robert Reid | Big Rivers Electric Corporation | 96 | KY0001929 | 11/30/2009 | None | None | Ash | | |
| **KY** | McCracken | Shawnee | Tennessee Valley Authority | 1750 | KY0004219 | 8/31/2010 | None | None | Ash & Scrubber | | |
| **KY** | Trimble | Trimble County | LGE and KU Energy LLC | 1400.1 | KY0041971 | 4/30/2015 | None | None | Scrubber | | |
| **KY** | Woodford | Tyrone | Kentucky Utilities Company | 75 | KY0001899 | 1/31/2007 | None | None | Ash | Kentucky River, 53.2 to 66.95 | Methylmercury (Fish Consumption Advisory) |
| **KY** | Clark | William C. Dale | East Kentucky Power Cooperative | 216 | KY0002194 | 11/30/2006 | None | None | Ash | Kentucky River, 121.1 to 138.5 | Methylmercury (Fish Consumption Advisory) |
| **LA** | Pointe Coupee | Big Cajun 2 | Louisiana Generating, LLC | 1871 | LA0054135 | 4/30/2014 | None | None | Ash | | |
| **LA** | Rapides | Brame Energy Center | Cleco Power LLC | 558 | LA0008036 | 3/31/2011 | Lead | Lead | Ash | | |
| **LA** | De Soto | Dolet Hills Power Station | Cleco Power LLC | 720.7 | LA0062600 | 10/28/2017 | Lead | Lead | Ash & Scrubber | | |
| **LA** | Calcasieu | R S Nelson | Entergy Corporation | 614.6 | LA0005843 | 9/30/2014 | Lead | Lead | Ash | Houston River - From Bear Head Creek to West Fork Calcasieu | |
| **MA** | Bristol | Brayton Point | Dominion Energy Brayton Point, LLC | 1124.6 | MA0003654 | 5/31/2017 | Cadmium, Lead | None | Ash | Mount Hope Bay | Nutrients; Unknown Toxicity |
| **MA** | Hampden | Mount Tom | FirstLight Power Resources | 136 | MA0005339 | 9/17/1997 | None | None | Ash | Connecticut River | Mercury (Fish Consumption Advisory) |
| **MA** | Essex | Salem Harbor Station | Footprint Power Salem Harbor Operations LLC | 329.6 | MA0005096 | 10/29/1999 | Arsenic, Cadmium, Lead, Mercury, Selenium | None | Ash | | |

# US COAL-FIRED POWER PLANTS

| STATE | COUNTY | FACILITY NAME | OPERATOR | NAMEPLATE CAPACITY (MW) | NPDES PERMIT ID | PERMIT EXPIRATION DATE | POLLUTANTS MONITORED | POLLUTANTS WITH A LIMIT | COAL ASH OR SCRUBBER OUTFALL? | IMPAIRED WATER | CAUSE OF IMPAIRMENT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **MD** | Allegany | AES Warrior Run | AES Corporation | 229 | MD0066079 | 12/31/2017 | None | None | | Lower North Branch Potomac River | Cadmium; Nickel; Ph; Phosphorus |
| **MD** | Anne Arundel | Brandon Shores | Raven Power Fort Smallwood LLC | 1370 | MD0001503 | 4/30/2014 | Arsenic, Cadmium, Mercury, Lead, Selenium | None | Scrubber | | |
| **MD** | Baltimore | C P Crane | C.P. Crane LLC | 399.8 | MD0001511 | 6/30/2015 | None | None | Ash | Middle River - Browns Creek (tidal) | |
| **MD** | Prince George's | Chalk Point | GenOn Chalk Point, LLC | 728 | MD0002658 | 6/30/2014 | None | None | Scrubber | | |
| **MD** | Montgomery | Dickerson | GenOn Mid-Atlantic, LLC | 588 | MD0002640 | 10/31/2014 | Arsenic, Cadmium, Mercury, Lead, Selenium | None | Ash & Scrubber | | |
| **MD** | Anne Arundel | Herbert A Wagner | Raven Power Fort Smallwood LLC | 495 | MD0001503 | 4/30/2014 | None | None | Ash | | |
| **MD** | Charles | Morgantown | GenOn Mid-Atlantic, LLC | 1252 | MD0002674 | 10/31/2014 | Arsenic, Cadmium, Mercury, Lead, Selenium | None | Ash & Scrubber | | |
| **MI** | Muskegon | B C Cobb | Consumers Energy Company | 312.6 | MI0001520 | 10/1/2013 | Mercury | None | Ash | Rivers/ Streams in HUC 040601021004 | Mercury (Fish Consumption Advisory) |
| **MI** | Saint Clair | Belle River | Detroit Edison Company | 1395 | MI0038172 | 10/1/2013 | Arsenic, Mercury, Selenium | Mercury, Selenium | Ash | Rivers/ Streams in HUC 040900010407 | Fish Consumption Advisory |
| **MI** | Bay | Dan E Karn | Consumers Energy Company | 544 | MI0001678 | 10/1/2011 | Mercury | Mercury | Ash | Rivers/ Streams in HUC 040801030101 | Fish Consumption Advisory |
| **MI** | Ingham | Eckert Station | Lansing Board of Water and Light | 375 | MI0004464 | 10/1/2012 | Mercury | None | | Rivers/ Streams in HUC 040500040703 | Mercury (Fish Consumption Advisory) |
| **MI** | Hillsdale | Endicott Generating | Michigan South Central Power Agency | 55 | MI0039608 | 10/1/2016 | Arsenic, Boron, Cadmium, Mercury, Selenium | Boron, Selenium | | | |
| **MI** | Eaton | Erickson | Lansing Board of Water and Light | 154.7 | MI0005428 | 10/1/2012 | Selenium | None | | Rivers/ Streams in HUC 040500040704 | Mercury (Fish Consumption Advisory) |
| **MI** | Huron | Harbor Beach | Detroit Edison Company | 121 | MI0001856 | 10/1/2014 | Mercury, Selenium | None | Ash | | |
| **MI** | Ottawa | J B Sims | Grand Haven Board of Light and Power | 80 | MI0000728 | 10/1/2015 | Mercury, Selenium | None | Ash & Scrubber | Grand River | Mercury; Mercury in fish tissue |
| **MI** | Bay | J C Weadock | Consumers Energy Company | 312.6 | MI0001678 | 10/1/2011 | Mercury | Mercury | Ash | Rivers/ Streams in HUC 040801030101 | Fish Consumption Advisory |
| **MI** | Ottawa | J H Campbell | Consumers Energy Company | 1585.9 | MI0001422 | 10/1/2011 | Mercury | None | Ash | | |
| **MI** | Monroe | J R Whiting | Consumers Energy Company | 345.4 | MI0001864 | 10/1/2012 | Mercury, Lead, Selenium | Mercury | Ash | | |
| **MI** | Ottawa | James De Young | City of Holland | 62.8 | MI0001473 | 10/1/2011 | None | None | Ash | Rivers/ Streams in HUC 040500020408 | |
| **MI** | Monroe | Monroe | Detroit Edison Company | 3279.6 | MI0001848 | 10/1/2014 | Mercury | Mercury | Ash & Scrubber | Rivers/ Streams in HUC 041000020410 | Mercury (Fish Consumption Advisory) |
| **MI** | Marquette | Presque Isle | Wisconsin Electric Power Company | 450 | MI0006106 | 10/1/2012 | None | None | Ash | | |
| **MI** | Wayne | River Rouge | Detroit Edison Company | 650.6 | MI0001724 | 10/1/2012 | Boron, Mercury, Selenium | None | Ash | Rivers/ Streams in HUC 040900040407 | Mercury (Fish Consumption Advisory) |
| **MI** | Marquette | Shiras | Marquette Board of Light and Power | 77.5 | MI0006076 | 10/1/2012 | Arsenic, Mercury, Selenium | None | Ash | | |
| **MI** | Saint Clair | St. Clair | Detroit Edison Company | 1547 | MI0001686 | 10/1/2013 | Mercury | Mercury | Ash | | |
| **MI** | Manistee | TES Filer City Station | CMS Enterprises Co. | 70 | None | None | None | None | | | |
| **MI** | Wayne | Trenton Channel | Detroit Edison Company | 775.5 | MI0001791 | 10/1/2012 | Mercury | None | Ash | | |
| **MI** | Wayne | Wyandotte | Wyandotte Municipal Services | 73 | MI0038105 | 10/1/2012 | Cadmium, Mercury, Selenium | Mercury | Ash | | |
| **MN** | Washington | Allen S King | Northern States Power (Xcel Energy) | 598.4 | MN0000825 | 1/31/2010 | None | None | Ash | | |

## US COAL-FIRED POWER PLANTS

| STATE | COUNTY | FACILITY NAME | OPERATOR | NAMEPLATE CAPACITY (MW) | NPDES PERMIT ID | PERMIT EXPIRATION DATE | POLLUTANTS MONITORED | POLLUTANTS WITH A LIMIT | COAL ASH OR SCRUBBER OUTFALL? | IMPAIRED WATER | CAUSE OF IMPAIRMENT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **MN** | Dakota | Black Dog | Northern States Power (Xcel Energy) | 293.1 | MN0000876 | 2/28/2013 | Mercury | None | Ash | | |
| **MN** | Itasca | Boswell Energy Center | Minnesota Power, Inc. | 1072.5 | MN0001007 | 2/29/2012 | Lead, Mercury | Mercury | Ash & Scrubber | Blackwater | |
| **MN** | Otter Tail | Hoot Lake | Otter Tail Power Company | 129.4 | MN0002011 | 11/30/2012 | Mercury | None | | | |
| **MN** | Saint Louis | Laskin Energy Center | Minnesota Power, Inc. | 116 | MN0000990 | 3/31/2010 | Boron, Mercury, Selenium | Mercury | Ash & Scrubber | | |
| **MN** | Sherburne | Sherburne County | Northern States Power (Xcel Energy) | 2430.6 | MN0002186 | 7/31/2014 | None | None | | | |
| **MN** | Olmsted | Silver Lake | Rochester Public Utilities | 99 | MN0001139 | 2/28/2013 | None | None | | | |
| **MN** | Cook | Taconite Harbor Energy Center | Minnesota Power, Inc. | 252 | MN0002208 | 11/30/2010 | Mercury | None | | | |
| **MO** | Jasper | Asbury | Empire District Electric Company | 231.5 | MO0095362 | 12/1/2010 | None | None | Ash | | |
| **MO** | Jackson | Blue Valley | Independence Power and Light | 115 | MO0115924 | 5/5/2016 | None | None | Ash | | |
| **MO** | Osage | Chamois Power Plant | Associated Electric Cooperative, Inc. | 59 | MO0004766 | 5/15/2008 | None | None | Ash | | |
| **MO** | Boone | Columbia | City of Columbia | 38.5 | MO0004979 | 7/5/2017 | Arsenic, Cadmium, Mercury, Lead, Selenium | None | Ash | | |
| **MO** | Jackson | Hawthorn | Kansas City Power & Light Company | 594.3 | MO0004855 | 7/27/2005 | None | None | | | |
| **MO** | Platte | Iatan | Kansas City Power & Light Company | 1640 | MO0082996 | 2/5/2009 | None | None | | | |
| **MO** | Greene | James River | City of Springfield, MO | 253 | MOR109Z51 | 3/7/2012 | Arsenic, Boron, Cadmium, Lead, Mercury, Selenium | None | Ash | Lake Springfield | |
| **MO** | Greene | John Twitty Energy Center | City of Springfield, MO | 494 | MO0089940 | 8/12/2015 | Selenium | Selenium | Ash | | |
| **MO** | Franklin | Labadie | Union Electric Company | 2389.4 | MO0004812 | 3/17/1999 | None | None | Ash | | |
| **MO** | Buchanan | Lake Road | KCP&L Greater Missouri Operations Company | 90 | MO0004898 | 6/12/2008 | None | None | Ash | | |
| **MO** | Saint Louis | Meramec | Union Electric Company | 923 | MO0000361 | 5/18/2005 | None | None | Ash | Mississippi River | Manganese; Fish Consumption Advisory |
| **MO** | Henry | Montrose | Kansas City Power & Light Company | 564 | MO0101117 | 3/26/2014 | Boron | None | Ash | | |
| **MO** | New Madrid | New Madrid Power Plant | Associated Electric Cooperative, Inc. | 1200 | MO0001171 | 4/21/2016 | None | None | Ash | | |
| **MO** | Jefferson | Rush Island | Union Electric Company | 1242 | MO0000043 | 9/30/2009 | None | None | Ash | | |
| **MO** | Jackson | Sibley | KCP&L Greater Missouri Operations Company | 524 | MO0004871 | 11/2/2005 | None | None | Ash & Scrubber | | |
| **MO** | Scott | Sikeston | Sikeston Bd. of Municipal Utilities | 261 | MO0095575 | 2/12/2014 | None | None | | | |
| **MO** | Saint Charles | Sioux | Union Electric Company | 1099.4 | MO0000353 | 4/15/2009 | None | None | Ash | | |
| **MO** | Randolph | Thomas Hill Energy Center | Associated Electric Cooperative, Inc. | 1135 | MO0097675 | 12/23/2008 | None | None | Ash & Scrubber | | |
| **MS** | Jackson | Daniel Electric Generating Plant | Mississippi Power Company | 1096.6 | MS0024511 | 12/31/2013 | None | None | Ash | | |
| **MS** | Lamar | R D Morrow Senior Generating Plant | South Mississippi Elec. Power Assoc | 400 | MS0028258 | 12/31/2010 | None | None | Ash & Scrubber | | |
| **MS** | Choctaw | Red Hills Generation Facility | Tractebel Power, Inc. | 513.7 | MS0053881 | 12/31/2016 | Selenium | Selenium | | | |
| **MS** | Harrison | Watson Electric Generating Plant | Mississippi Power Company | 877.2 | MS0002925 | 11/30/2013 | None | None | Ash | | |
| **MT** | Big Horn | Hardin Generating Station | Colorado Energy Management, LLC | 115.7 | MTR000457 | 9/30/2011 | None | None | | | |

## US COAL-FIRED POWER PLANTS

| STATE | COUNTY | FACILITY NAME | OPERATOR | NAMEPLATE CAPACITY (MW) | NPDES PERMIT ID | PERMIT EXPIRATION DATE | POLLUTANTS MONITORED | POLLUTANTS WITH A LIMIT | COAL ASH OR SCRUBBER OUTFALL? | IMPAIRED WATER | CAUSE OF IMPAIRMENT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **MT** | Yellowstone | J E Corette | P P & L Montana, LLC | 172.8 | MT0000396 | 3/1/2005 | None | None | Ash | Yellowstone River | Arsenic; Nutrients |
| **MT** | Richland | Lewis & Clark | Montana Dakota Utilities Company | 50 | MT0000302 | 11/30/2005 | None | None | Ash | Yellowstone River | Chromium, Copper, Lead |
| **NC** | Buncombe | Asheville | Carolina Power & Light Company | 413.6 | NC0000396 | 12/31/2010 | Arsenic, Cadmium, Mercury, Lead, Selenium | Mercury | Ash & Scrubber | | |
| **NC** | Stokes | Belews Creek | Duke Energy Corporation | 2160.2 | NC0024406 | 2/28/2017 | Arsenic, Mercury, Selenium | None | Ash & Scrubber | | |
| **NC** | Rowan | Buck | Duke Energy Carolinas, LLC | 250 | NC0004774 | 8/31/2016 | Arsenic, Selenium, Mercury | None | Ash | | |
| **NC** | Cleveland | Cliffside | Duke Energy Corporation | 570.9 | NC0005088 | 7/31/2015 | Arsenic, Selenium, Cadmium, Mercury | None | Ash & Scrubber | | |
| **NC** | Edgecombe | Edgecombe Genco, LLC | Edgecombe Genco, LLC | 114.8 | NC0077437 | 10/31/2014 | None | None | | | |
| **NC** | Gaston | G G Allen | Duke Energy Corporation | 1155 | NC0004979 | 5/31/2015 | Arsenic, Cadmium, Mercury, Selenium | None | Ash & Scrubber | | |
| **NC** | New Hanover | L V Sutton | Carolina Power & Light Company | 671.6 | NC0001422 | 12/31/2016 | Arsenic, Mercury, Selenium | Arsenic, Selenium | Ash | | |
| **NC** | Robeson | Lumberton Power | Lumberton Energy, LLC | 34.7 | NC0058301 | 7/31/2014 | Mercury | None | | | |
| **NC** | Marshall | Marshall | Tennessee Valley Authority | 1996 | NC0004987 | 4/30/2015 | Arsenic, Boron, Selenium | Selenium | Ash & Scrubber | | |
| **NC** | Person | Mayo | Carolina Power & Light Company | 735.8 | NC0038377 | 3/31/2012 | Arsenic, Cadmium,Lead, Selenium, Mercury, Boron | Cadmium, Lead, Mercury, Boron | Ash & Scrubber | | |
| **NC** | Gaston | Riverbend | Duke Energy Corporation | 466 | NC0004961 | 2/28/2015 | Arsenic, Mercury, Selenium | None | Ash | | |
| **NC** | Person | Roxboro | Carolina Power & Light Company | 2558.2 | NC0065081 | 5/31/2012 | Cadmium, Lead | Cadmium, Lead | Ash & Scrubber | | |
| **NC** | Halifax | Westmoreland Partners Roanoke Valley I | Westmoreland Partners LLC | 182.3 | NCS000229 | 6/30/2012 | None | None | | | |
| **NC** | Halifax | Westmoreland Partners Roanoke Valley II | Westmoreland Partners LLC | 57.8 | NCS000229 | 6/30/2012 | None | None | | | |
| **ND** | Mercer | Antelope Valley | Basin Electric Power Cooperative | 869.8 | ND0024945 | 6/30/2013 | None | None | Ash | | |
| **ND** | Mercer | Coyote | Otter Tail Power Company | 450 | ND0024996 | 3/31/2013 | None | None | Ash | | |
| **ND** | Mercer | Leland Olds | Basin Electric Power Cooperative | 656 | ND0025232 | 12/31/2016 | Arsenic, Cadmium, Mercury, Lead, Selenium | None | Ash | | |
| **ND** | Oliver | Milton R Young | Minnkota Power Cooperative, Inc. | 734 | ND0000370 | 6/30/2015 | Boron | None | Ash & Scrubber | | |
| **ND** | Morton | R M Heskett | Montana Dakota Utilities Company | 115 | ND0000264 | 3/31/2013 | None | None | Ash | | |
| **ND** | Mercer | Stanton | Great River Energy | 190.2 | ND0000299 | 12/31/2016 | Arsenic, Cadmium, Mercury, Lead, Selenium | None | Ash | | |
| **NE** | Lincoln | Gerald Gentleman Station | Nebraska Public Power District | 1362.6 | NE0111546 | 9/30/2016 | None | None | | | |
| **NE** | Adams | Gerald Whelan Energy Center | Nebraska Municipal Energy Agency | 324.3 | NE0113506 | 9/30/2017 | Cadmium, Mercury, Lead, Selenium | None | Ash & Scrubber | | |
| **NE** | Dodge | Lon D Wright Power Plant | City of Fremont | 130 | NE0001252 | 6/30/2015 | Cadmium, Mercury, Lead | None | | | |
| **NE** | Otoe | Nebraska City Station | Omaha Public Power District | 1389.6 | NE0111635 | 6/30/2013 | Arsenic, Cadmium, Mercury, Lead, Selenium | None | Ash | | |
| **NE** | Douglas | North Omaha Station | Omaha Public Power District | 644.7 | NE0000621 | 9/30/2013 | Arsenic, Cadmium, Mercury, Lead | None | Ash | | |
| **NE** | Hall | Platte | Grand Island Utilities Dept. | 109.8 | NE0113646 | 9/30/2017 | None | None | Ash | | |

## US COAL-FIRED POWER PLANTS

| STATE | COUNTY | FACILITY NAME | OPERATOR | NAMEPLATE CAPACITY (MW) | NPDES PERMIT ID | PERMIT EXPIRATION DATE | POLLUTANTS MONITORED | POLLUTANTS WITH A LIMIT | COAL ASH OR SCRUBBER OUTFALL? | IMPAIRED WATER | CAUSE OF IMPAIRMENT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **NE** | Lancaster | Sheldon | Nebraska Public Power District | 228.7 | NE0111490 | 9/30/2016 | Cadmium, Lead | None | Ash | | |
| **NH** | Merrimack | Merrimack | Public Service of New Hampshire | 459.2 | NH0001465 | 7/31/1997 | Cadmium, Lead | None | Ash & Scrubber | Merrimack River | |
| **NH** | Rockingham | Schiller | Public Service of New Hampshire | 100 | NH0001473 | 9/30/1995 | Arsenic, Cadmium, Mercury, Lead, Selenium | None | | Lower Piscataqua River | |
| **NJ** | Hudson | Hudson Generating Station | PSEG | 659.7 | NJ0000647 | 9/30/2016 | Mercury, Lead, Arsenic | None | Ash | | |
| **NJ** | Gloucester | Logan Generating Plant | Logan Generating Co. LP | 242.3 | NJ0076872 | 9/30/2011 | Arsenic | Arsenic | | | |
| **NJ** | Mercer | Mercer Generating Station | PSEG | 652.8 | NJ0004995 | 10/31/2011 | Arsenic, Cadmium, Mercury, Selenium, Lead | None | Ash | | |
| **NM** | McKinley | Escalante | Tri-State Generation & Transmission | 257 | NMR05A996 | 10/29/2005 | None | None | | | |
| **NM** | San Juan | Four Corners Steam Elec Station | Arizona Public Service Company | 2269.6 | NN0000019 | 4/6/2006 | None | None | Ash | | |
| **NM** | San Juan | San Juan | Public Service Company of New Mexico | 1848 | NM0028606 | 3/31/2016 | Boron, Selenium | None | | | |
| **NY** | Jefferson | Black River Generation, LLC | Black River Generation, LLC | 55.5 | NY0206938 | 7/31/2017 | Arsenic, Mercury, Lead | Arsenic, Lead, Mercury | | | |
| **NY** | Tompkins | Cayuga Operating Company, LLC | Cayuga Operating Company, LLC | 322.5 | NY0001333 | 12/31/2014 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | Arsenic, Cadmium, Mercury, Lead, Selenium | Ash & Scrubber | | |
| **NY** | Orange | Dynegy Danskammer | Dynegy Power Corporation | 386.5 | NY0006262 | 5/31/2011 | Arsenic, Cadmium, Mercury, Lead, Selenium | Arsenic, Cadmium, Mercury, Lead, Selenium | Ash | Hudson River | Cadmium; PCBS |
| **NY** | Erie | Huntley Power | Huntley Power, LLC | 436 | NY0001023 | 6/1/2008 | Arsenic, Cadmium, Mercury, Lead, Selenium | Lead | | | |
| **NY** | Chautauqua | NRG Dunkirk Power | NRG Energy, Inc | 627.2 | NY0002321 | 4/30/2015 | Arsenic, Cadmium, Mercury, Lead, Selenium | Mercury, Lead | Ash | | |
| **NY** | Niagara | Somerset Operating Company (Kintigh) | Somerset Operating Company, LLC | 655.1 | NY0104213 | 12/31/2013 | Arsenic, Boron, Mercury | Mercury | | | |
| **NY** | Onondaga | Syracuse Energy Corporation | SUEZ Energy Generation NA | 101.1 | NY0213586 | 4/30/2015 | Lead | None | | | |
| **OH** | Ashtabula | Ashtabula | FirstEnergy Generation Corporation | 256 | OH0001121 | 1/31/2013 | Mercury | Mercury | Ash & Scrubber | Lake Erie Central Basin Shoreline | Ph; Total Suspended Solids |
| **OH** | Lorain | Avon Lake Power Plant | GenOn Power Operating Services Midwest, Inc. | 766 | OH0001112 | 7/31/2015 | Mercury, Selenium | Mercury | Ash | Lake Erie Central Basin Shoreline | Ph; Total Suspended Solids |
| **OH** | Lucas | Bay Shore | FirstEnergy Generation Corporation | 498.8 | OH0002925 | 7/31/2015 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | Mercury | Ash | Lake Erie Tributaries (East of Maumee River to West of Toussant River) | Arsenic; Total Suspended Solids; Oil & Grease |
| **OH** | Jefferson | Cardinal | Cardinal Operating Company | 1880.4 | OH0012581 | 7/31/2012 | Arsenic, Boron, Mercury, Lead, Selenium | None | Ash & Scrubber | Ohio River (Upper South) | Iron |
| **OH** | Coshocton | Conesville | Ohio Power Company | 1890.8 | OH0005371 | 7/31/2012 | Boron, Cadmium, Mercury, Lead, Selenium | Mercury, Selenium | Ash & Scrubber | | |
| **OH** | Lake | Eastlake | FirstEnergy Generation Corporation | 1257 | OH0001139 | 1/31/2013 | Mercury | None | Ash | Lake Erie Central Basin Shoreline | Ph; Total Suspended Solids |
| **OH** | Gallia | Gen J M Gavin | Ohio Power Company | 2600 | OH0028762 | 7/31/2013 | Boron, Cadmium, Mercury, Selenium | Mercury | Ash & Scrubber | Ohio River Tributaries (Downstream Leading Creek to Upstream Kanawha River) | Arsenic; Boron; Cadmium: Chromium; Cobalt; Copper; Iron; Lead; Mercury; Zinc; Ph; Nickel |
| **OH** | Butler | Hamilton Municipal Power Plant | City of Hamilton | 75.6 | OH0010413 | 7/31/2014 | Mercury | None | | Great Miami River (Downstream Fourmile Creek to Mouth) | Fish Consumption Advisory |

## US COAL-FIRED POWER PLANTS

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|---|---|---|---|---|---|---|---|---|---|---|---|
| **OH** | Adams | J M Stuart | Dayton Power and Light Company | 2440.8 | OH0004316 | 6/30/2007 | Cadmium, Mercury, Lead, Boron, Arsenic | None | Ash & Scrubber | | |
| **OH** | Adams | Killen Station | Dayton Power and Light Company | 660.6 | OH0060046 | 1/31/2013 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | None | Ash & Scrubber | | |
| **OH** | Gallia | Kyger Creek | Ohio Valley Electric Corporation | 1086.5 | OH0005282 | 7/31/2013 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | Mercury | Ash & Scrubber | Ohio River Tributaries (Downstream Leading Creek to Upstream Kanawha River) | Arsenic; Boron; Cadmium: Chromium; Copper; Iron; Lead; Manganese; Mercury; Molybdeum; Nickel; Selenium; Silver; Zinc; Ph |
| **OH** | Cuyahoga | Lake Shore | FirstEnergy Generation Corporation | 256 | OH0001147 | 7/31/2016 | Mercury | Mercury | Ash | Lake Erie Central Basin Shoreline | Ph; Total Suspended Solids |
| **OH** | Hamilton | Miami Fort Generating Station | Duke Energy Ohio, Inc. | 1278 | OH0009873 | 7/31/2013 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | None | Ash & Scrubber | | |
| **OH** | Washington | Muskingum River | Ohio Power Company | 1529.4 | OH0006149 | 7/31/2011 | Arsenic, Mercury | None | Ash | | |
| **OH** | Montgomery | O H Hutchings | Dayton Power and Light Company | 414 | OH0009261 | 7/31/2014 | Mercury, Selenium | Selenium | Ash | | |
| **OH** | Pickaway | Picway | Ohio Power Company | 106.2 | OH0005398 | 6/30/2017 | None | None | Ash | Big Walnut Creek | |
| **OH** | Jefferson | W H Sammis | FirstEnergy Generation Corporation | 2455.6 | OH0011525 | 7/31/2012 | Mercury, Selenium, Boron, Cadmium, Lead | None | Ash & Scrubber | Ohio River (Upper North) | Iron |
| **OH** | Clermont | W H Zimmer Generating Station | Duke Energy Ohio, Inc. | 1425.6 | OH0048836 | 1/31/2015 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | Mercury | Scrubber | | |
| **OH** | Clermont | Walter C Beckjord Generating Station | Duke Energy Ohio, Inc. | 1221.3 | OH0009865 | 7/31/2013 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | Selenium | Ash | Ohio River Tributaries (Upstream Big Indian Run to Upstream Little Miami River | |
| **OK** | Le Flore | AES Shady Point LLC | | 350 | OK0040169 | 2/29/2016 | None | None | | | |
| **OK** | Mayes | Grand River Dam Authority | Grand River Dam Authority | 1134 | OK0035149 | 12/31/2014 | None | None | | Grand Neosho River | |
| **OK** | Choctaw | Hugo | Western Farmers Electric Cooperative, Inc. | 446 | OK0035327 | 5/31/2013 | None | None | Ash | Washita River | Lead; Turbidity |
| **OK** | Muskogee | Muskogee | Oklahoma Gas & Electric Company | 1716 | OK0034657 | 3/31/2016 | None | None | Ash | | |
| **OK** | Rogers | Northeastern | Public Service Company of Oklahoma | 946 | OK0034380 | 12/14/2011 | Arsenic, Mercury | None | Ash | | |
| **OK** | Noble | Sooner | Oklahoma Gas & Electric Company | 1138 | OK0035068 | 4/30/2011 | None | None | Ash | | |
| **PA** | Beaver | AES Beaver Valley LLC | AES Corporation | 114 | PA0218936 | 5/24/2007 | None | None | | Wexford Run | Nutrients |
| **PA** | Beaver | Bruce Mansfield | FirstEnergy Generation Corporation | 2741.1 | PA0027481 | 11/30/2011 | None | None | Ash & Scrubber | Hayden Run Creek/ Wexford Run | Nutrients |
| **PA** | York | Brunner Island | PPL Generation, LLC | 1558.7 | PA0008281 | 9/30/2011 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | Lead, Selenium | Ash | | |
| **PA** | Cambria | Cambria Cogen | Cambria CoGen Company | 98 | PA0204153 | 9/30/2012 | None | None | | | |
| **PA** | Allegheny | Cheswick | GenOn Power Midwest, LP | 637 | PA0001627 | 8/31/2012 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | Cadmium, Mercury, Lead, Selenium | Ash & Scrubber | Little Deer Creek | Aluminum; Arsenic; Cadmium; Chronium; Copper; Lead; Iron; Manganese; Mercury; Molybdeum; Selenium; Silver; Thallium; Zinc |
| **PA** | Cambria | Colver Power Project | A/C Power - Colver Operations | 118 | PA0204269 | 9/19/2000 | None | None | | Elk Creek | Arsenic; Cadmium; Chronium; Copper; Iron; Mercury; Zinc; Lead |
| **PA** | Indiana | Conemaugh | GenOn Northeast Management Company | 1872 | PA0005011 | 12/27/2006 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | Mercury, Lead, Selenium | Ash & Scrubber | | |

## US COAL-FIRED POWER PLANTS

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|---|---|---|---|---|---|---|---|---|---|---|---|
| **PA** | Cambria | Ebensburg Power Company | Power Systems Operations, Inc. | 57.6 | PA0098612 | 7/31/2011 | None | None | | | |
| **PA** | Washington | Elrama | GenOn Power Midwest, LP | 510 | PA0001571 | 9/20/2001 | None | None | Ash | | |
| **PA** | Schuylkill | Gilberton Power Company | Broad Mountain Partners | 88.4 | PA0061697 | 9/1/2014 | None | None | | Mill Creek | Arsenic; Cadmium; Chromium; Copper; Iron; Lead; Mercury; Zinc |
| **PA** | Greene | Hatfield's Ferry Power Station | Allegheny Energy | 1728 | PA0002941 | 12/31/2008 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | Mercury, Lead, Selenium | Scrubber | | |
| **PA** | Indiana | Homer City | NRG Homer City Services LLC | 2012 | PA0005037 | 7/31/2012 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | Lead, Selenium | Ash & Scrubber | | |
| **PA** | Armstrong | Keystone | GenOn Northeast Management Company | 1872 | PA0002062 | 3/31/2013 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | Mercury, Lead, Selenium | Ash & Scrubber | | |
| **PA** | Washington | Mitchell Power Station | Allegheny Energy | 299.2 | PA0002895 | 9/30/1996 | Boron | Boron | Ash & Scrubber | | |
| **PA** | Montour | Montour | PPL Generation, LLC | 1641.7 | PA0008443 | 1/31/2013 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | Cadmium, Mercury, Selenium | Scrubber | | |
| **PA** | Lawrence | New Castle | GenOn Power Midwest, LP | 348 | PA0005061 | 4/6/2010 | None | None | Ash | | |
| **PA** | Northampton | Northampton Generating Plant | NAES Corporation | 114.1 | PAR702213 | 6/2/2015 | None | None | | | |
| **PA** | Schuylkill | Northeastern Power Company | Nepco Services Company | 59 | PA0061417 | 1/31/2014 | None | None | | | |
| **PA** | York | P H Glatfelter Company | P H Glatfelter Company | 70.4 | PA0008869 | 6/30/2012 | Boron | None | | | |
| **PA** | Clarion | Piney Creek Power Plant | Piney Creek Limited Partnership | 36.2 | PA0005029 | 10/31/2017 | None | None | | | |
| **PA** | Northampton | Portland | GenOn REMA, LLC | 427 | PA0012475 | 7/15/2007 | None | None | | | |
| **PA** | Venango | Scrubgrass Generating Plant | Scrubgrass Generating Company | 94.7 | PA0103713 | 12/31/2017 | None | None | | Alleghany River | Mercury |
| **PA** | Indiana | Seward | GenOn Wholesale Generation, LP | 585 | PA0002054 | 7/18/2015 | Arsenic, Mercury, Lead | None | | Conemaugh River | Aluminum; Arsenic; Cadmium; Chromium; Cobalt; Copper; Iron; Manganese; Mercury; Nickel; Zinc; Ph |
| **PA** | Clearfield | Shawville | GenOn REMA, LLC | 626 | PA0010031 | 8/31/2015 | None | None | | West Branch Susquehanna River | Alumium; Arsenic; Cadmium; Chromium; Copper; Iron; Lead; Manganese; Mercury; Nickel; Zinc |
| **PA** | Snyder | Sunbury | Sunbury Generation, LP | 437.9 | PA0008451 | 3/31/2012 | Arsenic, Cadmium, Mercury, Lead, Selenium | None | Ash | | |
| **PA** | Berks | Titus | GenOn REMA, LLC | 225 | PA0010782 | 9/30/2015 | None | None | | | |
| **PA** | Schuylkill | Wheelabrator - Frackville | Wheelabrator Frackville Energy Company, Inc. | 48 | PA0061263 | 9/30/2016 | None | None | | Mill Creek | Arsenic; Cadmium; Chronium; Copper; Iron; Lead; Mercury; Zinc |
| **PA** | Schuylkill | WPS Westwood Generation, LLC | Olympus Power, LLC | 36 | PA0061344 | 4/30/2017 | None | None | | Lower Rausch Creek | Arsenic; Cadmium; Chromium; Copper; Iron; Lead; Mercury; Zinc |
| **SC** | Colleton | Canadys Steam | South Carolina Electric & Gas Company | 489.6 | SC0002020 | 6/30/2009 | Arsenic, Mercury | Arsenic, Mercury | Ash | | |
| **SC** | Orangeburg | Cope Station | South Carolina Electric & Gas Company | 417.3 | SC0045772 | 9/30/2014 | Mercury | None | Ash & Scrubber | | |
| **SC** | Berkeley | Cross | Santee Cooper | 2390.1 | SC0037401 | 8/31/2010 | Mercury | None | Ash | | |
| **SC** | Horry | Dolphus M Grainger | Santee Cooper | 163.2 | SC0001104 | 9/30/2006 | Arsenic | None | Ash | Waccamaw River | |
| **SC** | Berkeley | Jefferies | Santee Cooper | 345.6 | SC0001091 | 2/29/2008 | Arsenic | None | Ash | | |
| **SC** | Lexington | McMeekin | South Carolina Electric & Gas Company | 293.6 | SC0002046 | 4/30/2009 | Arsenic | None | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| **SC** | Aiken | Urquhart | South Carolina Electric & Gas Company | 100 | SC0000574 | 9/30/2008 | Mercury | None | Ash | | |
| **SC** | Anderson | W S Lee | Duke Energy Corporation | 355 | SC0002291 | 6/30/2013 | Arsenic, Cadmium, Mercury, Lead | None | Ash | | |
| **SC** | Richland | Wateree | South Carolina Electric & Gas Company | 771.8 | SC0002038 | 12/31/2012 | Arsenic, Mercury | None | Ash | | |
| **SC** | Berkeley | Williams | South Carolina Generating Company | 632.7 | SC0003883 | 5/31/2014 | Arsenic, Cadmium, Mercury, Selenium | Arsenic, Selenium | Ash & Scrubber | | |
| **SC** | Georgetown | Winyah | Santee Cooper | 1260 | SC0022471 | 7/31/2011 | Arsenic, Selenium | Arsenic, Selenium | Ash | | |
| **TN** | Shelby | Allen | Tennessee Valley Authority | 990 | TN0005355 | 8/3/2010 | None | None | Ash | McKellar Lake | Mercury; Nickel; Ph; Total Suspended Solids |
| **TN** | Anderson | Bull Run | Tennessee Valley Authority | 950 | TN0005410 | 11/1/2013 | Arsenic, Cadmium, Mercury, Lead, Selenium | None | Ash & Scrubber | | |
| **TN** | Stewart | Cumberland | Tennessee Valley Authority | 2600 | TN0005789 | 5/31/2010 | Cadmium, Mercury, Lead, Selenium | None | Ash & Scrubber | | |
| **TN** | Sumner | Gallatin | Tennessee Valley Authority | 1255.2 | TN0005428 | 5/31/2017 | Arsenic, Cadmium, Mercury, Lead, Selenium | None | Ash | | |
| **TN** | Hawkins | John Sevier | Tennessee Valley Authority | 800 | TN0005436 | 6/30/2014 | Arsenic, Cadmium, Mercury, Lead, Selenium | Arsenic, Selenium | Ash | Cherokee Reservoir | Mercury |
| **TN** | Humphreys | Johnsonville | Tennessee Valley Authority | 1485.2 | TN0005444 | 11/29/2013 | Arsenic, Cadmium, Mercury, Lead, Selenium | None | Ash | | |
| **TN** | Roane | Kingston | Tennessee Valley Authority | 1700 | TN0005452 | 8/31/2008 | None | None | Scrubber | Clinch River Arm of Watts Bar Reservoir | Mercury |
| **TN** | Spring City | Watts Bar Fossil | Tennessee Valley Authority | 240 | TN0005461 | 8/31/2016 | Arsenic, Cadmium, Mercury, Lead, Selenium | None | Ash | | |
| **TX** | Freestone | Big Brown | Luminant Generation Company LLC | 1186.8 | TX0030180 | 2/1/2012 | Selenium | Selenium | Ash | | |
| **TX** | Goliad | Coleto Creek | Coleto Creek Power, LP | 622.4 | TX0070068 | 2/1/2010 | None | None | Ash | | |
| **TX** | Grimes | Gibbons Creek Steam Electric Station | Texas Municipal Power Agency | 453.5 | TX0074438 | 5/1/2011 | Selenium | Selenium | | | |
| **TX** | Harrison | H W Pirkey Power Plant | Southwestern Electric Power Company | 721 | TX0087726 | 4/1/2011 | Selenium | Selenium | Ash & Scrubber | | |
| **TX** | Potter | Harrington Station | Southwestern Public Service Company | 1080 | TX0124575 | 10/1/2015 | Boron | None | | | |
| **TX** | Bexar | J K Spruce | City of San Antonio | 1444 | TX0063681 | 3/1/2015 | Selenium | Selenium | Ash & Scrubber | | |
| **TX** | Bexar | J T Deely | City of San Antonio | 932 | TX0063681 | 3/1/2015 | Selenium | Selenium | Ash & Scrubber | | |
| **TX** | Limestone | Limestone | NRG Energy, Inc | 1867.2 | TX0082651 | 12/1/2013 | Selenium | Selenium | Ash | | |
| **TX** | Rusk | Martin Lake | Luminant Generation Company LLC | 2379.6 | TX0054500 | 4/1/2012 | Selenium | Selenium | Ash & Scrubber | | |
| **TX** | Titus | Monticello | Luminant Generation Company LLC | 1980 | TX0000086 | 2/1/2010 | Selenium | Selenium | Ash & Scrubber | | |
| **TX** | Robertson | Oak Grove | Oak Grove Management Company LLC | 1795.4 | TX0068021 | 5/1/2014 | Selenium | Selenium | Ash & Scrubber | | |
| **TX** | Wilbarger | Oklaunion Power Station | West Texas Utilities Company | 720 | TX0087815 | 12/1/2015 | Arsenic, Cadmium, Mercury, Lead, Selenium | Arsenic, Cadmium, Mercury, Lead, Selenium | Ash | | |
| **TX** | Robertson | Optim Energy Twin Oaks | Optim Energy Twin Oaks LP | 349.2 | TX0101168 | 12/1/2013 | Selenium | Selenium | | | |
| **TX** | Fayette | Sam Seymour | Lower Colorado River Authority | 1690 | TX0073121 | 12/1/2014 | Selenium | Selenium | Ash | | |
| **TX** | Atascosa | San Miguel | San Miguel Electric Cooperative, Inc. | 410 | TX0090611 | 5/1/2015 | None | None | | | |

# US COAL-FIRED POWER PLANTS

| STATE | COUNTY | FACILITY NAME | OPERATOR | NAMEPLATE CAPACITY (MW) | NPDES PERMIT ID | PERMIT EXPIRATION DATE | POLLUTANTS MONITORED | POLLUTANTS WITH A LIMIT | COAL ASH OR SCRUBBER OUTFALL? | IMPAIRED WATER | CAUSE OF IMPAIRMENT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **TX** | McLennan | Sandy Creek Energy Station | Sandy Creek Energy Associates, LP | 900 | TX0127256 | 12/1/2014 | None | None | | | |
| **TX** | Fort Bend | W A Parish | NRG Energy, Inc | 2736.8 | TX0006394 | 7/1/2014 | Selenium | Selenium | Ash | | |
| **TX** | Titus | Welsh Power Plant | Southwestern Electric Power Company | 1674 | TX0063215 | 2/1/2016 | Selenium | Selenium | Ash | | |
| **UT** | Uintah | Bonanza | Deseret Generation & Transmission | 499.5 | UTU000120 | None | None | None | | | |
| **UT** | Carbon | Carbon | Pacificorp Energy Generation | 188.6 | UT0000094 | 2/29/2012 | None | None | | | |
| **UT** | Emery | Hunter | Pacificorp Energy Generation | 1472.2 | UTR000446 | 12/31/2012 | None | None | | | |
| **UT** | Emery | Huntington | Pacificorp Energy Generation | 996 | UT0023604 | 11/30/2012 | None | None | | Huntington Creek - 2 | Salinity/Total Dissolved Solids/Chlorides |
| **VA** | Campbell | Altavista Power Station | Dominion Generation | 71.1 | VA0083402 | 9/25/2010 | None | None | Scrubber | Roanoke (Staunton) River | Mercury (Fish Consumption Advisory) |
| **VA** | King George | Birchwood Power Facility | General Electric Company | 258.3 | VA0087645 | 12/7/2014 | zero discharge of coal ash | zero discharge of coal ash | | | |
| **VA** | Fluvanna | Bremo Power Station | Dominion Generation | 254.2 | VA0004138 | 7/31/2015 | None | None | Ash | James River | |
| **VA** | Chesapeake (City) | Chesapeake Energy Center | Dominion Generation | 649.5 | VA0004081 | 3/19/2017 | Arsenic | None | Ash | Elizabeth River | |
| **VA** | Chesterfield | Chesterfield Power Station | Dominion Generation | 1352.9 | VA0004146 | 12/9/2009 | None | None | Ash | Almond Creek | Ph |
| **VA** | Russell | Clinch River | Appalachian Power Company | 712.5 | VA0001015 | 9/14/2015 | None | None | Ash | | |
| **VA** | Halifax | Clover Power Station | Dominion Generation | 848 | VA0083097 | 1/12/2016 | None | None | Ash & Scrubber | Roanoke (Staunton) River | Mercury (Fish Consumption Advisory) |
| **VA** | Hopewell (City) | Cogentrix-Hopewell | James River Cogeneration Company | 114.8 | VA0073300 | 9/30/2017 | None | None | | | |
| **VA** | Portsmouth (City) | Cogentrix-Portsmouth | Cogentrix Virginia Leasing Corporation | 114.8 | VA0074781 | 9/3/2014 | None | None | | Unsegmented estuaries in Hampton Roads Harbor | Fish Consumption Advisory |
| **VA** | Giles | Glen Lyn | Appalachian Power Company | 337.5 | VA0000370 | 7/10/2014 | None | None | | New River | |
| **VA** | Hopewell (City) | Hopewell Power Station | Dominion Generation | 71.1 | VA0082783 | 7/10/2010 | None | None | | | |
| **VA** | Mecklenburg | Mecklenburg Power Station | Dominion Generation | 139.8 | VA0084069 | 12/20/2016 | None | None | | | |
| **VA** | Southampton | Southampton Power Station | Dominion Generation | 71.1 | VA0082767 | 2/22/2016 | None | None | | | |
| **VA** | Richmond (City) | Spruance Genco, LLC | Spruance Genco LLC | 229.6 | VA0085499 | 5/23/2011 | None | None | | | |
| **VA** | York | Yorktown Power Station | Dominion Generation | 375 | VA0004103 | 11/13/2017 | Arsenic | None | Ash | York River | |
| **WA** | Lewis | Centralia | TransAlta | 1459.8 | WAR001818 | 12/31/2014 | None | None | | | |
| **WI** | Buffalo | Alma | Dairyland Power Cooperative | 181 | WI0040223 | 12/31/2010 | Mercury | None | | Mississippi River - Chippewa River to Lock and Dam 6 | Mercury; Mercury (FCA) |
| **WI** | Ashland | Bay Front | Northern States Power (Xcel Energy) | 27.2 | WI0002887 | 12/31/2007 | Mercury | None | | | |
| **WI** | Boone | Columbia | City of Columbia | 1023 | WI0002780 | 9/30/2011 | Mercury | None | Ash | | |
| **WI** | Sheboygan | Edgewater | Wisconsin Power & Light Company | 770 | WI0001589 | 9/30/2008 | Arsenic, Mercury | None | | Lake Michigan | Mercury (Fish Consumption Advisory) |
| **WI** | Milwaukee | Elm Road Generating Station | Wisconsin Electric Power Company | 1316.3 | WI0000914 | 3/29/2010 | Mercury | None | | Lake Michigan | Mercury (FCA) |
| **WI** | Vernon | Genoa | Dairyland Power Cooperative | 345.6 | WI0003239 | 6/30/2013 | Mercury | Mercury | | Mississippi River - Root River to Wisconsin River | Mercury (Fish Consumption Advisory) |
| **WI** | Buffalo | J P Madgett | Dairyland Power Cooperative | 387 | WI0040223 | 12/31/2010 | Mercury | None | Ash | Mississippi River - Chippewa River to Lock and Dam 6 | Mercury (FCA) |
| **WI** | Grant | Nelson Dewey | Wisconsin Power & Light Company | 200 | WI0002381 | 12/31/2015 | None | None | Ash | Mississippi River - Wisconsin River to Lock and Dam 11 | Mercury (Fish Consumption Advisory) |

## US COAL-FIRED POWER PLANTS

| STATE | COUNTY | FACILITY NAME | OPERATOR | NAMEPLATE CAPACITY (MW) | NPDES PERMIT ID | PERMIT EXPIRATION DATE | POLLUTANTS MONITORED | POLLUTANTS WITH A LIMIT | COAL ASH OR SCRUBBER OUTFALL? | IMPAIRED WATER | CAUSE OF IMPAIRMENT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **WI** | Kenosha | Pleasant Prairie | Wisconsin Electric Power Company | 1233 | WI0043583 | 6/30/2009 | Arsenic, Mercury | Mercury | Ash & Scrubber | Lake Michigan | Mercury (Fish Consumption Advisory) |
| **WI** | Brown | Pulliam | Wisconsin Public Service Corporation | 350.2 | WI0000965 | 6/30/2011 | Mercury | None | | Lake Michigan | Mercury (Fish Consumption Advisory) |
| **WI** | Milwaukee | South Oak Creek | Wisconsin Electric Power Company | 1191.6 | WI0000914 | 3/29/2010 | Mercury | None | Ash | Lake Michigan | Mercury (FCA) |
| **WI** | Milwaukee | Valley (WEPCO) | Wisconsin Electric Power Company | 272 | WI0000931 | 12/31/1991 | Mercury | Mercury | Ash | | |
| **WI** | Marathon | Weston | Wisconsin Public Service Corporation | 1087.1 | WI0042765 | 3/31/2015 | Mercury | Mercury | Ash | Wisconsin River - Merril Dam to Prairie Du Sac Dam | Mercury (Fish Consumption Advisory) |
| **WV** | Monongalia | Fort Martin Power Station | Monongahela Power Company | 1152 | WV0004731 | 6/30/2014 | Arsenic, Mercury, Lead, Selenium | None | | | |
| **WV** | Marion | Grant Town Power Plant | Edison Mission Operation & Maintenance | 95.7 | WV0079235 | 1/29/2014 | Arsenic, Mercury, Selenium | None | | | |
| **WV** | Harrison | Harrison Power Station | Allegheny Energy | 2052 | WV0005339 | 6/30/2015 | Arsenic, Mercury, Lead, Selenium | None | | West Fork River | Iron; Zinc |
| **WV** | Putnam | John E Amos | Appalachian Power Company | 2932.6 | WV0001074 | 6/6/2012 | Arsenic, Mercury, Lead, Selenium | Arsenic, Selenium | Ash & Scrubber | Kanawha River (Lower) | Mercury |
| **WV** | Marshall | Kammer | Ohio Power Company | 712.5 | WV0005291 | 6/30/2015 | None | None | | Ohio River (Upper South) | Iron |
| **WV** | Kanawha | Kanawha River | Appalachian Power Company | 439.2 | WV0001066 | 11/17/2010 | None | None | Ash | | |
| **WV** | Monongalia | Longview Power | Longview Power, LLC | 807.5 | WV0116238 | 12/29/2016 | None | None | | | |
| **WV** | Marshall | Mitchell | Ohio Power Company | 1632.6 | WV0005304 | 6/30/2015 | Arsenic, Cadmium, Selenium, Boron | Selenium | Ash | Fish Creek / Ohio River (Upper South) | Mercury; Iron |
| **WV** | Monongalia | Morgantown Energy Facility | Morgantown Energy Associates | 68.9 | WV0078425 | 5/28/2014 | Arsenic, Mercury, Selenium | Arsenic, selenium | | | |
| **WV** | Grant | Mount Storm Power Station | Dominion Generation | 1662.4 | WV0005525 | 4/13/2013 | Mercury, Selenium | None | | | |
| **WV** | Mason | Mountaineer | Appalachian Power Company | 1300 | WV0048500 | 6/30/2013 | Arsenic, Mercury | Arsenic | Ash & Scrubber | | |
| **WV** | Grant | North Branch Power Station | Dominion Generation | 80 | WV0115321 | 5/23/2017 | Arsenic, Selenium | None | | | |
| **WV** | Mason | Phil Sporn | Appalachian Power Company | 1105.5 | WV0001058 | 6/30/2013 | Arsenic, Mercury, Selenium | Arsenic, Selenium | Ash | | |
| **WV** | Pleasants | Pleasants Power Station | Allegheny Energy | 1368 | WV0023248 | 12/13/2012 | Arsenic, Mercury, Selenium | Selenium | | Ohio River (Middle North) | Iron |
| **WY** | Converse | Dave Johnston | Pacificorp Energy Generation | 816.7 | WY0003115 | 11/30/2014 | Cadmium, Lead, Mercury, Selenium | Selenium | Ash & Scrubber | | |
| **WY** | Sweetwater | Jim Bridger | Pacificorp Energy Generation | 2317.7 | WYG650015 | 10/19/2012 | None | None | | | |
| **WY** | Lincoln | Naughton | Pacificorp Energy Generation | 707.2 | WY0020311 | 7/31/2013 | Selenium | None | Ash | | |
| **WY** | Campbell | Wyodak | Pacificorp Energy Generation | 362 | WY0001384 | 9/30/2015 | Selenium | None | Ash & Scrubber | | |

## US COAL-FIRED POWER PLANTS DISCHARGING TO WATER IMPAIRED BY As, B, Cd, Hg, Pb or Se

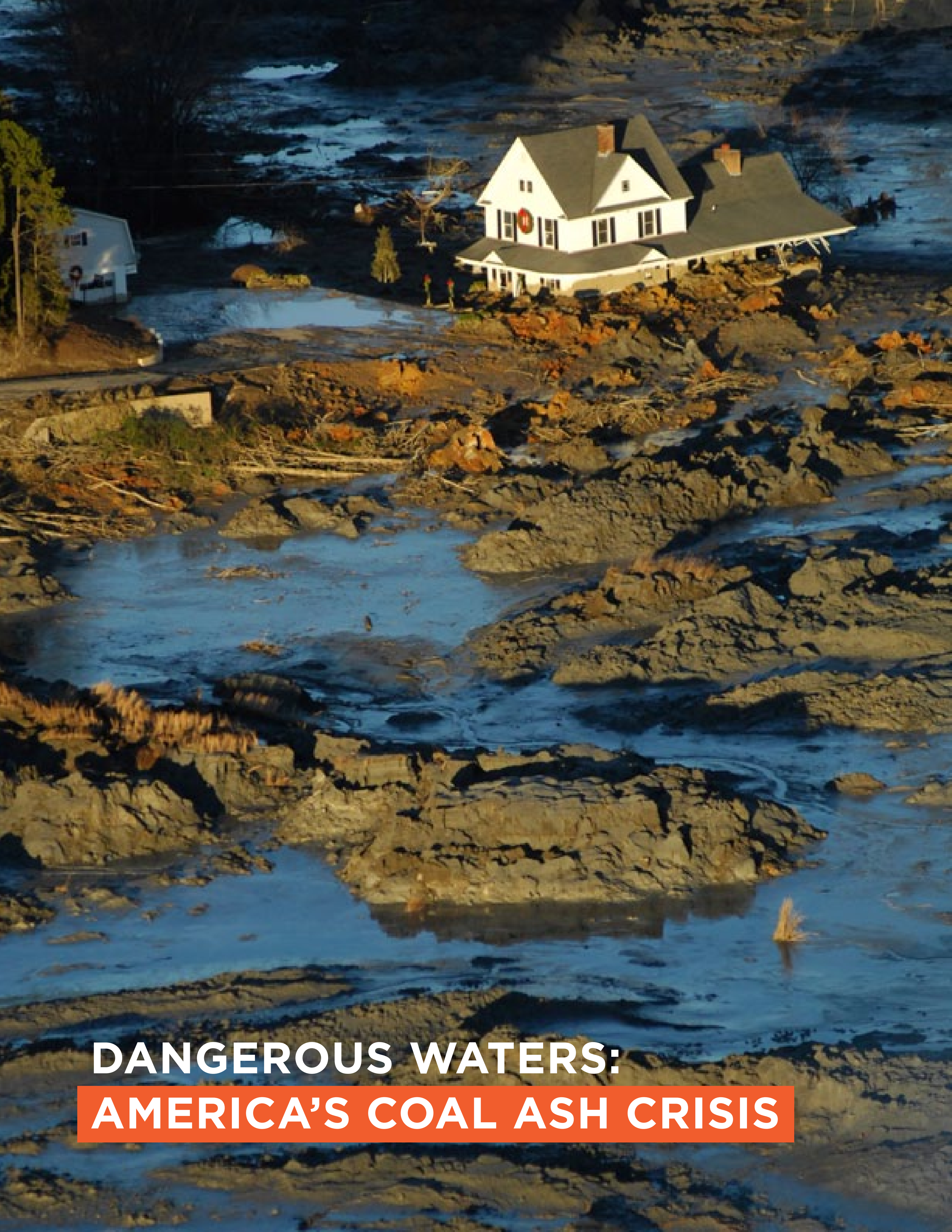
| STATE | COUNTY | FACILITY NAME | OPERATOR | NAMEPLATE CAPACITY (MW) | NPDES PERMIT ID | PERMIT EXPIRATION DATE | POLLUTANTS MONITORED | POLLUTANTS WITH A LIMIT | COAL ASH OR SCRUBBER OUTFALL? | IMPAIRED WATER | CAUSE OF IMPAIRMENT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO** | Adams | Cherokee | Public Service Company of Colorado | 676.3 | CO0001104 | 4/30/14 | Boron, Cadmium, Mercury, Lead, Selenium | Cadmium, Lead, Selenium | Ash | South Platte River | Cadmium |
| **CO** | Pueblo | Comanche | Public Service Company of Colorado | 1635.3 | CO0000612 | 10/31/13 | None | None | | St. Charles River | Selenium |
| **CO** | Boulder | Valmont | Public Service Company of Colorado | 191.7 | CO0001112 | 10/31/17 | Cadmium, Boron, Mercury, Arsenic | None | Ash | Tributaries to St. Vrain Creek | Selenium |
| **FL** | Putnam | Seminole | Seminole Electric Cooperative, Inc. | 1429.2 | FL0036498 | 8/28/17 | Arsenic, Cadmium, Lead, Mercury | Selenium, Lead, Mercury | Scrubber | Rice Creek | Cadmium; Iron; Lead; Nickel; Silver |
| **IA** | Woodbury | George Neal North | MidAmerican Energy Company | 1046 | IA0004103 | 11/30/16 | None | None | Ash | Missouri River | Mercury (Fish Consumption Advisory) |
| **IA** | Woodbury | George Neal South | MidAmerican Energy Company | 640 | IA0061859 | 3/30/14 | None | None | Ash | Missouri River | Mercury (Fish Consumption Advisory) |
| **IL** | Sangamon | Dallman | City of Springfield, IL | 667.7 | IL0024767 | 12/31/06 | Boron | Boron | Ash & Scrubber | Illinois River | Mercury; Silver; Nitorgen; Phosphorus; Total Suspended Solids; Fish Consumption Advisory |
| **IL** | Fulton | Duck Creek | Ameren Energy Resources Generating Company | 441 | IL0055620 | 2/28/13 | Boron, Mercury | Boron | Ash | Illinois River | Silver, Boron, Iron, Mercury |
| **IL** | Mason | Havana | Dynegy Midwest Generation Inc. | 488 | IL0001571 | 9/30/17 | Mercury | None | Ash & Scrubber | Illinois River | Mercury; Silver; Nitorgen; Phosphorus; Total Suspended Solids; Fish Consumption Advisory |
| **IL** | Putnam | Hennepin Power Station | Dynegy Midwest Generation Inc. | 306.3 | IL0001554 | 4/30/16 | Mercury | None | Ash | Illinois River | Mercury (Fish Consumption Advisory) |
| **IL** | Will | Joliet 29 | Midwest Generation EME, LLC | 1320 | IL0064254 | 11/30/00 | None | None | Ash | Des Plaines River | Mercury (Fish Consumption Advisory) |
| **IL** | Washington | Prairie State Generating Company | Prairie State Generating Company | 245 | IL0076996 | 11/30/10 | Arsenic, Cadmium, Mercury, Lead, Selenium | None | Ash | Illinois River | Mercury |
| **IN** | Posey | A B Brown Generating Station | Southern Indiana Gas and Electric Company | 530.4 | IN0052191 | 9/30/16 | Arsenic, Boron, Cadmium, Mercury, Selenium | None | Ash | Ohio River - Evansville to Uniontown | Mercury (fish tissue) |
| **IN** | Warrick | Alcoa Allowance Management Inc | Alcoa Allowance Management, Inc. | 777.6 | IN0055051 | 3/31/91 | None | None | Ash & Scrubber | Ohio River - Cannelton to Newburgh | Mercury (fish tissue) |
| **IN** | Porter | Bailly Generating Station | Northern Indiana Public Service Company | 603.5 | IN0000132 | 7/31/17 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | None | Ash | Lake Michigan Shoreline - Dunes | Mercury |
| **IN** | Vermillion | Cayuga | Duke Energy Corporation | 1062 | IN0002763 | 7/31/12 | Arsenic, Cadmium, Selenium, Mercury | Mercury | Ash | Wabash River | Mercury (fish tissue) |
| **IN** | Pike | Frank E Ratts | Hoosier Energy REC, Inc. | 233.2 | IN0004391 | 9/30/17 | Arsenic, Mercury, Selenium | None | Ash | White River | Mercury (fish tissue) |
| **IN** | Morgan | IPL - Eagle Valley Generating Station | Indianapolis Power & Light Company | 301.6 | IN0004693 | 9/30/17 | Arsenic, Cadmium, Lead, Mercury, Selenium, Boron | None | Ash | White River | Mercury (fish tissue) |
| **IN** | Marion | IPL - Harding Street Station (EW Stout) | Indianapolis Power & Light Company | 698 | IN0004685 | 9/30/17 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | Cadmium, Lead, Mercury (effective Aug. 28, 2015) | Ash & Scrubber | White River | Mercury (fish tissue) |
| **IN** | Pike | IPL - Petersburg Generating Station | Indianapolis Power & Light Company | 2146.7 | IN0002887 | 9/30/17 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | Boron, Cadmium, Lead, Mercury, Selenium (effective Sept. 28, 2015) | Ash & Scrubber | White River | Mercury (fish tissue) |
| **IN** | LaPorte | Michigan City Generating Station | Northern Indiana Public Service Company | 540 | IN0000116 | 2/29/16 | Cadmium, Mercury, Lead | None | Ash | Lake Michigan Shoreline-Dunes | Mercury (Fish Consumption Advisory) |
| **IN** | Spencer | Rockport | Indiana Michigan Power Company | 2600 | IN0051845 | 11/30/15 | Boron, Mercury, Lead, Selenium | Lead, Selenium | Ash & Scrubber | Ohio River - Cannelton to Newburgh | Mercury (fish tissue) |
| **IN** | Dearborn | Tanners Creek | Indiana Michigan Power Company | 1100.1 | IN0002160 | 5/31/15 | Arsenic, Cadmium, Mercury | None | Ash | Ohio River and Tanners Creek | Mercury in fish tissue |
| **IN** | Vigo | Wabash River Gen Station | Duke Energy Corporation | 860.2 | IN0063134 | 10/31/13 | Arsenic, Mercury | None | Ash | Wabash River - Wabash Gen Sta to Lost Creek | Mercury (Fish Consumption Advisory) |

## US COAL-FIRED POWER PLANTS DISCHARGING TO WATER IMPAIRED BY As, B, Cd, Hg, Pb or Se

| STATE | COUNTY | FACILITY NAME | OPERATOR | NAME-PLATE CAPACITY (MW) | NPDES PERMIT ID | PERMIT EXPIRATION DATE | POLLUTANTS MONITORED | POLLUTANTS WITH A LIMIT | COAL ASH OR SCRUBBER OUTFALL? | IMPAIRED WATER | CAUSE OF IMPAIRMENT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| KS | Shawnee | Tecumseh Energy Center | Westar Energy, Inc. | 232 | KS0079731 | 7/31/17 | None | None | Ash | Kansas River | Lead |
| KY | Hancock | Coleman | Big Rivers Electric Corporation | 602 | KY0001937 | 2/28/05 | None | None | Ash | Ohio River | Mercury in fish tissue |
| KY | Mercer | E W Brown | LGE and KU Energy LLC | 757.1 | KY0002020 | 2/28/15 | None | None | Ash | Herrington Lake | Methylmercury (Fish Consumption Advisory); Ph; Total Suspended Solids |
| KY | Daviess | Elmer Smith | Owensboro Municipal Utilities | 445.3 | KY0001295 | 3/31/05 | None | None | Ash & Scrubber | Ohio River (Cannelton to Newburgh) | Mercury (Fish Consumption Advisory) |
| KY | Pulaski | John S. Cooper | East Kentucky Power Cooperative | 344 | KY0003611 | 10/31/13 | None | None | Ash & Scrubber | Lake Cumberland | Methylmercury |
| KY | Woodford | Tyrone | Kentucky Utilities Company | 75 | KY0001899 | 1/31/07 | None | None | Ash | Kentucky River, 53.2 to 66.95 | Methylmercury (Fish Consumption Advisory) |
| KY | Clark | William C. Dale | East Kentucky Power Cooperative | 216 | KY0002194 | 11/30/06 | None | None | Ash | Kentucky River, 121.1 to 138.5 | Methylmercury (Fish Consumption Advisory) |
| MA | Hampden | Mount Tom | FirstLight Power Resources | 136 | MA0005339 | 9/17/97 | None | None | Ash | Connecticut River | Mercury (Fish Consumption Advisory) |
| MD | Allegany | AES Warrior Run | AES Corporation | 229 | MD0066079 | 12/31/17 | None | None | | Lower North Branch Potomac River | Cadmium; Nickel; Ph; Phosphorus |
| MI | Muskegon | B C Cobb | Consumers Energy Company | 312.6 | MI0001520 | 10/1/13 | Mercury | None | Ash | Rivers/ Streams in HUC 040601021004 | Mercury (Fish Consumption Advisory) |
| MI | Ingham | Eckert Station | Lansing Board of Water and Light | 375 | MI0004464 | 10/1/12 | Mercury | None | | Rivers/ Streams in HUC 040500040703 | Mercury (Fish Consumption Advisory) |
| MI | Eaton | Erickson | Lansing Board of Water and Light | 154.7 | MI0005428 | 10/1/12 | Selenium | None | | Rivers/ Streams in HUC 040500040704 | Mercury (Fish Consumption Advisory) |
| MI | Ottawa | J B Sims | Grand Haven Board of Light and Power | 80 | MI0000728 | 10/1/15 | Mercury, Selenium | None | Ash & Scrubber | Grand River | Mercury; Mercury in fish tissue |
| MI | Monroe | Monroe | Detroit Edison Company | 3279.6 | MI0001848 | 10/1/14 | Mercury | Mercury | Ash & Scrubber | Rivers/ Streams in HUC 041000020410 | Mercury (Fish Consumption Advisory) |
| MI | Wayne | River Rouge | Detroit Edison Company | 650.6 | MI0001724 | 10/1/12 | Boron, Mercury, Selenium | None | Ash | Rivers/ Streams in HUC 040900040407 | Mercury (Fish Consumption Advisory) |
| MT | Yellowstone | J E Corette | P P & L Montana, LLC | 172.8 | MT0000396 | 3/1/05 | None | None | Ash | Yellowstone River | Arsenic; Nutrients |
| MT | Richland | Lewis & Clark | Montana Dakota Utilities Company | 50 | MT0000302 | 11/30/05 | None | None | Ash | Yellowstone River | Chromium, Copper, Lead |
| NY | Orange | Dynegy Danskammer | Dynegy Power Corporation | 386.5 | NY0006262 | 5/31/11 | Arsenic, Cadmium, Mercury, Lead, Selenium | Arsenic, Cadmium, Mercury, Lead, Selenium | Ash | Hudson River | Cadmium; PCBS |
| OH | Lucas | Bay Shore | FirstEnergy Generation Corporation | 498.8 | OH0002925 | 7/31/15 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | Mercury | Ash | Lake Erie Tributaries (East of Maumee River to West of Toussant River) | Arsenic; Total Suspended Solids; Oil & Grease |
| OH | Gallia | Gen J M Gavin | Ohio Power Company | 2600 | OH0028762 | 7/31/13 | Boron, Cadmium, Mercury, Selenium | Mercury | Ash & Scrubber | Ohio River Tributaries (Downstream Leading Creek to Upstream Kanawha River) | Arsenic; Boron; Cadmium: Chromium; Cobalt; Copper; Iron; Lead; Mercury; Zinc; Ph; Nickel |
| OH | Gallia | Kyger Creek | Ohio Valley Electric Corporation | 1086.5 | OH0005282 | 7/31/13 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | Mercury | Ash & Scrubber | Ohio River Tributaries (Downstream Leading Creek to Upstream Kanawha River) | Arsenic; Boron; Cadmium: Chromium; Copper; Iron; Lead; Manganese; Mercury; Molybdeum; Nickel; Selenium; Silver; Zinc; Ph |
| OK | Choctaw | Hugo | Western Farmers Electric Cooperative, Inc. | 446 | OK0035327 | 5/31/13 | None | None | Ash | Washita River | Lead; Turbidity |
| PA | Allegheny | Cheswick | GenOn Power Midwest, LP | 637 | PA0001627 | 8/31/12 | Arsenic, Boron, Cadmium, Mercury, Lead, Selenium | Cadmium, Mercury, Lead, Selenium | Ash & Scrubber | Little Deer Creek | Aluminum; Arsenic; Cadmium; Chronium; Copper; Lead; Iron; Manganese; Mercury; Molybdeum; Selenium; Silver; Thallium; Zinc |
| PA | Cambria | Colver Power Project | A/C Power - Colver Operations | 118 | PA0204269 | 9/19/00 | None | None | | Elk Creek | Arsenic; Cadmium; Chronium; Copper; Iron; Mercury; Zinc; Lead |

## US COAL-FIRED POWER PLANTS DISCHARGING TO WATER IMPAIRED BY As, B, Cd, Hg, Pb or Se

| STATE | COUNTY | FACILITY NAME | OPERATOR | NAME-PLATE CAPACITY (MW) | NPDES PERMIT ID | PERMIT EXPIRATION DATE | POLLUTANTS MONITORED | POLLUTANTS WITH A LIMIT | COAL ASH OR SCRUBBER OUTFALL? | IMPAIRED WATER | CAUSE OF IMPAIRMENT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **PA** | Schuylkill | Gilberton Power Company | Broad Mountain Partners | 88.4 | PA0061697 | 9/1/14 | None | None | | Mill Creek | Arsenic; Cadmium; Chromium; Copper; Iron; Lead; Mercury; Zinc |
| **PA** | Venango | Scrubgrass Generating Plant | Scrubgrass Generating Company | 94.7 | PA0103713 | 12/31/17 | None | None | | Alleghany River | Mercury |
| **PA** | Indiana | Seward | GenOn Wholesale Generation, LP | 585 | PA0002054 | 7/18/15 | Arsenic, Mercury, Lead | None | | Conemaugh River | Aluminum; Arsenic; Cadmium; Chromium; Cobalt; Copper; Iron; Manganese; Mercury; Nickel; Zinc; Ph |
| **PA** | Clearfield | Shawville | GenOn REMA, LLC | 626 | PA0010031 | 8/31/15 | None | None | | West Branch Susquehanna River | Alumium; Arsenic; Cadmium; Chromium; Copper; Iron; Lead; Manganese; Mercury; Nickel; Zinc |
| **PA** | Schuylkill | Wheelabrator - Frackville | Wheelabrator Frackville Energy Company, Inc. | 48 | PA0061263 | 9/30/16 | None | None | | Mill Creek | Arsenic; Cadmium; Chronium; Copper; Iron; Lead; Mercury; Zinc |
| **PA** | Schuylkill | WPS Westwood Generation, LLC | Olympus Power, LLC | 36 | PA0061344 | 4/30/17 | None | None | | Lower Rausch Creek | Arsenic; Cadmium; Chromium; Copper; Iron; Lead; Mercury; Zinc |
| **TN** | Shelby | Allen | Tennessee Valley Authority | 990 | TN0005355 | 8/3/10 | None | None | Ash | McKellar Lake | Mercury; Nickel; Ph; Total Suspended Solids |
| **TN** | Hawkins | John Sevier | Tennessee Valley Authority | 800 | TN0005436 | 6/30/14 | Arsenic, Cadmium, Mercury, Lead, Selenium | Arsenic, Selenium | Ash | Cherokee Reservoir | Mercury |
| **TN** | Roane | Kingston | Tennessee Valley Authority | 1700 | TN0005452 | 8/31/08 | None | None | Scrubber | Clinch River Arm of Watts Bar Reservoir | Mercury |
| **VA** | Campbell | Altavista Power Station | Dominion Generation | 71.1 | VA0083402 | 9/25/10 | None | None | Scrubber | Roanoke (Staunton) River | Mercury (Fish Consumption Advisory) |
| **VA** | Halifax | Clover Power Station | Dominion Generation | 848 | VA0083097 | 42381 | None | None | Ash & Scrubber | Roanoke (Staunton) River | Mercury (Fish Consumption Advisory) |
| **WI** | Buffalo | Alma | Dairyland Power Cooperative | 181 | WI0040223 | 40543 | Mercury | None | | Mississippi River - Chippewa River to Lock and Dam 6 | Mercury; Mercury (FCA) |
| **WI** | Sheboygan | Edgewater | Wisconsin Power & Light Company | 770 | WI0001589 | 39721 | Arsenic, Mercury | None | | Lake Michigan | Mercury (Fish Consumption Advisory) |
| **WI** | Milwaukee | Elm Road Generating Station | Wisconsin Electric Power Company | 1316.3 | WI0000914 | 40266 | Mercury | None | | Lake Michigan | Mercury (FCA) |
| **WI** | Vernon | Genoa | Dairyland Power Cooperative | 345.6 | WI0003239 | 41455 | Mercury | Mercury | | Mississippi River - Root River to Wisconsin River | Mercury (Fish Consumption Advisory) |
| **WI** | Buffalo | J P Madgett | Dairyland Power Cooperative | 387 | WI0040223 | 40543 | Mercury | None | Ash | Mississippi River - Chippewa River to Lock and Dam 6 | Mercury (FCA) |
| **WI** | Grant | Nelson Dewey | Wisconsin Power & Light Company | 200 | WI0002381 | 42369 | None | None | Ash | Mississippi River - Wisconsin River to Lock and Dam 11 | Mercury (Fish Consumption Advisory) |
| **WI** | Kenosha | Pleasant Prairie | Wisconsin Electric Power Company | 1233 | WI0043583 | 39994 | Arsenic, Mercury | Mercury | Ash & Scrubber | Lake Michigan | Mercury (Fish Consumption Advisory) |
| **WI** | Brown | Pulliam | Wisconsin Public Service Corporation | 350.2 | WI0000965 | 40724 | Mercury | None | | Lake Michigan | Mercury (Fish Consumption Advisory) |
| **WI** | Milwaukee | South Oak Creek | Wisconsin Electric Power Company | 1191.6 | WI0000914 | 40266 | Mercury | None | Ash | Lake Michigan | Mercury (FCA) |
| **WI** | Marathon | Weston | Wisconsin Public Service Corporation | 1087.1 | WI0042765 | 42094 | Mercury | Mercury | Ash | Wisconsin River - Merril Dam to Prairie Du Sac Dam | Mercury (Fish Consumption Advisory) |
| **WV** | Putnam | John E Amos | Appalachian Power Company | 2932.6 | WV0001074 | 41066 | Arsenic, Mercury, Lead, Selenium | Arsenic, Selenium | Ash & Scrubber | Kanawha River (Lower) | Mercury |
| **WV** | Marshall | Mitchell | Ohio Power Company | 1632.6 | WV0005304 | 42185 | Arsenic, Cadmium, Selenium, Boron | Selenium | Ash | Fish Creek / Ohio River (Upper South) | Mercury; Iron |



# DANGEROUS WATERS: AMERICA'S COAL ASH CRISIS

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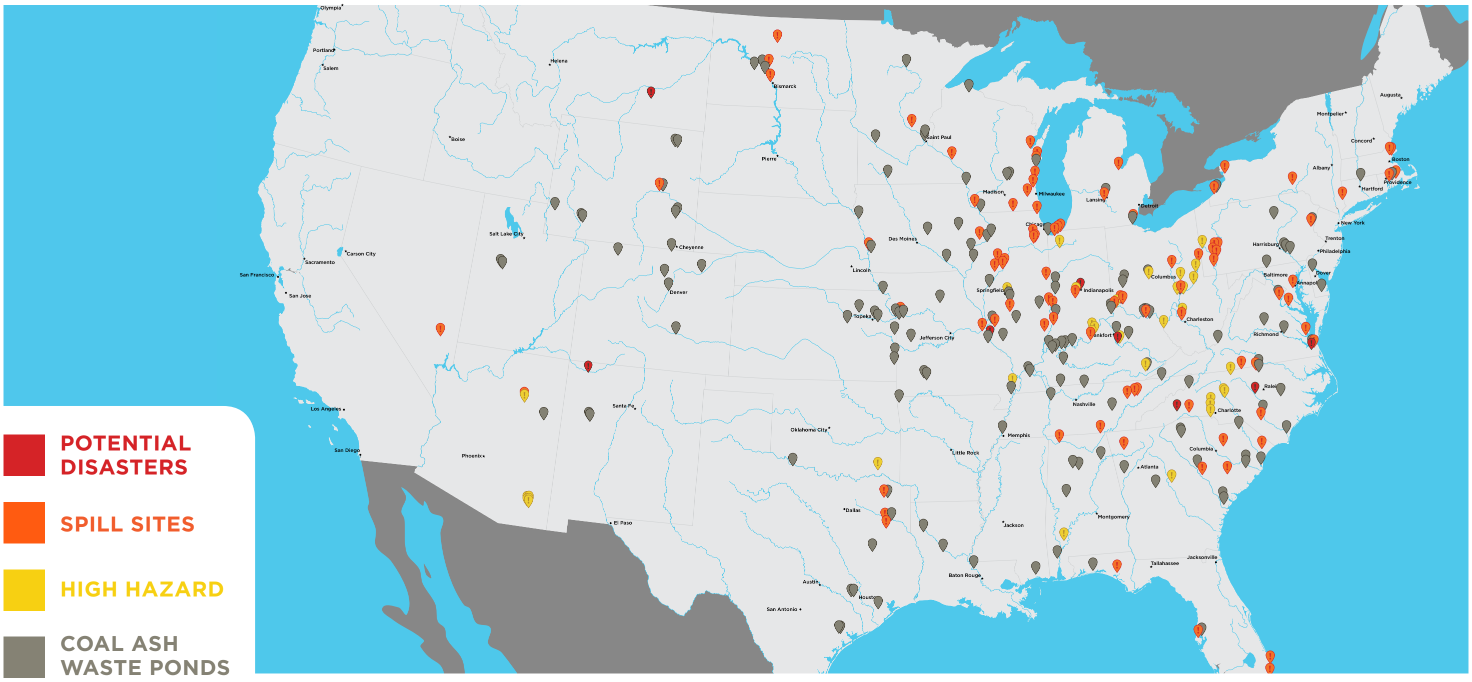



*THE EPA NOW ASSIGNS HAZARD RATINGS TO COAL ASH PONDS:
"HIGH HAZARD" INDICATES THAT AN IMPOUNDMENT FAILURE WOULD LIKELY CAUSE LOSS OF HUMAN LIFE;
"SIGNIFICANT HAZARD" INDICATES THAT AN IMPOUNDMENT FAILURE WOULD CAUSE SIGNIFICANT ECONOMIC, ENVIRONMENTAL, OR INFRASTRUCTURE DAMAGE.
VISIT HTTP://CONTENT.SIERRACLUB.ORG/COAL/WATER TO VIEW AN INTERACTIVE MAP OF THESE SITES.

# DANGEROUS WATERS: AMERICA'S COAL ASH CRISIS

Each year, coal-fired power plants in the United States produce 140 million tons of hazardous solid waste, known as coal ash. Much of this waste is stored in more than 1,400 sites in 45 states. Coal ash pits vary widely, based on whether waste is stored in ponds (wet impoundments) or landfills (dry impoundments) as well as on their size and the level of hazard they present to human life.

Coal ash pits often reside adjacent to the power plants that produces their toxic contents. Because vast quantities of water are consumed in coal power generation, these power plants lie beside large sources of water, including our Great Lakes, aquifers, and many of our most important and iconic rivers.

Coal ash is the byproduct of coal combustion mixed with other hazardous compounds including those used to clean coal furnaces (imagine oven cleaner on an industrial scale). As technology has allowed power plants to capture more hazardous pollutants that would have gone into our air, these toxins — including mercury and arsenic — increasingly become part of the solid waste mixture that is coal ash. We have essentially traded one form of toxic pollution for another.

## THE RISKS OF COAL ASH

When coal ash spills, leaks or leaches into nearby groundwater or waterways, the toxins contained within pose serious health risks to nearby communities. In fact, the Environmental Protection Agency (EPA) found that living near certain coal ash ponds is significantly more dangerous than smoking a pack of cigarettes a day.

A person living within one mile of an unlined coal ash pond that co-disposes of coal refuse has a 1 in 50 lifetime risk of cancer — more than 2,000 times higher than the EPA goal for cancer risk. According to the EPA, 1.54 million American children live near coal ash storage sites.[1]

Coal ash contains many toxic contaminants, including arsenic, lead, mercury, hexavalent chromium, and selenium, as well as aluminum, barium, boron, and chlorine. These toxins can cause cancer, heart damage, lung disease, respiratory distress, kidney disease, reproductive problems, gastrointestinal illness, birth defects, and impaired bone growth in children. In short, coal ash toxics have the potential to damage every one of our major organ systems.

### NO FEDERAL SAFEGUARDS

Incredibly, there are no federal standards for the storage and disposal of coal ash to protect communities and waterways from coal ash pollution; no federal standards exist for monitoring groundwater or reporting coal ash pit integrity or pollution. What exists in place of a strong, uniform standard is a disjoined and ineffective jumble of state-based regulations.

Many coal ash dumps lack basic safety features and regular inspections, leaving communities at risk of large-scale disasters like those in Kingston, Tennessee (see box: The Kingston Disaster) and North Carolina (see section: The Dan River Spill). Far more common than a full impoundment failure, however, are the unreported slow leaching of coal ash and pond overflows that pollute our water. Many states do not require owners to line coal ash ponds or monitor nearby groundwater. The EPA has confirmed water contamination from coal ash in every state where coal ash is stored — more than 200 cases in all. However, because there are no federal standards to require reporting, the full picture of coal ash pollution and the damage it causes remains murky.

### PUBLIC DEMAND FOR COAL ASH PROTECTIONS

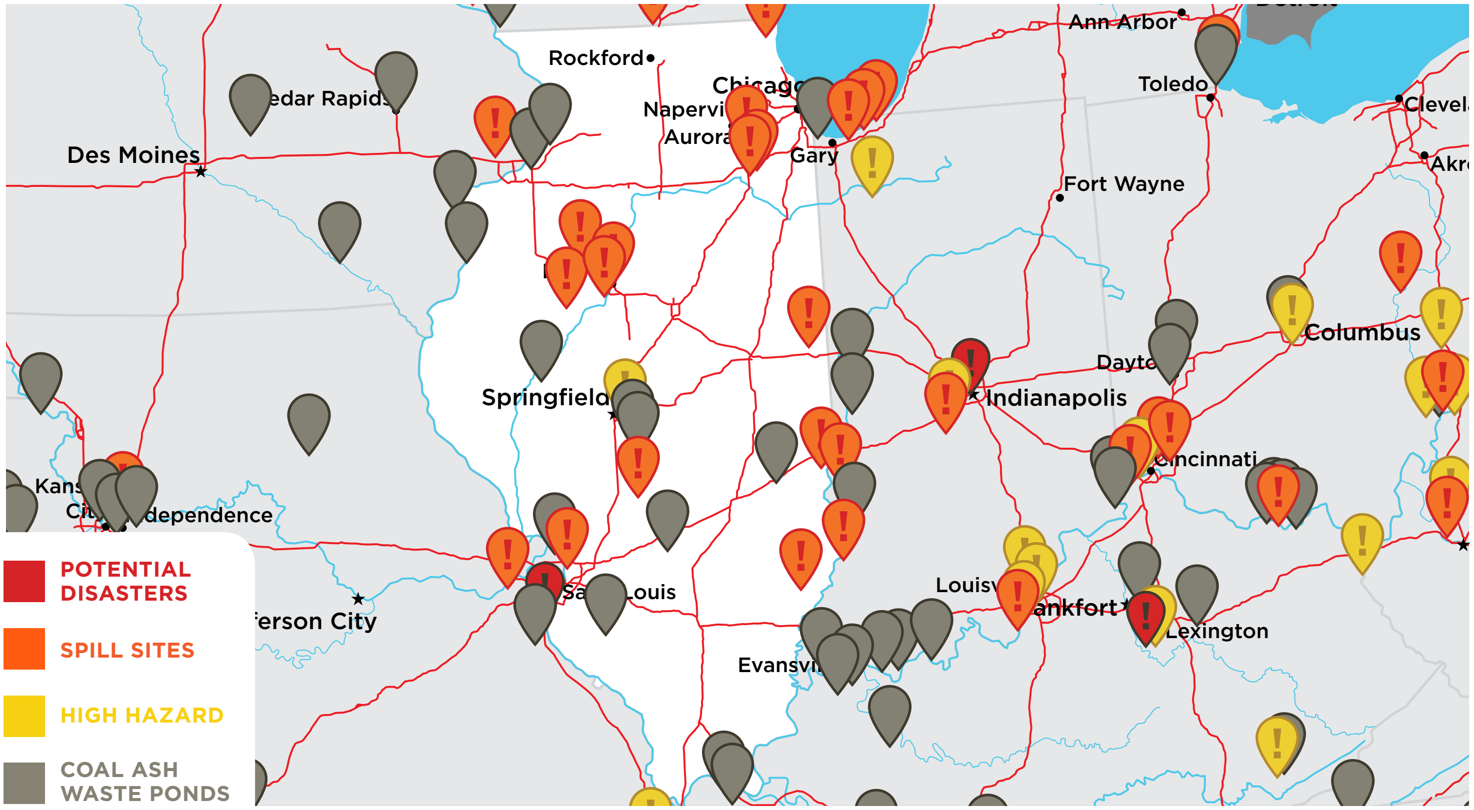
As part of a settlement with affected communities and environmental groups, the U.S. Environmental Protection Agency must finalize new federal standards for the disposal of coal ash by the end of 2014.

Communities on the frontlines of the coal ash fight, as well as public health and environmental groups, are calling for strong, federally enforceable protections for public health and safety. These safeguards should include:

- Phasing out dangerous wet impoundments and cleaning up and closing existing ponds;
- Ensuring coal ash landfills are properly lined and that groundwater around the sites is monitored for contamination;
- Requiring owners to clean up coal ash contamination before it enters drinking water and waterways;
- Requiring owners to provide "financial assurance" in order to protect the community and taxpayers from the cost of cleanup.

## THE KINGSTON DISASTER

On December 22, 2008, a massive coal ash dam failed at the Kingston Fossil Plant in Kingston, Tennessee, releasing a river of toxic coal ash sludge into the surrounding community. In what is the largest toxic waste spill in U.S. history, 1.1 billion gallons of toxic sludge poured across 300 acres of land, damaging or destroying 40 homes, and polluting the Emory and Clinch Rivers. Already the Tennessee Valley Authority has spent more than $1 billion in clean-up efforts, and the total economic impact of the spill is estimated at upwards of $3 billion.




# THE TOXIC LEGACY OF COAL ASH IN ILLINOIS

With 58 operating coal ash dams and 15 "legacy" ponds that still pose a danger to adjacent communities, Illinois ranks first in the nation in total number of coal ash ponds. Taking only active coal ash ponds into account, Illinois ranks second in total surface area for its coal ash ponds with over 3.3 square miles of coal ash wet impoundments. After EPA inspections of 38 Illinois coal ash ponds for structural stability, the agency rated 16 ponds in the state in "poor" condition.  Only 3 of the 38 ponds inspected were rated "satisfactory."

Despite the substantial threat these numerous large coal ash sites pose to Illinois communities, state protections are sorely lacking. State regulation does not require liners or groundwater monitoring for all coal ash sites, and the Illinois Environmental Protection Agency (IEPA) recently found that only a third of the state's coal ash ponds are lined or monitored.

A 2010 IEPA assessment categorized 10 active coal ash sites in Illinois as having "high" to "very high" potential to contaminate nearby drinking water sources. Coal ash has already been found to have contaminated groundwater countless times at all 15 site across the state that have been studied. Harmful pollutants discovered at these sites include arsenic, boron, chloride, iron, lead, manganese, mercury, nitrate, elevated pH, selenium, sulfate, and thallium.[2]

Sites where contamination has been found are Powerton Station, Duck Creek Station, Hennepin Power Station, Havana Power Plant, Vermilion Power Station, Hutsonville Power Station, Wood River Power Station, Coffeen/White & Brewer Fly Ash Landfill, Lakeside Power Station, Joppa Power Station, Prairie Power Pearl Station, Ameren-Meredosia, Waukegan, Venice Plant, and Joliet 29, Marion Plant, and Joliet 9 Generating Station.[3]

| STATE REGULATION | PONDS | LANDFILLS |
|---|---|---|
| Groundwater Monitoring Required for All New and Existing Sites | None | ✓ |
| Liners Required for New Sites* | None | None |
| Site Construction in Water Table Prohibited* | None | ✓ |
| Financial Assurance Required | ✓ | ✓ |

*REQUIRED ON AN AD HOC BASIS BUT NOT UNIFORMLY BY LAW.

Following major coal ash spills in Tennessee and North Carolina, the IEPA is moving forward with new rules for coal ash ponds. However, the state's proposed rules fall short of protecting Illinois communities from the serious harm that coal ash pits pose. For example, while the rules would require a facility to take corrective action if the site is found to be contaminating groundwater, they would not require that the site be closed. Further, the rules would not require complete removal of waste when a coal ash pit is retired. Many of the state's coal ash pits are located in floodplains or other sensitive areas. Allowing toxic coal ash to remain, rather than requiring it be moved to lined landfills, represents an unacceptable risk to nearby communities.

Local activists and environmental groups in the state have also called for owners to provide financial assurances for all coal ash pits, so communities don't get stuck with the bill for cleanup along with a phase out of coal ash wet storage and a move to dry landfill storage; an assessment of all sites for potential breaches and dam failures; and greater public engagement including public comment on plans to correct and close pits, and public IEPA meetings to address community concerns.[4]

Due to documented water impacts and lax regulation, Sierra Club, Environmental Law & Policy Center, Prairie Rivers Network, and Citizens Against Ruining the Environment filed legal action before Illinois's Pollution Control Board to force plant operators to clean up ash ponds that are causing unsafe levels of arsenic, antimony, boron, chloride, iron, lead, manganese, mercury, nitrate, selenium, sulfate, and thallium in groundwater resources.

Coal ash throughout Illinois, and in particular at the E.D. Edwards coal plant owned by Dynegy (detailed in the following section of this report), pose serious concerns for public health and the safety of our waterways, groundwater, and drinking water sources. The ongoing challenges that communities face in remedying the problem of coal ash pollution — in Illinois and in all states where coal ash is stored — point to the need for strong federal safeguards.

| ILLINOIS: SNAPSHOT OF COAL ASH RISKS & REGULATION | |
|---|---|
| Number of Coal Ash Ponds | **84** |
| High-Hazard Sites | **2** |
| Significant Hazard Sites | **22** |
| Documented Cases of Water Contamination or Spills | **20** |

# DISASTER WAITING TO HAPPEN: THE E.D. EDWARDS COAL PLANT

The outdated and unlined E.D. Edwards coal-fired power plant in Bartonville, owned by Dynegy, lies on the banks of the Illinois River. It has operated for more than 50 years and still pollutes central Illinois communities including Peoria, Bartonville, Pekin and East Peoria.

Throughout its half century of operations, the E.D. Edwards plant has stored large amounts of coal ash dangerously close to the Illinois River. The accumulated toxic coal ash currently sits in an 89-acre, 32-foot-deep pond near the plant and has caused documented groundwater contamination around the site. This legacy of pollution has left the Illinois River "impaired" for mercury, leading the state of Illinois to post fish consumption warnings.[5]

> "It is disheartening to know that polluters are given a free pass to discharge toxic metals into our waterways. The Illinois River, Pekin Lake and our other local fishing spots define summertime here in Peoria. We boat, we fish and we recreate in that water. Right now, the fish that come from the Illinois River is too dangerous to eat. Our families and our rivers deserve better than toxic pollution."
>
> *— Jacob Leibel, Peoria Resident and member of the Central Illinois Healthy Community Alliance*

By the company's own reported data, the E.D. Edwards plant discharges over four million gallons of coal ash wastewater into the Illinois River *each day*. The ash discharge — a cocktail of bottom ash and fly ash — carries with it toxic metals like arsenic, lead and mercury. To date, the Illinois Environmental Protection Agency has failed to place limits under the plant's water discharge permit on the amount of dangerous heavy metal pollution that the E.D. Edwards plant can send from its ash ponds into the river.[6]

## ASH POND SAFETY RISKS

The Illinois River is already designated as an impaired waterway because of mercury contamination. Active coal-fired power plants are the largest sources of these toxic pollutants nationally.

The E.D. Edwards coal plant sits on the Illinois River upstream from recreational areas where families gather, including Pekin Lake and fishing sites along both sides of

| E.W. EDWARDS'S COAL ASH POND | |
|---|---|
| Number of Coal Ash Ponds | **1** |
| Total Known Capacity | **587,000,000 gallons**[7] |
| Hazard Level | **Signficiant**[8] |
| Known Groundwater Contamination | **Sulfate, iron, manganese** |
| USEPA Geologic Vulnerability Rating | **Very High** |
| Dam Safety Permit Required for Pit? | **No** |
| USEPA Potable Well Contamination Potential | **High** |

the river. The Edwards plant puts the health of families who enjoy Peoria's resources at risk by discharging toxic polluted water.

## UNCERTAINTY ABOUT THE FUTURE, DYNEGY'S RESPONSE TO A POTENTIAL COAL ASH DISASTER

Dynegy, a Texas-based energy company, took over ownership of the E.D. Edwards coal plant in late 2013 after decades of ownership by Ameren.

Dynegy requested a variance from the Illinois Pollution Control Board (IPCB) to have until 2020 to comply with Illinois's Multi-Pollutant Standard, established in 2006 to require reductions in life-threatening air pollution from Illinois coal plants. The company claimed that complying with Illinois's common-sense clean air standard would cause it undue financial hardship. The IPCB voted three to one in favor of granting the variance, with the dissenting opinion of IPCB Chair Deanna Glosser doubting Dynegy's claims of financial hardship.

Dynegy's history of bankruptcy and mismanagement begs the question of how the company would financially or environmentally handle a coal ash disaster at the E.D. Edwards coal ash pit. Local residents are wary of Dynegy's track record for coal ash in the State of Illinois because the coal ash pit at Dynegy's retired Vermilion coal plant is also fouling local water.

In the company's quarterly report to the U.S. Securities Exchange Commission in summer 2013, Dynegy explained that it has been doing "hydrogeologic" investigations at the Vermilion coal plant site, and results have shown that the coal ash pits are affecting groundwater in the area.[9] This leaking coal ash pit is also close to Illinois's only National Scenic Waterway, the Middle Fork Vermilion River.

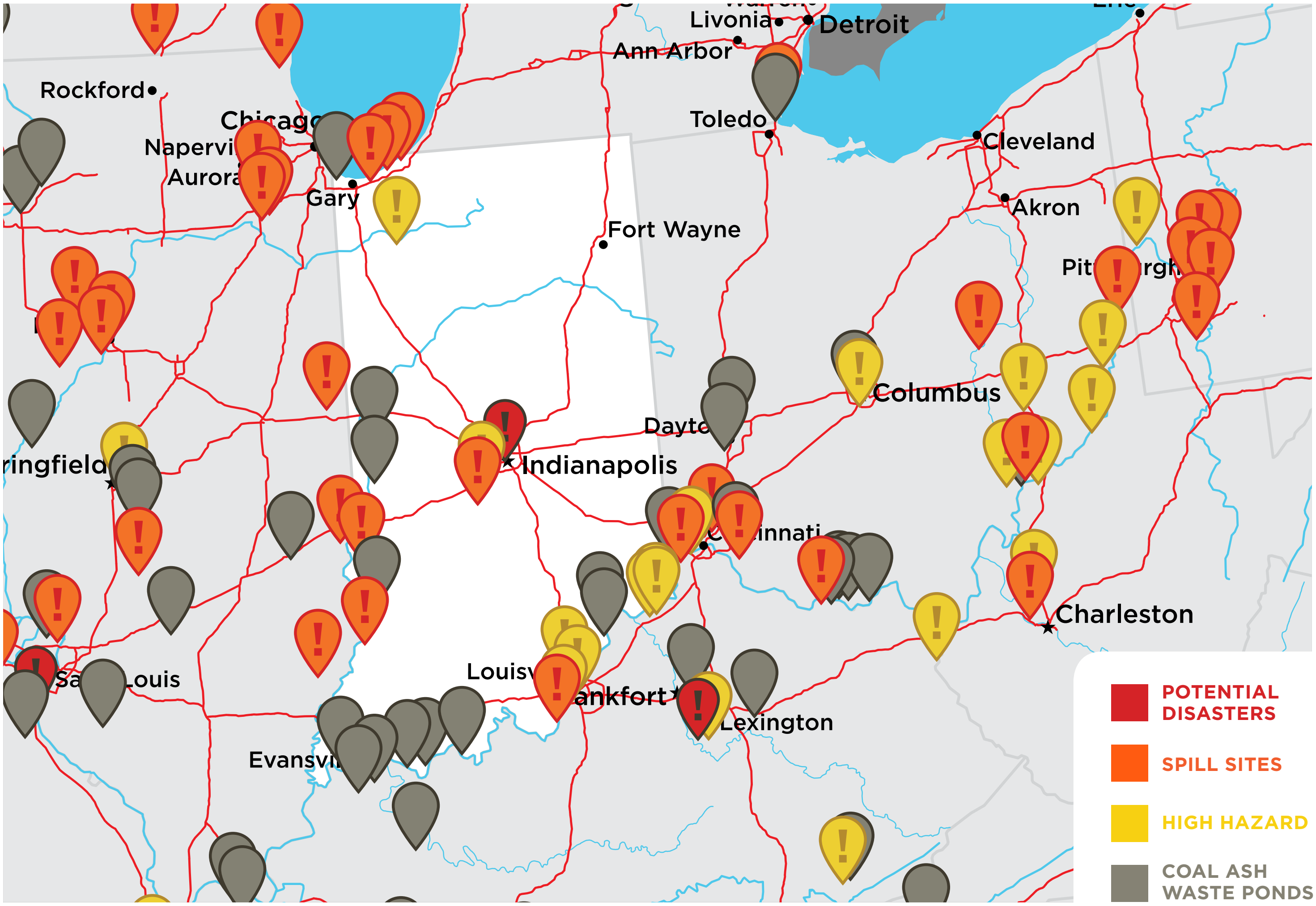
Residents across the State of Illinois have been spurred to action after witnessing the coal ash catastrophe unfold along the Dan River in North Carolina. In order to keep the burden of cleanup off the shoulders of small Illinois communities, a strong state coal ash rule that will determine how and when utilities close and clean up dangerous coal ash pits is vital.

At statewide hearings on the Illinois coal ash rule, residents living in near coal ash pits have asked the IPCB to require the removal of coal ash from failing pits to high and dry landfills, allow for the assessment and prevention of damage to rivers and lakes, and provide more opportunity for public input. They are also urging a requirement that power companies provide financial assurances so that taxpayers aren't left paying the bill for coal ash disaster clean-up.

Illinoisans — and all Americans — deserve strong, federally enforceable coal ash protections. They will continue to work for change at the state level, but the U.S. Environmental Protection Agency must act to protect the health, safety and financial future of all communities put at risk from coal ash pollution.

> "Illinois's aging coal ash pits were built in places they never should have been — over mine voids and in floodplains of rivers. Our state can't afford to take on the liability and expense for more groundwater contamination from ash pits or clean up after one of these toxic dinosaurs collapses into one of our rivers. Governor Quinn and our state regulators have the opportunity right now to enact rules that will prevent disaster and ensure the utilities are taking responsibility."

*— Traci Barkley, Water Resources Scientist with Prairie Rivers Network*




# THE TOXIC LEGACY OF COAL ASH IN INDIANA

Coal-fired power plants in the Hoosier State produce a whopping 9.5 million tons of coal ash waste each year, making it second in the nation in the amount of coal ash it generates. Indiana has more operating coal ash ponds than any other state in the nation.[10]

Indiana has some of the weakest protections for residents, property, and water quality from the dangers of coal ash. According to Earthjustice:[11]

1. State regulations fail to require the safe disposal of coal ash and to require appropriate safeguards, such as pond liners to protect groundwater, groundwater monitoring, regular inspections, emergency response plans, and design of levees and dams by professional engineers.
2. Indiana's record of spills and drinking water contamination is among the worst in the nation: 15 contaminated sites and spills, including a Superfund site involving contaminated wells in the Town of Pines that has still not been cleaned up.

The state has an alarmingly poor record of coal ash dam safety and water contamination, lacking many basic protections against coal ash pollution. In fact, of the 41 coal ash dams inspected by the U.S. Environmental Protection Agency in Indiana, 25 (60 percent) were rated in "poor" condition.

| STATE REGULATION | PONDS | LANDFILLS |
|---|---|---|
| Groundwater Monitoring Required for All New and Existing Sites | None | None |
| Liners Required for New Sites | None | None |
| Site Construction in Water Table Prohibited | None | None |
| Financial Assurance Required | None | ✓ |

There have been two major spills from coal ash ponds at the Eagle Valley Generating Station in Martinsville (each involving upwards of 30 million gallons of contaminated water) and two spills at the R.M. Schahfer in Wheatfield. Coal ash pollution has contaminated groundwater at 11 sites, including at the Town of Pines, where leaking coal ash from a nearby pond contaminated drinking water with arsenic, boron, molybdenum and other toxic substances, requiring installation of a public water system and leading to the town being designated a federal Superfund site.

Safeguards to protect the public from coal ash disasters like those that took place in Tennessee and North Carolina are nonexistent in Indiana. Indiana has no requirement that coal ash dams be designed by a professional engineer, no requirement to inspect dams, no reporting requirements, no inundation mapping in case of floods, no requirement for emergency action plans, and no financial assurance requirements.

Similarly, state law fails to protect drinking water and surface water from the leaching of toxic chemicals from coal ash. The state does not require groundwater monitoring or liners at all ponds and landfills. Regulations even fail to prohibit dumping of coal ash directly into the water table.[12]

Indiana's 11 documented cases of water contamination by coal ash pollution, the poisoning of an entire town's drinking water, its four large ash pond spills, and 25 coal ash dams with "poor" ratings are the direct result of the state's lack of safeguards. You will also read in the following section about the risks to the health and safety of the surrounding community posed by the Harding Street Station in Indianapolis. Together these sites — and dangerous coal ash sites across the country — show the need for strong, federally enforceable protections.

| INDIANA: SNAPSHOT OF COAL ASH RISKS & REGULATION | |
|---|---|
| Number of Coal Ash Ponds | **78** |
| High-Hazard Sites | **5** |
| Significant Hazard Sites | **37** |
| Documented Cases of Water Contamination or Spills | **15** |

# DISASTER WAITING TO HAPPEN: HARDING STREET COAL ASH

For more than 50 years, Indianapolis Power & Light's (IPL) Harding Street coal-burning power plant has sent toxic pollution into the air, land, and water of Indiana's largest urban area. Located just 15 minutes from downtown Indianapolis, IPL's Harding Street plant is the biggest polluter in Marion County – responsible for 88 percent of industrial toxic emissions reported to the U.S. Environmental Protection Agency's Toxic Release Inventory.[13] More than 35,000 people live within three miles of the plant.[14]

For as long as IPL has been burning coal on the south side of Indianapolis, it has been dumping toxic coal ash waste into unlined ponds located adjacent to the Harding Street plant. The plant's five coal ash ponds, two of which are rated "high hazard" by the U.S. Environmental Protection Agency for their potential to cause loss of human life in the event of a dam breach, sit just a stone's throw from the White River and lie upstream from nearby neighborhoods. According to EPA records, above-ground levees holding back the coal ash are more than 17,000 feet long and up to 48 feet high.[15] When full, the ponds could contain more than 310 million gallons of coal ash and contaminated water.[16]

### THREATS TO DRINKING WATER

Though the Harding Street plant has long disposed of its waste in coal ash ponds, IPL does not monitor groundwater adjacent to these ponds or report results to state or federal agencies. Historic records from the Marion County Public Health Department show groundwater contamination in monitoring wells at the perimeter of the ash ponds in the 1980s.[17] According to J. Russell Boulding, a geologist hired by the Hoosier Environmental Council, concentrations of arsenic were twice the EPA standard for drinking water and mercury levels were 20 times over the standard. Boron results were three times EPA's child health advisory for drinking water.[18]

> "The nearest residential area, a neighborhood known as Sunshine Gardens, is located only 1.5 miles downstream from the Harding Street Station coal ash ponds. Many residents of this neighborhood rely on groundwater wells for their drinking and household water. The water wells used by residents of this neighborhood are located in the same White River outwash aquifer that lies below the Harding Street Station."
>
> —*Hoosier Environmental Council*

"The high concentrations of signature coal ash contaminants arsenic and boron dating from the late 1980s suggest that contaminants have been migrating from the ash ponds for a considerable amount of time," Boulding said in his March 2014 report. "Given the highly permeable character of the sand and gravel aquifer, contaminants may have migrated well beyond the perimeter monitoring wells in the [past] twenty-five years."

Boulding concluded that contamination could potentially have spread to private drinking water wells in the Sunshine Gardens neighborhood and could even pose a threat to the city's major drinking water wells nearby. In April, the Marion County Public Health Department agreed to test private wells in the area for boron, a marker of coal ash contamination.[21] The Sierra Club is calling for further investigation to determine the extent of groundwater contamination under the ponds and how far it has traveled. Residents have a right to know whether their drinking water is contaminated today and, if not, that it will be protected from future spread of contamination.

## DANGEROUS HIGH HAZARD PONDS

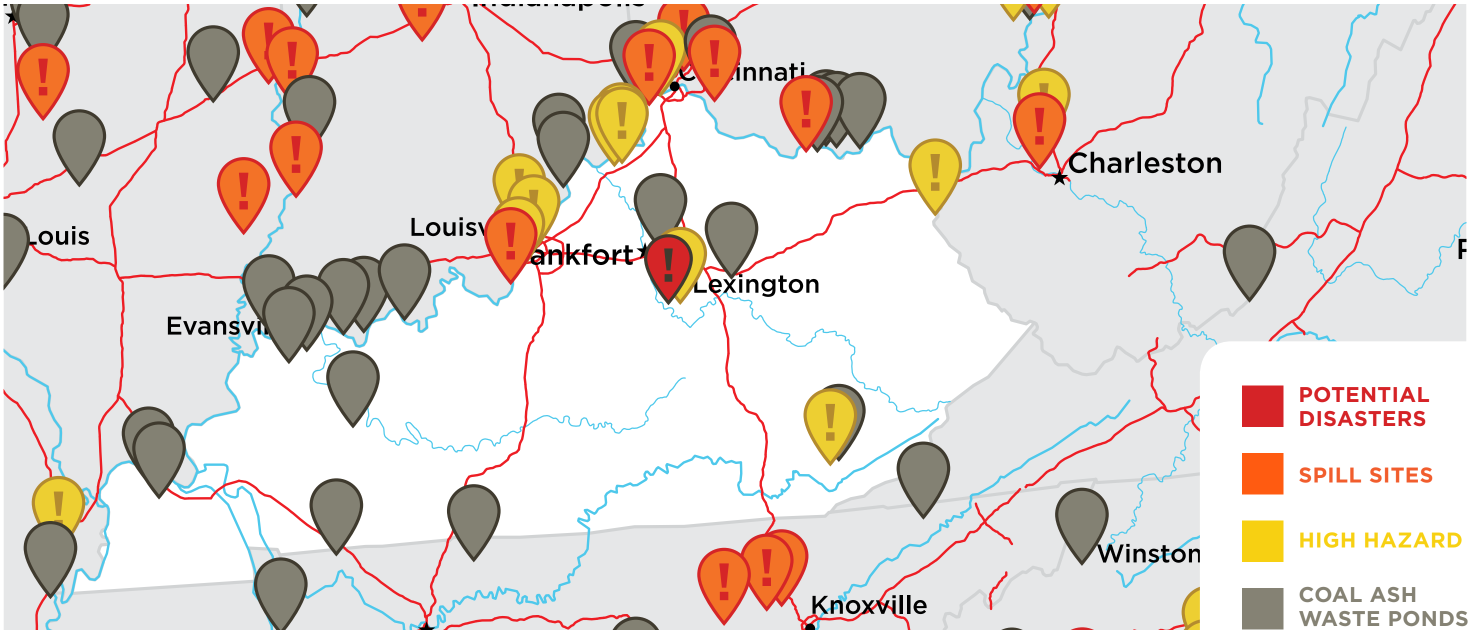
Between 2009 and 2013, the EPA launched investigations into the structural safety of coal ash ponds nationwide.[22] The assessment rated two Harding Street coal ash ponds as "high hazard" and rated all six Harding Street coal ash ponds in "poor" condition. Despite experiencing two 30 million-gallon coal ash slurry spills at its Martinsville power plant in 2007 and 2008, IPL had no written maintenance program and no emergency action plan for the Harding Street ash ponds in 2010. According to the engineering consulting firm CDM, which conducted the assessment for EPA, a breach at Pond 2 or Pond 4 could "cause property damage at an adjacent stone quarry and possibly result in quarry worker's loss of life." A failure of ash ponds 2 or 3 also could send toxic coal ash into Lick Creek and White River, harming the river environment and potentially causing property damage or loss of life in communities downstream.[23]

The Harding Street coal ash ponds are located in the White River's 100-year flood plain, which is connected to the city's well-field protection areas downstream. According to the Hoosier Environmental Council, a large flood could wash coal ash pollutants into surrounding neighborhoods and the well-field protection area, which is designed to protect groundwater that supplies drinking water throughout the city.[24]

## MERCURY-CONTAMINATED FISH

Fish in the White River are already contaminated with mercury, making many fish unsafe for children and young women to eat.[25,26] Pollution controls that will reduce mercury coming from power plant smokestacks will transfer more mercury into coal ash waste, putting White River and other waterways at even greater risk if coal ash is not safely handled and disposed in ways that don't contaminate Indiana's water.[27]

| THE HARDING STREET STATION COAL ASH PONDS | |
|---|---|
| Number of Coal Ash Ponds | **8** |
| Total Known Capacity | **310,000,000 gallons**[19] |
| Hazard Level | **High (Ponds 2 and 4)**[20] |
| Known Groundwater Contamination | **High levels of mercury, arsenic and boron** |




# THE TOXIC LEGACY OF COAL ASH IN KENTUCKY

Kentucky is both a leading coal-burning and coal ash producing state, generating more than nine million tons of toxic coal ash annually. The state is home to 48 coal ash ponds, eight of which are rated high hazard. Kentucky has the third largest coal ash storage capacity in the nation — 64,000 acre-feet or enough toxic sludge to cover the Churchill Downs Racetrack, home to the Kentucky Derby, under 800 feet of toxic sludge.

Yet, state agencies that should be protecting the health of residents from coal ash toxins require virtually no safeguards at coal ash sites. Incredibly, 20 of the state's 48 coal ash dams were not designed by professional engineers. Only 32 of Kentucky's dams have been inspected by the U.S. Environmental Protection Agency (EPA) to date, and power plant owners admit engineers do not presently monitor 30 of the 48 dams.[28]

There are no regular reporting requirements after construction, except for certificate renewal every five years; and coal ash sites have been able to operate with expired licenses. Historically, operators have not always been required to provide financial assurances in the event of a spill, potentially leaving Kentuckians on the hook for the cost of cleanup. Kentucky regulation does not require emergency action plans or inundation maps (that show how the surrounding communities would be affected by a dam breach). These represent an incredible failure of oversight, especially given the presence of eight high-hazard dams that would likely take human lives in the event of failure.

Groundwater contamination from coal ash dumping has already been documented at five sites in Kentucky, including high levels of arsenic, boron, manganese,

| KENTUCKY: SNAPSHOT OF COAL ASH RISKS & REGULATION | |
|---|---|
| Number of Coal Ash Ponds | 48 |
| High-Hazard Sites | 8 |
| Significant Hazard Sites | 18 |
| Documented Cases of Water Contamination or Spills | 5 |

| STATE REGULATION | PONDS | LANDFILLS |
|---|---|---|
| Groundwater Monitoring Required for All New and Existing Sites | None | None |
| Liners Required for New Sites | None | None |
| Site Construction in Water Table Prohibited | None | None |
| Financial Assurance Required | None | None |

nickel, and sulfate. It is likely that contaminants are present at many more sites but go undetected, because the state does not require liners (that prevent leaching of coal ash toxins into the ground) at all coal ash ponds nor does the state prohibit dumping coal ash waste directly into the water table [See Mill Creek: Disaster in Slow Motion].[29]

Toxic dust from coal ash landfills is also a public health threat to communities near coal plants in Kentucky. The LG&E Cane Run Generating Station near Louisville, KY stores enormous mountains of coal ash on site. For years, toxic dust clouds and odors have blown from the facility into the community next to the plant. The Louisville Metro Air Pollution Control District has repeatedly responded to the toxic dust with notices of violations and fines, but residents continue to be plagued by blowing ash.

Because Kentucky regulations do not require groundwater monitoring at all coal ash dump sites, Kentuckians are left in the dark about the full extent of contamination and the risks they face but, according to EPA calculations, coal ash landfills and ponds are responsible for all land releases of arsenic, chromium, and mercury in Kentucky.[30]

Because of lax regulation and poor oversight by the state — including allowing virtually unlimited discharge of toxic coal ash pollutants and allowing coal ash ponds to operate under long-expired permits[31] — Kentuckians are put at significant risk from coal ash pollution.

As part of a national investigation, the following section details the coal ash ponds at E.W. Brown Generating Station in Harrodsburg, Kentucky and the risks local families face from these ponds' toxic contents. Given the failure of state regulators — in Kentucky, and indeed across the United States — to create and enforce common-sense safeguards that would protect public health and waterways, it's time for the U.S. Environmental Protection Agency to issue strong, federally enforceable protections.

## MILL CREEK: DISASTER IN SLOW MOTION

Beginning in 2013, time-lapse photography from a camera attached to a tree across the Ohio River from Louisville Gas and Electric's Mill Creek Generating Station captured a year's worth of images showing dangerous coal ash wastewater pouring unabated into the Ohio River. An unlined waste pond storing toxic coal ash is the source of the pollution.

The Mill Creek coal plant and its associated coal ash pond are 500 feet from a large residential development and 1,000 feet from a middle school. Despite this close proximity; Kentucky law does not require LG&E to test its coal ash wastewater for toxic pollutants such as mercury.

*"It's devastating to think that this could have been going on for more than 20 years. It's like the North Carolina or West Virginia spills but in slow motion, with no one to stop it."*

— SIERRA CLUB ORGANIZER THOMAS PEARCE, WHO HELPED INSTALL THE HIDDEN CAMERA.

# PILING ON A PROBLEM: E.W. BROWN'S COAL ASH POND & PROPOSED LANDFILL

The E.W. Brown Generating Station in Harrodsburg, Kentucky is a nearly 60-year-old coal-burning plant less than 30 miles from Lexington.[32] Operated by Kentucky Utilities and owned by Louisville Gas & Electric, the plant maintains a 126-acre main coal ash pond. The massive unlined pond, built with the coal plant in 1957, was an unregulated dumping site for coal ash waste, which is the by-product resulting from burning coal.[33]

Over the last few years, the pond has stopped receiving coal ash, but the site remains unlined and still contains about 26 million tons of ash. The E.W. Brown plant and its coal ash ponds, located over an already fractured, highly permeable and vulnerable region, are leaking contaminants into the surface and groundwater, threatening public health and violating state and federal laws.[34]

Tests on the water show arsenic contamination at more than 14 times the amount determined safe for Kentucky drinking water. About a dozen springs southeast of E.W. Brown's ponds are discharging contaminants into nearby Herrington Lake, which has shown unhealthy levels of mercury. Further, two local springs contained boron at levels exceeding the U.S. Environmental Protection Agency's Health Advisory for Children. Herrington Lake flows into the Kentucky River, one of the most polluted waterways in the United States.[35]

### DAM SAFETY RISKS

The Kentucky Department for Environmental Protection's Division of Water has also deemed the 126-ft. pond dam a high hazard structure, meaning that if it failed it would cause deaths and seriously damage property and transportation routes.  However, Kentucky Utilities has failed to act on this looming threat.[38]

### PROPOSED LANDFILL

Kentucky Utilities has proposed to construct a coal ash landfill larger than 105 acres on top of the E.W. Brown's main coal ash pond.[39] The long-term impacts of placing a landfill on top of a coal ash pond are unknown, and the design raises serious questions about long-term stability and continued pollution from the site, especially given the ongoing contamination of the groundwater. The landfill could drive contaminants deeper into the groundwater, making it more difficult to take action and stop the problem.[40]

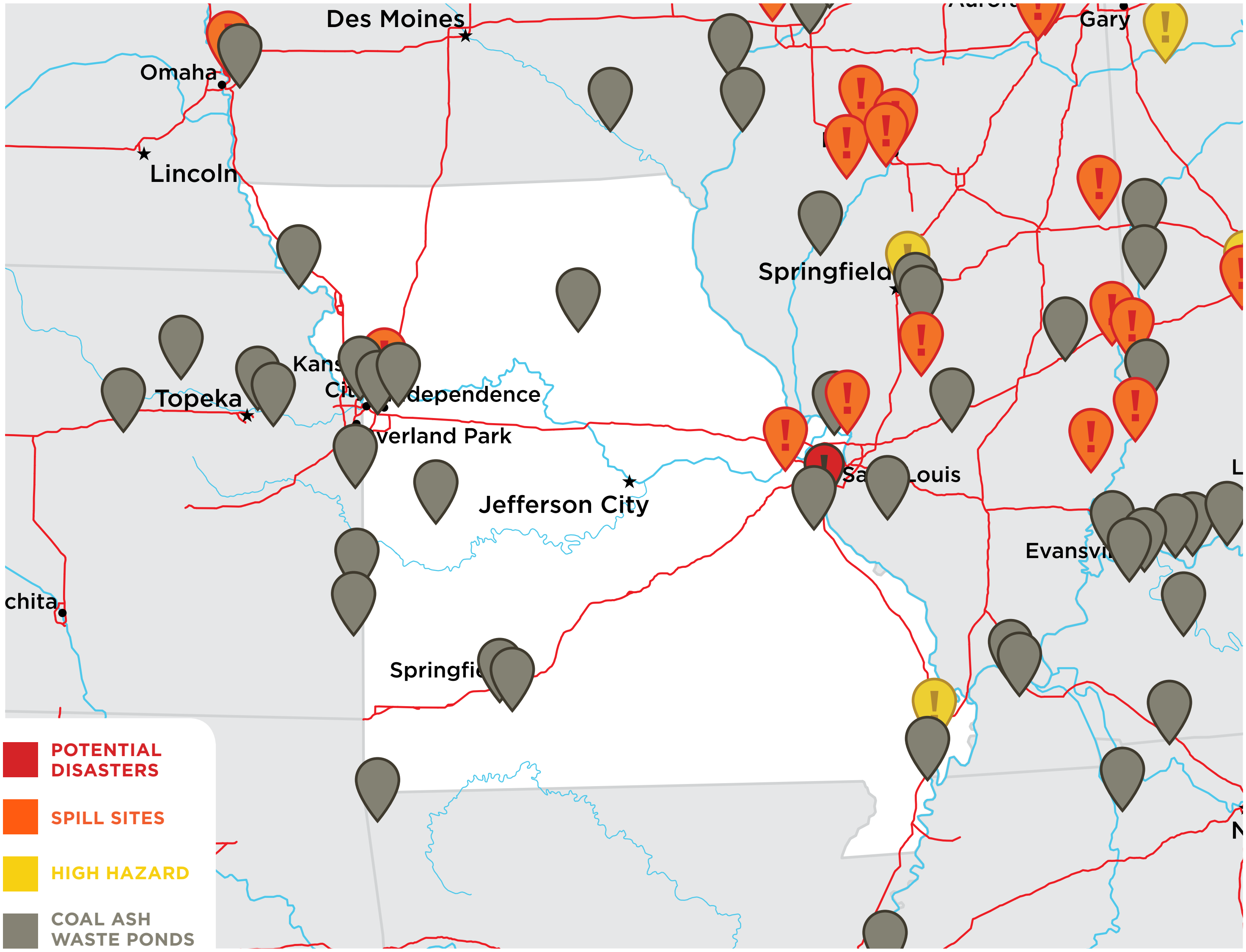
### WHAT'S AT STAKE?

The proposed landfill would pile tens of millions of tons of coal ash on top of the leaking pond, which is less than a quarter of a mile from vacation homes and other residential neighborhoods surrounding the 2,300-acre Herrington Lake.[41] Built by Kentucky Utilities in 1925 as a hydroelectric dam, the lake is now a major recreational and fishing area, drawing families and vacationers seeking to enjoy the marina views, local eateries, boating, and other water sports.

| E.W. BROWN'S COAL ASH POND | |
|---|---|
| Number of Coal Ash Ponds | **3**[36] |
| Total Known Capacity | **Undetermined**[37] |
| Hazard Level | **High (2 ponds)** |
| Known Groundwater Contamination | **Arsenic at more than 14 times safe level, boron, mercury, and selenium** |

### A LEGACY OF CONTAMINATION

Both LG&E and Kentucky Utilities are owned by PP&L (Pennsylvania Power & Light), a large corporate offender that is also responsible for coal ash pollution in Montana at its Colstrip plant.[42] Like E.W. Brown, the Colstrip plant's ponds and containment system have been leaking for decades, contaminating the groundwater. Also in Kentucky, a hidden camera operation revealed that LG&E's Mill Creek plant has been constantly dumping coal ash wastewater into the Ohio River for a year. Google Earth images also show many years worth of snapshots that captured an outflow into the river.[43]




# THE TOXIC LEGACY OF COAL ASH IN MISSOURI

Only the largest, most dangerous of Missouri's 32 coal ash ponds are regulated for dam safety. Coal ash ponds with a whopping 170 million gallons of capacity (enough to fill the entire National Mall in Washington D.C. with two feet of coal ash sludge) go virtually unregulated.

Key safeguards to protect the public are absent in Missouri. Regular state coal ash dam safety inspections are not required, nor is groundwater monitoring or liners at all coal ash ponds. Missouri regulations even fail to prohibit dumping directly into the water table. Half of Missouri's coal ash dams were not constructed by professional engineers.

One of Missouri's 39 coal ash pond dams is rated as a "High" hazard by the U.S. Environmental Protection Agency (EPA), meaning that failure is likely to take human lives, and five are rated as a "Significant" hazard, meaning that failure would cause economic and/or environmental damage.  Six of Missouri's coal ash ponds also have an EPA Condition Assessment of "Poor," meaning that remedial action is needed.

Missouri is a coal-dependent state with especially lax groundwater monitoring requirements at coal ash ponds. Currently, the state's Department of Natural

| STATE REGULATION | PONDS | LANDFILLS |
|---|---|---|
| Groundwater Monitoring Required for All New and Existing Sites | None | ✓ |
| Liners Required for New Sites | None | ✓ |
| Site Construction in Water Table Prohibited | None | None |
| Financial Assurance Required | None | None |

Resources has not exercised its authority to collect groundwater monitoring data at many coal ash ponds. Without this vital information, local residents are kept in the dark about the extent of potential drinking water contamination and the serious health risks they face.

Across state lines in Illinois, where Ameren has dumped coal ash in ponds for decades, monitoring required by the state revealed widespread contamination. There is no distinguishable difference in the type of coal ash ponds operated in Missouri and those in Illinois, but the lack of contamination data in Missouri puts Missourians in relatively greater danger.

The Missouri Department of Natural Resources (DNR) knew as early as 1992 that a 154-acre, unlined coal ash pond at Ameren's Labadie plant — the largest coal plant in the state and the 14th largest in the nation — had been leaking some 50,000 gallons of coal ash waste per day. It's believed the leaks went on for about two decades before media attention and public pressure triggered Ameren to take steps to address them. Ameren has not stopped the leaking of toxic coal ash at the source but has taken steps to reduce contamination into the environment.

The DNR has not required groundwater monitoring or cleanup, despite the threat to the local population that relies on groundwater for drinking water and agricultural use. The DNR also allowed the plant to continue operating under a 1994 permit, which should have expired in 1999, without issuing an updated renewal permit to require groundwater monitoring and cleanup.[44] The following section will detail the risks posed by proposed coal ash landfills at the Labadie site as well as two other Ameren plants, in particular the Meramec plant.

The state's apparent disregard for major health and safety concerns from massive coal ash dump sites and dams across the state is part and parcel of why we need strong, federally enforceable safeguards from coal ash pollution — for Missourians and all Americans.

| MISSOURI: SNAPSHOT OF COAL ASH RISKS & REGULATION | |
|---|---|
| Number of Coal Ash Ponds | **39** |
| High-Hazard Sites | **1** |
| Significant Hazard Sites | **5** |
| Documented Cases of Water Contamination or Spills | **4** |

# DISASTER WAITING TO HAPPEN: COAL ASH AT THE MERAMEC COAL PLANT

For the past 60 years, utility giant Ameren has dumped coal ash into unlined ponds at the Labadie, Meramec, Rush Island, and Portage Des Sioux coal-burning power plants located throughout the St. Louis metropolitan area. Ameren Corporation is heavily dependent on coal, drawing approximately 80 percent of its power from burning the dirty fossil fuel.

Today, Ameren is seeking approval from the Missouri Department of Natural Resources (DNR) to build new coal ash landfills at the Labadie, Meramec and Rush Island power plants. All are located in the floodplains of the Missouri, Mississippi and Meramec Rivers. The coal ash landfills at the Meramec and Rush Island plants would be built on top of unlined coal ash ponds where at least one instance of leaking coal ash toxins has already been confirmed. This risky — and unprecedented in Missouri — approach to coal ash disposal raises serious questions and concerns for the affected communities as well as families across Missouri.

The proposal to build a risky new landfill at the aging Meramec coal-fired power plant on the confluence of the Meramec and Mississippi Rivers is particularly alarming for area residents. Ameren began dumping coal ash into unlined ash ponds at the Meramec plant in St. Louis County in 1953. Since then, Ameren has used ten different ash ponds at the site.[45] Of the six ash ponds

> "We know that Ameren knows how to look for contamination, and when they look for it they usually find it."
>
> —*Maxine Lipeles, co-director of the Interdisciplinary Environmental Clinic at Washington University School of Law*[51]

remaining in active use, four are unlined and three date to the 1950s. In 2012, the U.S. Environmental Protection Agency (EPA) inspected the Meramec plant's six active ponds for structural stability and rated them all as "poor."[46]

### ASH POND SAFETY RISKS

DNR has said that it intends to include groundwater monitoring requirements if and when it updates the expired water pollution discharge (NPDES) permits for the Labadie, Meramec, and Rush Island plants. Yet these permits are long expired — the Labadie plant expired in 1999, Meramec in 2005, and Rush Island in 2009 — and DNR's efforts to issue renewal permits have repeatedly faltered.

An Ameren report shows that the company found groundwater contamination at the Meramec site in 1988. Ameren's tests detected pollutants associated with coal ash,[48] including iron, boron, and manganese in concentrations that exceeded state limits for groundwater safety. Ameren's contractor even acknowledged that elevated levels of boron indicated that coal ash was leaking from the ponds.[49] This contamination was associated with one of the two ash ponds above which Ameren now proposes to build a coal ash landfill. While that ash pond is now apparently lined, there is no indication that any of the contamination has been cleaned up. Four of the six active ash ponds at the Meramec sites — including the other pond above which Ameren seeks to build its proposed coal ash landfill — are unlined.[50]

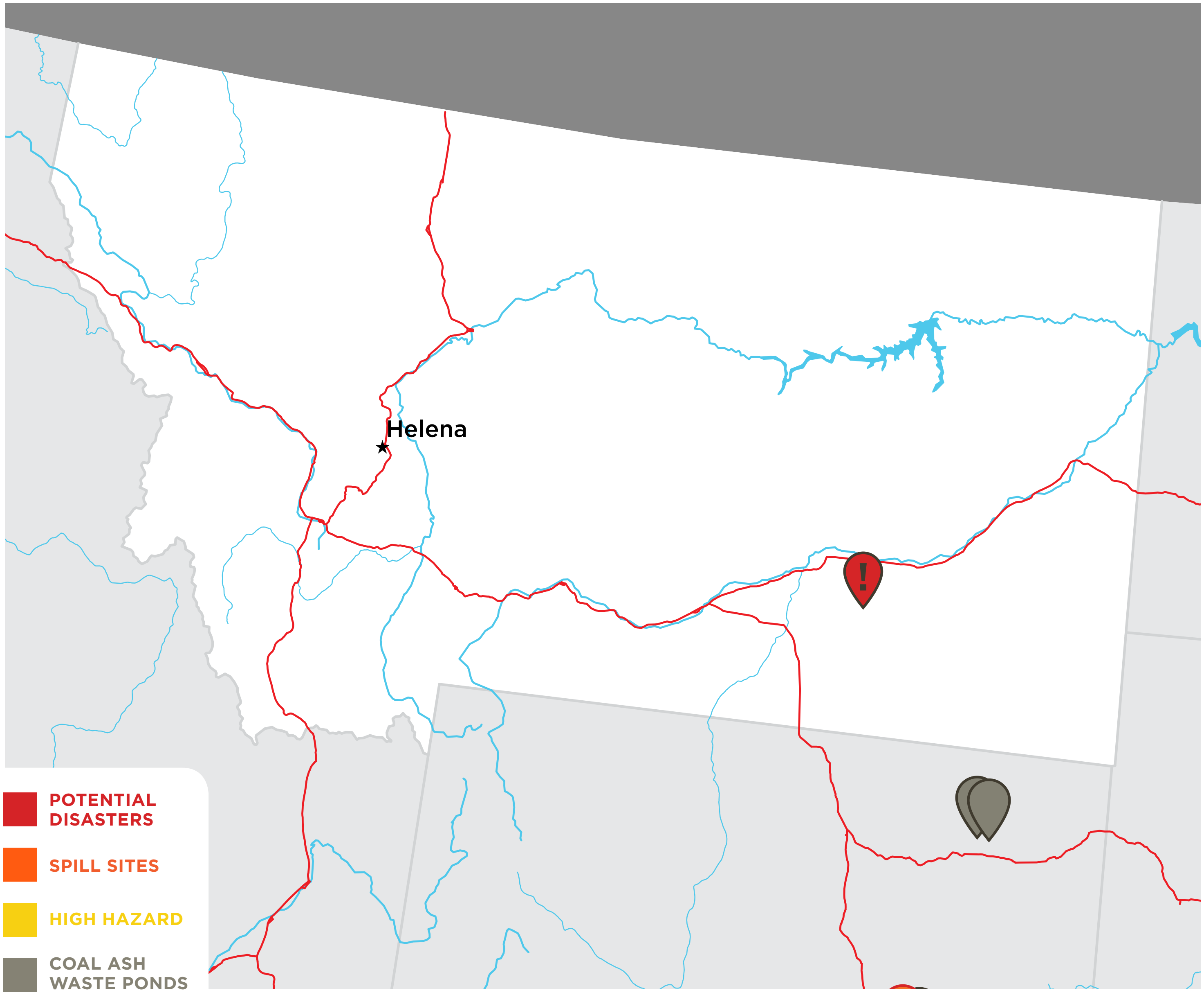
### THE PUSH FOR WATER PROTECTIONS IN MISSOURI CONTINUES

The fate of Ameren's risky plans to build coal ash landfills on top of already-leaking, outdated ponds rests in the hands of the Missouri DNR. The agency can and should require groundwater monitoring and establish the structural integrity of the underlying ponds before Ameren can take steps to build these landfills. Ameren recently began voluntary groundwater monitoring at Rush Island, in order to develop a closure plan for the ash pond as part of its landfill proposal. DNR has asked for, but not yet received (as of May 2014) the results of the first quarterly groundwater sampling.

| THE MERAMEC COAL ASH PONDS | |
|---|---|
| Number of Coal Ash Ponds | **10** |
| Total Known Capacity | **267,000,000 gallons[47]** |
| Hazard Level | **Low** |
| EPA Condition Assessment | **Poor** |
| Known Groundwater Contamination | **High levels of iron, boron, and manganese (1988). Current levels unknown due to lack of DNR groundwater monitoring** |

Dedicated St. Louis residents have fought the risky proposed landfills for years, voicing concerns for the safety of their own groundwater wells that are likely to be contaminated by Ameren's coal ash leakage. In 2013, the Sierra Club and the Labadie Environmental Organization called on DNR to immediately require comprehensive groundwater monitoring of known and likely contamination at Ameren's Labadie, Meramec, and Rush Island coal-fired power plants.[52] In early 2014, the groups brought their concerns to Governor Jay Nixon, calling for a halt to all proposed coal ash landfill permits until comprehensive groundwater monitoring has been conducted at all existing coal ash ponds.

Missouri residents will continue to fight for even the most basic information and protection of their health and waterways from coal ash pollution. The long-standing serious concerns raised by Missourians and communities across the country who are put at risk by toxic coal ash show the need for strong, federally enforceable protections.




# THE TOXIC LEGACY OF COAL ASH IN MONTANA:

Montana's coal ash ponds operate without sufficient safeguards and little or no oversight to ensure the health and safety of Montanans are protected. In 2003, the state's already weak standards for coal ash safety were removed entirely for new coal plants when Montana exempted coal-fired power plants from its Major Facility Siting Act (MFSA).

Even Montana's Department of Environmental Quality admits that this absolute lack of coal ash protections for future plants is "no longer appropriate." Yet attempts to bring coal ash back under the most basic program of monitoring and safety standards have failed thus far at the state level. Montana has no requirements for liners, groundwater monitoring, preventing leaching of toxic waste, financial assurance or clean up at any new coal ash sites and very limited authority at existing sites like Colstrip. The Colstrip power plant in Rosebud County is

| STATE REGULATION | PONDS | LANDFILLS |
|---|---|---|
| Groundwater Monitoring Required for All New Sites | None | None |
| Liners Required for New Sites | None | None |
| Site Construction in Water Table Prohibited | None | None |
| Financial Assurance Required | None | None |

the site of most of the coal ash ponds in the state. These ponds are known to have been leaking almost since their inception. The details of the contamination of drinking water of the town of Colstrip and the subsequent legal settlements will be detailed in the following section. Contamination from coal ash sickened residents and continues to pollute ground and surface water near the plant.[53]

| MONTANA: SNAPSHOT OF COAL ASH RISKS & REGULATION | |
|---|---|
| Number of Coal Ash Ponds | **17** |
| High-Hazard Sites | **1** |
| Significant Hazard Sites | **3** |
| Documented Cases of Water Contamination or Spills | **6** |

# AN UNTOLD CATASTROPHE: THE COLSTRIP COAL PLANT IN MONTANA

For decades, the Colstrip coal plant in Colstrip, Montana has been leaking toxic coal ash waste into precious groundwater resources in dry Rosebud County, Montana. Local ranchers, whose families have been in Rosebud County since the 1800s, are dependent upon groundwater to sustain their cattle ranches, as Colstrip gets as little as 13 inches of rain a year.

The biggest individual owner of the Colstrip coal plant is Puget Sound Energy, the largest electric utility in Washington State. The second largest owner and operator of the plant is Pennsylvania- based PPL, headquartered in Allentown, Pennsylvania. In addition to the Colstrip coal plant, PPL also owns Louisville Gas & Electric, which operates the Mill Creek coal plant in Mill Creek, Kentucky that was recently exposed for releasing nearly unlimited amounts of toxic coal ash waste water into the Ohio River. PPL is establishing a pattern of allowing toxic coal ash waste into essential water bodies. The other Colstrip owners include: Avista Utilities in Spokane, Washington and Northern Idaho; Portland General Electric in Portland, Oregon; NorthWestern Energy, the largest electric utility in Montana; and PacifiCorp, one of the largest utilities in the country.

After nearly 40 years of plant operations, the Colstrip coal plant now has over 800 acres of waste ponds that contain toxic pollutants like boron and arsenic.[54] The waste ponds collectively leak over 360 gallons per minute of contaminated effluent into the underlying groundwater.[55] Due to contamination originating from the Colstrip site, the owners of the plant had to pay a $25 million settlement to neighbors and ranchers for contamination of their drinking water in 2008.[56] Additionally, the City of Colstrip has to pipe in fresh water from miles away and operate a separate drinking water system to ensure local residents are assured of the basic right to safe drinking water.[57] Aerial photographs and maps provided by the coal plant owners document that the plume of pollution has spread below the town of Colstrip.[58]

The U.S. Environmental Protection Agency has identified some of the Colstrip dams that hold back the toxic waste ponds as "high hazard dams."[59] According to the Environmental Protection Agency, a "high hazard dam" is one in which a "failure or mis-operation will probably cause loss of human life."[60] These dams should be evaluated by a government agency to ensure they are not at risk of breaching, and thereby causing yet another coal ash disaster. Yet no government agency has ever inspected these dams.

While the Colstrip plant was originally intended to utilize a "closed loop" system for its waste, meaning that any wastewater generated by the plant should stay within the plant compound, this is not the case. PPL tries to characterize their system as "closed loop" because they simply re-define containment. In a feeble attempt to control the spreading contamination, PPL has set up a system of pollution monitoring wells outside the suspected area of groundwater pollution. If these monitoring wells detect pollution, the plant operator attempts to stop the spread of the pollution by converting the monitoring wells to pump-back wells, where they simply pump the contaminated water back into the central waste ponds. The owners are now operating approximately 188 pump-back wells. Essentially, what PPL is doing is moving the goal posts. As soon as more contamination shows up on the perimeter, they move out the perimeter, thereby redefining containment.

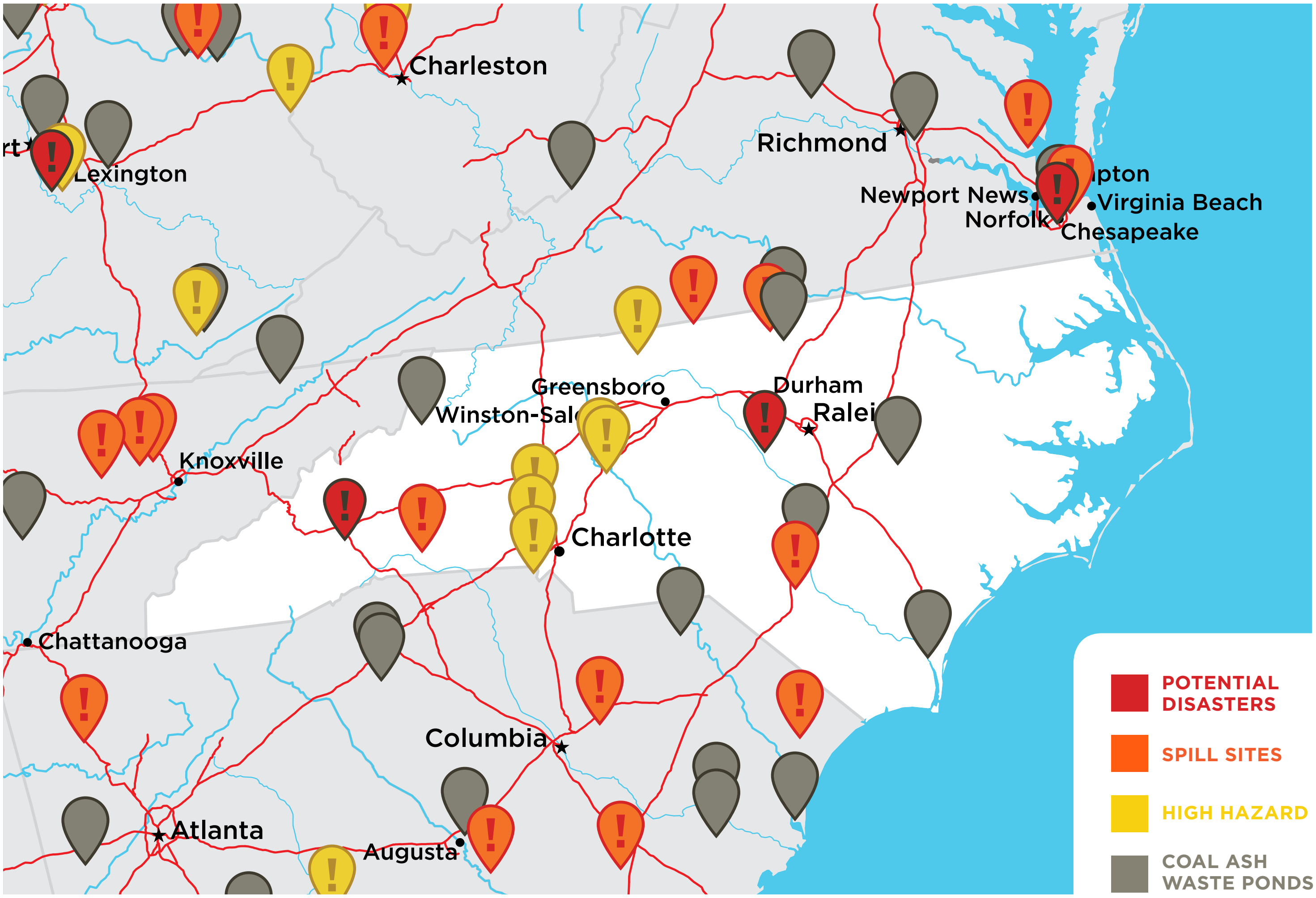
This is similar to PPL's bending of the law in Kentucky. PPL's current permit at the Mill Creek plant allows it to "occasionally" discharge its waste water into the Ohio. PPL has simply defined "occasional" to mean every day. PPL is establishing a pattern of distorting the law to avoid being responsible for its toxic pollution.

While water users in Montana must limit their well water withdrawals to 35 gallons per minute or 10 acre-feet annually, PPL is now pumping back nearly 1000 gallons per minute of groundwater into the waste water impoundments.[61] Collectively and often individually, Colstrip's monitoring wells far exceed legally acceptable levels of water withdrawals. Yet Colstrip is currently avoiding having to obtain essential water rights that are designed to sustain water use in the very arid environment of Eastern Montana, where groundwater is like gold.

This untold Colstrip disaster is another sad legacy in Montana's history of out-of-state corporations coming into Montana, stripping away the natural resources, and leaving a toxic site behind. The chemical conglomerate WR Grace, the Zortman-Landusky gold mine, the multinational ARCO and its Berkeley Pit have spoiled Montana with some of the nation's worst and most-expensive toxic waste sites. Montanans are slowly and reluctantly waking up to the fact that Colstrip may be Montana's next catastrophe.

PPL's coal-ash system is not working. Colstrip does not need one of PPL's high hazard dams to break for a catastrophe to occur. It is happening now, and has been going on for decades. Montanans and all Americans need strong, federally enforceable protections from the serious dangers posed by coal ash.

| THE COLSTRIP COAL ASH PONDS | |
|---|---|
| Number of Coal Ash Ponds | 9 |
| Total Known Capacity | **Unknown** |
| Hazard Level | **High** |
| Known Groundwater Contamination | **boron, sulfate, heavy metals** |




# THE TOXIC LEGACY OF COAL ASH IN NORTH CAROLINA

Power plants in North Carolina create an enormous amount of coal ash—5.5 million tons annually. The state is among the top-ten largest producers of coal ash in the nation, playing host to 26 enormous coal ash dams. The average coal ash dam in North Carolina is over six stories tall (62 feet) and can store nearly 65,000 acre-feet—the equivalent of 32,000 Olympic-sized swimming pools—of toxic coal sludge.

Dam safety, however, appears to be a low priority for North Carolina regulators. State law does not require operators to submit regular reports, nor does it ensure that the public is free from financial responsibility if a dam fails. So lax are the protections that North Carolina created loopholes for operators of coal ash dams to avoid submitting emergency action plans in case of a catastrophic failure.

When millions of gallons of coal ash sludge and contaminated water spilled into the Dan River in February 2014, it was not the first time that North Carolinians faced toxic dangers from coal ash at the hands of Duke Energy, which owns and operates 14 coal plants in the state. Duke Energy has previously been responsible for coal ash contamination of Mountain Island Lake, which is the drinking water source for more than over 800,000 people in the Charlotte area.

| STATE REGULATION | PONDS | LANDFILLS |
|---|---|---|
| Groundwater Monitoring Required for All New and Existing Sites | ✓ | None |
| Liners Required for New Sites* | None | ✓ |
| Site Construction in Water Table Prohibited | ✓ | ✓ |
| Financial Assurance Required | None | ✓ |

*NO NEW COAL ASH POND SITES ARE ANTICIPATED.
TABLE CITATION - HTTP://EARTHJUSTICE.ORG/SITES/DEFAULT/FILES/NC-COAL-ASH-FACTSHEET-1112.PDF AND HTTP://WWW.EPA.GOV/OSW/NONHAZ/INDUSTRIAL/SPECIAL/FOSSIL/SURVEYS2/INDEX.HTM

Meanwhile, Duke Energy's coal ash pollution in Sutton Lake is estimated to kill more than 900,000 fish every year.[62] In Asheville, where local activists are calling for the retirement of the Asheville coal plant, old coal ash ponds are known to leach toxic chemicals into groundwater and the French Broad River.

Duke Energy and North Carolina's Department of Environment and Natural Resources (DENR) have known about contamination and dangerous coal ash storage pits for years. Yet neither Duke Energy nor the state took action to clean up the waste pits and protect state waterways or residents, until concerned local activists began calling for transparency and clean up.[63]

In addition, recent reports have shed light on just how far North Carolina Governor Pat McCrory (a former Duke Energy employee) and DENR have gone to protect the interests of Duke Energy. This includes initiating lawsuits against Duke Energy for coal ash pollution in order to block actions by environmental groups and then attempting to quickly settle those cases with small fines that amount to a pittance for the energy giant, while shielding Duke Energy from full public disclosure of wrong-doing.[64] A federal criminal grand jury is now investigating how Duke Energy and the State have handled coal ash.

Since the Dan River spill, state regulators and Duke Energy have come under enormous scrutiny and are beginning to change their tune. In fact, one month after the disaster and just days after an Associated Press public records inquiry, North Carolina regulators cited five more Duke Energy power plants for lacking required storm water permits: Belews Creek Steam Station, Cliffside Steam Station, Lee Steam Electric Plant, Roxboro Steam Electric Power Plant, and Sutton Steam Electric Plant.

State regulators and Duke Energy are finally beginning to move reluctantly toward implementing a modicum of protection and transparency —but neither goes far enough to provide the safeguards that all North Carolinians deserve when it comes to clean drinking water and the health of their families. Still, without strong, enforceable federal protections, North Carolina's waterways and communities remain at risk from toxic coal ash pollution.

| NORTH CAROLINA: SNAPSHOT OF COAL ASH RISKS & REGULATION | |
|---|---|
| Number of Coal Ash Ponds | **37 at 14 sites** |
| High-Hazard Sites | **29** |
| Significant Hazard Sites | **2** |
| Documented Cases of Water Contamination or Spills | **All 14 sites (plants)** |

# DISASTER WAITING TO HAPPEN: THE ASHEVILLE COAL ASH LAGOONS

In October 2012, conservation groups filed suit to protect North Carolina communities from toxic groundwater contamination at 14 coal-fired power plants with outdated, unlined coal ash ponds. The lawsuit sought the enforcement of state law that requires industrial polluters to stop groundwater contamination and cleanup existing pollution. In January 2013, conservation groups in North Carolina issued the first of several Notices of Intent that they would sue Duke Energy under federal law to protect North Carolina communities from unlawful pollution at Duke's outdated, unlined coal ash ponds.

Today, local communities are still waiting for justice and for Duke Energy to clean up these sites, among the most important of which is the Asheville Plant coal ash lagoons in Arden, NC, just minutes from Asheville and Lake Julian, along the French Broad River.

The Asheville coal ash lagoons include two massive coal ash dams, each roughly the height of an eight-story building with the capacity to hold nearly half a billion gallons of toxic coal ash sludge. In July 2012, Duke Energy acquired the Asheville Plant and its coal ash ponds in a merger with Progress Energy.[65]

Groundwater monitoring at the site shows persistent contamination that exceeded state limits. Among the contaminants are thallium and selenium. Thallium is a poison and suspected carcinogen that is highly water-soluble and can enter the body through the skin. It is odorless and nearly tasteless, making it difficult to detect and identify. Exposure to selenium can cause illness, neurological damage, and even death; it is also extremely toxic to fish at low doses.

### THE ANCHOR OF WESTERN NORTH CAROLINA'S TOURIST ECONOMY

The French Broad River, which cuts through the heart of Asheville and offers world-class outdoor recreation, is one of North Carolina's most iconic landmarks. Asheville and its river are also the anchor of the tourist economy of western North Carolina.

Tourism dollars and jobs are incredibly important to the local economy. Asheville's leisure and hospitality sector topped all other sectors in terms of job growth (8.9 percent) between 2012 and 2013, helping the metro region significantly outpace both the state and the

> "The French Broad River is a world class recreation destination, and we no longer want to see it used as a dumping ground for toxic coal ash."
>
> —*Hartwell Carson of the French Broad Riverkeepers*

nation in job growth for the 12-month period.[68] In 2012, tourists spent $834 million in Buncombe County, of which Asheville is the county seat; tourism brought in nearly $80 million in local and state tax receipts.[69]

The Asheville coal ash lagoons, which visibly loom above I-26 and the French Broad River, are both rated "high hazard" and in the event of a dam breach, would almost certainly result in loss of human life and a permanently altered landscape and economy for the area.

### THE STRUGGLE TO PROTECT NORTH CAROLINIANS CONTINUES

The battle to hold Duke Energy accountable through the courts seemed all but over after DENR inserted itself, in what many believe was an attempt to block citizen suits. DENR quickly proposed a settlement to the suit that would allow Duke Energy to pay a miniscule fine and not require the company to clean up the site.

The Southern Environmental Law Center, on behalf of Sierra Club, Waterkeeper Alliance, and Western North Carolina Alliance, pushed back and won the right for its clients to intervene in the litigation and protest the state's sweetheart deal with Duke Energy.

In a separate action on behalf of the same groups as well as Cape Fear River Watch, on March 6, 2014, a Wake County Judge ruled that Duke Energy must take immediate action to eliminate the sources of groundwater contamination that are currently violating water quality standards at all 14 of its coal-fired power plants in the state. Even after the massive Dan River coal ash spill, however, Duke Energy immediately appealed the decision and filed a motion to stay the ruling. Ironically, the State also appealed the ruling, insisting that it did not have the authority to require Duke to "take immediate action."

Duke Energy recently signaled that it is considering phasing out coal power generation at the Asheville Plant, as well as moving away from dangerous wet storage of coal ash. Community leaders and activists have applauded the news, but remain committed to holding Duke Energy and state regulators accountable for an end to coal ash pollution and a full cleanup at sites across the state.[70]

Both the dangers posed by the Asheville coal ash lagoons and the difficulties local residents have faced in ending water contamination at the site and protecting their families highlight the need for strong, enforceable federal safeguards for communities like Asheville against coal ash pollution.

| THE ASHEVILLE COAL ASH LAGOONS | |
|---|---|
| Number of Coal Ash Ponds | **2** |
| Total Known Capacity | **906,000,000 gallons*** |
| Hazard Level | **High** |
| Known Groundwater Contamination | High levels of boron, chloride, chromium, iron, manganese, selenium, thallium, arsenic, lead, and pH |
| Dam Safety Risks | Both of the site's coal ash dams are unlined, allowing coal ash toxins to leach into groundwater. In 2010, the older dam (constructed in 1964) was also found to be in "poor" safety rating by structural engineers.[66] In 2012, the newer of Duke's two coal ash lagoons at Asheville suffered a major breach at an internal dike, causing a 60 foot by 25 foot blowout. Fortunately, the breach did not result in a release of coal ash, but Duke had to dewater the coal ash lagoon immediately and conduct emergency repairs.[67] |
| What's at Stake? | The French Broad River cuts through the heart of Asheville and is a world-class tourism destination, bringing nearly $1 billion dollars to the area each year. |

**HTTP://WWW.SOUTHEASTCOALASH.ORG*

# DISASTER WAITING TO HAPPEN: THE CAPE FEAR COAL ASH LAGOONS

The Dan River coal ash spill drew North Carolinians' attention to dangerous and outdated coal ash ponds and dams across the state, but the outdated infrastructure is not the only threat North Carolina's rivers, lakes, and streams face. Just weeks after the Dan River spill, clean water advocates discovered that Duke Energy improperly pumped more than 60 million gallons of untreated coal ash waste water directly from its ponds into the Cape Fear River, threatening drinking water safety, agriculture, and wildlife.

Duke Energy's Cape Fear coal-fired power plant and its five coal ash lagoons and dams sits alongside the Cape Fear River near Moncure, NC. The plant, originally built in 1923, was retired in 2012, yet its coal ash dams, built over the course of six decades, are arguably the most dangerous in the state.

Investigations conducted by the United States Environmental Protection Agency (EPA) as well as Waterkeeper Alliance and Cape Fear Riverkeeper have uncovered serious safety issues with the lagoons and dams, as well as unauthorized leaks from the toxic lagoons into groundwater and the Cape Fear River. According to the EPA report[71], all five ponds and dams are rated "in poor condition" because they were not built up to the recommended safety standards. EPA investigators classified the Cape Fear coal ash ponds and dams as more dangerous than even the Dan River ponds, one of which failed in February 2014.

The coal ash dam built in 1985 is particularly unsafe; it has cracked three times. Two of these cracks were identified in the EPA engineering report and the third crack was identified by investigations in 2014. This 2014 investigation, conducted by experts from Waterkeeper Alliance and Cape Fear Riverkeeper, revealed that Duke Energy was intentionally pumping more than 60 million gallons of untreated, concentrated coal ash wastewater out of the bottom of two of the ponds.[72,73] According to this same investigation, during the pumping the 1985 pond developed the third crack, more than 30 feet long and four inches wide.

The Cape Fear coal ash ponds sit just a few short miles upstream of where the communities of Sanford, Dunn and parts of Harnett county draw their drinking water from the Cape Fear River. Further downstream, the cities of Fayetteville, Fort Bragg and Wilmington also pull drinking water from the river. If any of the dams or ponds failed and a spill occurred, drinking water resources for more than a half million people in the region would be threatened. (431)

> "Even after the Dan River spill, Duke Energy chose to pump more than sixty million gallons of toxic coal ash wastewater into the Cape Fear River. This river gives us our drinking water. This river is a part of our heritage. We can't let Duke Energy ruin that."

*— Kemp Burdette, Executive director, Cape Fear Riverkeeper*

Dam safety risks: Recent investigation and sampling conducted by Waterkeeper Alliance and Cape Fear Riverkeeper on March 13, 2014 confirms that the Cape Fear dams are leaking in numerous places. The pollutants leaking into the Cape Fear River and the canal between the coal ash ponds include aluminum, arsenic, boron, chromium, lead, manganese, nickel and zinc.

What's at stake? The communities of Sanford, Dunn, Harnett County, Fayetteville, Fort Bragg and Wilmington draw drinking water from the Cape Fear River downstream of the coal ash ponds and dams. In the case of a spill, drinking water resources for more than half a million people in Eastern North Carolina would be threatened.

The Cape Fear River is one of the longest rivers in North Carolina with the largest watershed basin in the state, running from the confluence of the Deep and Haw Rivers near Haywood, NC, all the way to Wilmington, one of North Carolina's most important coastal cities. The Cape Fear River is the only major river in North Carolina that flows into the Atlantic Ocean, opening into an estuary at Cape Fear and is part of the Intracoastal Waterway system.

"The [pumping] incident shows the importance of citizen involvement," said Frank Holleman, senior attorney for the Southern Environmental Law Center. "Had the Waterkeeper Alliance not been inspecting that site, it's likely that no one would have known it was happening, or DENR would not have found it until later and even more contaminated water might have been pumped into the river."

### THE STRUGGLE TO PROTECT NORTH CAROLINIANS CONTINUES

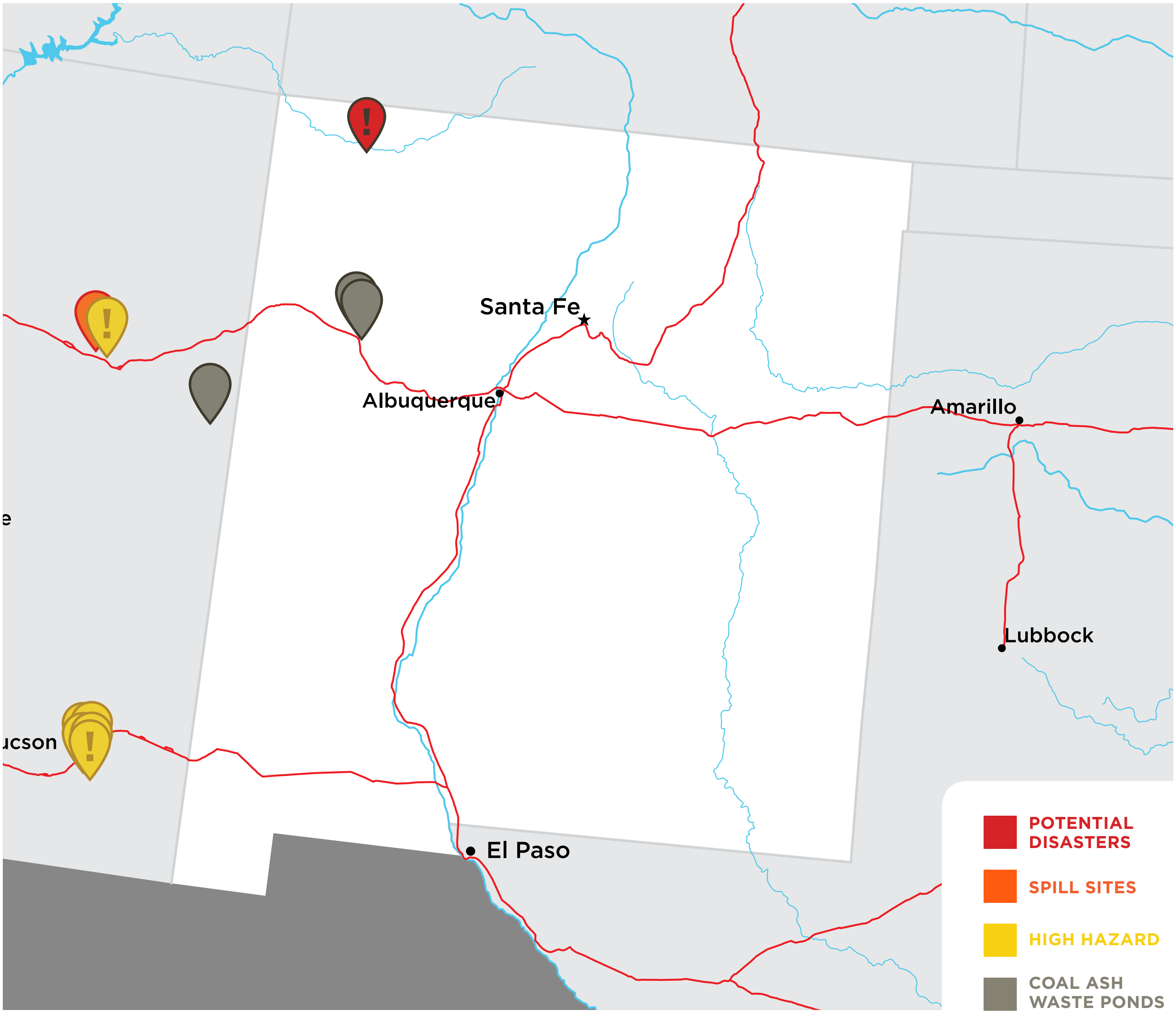
The battle to hold Duke Energy accountable through the courts seemed all but over after DENR inserted itself, in what many believe was an attempt to block citizen suits. DENR quickly proposed a settlement to the suit that would allow Duke Energy to pay a miniscule fine and not require the company to clean up the site.

The Southern Environmental Law Center, on behalf of the Sierra Club, Waterkeeper Alliance, and Western North Carolina Alliance, pushed back and won the right for its clients to intervene in the litigation and protest the state's sweetheart deal with Duke Energy.

In a separate action on behalf of the same groups as well as Cape Fear River Watch, on March 6, 2014, a Wake County Judge ruled that Duke Energy must take immediate action to eliminate the sources of groundwater contamination that are currently violating water quality standards at all 14 of its coal-fired power plants in the state. Even after the massive Dan River coal ash spill, however, Duke Energy immediately appealed the decision and filed a motion to stay the ruling. Ironically, the State also appealed the ruling, insisting that it did not have the authority to require Duke to "take immediate action."

Both the dangers posed by the Cape Fear coal ash lagoons and the difficulties advocates have faced in ending water contamination at the site and protecting their families highlight the need for strong, enforceable federal safeguards for communities in Eastern North Carolina against coal ash pollution. (256)

| THE CAPE FEAR COAL ASH LAGOONS | |
|---|---|
| Number of Coal Ash Ponds | **5** |
| Total Known Capacity | **953,000,000 gallons** |
| Hazard Level | **Significant** |
| Known Groundwater Contamination | **Levels of lead, boron, chromium, iron, manganese and sulfate exceed NC groundwater standards**[74] |




# THE TOXIC LEGACY OF COAL ASH IN NEW MEXICO

Coal-fired power plants in New Mexico generate 3.6 million tons of coal ash each year. New Mexico has 28 coal ash ponds at three plants, covering more than 165 acres of land. Three of these coal ash ponds have been rated "significant hazard." Many of the ponds are unlined or inadequately lined to prevent the release of contamination. The state of New Mexico requires no groundwater monitoring or financial assurances for coal ash dams.[75]

| STATE REGULATION | PONDS | LANDFILLS |
|---|---|---|
| Groundwater Monitoring Required for All New and Existing Sites | None | None |
| Liners Required for New Sites | None | None |
| Site Construction in Water Table Prohibited | None | None |
| Financial Assurance Required | None | None |

| NEW MEXICO: SNAPSHOT OF COAL ASH RISKS & REGULATION | |
|---|---|
| Number of Coal Ash Ponds | **28** |
| High-Hazard Sites | **0** |
| Significant Hazard Sites | **2** |
| Documented Cases of Water Contamination or Spills | **2*** |

*SAN JUAN GENERATING PLANT AND FOUR CORNERS PLANT*

Multiple studies by Earthjustice found that groundwater and surface water near the Four Corners site contained high levels of numerous toxic chemicals (including concentrations of boron nearly twelve times higher than those found upstream) that could only reasonably be attributed to coal ash contamination.[76]

# DISASTER WAITING TO HAPPEN: FOUR CORNERS POWER STATION

In the Four Corners region of New Mexico, Colorado, Arizona and Utah, the largest tribal reservation in the United States — belonging to the Navajo Nation — spans an expanse roughly the size of West Virginia. In the very northwest corner of New Mexico on the Navajo reservation lies the aging Four Corners Power Plant and a very large coal mine that produces over 7 million tons of coal each year.

In 1963, the Arizona Public Service (APS) entered into an agreement with the Navajo Nation to lease part of their land for the construction of the Four Corners Power Plant, located near Fruitland, New Mexico. Until December 2013, the plant consisted of five units that generated 2,040 megawatts of power[77] using coal supplied from the nearby BHP Billiton mine. In 1971, this mine also became the dumping grounds for coal's toxic byproduct, known as coal combustion waste or, more simply, coal ash. Since 1962, approximately 30 million of tons of coal ash from the plant have also been dumped in six (lined and unlined) inactive and active ponds near the power plant.

The Four Corners Plant is one of the largest in the West and sends most of the power it generates elsewhere — in fact the second largest stakeholder at the plant is the Los Angeles Department of Water and Power.[78] While massive amounts of coal and electricity are produced right on Navajo land, an estimated 16,000 Navajo families are without access to electricity.[79] The Navajo population is left without electricity and is instead burdened by the enormous pollution created by coal-fired electricity generation.

For nearly forty years coal ash from the Four Corners Power Plant was sent back to the mine and dumped into empty, mined out "disposal" pits that have no protective linings or barriers between the soil and the toxic coal ash. As of 2000, APS had disposed of between 50 and 55 million tons of coal ash waste from the Four Corners plant in the BHP Mine, covering approximately 230 acres of land. Since 2007, APS has disposed of ash in two large lined landfills near the plant. The larger of the two landfills rises 110 feet above natural grade.

Today, there is no federal regulation of coal ash, and APS has gone far too long without providing monitoring data and information about how the toxic ash is being stored at both the mine and at the plant itself. Without this critical information, the impacts of decades of toxic coal ash pollution on the environment and public health remain unknown. For many, the failure to protect local communities from coal ash is an environmental justice issue, as local activists seek answers to why swirling black dust stains livestock and clothing on windy days. Without access to information relating to coal ash, communities have been left with virtually no safeguards.

In 2007, available surface water data were analyzed to determine the impact of the Four Corners Plant's coal ash ponds on water quality in the Chaco River, which lies just 50 feet from some of the ponds and flows directly into the San Juan River Basin. The analysis found levels of boron, copper, lead, mercury and zinc in the water downstream from the coal ash ponds at levels harmful to livestock, aquatic organisms, and human health.[80] In fact, lead concentrations downstream from the plant's coal ash ponds are almost 50 times higher than the recommended standards to protect aquatic life. The only logical source for these high levels of toxins is the coal ash ponds that sit nearby.

For decades, testing was also conducted on the Chaco River both upstream and downstream from the coal ash disposal area in the Navajo Mine. The results indicated that coal ash contamination was reaching the river, and the degradation of water quality was alarming. Amounts of selenium downstream were nearly three times higher than upstream of the mine. For boron, the concentration was twelve times higher.[81] While the Chaco Wash is not currently designated as a source of drinking water, the water may be used for domestic purposes and for watering livestock. The increased downstream average boron levels are more than four times the New Mexico standard for drinking water. In addition, these levels are high enough to harm aquatic freshwater organisms in the river. Average downstream sulfate concentrations were more than four times the secondary drinking water standard and more than twice EPA's health-based drinking water advisory for sulfate.

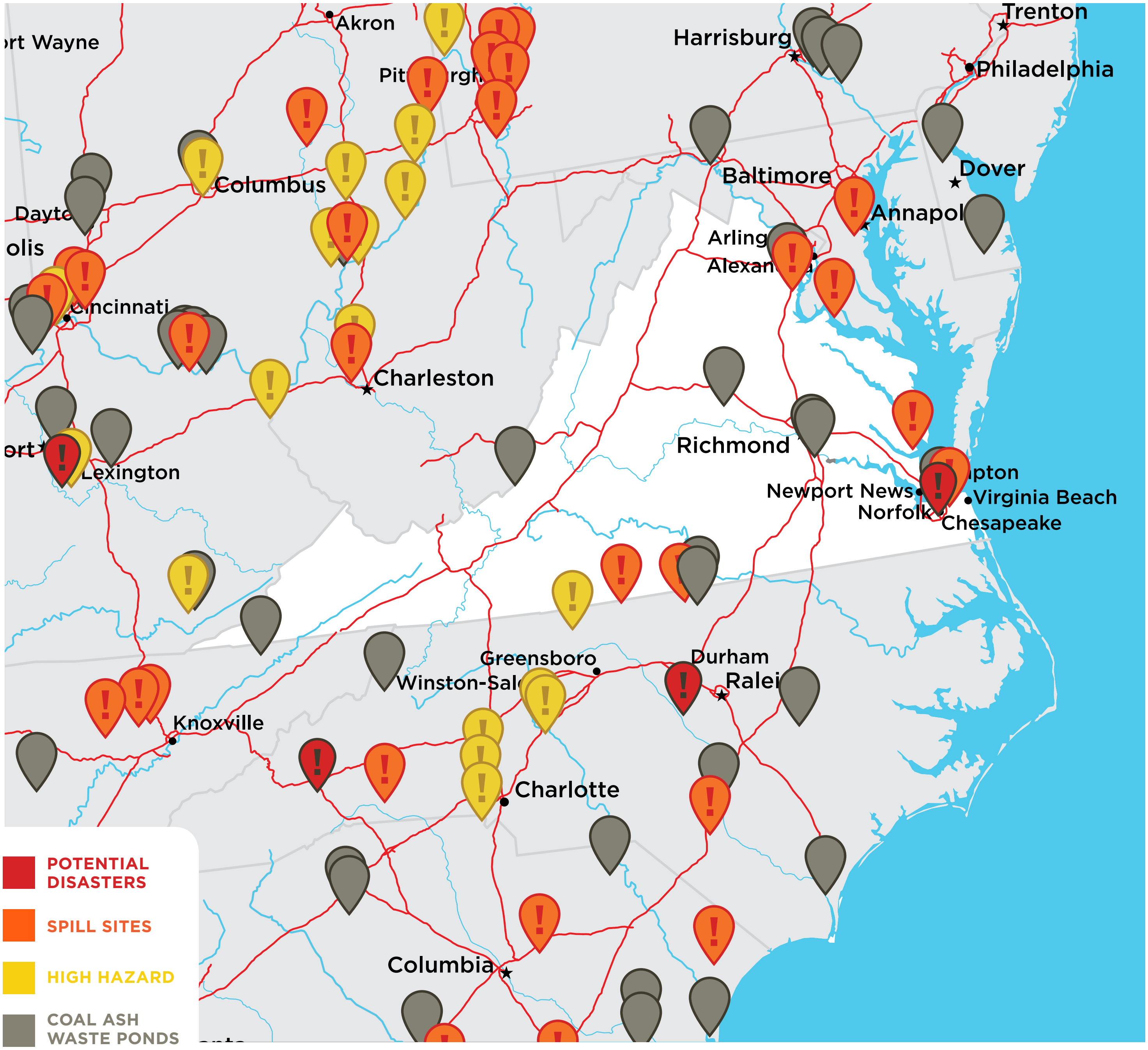
While testing on the Chaco River has shown dangerous levels of toxic coal ash contaminants, without a federal mandate regulating coal ash at Four Corners, the health and safety of downstream communities and nearby Navajo residents remain at risk. People who live near an unlined coal ash pond where ash is co-disposed with coal refuse and whose drinking water source is groundwater have a 1 in 50 chance of getting cancer from water contaminated by arsenic— a risk 2,000 times greater than the EPA's goal for reducing cancer risk to 1 in 100,000.[82] It should come as no surprise that many Dine' people suffer from chronic illness. These coal ash sites are neighbors to large numbers of Navajo people, putting their health and welfare in danger. Without health insurance, many Navajo people rely solely on Indian Health Services for health care at facilities across the Navajo Nation.[83]

Additionally, Navajo people use their local environment to gather medicines for ceremony and wellness. According to the Dine' Citizens Against Ruining the Environment, contamination from coal ash jeopardizes the Navajo people's ability of to practice traditional healings, which is embedded in their culture. Coal ash from the Four Corner Power Plant infringes on the ability to practice traditional living and ceremony.

It is clear the population bearing the biggest burden of the coal ash pollution at the Four Corners Plant and Navajo Mine are the many families living on the Navajo reservation. The overwhelming evidence of coal ash contamination from the Four Corners Power Plant and the lack of oversight and action from regulators illustrates the need for strong, federally enforceable protections from coal ash pollution for communities across the country, and for the Navajo people.

| FOUR CORNERS POWER STATION | |
|---|---|
| Number of Coal Ash Ponds | **6 (both inactive and active)** |
| Total Known Capacity | **973,000,000 gallons*** |
| Hazard Level | **Significant** |
| Known Groundwater Contamination | **High levels of copper, lead, zinc, boron, and mercury** |

*HTTP://WWW.EPA.GOV/OSW/NONHAZ/INDUSTRIAL/SPECIAL/FOSSIL/SURVEYS/APS2.PDF*




# THE TOXIC LEGACY OF COAL ASH IN VIRGINIA

Virginia's 16 (retired and currently operational) coal-fired power plants have created a substantial toxic legacy in the Commonwealth in the form of coal ash contamination. This includes at least two federal Superfund sites in Virginia, one of which had the dubious distinction of inclusion on the National Priority List of the nation's most contaminated Superfund sites, and four other sites where coal ash contaminated groundwater or caused extensive ecological damage.[84]

| STATE REGULATION | PONDS | LANDFILLS |
| --- | --- | --- |
| Groundwater Monitoring Required for All New and Existing Sites | None | None |
| Liners Required for New Sites | None | None |
| Site Construction in Water Table Prohibited | None | None |
| Financial Assurance Required | None | None |

Despite its history of coal ash contamination, the Virginia Department of Environmental Quality (VDEQ) does not require liners or groundwater monitoring at every coal ash site. And, while Virginia's coal ash dams are among the oldest (with an average age of over 40 years), state regulations do not require state inspection of coal ash dams or adequate reporting on dam condition by owners. Virginia also does not require owners to provide financial assurances, consequently taxpayers may be stuck with a hefty bill for clean up in the event of a coal ash spill.[85]

The coal ash pond at Dominion Energy's Chesapeake Energy Center in the Tidewater area is profiled in the following section as part of a national investigation by Sierra Club into the serious risks to public health posed by coal ash. The pond at the site is unlined, has been rated significant hazard, and was given a rating of "poor" for its structural integrity by EPA.[86]

| VIRGINIA: SNAPSHOT OF COAL ASH RISKS & REGULATION | |
| --- | --- |
| Number of Coal Ash Ponds | **25** |
| Significant-Hazard Sites | **8** |
| Significant-Hazard Sites rated "Poor" by EPA | **2***  |
| Documented Cases of Water Contamination or Spills | **6**** |

**AEP CLINCH RIVER POWER PLANT, CARBO, VA: DOMINION ENERGY CHESAPEAKE ENERGY CENTER, CHESAPEAKE, VA*
***COAL ASH CONTAMINATION HAS GENERATED AT LEAST TWO FEDERAL SUPERFUND SITES IN VIRGINIA, INCLUDING ONE ON THE NATIONAL PRIORITY LIST OF THE NATION'S MOST CONTAMINATED SUPERFUND SITES.*


# DISASTER WAITING TO HAPPEN: DOMINION'S CHESAPEAKE ENERGY CENTER

The bottom ash and sediment coal ash pond at Dominion's Chesapeake Energy Center was found to have contaminated groundwater with arsenic as high as 30 times the drinking water standard for almost a decade. The power plant's clay-lined coal ash landfill also required corrective action to address groundwater contamination with arsenic, sulfides and vanadium in 2001.[87]

As Dominion looks to retire its Chesapeake Energy Center in the coming months, serious concerns remain about the fate of the plant's notorious coal ash ponds. As the recent Dan River spill in North Carolina shows, toxic sludge from a retired coal ash ponds (See Section: The Dan River Spill), known as "legacy ponds," pose as great a risk to public health as active coal ash ponds. In fact, the risk may be greater, as less oversight by operators means old dams and other infrastructure can leak and weaken without being noticed.

Dominion has taken steps at its Chesterfield plant to move coal ash from dangerous unlined ponds to lined dry storage landfills. This should be the standard for all retired coal ash ponds — in fact, this should be the standard to protect families in Virginia and across the United States. Groundwater monitoring should also be required as well as regular reporting at any new dry storage coal ash landfill.

In 2011, EPA gave a “poor” rating to the plant’s ash and sedimentation pond. The pond is ranked a significant hazard, because a failure would release toxic coal ash to the Elizabeth River, which would flow into Chesapeake Bay. The pond is contained by an earthen dam and is unlined, holding fly ash, bottom ash, and leachate contaminated with arsenic from the coal-fired power plant. EPA identified the need to make “urgent” repairs to address slope failures at the pond.[88]

Local activists and environmental groups continue to seek justice, transparency, and greater protections from toxic coal ash pollution in Virginia. The example of Chesapeake Energy Center — and the related contamination of drinking water at Battle Creek Golf Course — illustrates the need for strong, federally enforceable protections.

| DOMINION’S CHESAPEAKE ENERGY CENTER | |
|---|---|
| Number of Coal Ash Ponds | **1** |
| Total Known Capacity | **24,400,000 gallons**[91] |
| Hazard Level | **Significant** |
| Known Groundwater Contamination | **Arsenic 30 times higher than safe standard**[92] |

## THE BATTLEFIELD GOLF COURSE DISASTER

In spite of known contamination, beginning in 2002, Virginia Department of Environmental Quality (VDEQ) allowed Dominion to use 1.5 million tons of coal ash to construct the Battlefield Golf Course. The ash was dumped (with cement kiln dust as a “binding agent”) on swampy fields less than two feet above a shallow groundwater table in the heart of a residential neighborhood, where many families relied on private wells for their drinking water. Dominion officials assured the Chesapeake Planning Commission that their ash was “as safe as dirt.” The Chesapeake City Council and VDEQ gave the plan a green light as a “beneficial use” of coal ash under 9 VAC 20-85 waiving liners or covers that would have been required by the state’s solid waste regulations.[89] The result was polluted drinking water for nearby residents.

In 2009, Dominion agreed to pay $6 million to provide city water to residents around the golf course who abandoned their wells. In 2012, nearly 400 residents filed a class action lawsuit seeking more than $2 billion in damages from Dominion and others. The suit claims the actions of these defendants contaminated their water and invaded their properties with clouds of coal ash dust. Test results filed with the suit found dangerous levels of lead, cadmium, nickel, vanadium, manganese, cobalt, and zinc in residential wells, and arsenic and beryllium in monitoring wells. According to the suit, which is still pending, constant exposure to toxic dust caused chronic obstructive pulmonary disease and asthma in ten residents, nine of them children. Pets and livestock were also harmed.[90]

PHOTO CREDIT: CATAWBA RIVERKEEPER

# CASE STUDY: THE DAN RIVER SPILL

On February 2, 2014, a stormwater pipe burst underneath an unlined coal ash pit at a retired Duke Energy coal plant in Eden, North Carolina. The Dan River ran grey, as 39,000 tons of toxic coal ash and 27 million gallons of contaminated wastewater flowed into it, threatening the drinking water for eight counties downstream and coating the river bottom with toxic sludge for 70 miles.

For 24 hours after it was discovered, Duke Energy did not so much as issue a press release or inform the public about the massive spill. State officials initially told the public that state testing showed the water was safe to drink (in spite of the enormous spill of coal ash known to contain arsenic, selenium, lead, mercury, and many other toxic materials). They then backtracked and told the public that even direct contact with the water was not safe. Governor Pat McCrory, a former Duke Energy employee, waited more than a week to speak publicly about the disaster.

In all, it took Duke Energy nearly a week before workers were finally able to stem the flow of toxic coal ash into the Dan River. It was the third largest coal ash spill in our nation's history and contaminated the Dan River with dangerous levels of arsenic and other hazardous toxics. Months later, downstream communities continue to worry about the health risks — as well as the impacts on farming and tourism — from the toxic sludge.

### PUBLIC DEMAND FOR SOLUTIONS

Just weeks after the spill, North Carolinians rallied at Duke Energy's Charlotte headquarters delivering

# COAL ASH SPILL

## *Farmers along Dan River worry about livelihood*

"Lost in the discussion has been the plight of farmers, whose fields sit in the lowlands along the Dan in the back roads of Rockingham and Caswell counties… '"I grow crops along here, and all of them are consumed by humans and animals. I would not like to be told I can't farm here. I'd like some answers.'"[93]

*—VIRGINIA FARMER MIKE POWELL*

petitions from 9,000 Duke Energy customers and demanding the disaster be "Our Last Coal Ash Spill."

Polling of North Carolina voters from March 2014 found strong, across-the-board, support for new protections against future coal ash disasters — including stronger federal safeguards. Respondents from across the political spectrum said that Duke Energy should clean up all coal ash sites in the state, including the Dan River spill (90% support). The poll found similar support for requiring coal ash be stored away from water in specially lined landfills (88%) and regulating coal ash as a hazardous substance (83%).[94]

With mounting public pressure, both Duke Energy and state officials now promise significant action. But given their close ties and apparent priorities, North Carolinians — and indeed all Americans — would be well served by a new set of strong, enforceable safeguards for coal ash from the U.S. Environmental Protection Agency — protections that are due by the end of 2014 and that communities across the country desperately need.

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BEYOND COAL

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October 10, 2016

*Via electronic filing and electronic mail*

Chairman Brown, Comm'rs. Brisé, Edgar, Graham, Patronis
Florida Public Service Commission
2540 Shumard Oak Blvd.
Tallahassee, Florida 32399-0850

**Re: Planning for least-cost electric service in Florida**

Dear Commissioners:

Rapid changes in the electric sector make integrated resource planning more important than ever. Yet Florida electric utilities, especially the investor-owned utilities (IOUs), barely have any plans at all—besides adding natural gas-burning generation, which dwarfs everything else in their plans.[1] Sierra Club respectfully urges the Commission to reject them and require revised plans for four main reasons:

1. Florida law requires utilities to provide least-cost service, but the utilities are unprepared to do so because they fail to perform options analyses; the utilities thus never try to (nor could they) square their gas-laden plans with the alternatives available to them in the market.[2]

2. The proposed gas generation violates the least-cost standard because this generation is inherently high cost and high risk.

3. The proposed gas generation also violates the least-cost standard because it reduces fuel diversity and foregoes cost-effective renewables and energy efficiency, thereby pushing Florida's all-time high gas reliance, 71% of the state generation total, even higher, to 74%.

4. With no shortage of cost-effective alternatives in the market, especially renewables and energy efficiency, the only way to explain the utilities' gas generation proposals is that they aim to benefit entities other than customers.

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[1] Unless stated otherwise, "plans" refers to ten-year site plans, and "utilities" refers to those that file them.

[2] To their credit, Staff issued extensive data requests. The responses, however, cannot cure the unlawful plans.

By now, it is unmistakable; the IOUs/their affiliates are investing heavily in every aspect of gas generation and infrastructure with a perverse incentive to continue to do so. They pass the resulting added cost of service onto their captive customers, and the resulting windfall profits to shareholders.

It is imperative that the Commission intervene and reject all of the unlawful plans. Revised plans should follow as soon as practicable. For the IOUs, this should be no later than April 1, 2017, the annual deadline for revised plans, to minimize the fallout from their conflict-ridden plans.

As we discuss below, at least one Florida utility, Lakeland Electric, recently undertook an assessments of its options under different scenarios, showing this is eminently doable. Moreover, practically all of the Florida utilities, with the glaring exception of the IOUs, have issued requests for proposals (RFPs) for renewables and found no shortage of cost-effective solar generation options in the Florida market. When done well, market assessments like these promote competition, stakeholder participation, and ultimately transparent, data-driven options analyses to guide utilities to least-cost investments.

The stakes are high. Every year that passes without plans for least-cost electric service further jeopardizes the competitiveness of Florida's economy and the wellbeing of its residents. This includes the millions of low-income/fixed-income Floridians who already face a disproportionate energy burden.

## DISCUSSION

**The Commission should reject the plans because they violate the least-cost standard under Florida law; the revised plans should include robust options analyses focusing on renewables and energy efficiency.**

We divided this discussion into three parts: First, we discuss the applicable least-cost standard under Florida law. Second, we show that the utility plans violate this standard, and the Commission should reject them. Finally, we conclude by urge the Commission to obtain revised plans, including the chronically missing options analyses, as soon as practicable, so that the Commission can meaningfully audit the utilities and ensure they are prepared to achieve least-cost service.

### I. Under Florida's least-cost standard, electric utilities must develop robust options analyses focusing on renewables and energy efficiency to guide the utilities to least-cost investments to serve their customers.

Florida law requires electric utility service to be least-cost. As the Florida Supreme Court affirmed, under this standard, the state's electric utilities must "t[ake] every reasonably available prudent action to minimize [their cost of service]."[3] Planning is the critical first step. Per Commission rules, the utilities must develop and disclose "sufficient information to reassure the Commission that an adequate and reliable supply of electricity at the lowest cost possible is planned."[4]

### A. Utilities must develop robust options analyses to guide them to least-cost investments.

Options analyses are routine in the business world, and essential for the utilities to meet the least-cost standard under Florida law. This is a matter of Commission precedent and common sense.[5][6] Options typically available to utilities include but are not limited to:

- ◊ Alternatives to conventional generation, such as renewables[7] and energy efficiency;[8]
- ◊ Alternatives identified through market assessments such as the request for proposal process under Rule 25-22.082, F.A.C (i.e., the Commission's competitive "bid rule");[9]

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[3] *Gulf Power Co. v. Florida pub. Service Com'n*, 453 So.2d 799, 802 (Fla. 1984).

[4] Rule 25-22.072(1), F.A.C., incorporating by reference Form PSC/RAD 43-E (11/97), at 4; *cf.* Section 366.82(5)(b)(requiring "analysis of various policy options … to achieve least-cost strategy").

[5] Order No. PSC-11-0547-FOF-EI, at 82, issued on November 23, 2011, in Docket No. 11 0009-EI, In re: Nuclear cost recovery clause; *See also* Order No. PSC-11-0547-FOF-EI (redacted Final Order) (noting approval of utility's rate increase request upon finding "no practical alternative") issued on November 23, 2011, in Docket No. 11 0009-EI, In re: Nuclear cost recovery clause; *cf.* Order No. PSC-11-0547-FOF-EI (redacted Final Order), at 6 (reviewing whether utilities properly considered "all available" demand-side and supply-side conservation and efficiency measures) issued on December 16, 2014, in Docket No. 130205-EI, In re: Commission review of numeric conservation goals (Florida Public Utilities Company).

[6] Order No. PSC-11-0547-FOF-EI, at 82 (noting the review of "all available options" is "routine procedure in the business world," including the electric utilty industry as it undertakes "long-term, complex project[s]") issued on November 23, 2011, in Docket No. 11 0009-EI, In re: Nuclear cost recovery clause.

[7] Unless otherwise noted, the terms "renewables" and "renewable energy" refer to the same energy resources. *See generally* Section 366.91(2)(d), F.S, (defining "renewable energy" in pertinent part as "electrical energy produced from a method that uses one or more of the following fuels or energy sources: hydrogen produced from sources other than fossil fuels, biomass, solar energy, geothermal energy, wind energy, ocean energy, and hydroelectric power").

[8] *See, e.g.,* Order No. PSC-14-0696-FOF-EU, at 39, issued on December 16, 2014, in Docket No. 130205-EI, In re: Commission review of numeric conservation goals (Florida Public Utilities Company) ("demand-side management is an alternative resource to generation plants and should be evaluated similarly for reliability and economic impacts."); *See also* Order No. PSC-16-0032-FOF-EI, at 13−15, issued on January 19, 2016, in Docket No. 150196-EI, In re: Petition for determination of need for Okeechobee Clean Energy Center Unit 1, by Florida Power & Light Company; *See also* Order No. PSC-11-0547-FOF-EI, issued on November 23, 2011, in Docket No. 11 0009-EI, In re: Nuclear cost recovery clause ("In 2006, we stated that utilities should not assume the automatic approval of natural gas-fired plants.").

- ◊ Incremental capacity increases;[10]

- ◊ Earlier or later extremes of commercial operations date;[11] and

- ◊ Retaining one vendor, retaining multiple vendors, or building the generation itself ("self-build").[12]

Robust options analyses are those that develop information on the economics of these wide ranging options under various scenarios.[13] A simple comparison of the status quo and one option is indefensible.[14]

### B. Utilities must focus on renewables and energy efficiency.

Florida Statutes brim with directives to diversify the fuels and the technologies the utilities use to serve customers.[15] More specifically, they emphasize and reiterate that Florida's reliance on inherently risky natural gas imports is a problem, and that cost-effective renewables and energy efficiency are solutions that are in the public interest. As the utilities perform options analysis, they must therefore focus on renewables and energy efficiency as part of their plan to serve customers at the least-cost.

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[9] *See*, *e.g.*, Order No. PSC-06-0779-PAA-EI, at 3, issued on September 19, 2006, in Docket No. 060426-E1, In re: Petition for exemption under Rule 25-22.082(18), F.A.C., from issuing request for proposals (RFPs), by Florida Power & Light Company ("the RFP process provides us with valuable information on the available capacity alternatives and is a valid tool for evaluating the cost-effectiveness of proposed generating units.").

[10] *See*, *e.g.*,Order No. PSC-13-0505-PAA-EI, at 13, issued on October 28, 2013, in Docket No. 130198-EI, In re: Petition for prudence determination regarding new pipeline system by Florida Power & Light Company; *See also* Florida Public Service Commission, *States' Electric Resurfacing Activities* (1997); *See also* F.L. House of Representatives, Committee on Utilities and Communications, *Overview of the Electric Industry*, 27 (2000), *available at* https://goo.gl/uKDBP6.

[11] *See*, *e.g.*, Order No. PSC-11-0547-FOF-EI, at 82.

[12] *See*, *e.g.*, Order No. PSC-08-0749-FOF-E, issued on Nov. 12, 2008, in Docket No. 080009-EI, In re: Nuclear cost recovery clause; *See also* Order No. PSC-09-0783-FOF-EI, issued on Nov. 19, 2009, in Docket No. 090009-EI, In re: Nuclear cost recovery clause; *See also* Order No. PSC-11-0547-FOF-EI.

[13] *See* Sierra Club Comments (Oct. 16, 2013) (hereinafter "Sierra Club 2013 Comments") (discussing best practices in integrated resource planning including options analysis), *available at* http://goo.gl/h9RHeT.

[14] *Gulf Power Co. v. Florida pub. Service Com'n*, 453 So.2d 799 (Fla. 1984) (affirming Commission disallowance of costs incurred pursuant to utility's failure to review other other options beyond its preferred proposal for years).

[15] For a recap of the relevant provisions in Florida Statutes, see Sierra Club Post-Hearing Brief in Docket No. 160021 (Sept. 19, 2016), *available at* https://goo.gl/X6QJ91.

## II. The Commission should reject the plans because they are in no way least-cost.

The plans fail to meet the least-cost standard under Florida law for many reasons. The most glaring one is that the utilities failed to present any options analyses. The utilities thus failed to reconcile their inherently high-cost, high-risk gas generation with the abundant, competitive renewables and energy efficiency in the market available to them, and in the case of the IOUs, plainly have a conflict of interest behind the omission.

### A. The utilities failed to present any options analyses in their plans.

This year, the utilities continued their practice[16] of presenting the Commission just their preferred generation proposals and asserting they considered/will continue to consider their options.[17] This violates the unambiguous requirement in Florida Statutes that the Commission "shall review"—"possible alternatives to the proposed plan[s]" of the utilities.[18] If the utilities present no data or analyses on the options/alternatives available to them in the market, they preclude the Commission from performing its plain duty under Florida Statutes.

To be sure, the utility responses to Staff data requests do not cure the unlawful plans. For all of the planned generating units, Staff asked the utilities to "identify the next best alternative that was rejected for each unit."[19] The fact that Staff had to ask for this information underscores how devoid the plans are of options analyses. The utility responses do, too. They are high-level comparisons between each <u>planned ***gas*** generating unit</u> and <u>another ***gas*** generating unit</u>. That is all. That is the sum total of the options analyses before the Commission.

No one can square the dearth of information presented by the utilities with the least-cost standard under Florida law. As discussed in Section I (above), the standard requires the utilities to conduct robust options analyses, focusing on renewables and energy efficiency, so that they are prepared to take <u>every</u> reasonably available prudent action to minimize cost of

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[16] *See* Sierra Club 2013 Comments (noting the unlawful practice), *available at* http://goo.gl/h9RHeT; Sierra Club Comments (Dec. 15, 2015) (hereinafter "Sierra Club 2015 Comments") (noting the same), *available at* https://goo.gl/IWbsDH.

[17] *See e.g.*, Florida Power & Light Company's 2016 Ten-Year Power Plant Site Plan (hereinafter "FPL 2016 TYSP"), Chapter III.C (noting "significant factors that either influenced the current resource plan presented in this document or which may result in changes in this resource plan in the future" but omitting data on or comparative analysis of those factors/ changes; i.e., options analysis); *available at* https://goo.gl/wgWn9Y; *see generally* 2016 Ten-Year Site Plans (similar omissions) *available at* https://goo.gl/1y17w9.

[18] Section 186.801(2), F.S.

[19] Staff data request no. 42.

service, and Florida's reliance on inherently risky natural gas imports. Working up the details of just one gas generation plan and then, at Staff's prodding, working up another is nowhere near the robust options analysis that is routine and essential to prepare electric utilities to provide least-cost service. The Commission therefore should reject the plans.

### B. The utilities failed to reconcile their inherently high-cost, high-risk gas generation proposals with the abundant, cost-effective renewables and energy efficiency in the market available to them.

The plans are indefensible and the Commission should reject them for the additional reason that they would increase gas generation, which is inherently high cost and high risk, especially as demand is down. The utilities never tried to (nor could they) reconcile their plans with the abundant, cost-effective renewables and energy efficiency in the market available to them.

#### 1. Demand is down and the growth projected by utilities has not materialized for eight straight years, a trend no one can square with adding gas generation in large, inflexible increments.

Since it peaked in 2005, demand for electricity across Florida is down. This is not due to the Recession alone, as the Commission itself noted.[20] Previous utility load forecasts required downward revisions due to slower-than-projected growth <u>for eight straight years</u>, including the last three.[21] The utilities themselves acknowledge that usage per customer is down.[22]

Yet the utilities project peak demand will somehow grow faster than one percent annually between 2016 and 2025 (net firm peak demand)—more than half again the rate experienced between 2004 and 2015 (0.76 percent CAAGR). This is inconsistent with, for example, the U.S. Energy Information Administration's lower projection of a 0.7 percent annual growth rate through 2025.[23]

More importantly and obviously, demand projections are never as good as verified actual data, and the actuals have shown a consistent downward trend. The best options for

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[20] FPSC, Review of the 2015 TYSPs, at 22, *available at* https://goo.gl/DTGoX1.

[21] *Compare* FRCC 2014 Presentation, at 7 ("Forecasted energy sales and winter firm peak demands are lower in 2014 TYSP compared to 2013 TYSP and forecasted summer firm peak demands are higher from 2017 forward."), *available at* https://goo.gl/ACqiVT; FRCC 2015 Presentation, at 7, ("forecasted energy sales and firm peak demands are lower in 2015 TYSP compared to 2014 TYSP"), *available at* https://goo.gl/mn4gUf; and FRCC 2016 Presentation, at 8 "forecasted energy sales and firm peak demands are lower in 2016 TYSPs compared to 2015 TYSPs"), *available at* https://goo.gl/UScXlk.

[22] Utility responses to Staff data request no. 10.

[23] This is EIA's projection for Florida as well as other South Atlantic states.

Florida therefore are those that (1) keep demand down to reduce cost (i.e., demand-side management), and (2) meet any growth in demand with incremental supply that closely matches the growth (i.e., flexible supply). The utilities failed to present any such options. The only option the utilities did present—large, inflexible gas generation additions—flies in the face of the market reality just described. It is indefensible also because the additional capacity maintained by the IOUs consistently exceeds the levels needed for an adequate and reliable supply of electricity.[24]

### 2. Gas generation is inherently high cost and high risk.

The Commission should not accept the utilities' complacency about the costs and risks of gas generation, especially as the state's reliance on natural gas is already at an all-time high—71% of the total generation.[25] The utilities propose to add another five gigawatts—pushing that up to 74% by 2025.[26] Even the smallest proposed increment exceeds 180 MW,[27] with projected capital costs measured in millions of dollars, and book lives in decades. Moreover, with the exception of Orlando Utilities Commission (OUC) and Florida Power & Light Company (FPL), the utilities propose inherently less efficient peaking generation—gas combustion turbines (CTs).[28]

All of the proposed gas generation raises stranded asset risk, but the utilities fail to mention that fact. This is a glaring omission as it is the judgment of Florida's largest utility FPL that in four years, 2020, gas peakers will be obsolete compared to energy storage and renewables.[29] It is even more troubling then that the utilities never present any options analyses for the proposed gas peakers. Nor even the basic data to allow for such a

[24] *See* the detailed briefing by Public Counsel, filed July 15, 2015, in Docket No. 160096-EI, Joint petition for approval of modifications to risk management plans by DEF, FPL, Gulf and TECO; *See also* joint petition filed by Public Council, filed Dec 9., 2015, in Docket No. 150196-EI, In re: Petition for determination of need for Okeechobee Clean Energy Center Unit 1, by Florida Power & Light Company, *available at* https://goo.gl/wBgl2S.

[25] FRCC, 2016 Presentation, at 22.

[26] *Id.*

[27] Tampa Electric Company's 2016 Ten-Year Site Plan (hereinafter "TECO 2016 TYSP") (planning to add 180 MW CT in 2019), *available at* https://goo.gl/zGh1Id.

[28] OUC and FPL propose gas combined cycle generation (CCs) with 2021 and 2024 in-service dates respectively. Like CTs, the CCs involve massive costs and risks, and the utilities can only add them in large, inflexible increments. Thus, beyond the marginal efficiency improvement of CCs over CTs, our discussion of the CTs applies equally to the CCs.

[29] NextEra on Storage: 'Post 2020, There May Never Be Another Peaker Built in the US,' Sept. 30, 2015, GreenTech Media [hereinafter "NextEra on Storage"], https://goo.gl/rQDK0H (referring to judgment of team including FPL executives).

comparison. In response to Staff data requests, for instance, the utilities omitted the inputs and workbooks that would allow independent verification of their summary comparisons between two gas generation options, discussed in Section II.B.1 above, and provided virtually no data on other, non-gas options, as discussed further below in Section II.B.3.

As the Commission maintains separate dockets on the operation and maintenance costs and risks of gas generation, it knows how astronomically high those costs and risks have proven to be. With gas prices at all-time lows—levels so low they are widely expected to only go up from here—Floridians have already lost billions of dollars on risk hedging programs.[30] Still, the hedging programs themselves are mere half-measures against the price and supply risks of Florida's reliance on natural gas imports—and useless against stranded asset risk. The FPL rate case underscores this.[31] FPL supported its request for a $1.3 billion annual rate increase and a 100 basis point return on equity increase with sworn testimony on all the costs and risks associated with managing its out-sized gas generation fleet.

Adding more gas generation is thus indefensible because it would exacerbate the burden on customers who essentially bear all the costs and risks. This includes the tremendous capital outlays required at the outset to add gas generation (recovered through base rates), and the tremendous operations and maintenance, including hedging expenses, over the 30 or more years these plants are supposed to be in service (recovered through separate clauses).

### 3. Renewables and energy efficiency are abundantly available to meet peak demand, and they can achieve deep cost-savings—unlike gas generation—through their flexible and diverse applications across the electric grid's generation, transmission, and distribution functions.

For alternatives to meet peak demand, such as renewables and energy efficiency, the market is better than ever. Yet the utilities only propose relatively modest amounts of solar, and even less amounts of other alternatives, despite these technologies' maturity, competitiveness, and widespread adoption in neighboring states. Moreover, these technologies can achieve deep cost-savings—unlike gas generation—through their flexible and diverse applications to the grid's electric generation, transmission, and distribution functions. As we discuss below, this is borne out by RFPs and integrated resource plans (IRPs) across our region and the country. We also discuss how the IOUs' refusal to conduct RFPs for renewables makes them particularly unprepared to deliver least-cost service.

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[30] *See* the detailed briefing by Public Counsel, filed July 15, 2015, in Docket No. 160096-EI, Joint petition for approval of modifications to risk management plans by DEF, FPL, Gulf and Tampa Electric Company.

[31] FPSC Docket No. 160021.

### a. Solar

Solar generation technologies, especially solar photovoltaics (PV) can meet peak demand[32] and achieve deep cost savings as a hedge against natural gas price volatility.[33] Solar PV is also a flexible resource, precisely what Florida needs as discussed in Section II.B.1 above. With an abundant solar resource—consistently ranked third best in the country for solar generation potential[34]—and ample support for developing it in Florida Statutes, discussed above in Section I.B, the utilities should be planning to "make Florida a leader in [this] new and innovative technolog[y]."[35]

Florida's tremendous solar potential, however, remains largely untapped because, in essence, the IOUs—with their overwhelming control of the state's energy market—sit on the tap. FPL is the sitter in chief. Florida's largest utility has not issued an RFP for renewable energy since 2007 and 2008, and never explains this omission, even though FPL acknowledges the cost of solar PV has since "plunged."[36] Likewise, DEF, the second largest utility, admits that it received "436 inquiries" from third parties interested in developing in-state renewables.[37] As Sierra Club has consistently highlighted, and as the Southern Alliance for Clean Energy (SACE) comments discuss in more detail, a disturbing lack of transparency shrouds such inquiries. This includes the modest solar power purchase agreements (PPAs) that DEF has negotiated to date. DEF refuses to disclose details, even such basic ones as the in-service, start, and end dates of the PPAs.[38] Gulf Power Company (Gulf) and Tampa Electric Company (TECO) are no better.[39]

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[32] *See, e.g.,* FPL 2016 TYSP, at 49-50 (crediting solar PV with 52% nameplate capacity at summer peak).

[33] Lawrence Berkeley National Laboratory, *Utility-Scale Solar 2014: An Empirical Analysis of Project Cost, Performance, and Pricing Trends in the United States* (Sept. 2015) at ii ("At these low levels – which appear to be robust, given the strong response to recent utility solicitations – PV compares favorably to just the fuel costs (i.e., ignoring fixed capital costs) of natural gas-fired generation, and can therefore potentially serve as a [']fuel saver['] alongside existing gas-fired generation (and can also provide a hedge against possible future increases in fuel prices).") (hereinafter "Utility-Scale Solar 2014"), *available at* https://goo.gl/0L2dDOU.

[34] *See, e.g.*, AEE, *Advanced Energy in Florida* (Jun. 11, 2015), *available at* https://goo.gl/BBL5M4.

[35] Section 366.91(1), F.S.

[36] NextEra on Storage, https://goo.gl/eIVoSL.

[37] DEF response to Staff data request no. 35.

[38] DEF response to Staff data request no. 28 (stating "n/a" or "TBD" for in-service, start, and end dates).

[39] *See generally* Gulf Power Company's 2016 Ten-Year Site Plan (hereinafter "Gulf 2016 TYSP"), *available at* https://goo.gl/PE1qbW; Gulf 2016 TYSP Workshop Presentation, *available at* https://goo.gl/GH9rME; TECO 2016 TYSP; TECO 2016 TYSP Workshop Presentation, *available at ht*tps://goo.gl/rQNeYF.

Collectively, the IOUs plan to add in ten years as much solar generation as Gulf's sister subsidiary, Georgia Power, will add by next year—more than a gigawatt.[40] Moreover, through additional RFPs, Georgia Power plans to double its installed capacity again in five years with more solar PV, battery storage, and other renewables.[41] Georgia Power is hardly alone. In 2015, 100% of Alabama Power's new generation came from solar, and that utility just gained approval to issue RFPs for 500 MW more.[42] In fact, RFPs in every single state in the Southeast have returned abundant, cost-effective solar PV bids.[43] These are widely reported precedents, which reputable entities such as the U.S. Department of Energy also verify and publish in market reports.[44] Yet the IOUs never mention them; much less reconcile their refusal to issue RFPs with the relatively modest amounts of solar they propose to build themselves.

Indeed, the utilities present no data or analyses whatsoever to justify the relatively modest amount of solar generation they propose. The RFPs of other Florida utilities, however, confirm there is no shortage of cost-effective solar PV in Florida.[45] As we highlighted last year, on a per customer basis these utilities have already installed far more solar capacity than the IOUs.[46]

The IOUs' proposals to add solar are also mere placeholders. Unlike the solar PV contracts that other utilities are negotiating with third parties, the IOUs have identified no particular process to set the terms of the solar they would build, such as the timing, sizing, siting, sourcing of inputs, and the costs. This gives the Commission—and the public—no reassurance whatsoever that the IOU investments in solar generation will in fact be optimally timed, sized, sited, etc. to achieve least-cost service. [47]

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[40] Georgia Power, Utility-Scale RFP Program, *available at* https://goo.gl/yEKHAu.

[41] Georgia Power 2016 Integrated Resource Plan, at 10-101, *available at* https://goo.gl/CdMFiZ.

[42] *See* Top 10 Solar States (2015), https://goo.gl/F3jIVu; *See also* Alabama Power's plan for 500 MW of renewables approved by regulators, Utility Dive, Sept. 3, 2015, https://goo.gl/uf5Ffm.

[43] *See* Exhibit A: Southeast RFPs for renewables.

[44] *See, e.g.,* Utility-Scale Solar 2014, at 37; *See also* Tracking the Sun IX: The Installed Price of Residential and Non-Residential Photovoltaic Systems in the United States (2016), *available at* https://goo.gl/SpUJY2.

[45] *See* Exhibit B: Florida RFPs for solar.

[46] *See* Sierra Club 2015 Comments, at 12.

[47] Sierra Club supports SACE's comments and shares SACE's concern that, beyond ten-year site plan reviews, the Commission may not get another opportunity to conduct fact-finding until after the utilities have already built whatever solar generation they unilaterally selected.

### b. Energy storage

Energy storage is another competitive alternative to gas generation. Tellingly, the states that already use energy storage want to add more of it. This includes Alabama,[48] Georgia,[49] West Virginia,[50] Tennessee,[51] and California.[52] Other states with energy storage market studies, such as Texas and Massachusetts, also report that this technology can provide immense improvements to the electric grid—and deep cost-savings relative to the status quo.

In contrast, there is a glaring omission of energy storage from the Florida utility plans. At the planning workshop, DEF explained that it lumps energy storage with offshore wind,[53] but that technology came online for the first time this summer.[54] Energy storage projects in contrast have been operational for decades. The first advanced compressed air energy storage (CAES) plant came online in 1978, and the first one in the US, in 1991, in

[48] As noted above, Alabama Power recently gained approval to issue additional RFPs for renewables. The company built the country's first compressed air energy storage CAES plant, 110-MW McIntosh plant, in 1991. PowerSouth Energy Cooperative, https://goo.gl/idGTAz. ("The unit captures off-peak energy at night, when utility system demand and costs are lowest. […] PowerSouth uses the stored energy during intermediate and peak energy demand periods to generate electricity.").

[49] As of September of 2015, Georgia has the largest Southern Company battery storage research project, which is testing a 1 MW/2 MWh lithium-ion battery storage system at a solar facility. Southern Company: Cedartown Battery Energy Storage Project, Sept. 17, 2015, https://goo.gl/MvLO7a; Southern Company also has a partnership with Tesla to test energy-storage products for commercial customers. Southern Co. goes all in on solar, storage, smart homes, EnergyWire, May 28, 2015, https://goo.gl/LjxEwD.

[50] In West Virginia, AES Energy Storage installed the Laurel Mountain Energy Storage Project at the Laurel Mountain wind plant, which delivers 32 MW of regulation and wind smoothing. The World's Largest Lithium-Ion Battery Farm Comes Online, Forbes, Oct. 27, 2011, https://goo.gl/L5g8K9.

[51] The Tennessee Valley Authority (TVA) operates the Raccoon Mountain Pumped-Storage Plant in Marion County, Tennessee. With capacity of 1,616 MW, it is TVA's largest hydroelectric facility and "provides critical flexibility." 2015 Tennessee Valley Authority Integrated Resource Plan (hereinafter "2015 TVA IRP"), at 40, *available at* https://goo.gl/GiURX3.

[52] World's Largest Storage Battery Will Power Los Angeles, Scientific American, July 7. 2016, https://goo.gl/cvGXzD; CNBC, Tesla tackles California energy woes with massive energy-storage deal, Sept. 16, 2016, https://goo.gl/z1YELb; California Dreaming: 5,000MW of Applications for 74MW of Energy Storage at PG&E, GreenTech Media, May 28, 2015, https://goo.gl/nuZRT4.

[53] Duke Energy has relegated energy storage has into a third category of "Emerging Technologies," along with offshore wind technologies. Duke Energy, A Brief Overview of DEF Planning. Duke Presentation, given at the Sept. 14, 2016 Ten-Year Site Plan Workshop, *available at* https://goo.gl/STKM0q.

[54] Offshore Wind Arrives in America, Energy.gov, Sept. 9, 2016, https://goo.gl/sqjxpr.

Alabama.[55] Now, as utilities across the country are rapidly procuring storage, Florida utilities are behind, without even a plan to explore procurements of their own.

As noted above, FPL itself acknowledges that energy storage is a competitive alternative to peakers. Market studies commissioned by state energy regulators and by other utilities agree: energy storage investments can save <u>hundreds of millions, if not billions</u> of dollars.[56] These projected savings stem from the wide-ranging applications of this technology, spanning electric generation (on and off peak), transmission, and distribution.

Peak generation is of course the most expensive generation, and storage allows utilities to reduce or avoid that generation altogether by redeploying surplus energy from lower cost, off-peak hours. A 2016 report by the state of Massachusetts concluded that this application alone could save customers in that state <u>more than a billion dollars</u>. Other studies document the cost savings from energy storage's ability to reduce transmission and distribution-related maintenance, as well as defer and even avoid huge capital expenditures.[57] In 2014, Texas utility, Oncor, announced it would seek approval to build <u>5,000 MW of energy storage</u> citing over <u>$625 million of projected customer savings</u>.[58]

Storage can also reduce risk by providing both flexibility and reliability. Energy storage is in fact highly accommodating with sizing, siting, permitting, and construction time. Because this technology does not produce direct air emissions, or have large land requirements, the permitting and siting processes are far easier.[59] Because individual storage systems are modular, one system can consist of many modules operating simultaneously, and can take on additional modules incrementally, so the system will not fail from the breakdown of one module.[60] Additionally, several types of advanced storage technologies are commercially viable,[61] including batteries, compressed air energy storage, liquid air energy storage, pumped hydroelectric storage, and flywheels.[62] They are also readily available. A

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[55] PowerSouth Energy Cooperative, https://goo.gl/idGTAz.

[56] A 2016 report by the state of Massachusetts concludes that 600 megawatts of storage capacity installed by 2025 would save ratepayers $800 million in system costs. Massachusetts Energy Storage Initiative Study (2016), at xvi-xvii, *available at* https://goo.gl/D3zviD.

[57] *Id.* at 86-89.

[58] The Value of Distributed Electricity Storage in Texas Proposed Policy for Enabling Grid-Integrated Storage Investments (2014), at 14, *available at* https://goo.gl/fv2mYF.

[59] Massachusetts Energy Storage Initiative Study, at 9.

[60] Massachusetts Energy Storage Initiative Study, at 10.

[61] This is evidenced by their widespread use in competitive markets without subsidies. *Id.* at 2.

[62] Energy Storage Technologies, https://goo.gl/5vcJTb.

2016 study found utilities could procure these advanced technologies within months—four to six times faster than conventional technologies.[63]

The value of energy storage is also apparent in California's use of it to solve the emergency that resulted from the massive gas facility failure at Aliso Canyon. That failure put the entire region at high risk of far-reaching power outages. State regulators directed utilities to speed up the deployment of large-scale, grid-connected storage. As of August, California utilities have proposed three large-scale battery installations[64]—one with an in-service date just five months after it was proposed.[65]

### c. Energy efficiency

Energy efficiency is the lowest-cost energy resource available,[66] and is essential to deliver least-cost electric service. More specifically, the wide-ranging technologies labeled as energy efficiency are part of the demand-side management that Florida needs to keep demand down and electric bills low, as noted in Section II.B.1 above. Yet the utilities continue their practice of ignoring any incremental energy efficiency additions beyond the levels set by the Commission based on information three or more years old.[67] This cannot be squared with the more recent market assessments, including those in other Southeast states, consistently showing that energy efficiency is not only cost-effective, but a critical resource to meet peak demand,[68] reduce risk, and save customers money.[69]

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[63] *Id.* at 10.

[64] They proposed two 20 MW (80 MWh) facilities from SCE and a 37.5 MW (150 MWh) project from SDG&E. 'Eyes wide open': Despite climate risks, utilities bet big on natural gas, Utility Dive, Sept. 27, 2016, https://goo.gl/697hYh.

[65] As Aliso Canyon Gas Shortage Looms, Southern California Looks to Energy Storage, Greentech Media, Jun. 02, 2016, https://goo.gl/JrI0O4; *See also* California Utilities Are Fast-Tracking Battery Projects to Manage Aliso Canyon Shortfall, GreenTech Media, Aug. 18, 2016, https://goo.gl/9XyYx1. (stating that the projects must be grid-ready by year's end, in SCE's case, or by Jan. 31, 2017, in SDG&E's case.).

[66] SEE, Guide For States: Energy Efficiency As A Least-Cost Strategy To Reduce Greenhouse Gases And Air Pollution, And Meet Energy Needs In The Power Sector (2016), *available at* https://goo.gl/ZtQ7pc; *See also* ClimateWorks & Fraunhofer ISI, How Energy Efficiency Cuts Costs for a 2°C Future (2015), *available at* https://goo.gl/fjf0xR; *See also* The Best Value for America's Energy Dollar: A National Review of the Cost of Utility Energy Efficiency Programs (2014), *available at* https://goo.gl/GPYhzU.

[67] Here, "utilities" refers to the utilities subject to the Florida Energy Efficiency and Conservation Act (FEECA). The other Florida utilities also have an obligation to provide least-cost service and to that end should develop and disclose robust options analyses focusing on energy efficiency.

[68] At very low cost and risk, efficiency offers flexibility in meeting peak demand. Florida utilities can quickly ramp up efficiency to meet demand growth and thereby reduce or entirely avoid costly infrastructure improvements and expansion. RAP, Recognizing the Full Value of Energy Efficiency (What's Under the Feel-

Energy efficiency programs are inherently less risky since they consist of many discrete resources that will not fail all at once.[70] Additionally, efficiency increases system reliability by reducing the stress on it. Many utilities give energy efficiency resources a risk credit, meaning the risk reduction effects of implementing efficiency reduced the cost of energy efficiency.[71] Thus, efficiency is a highly predictable and reliable cost-effective resource that enables the utility system to avoid the risk of surpluses, shortages, and periodic outages.

The utilities' refusal to consider incremental energy efficiency additions is even more alarming given the highly publicized, rapid changes in the market, and the billions of dollars that other utilities reported saving in recent years from geographically targeted energy efficiency programs, especially those that defer or avoid large transmission and distribution expenditures.[72] This Commission itself stated that, "at any time," it is ready to "reexamine and then adopt new [energy efficiency/demand-side management] goals or changes to those goals." [73] It is the responsibility of the utilities to develop data and analysis to allow the Commission to do so.

Indeed, if the utilities and the Commission are serious about closing the gap that minority and low-income households spend on energy, then they will rapidly develop plans to increase investment in energy efficiency, as leading energy efficiency experts have recommended.[74]

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Good Frosting of the World's Most Valuable Layer Cake of Benefits) (2013) (hereinafter "2013 RAP Energy Efficiency Report"), at 41, *available at* https://goo.gl/APjr2s.

[69] Because efficiency reduces all pollutants, it can also save ratepayers money by satisfying environmental regulations without building new power plants, which require huge, inflexible capital outlays.

[70] 2013 RAP Energy Efficiency Report, at 41.

[71] The 2013 PacifiCorp IRP and the Northwest Power Council both give energy efficiency resources risk credit. ACEEE Comments on 2015 Tennessee Valley Authority Draft Integrated Resource Plan, at 3.

[72] For instance, in 2011, Consolidated Edison estimated that including the effects of geographically-targeted efficiency programs in its 10-year forecast reduced costs by over $1 billion. Additionally, since 2012, ISO New England identified over $400 million in deferred transmission investments due to efficiency. NEEP Northeast Energy Efficiency Partnerships: Energy Efficiency as a T&D Resource: Lessons from Recent U.S. Efforts to Use Geographically (2015), at 12 available at https://goo.gl/AXRf3m.

[73] FPSC Transcript Document No. 06614-14, at 21, Order No. PSC-14-0696-FOF-EU, filed Dec. 5, 2014, in Docket No. 130205-EI.

[74] ACEE, Lifting the High Energy Burden in America's Largest Cities: How Energy Efficiency Can Improve Low-Income and Underserved Communities, Apr. 20, 2016, at 3-4. (For African-American, Latino, and renting households, 42%, 68%, and 97% of their excess energy burdens, respectively, could be eliminated by raising household efficiency to the median.).

**C. Rather than minimize cost of service to customers, the plans pave the way for windfalls for the IOUs/their affiliates at the expense of the captive customer base; it is imperative for the Commission to intervene and reject the plans.**

As discussed above, the plans are in no way least-cost from an electric utility customer perspective. Others, however, certainly profit from these gas-laden proposals. The most obvious profiteers are the shareholders of the IOUs/their affiliates—together they are heavily investing in gas generation and infrastructure, such as inter-state pipelines. This gives the IOUs a perverse incentive to increase their reliance on and subsidize the inefficient production and distribution of natural gas as they pass increases in fuel costs directly to customers.

In his testimony before the Senate Energy and Natural Resources Committee, Jonathan Peress highlights "a disturbing trend of utilities pursuing a capacity expansion strategy by imposing transportation contract costs on state-regulated retail utility ratepayers so that affiliates of those same utilities can earn shareholder returns as pipeline developers. . . . Thus ratepayer costs which may not be justified by ratepayer demand are being converted into shareholder return."[75] Mr. Peress further explains, "the effect of these affiliate transactions, whereby utilities commit their captive customers to pay for pipelines being developed by the same corporate group, is that customers are saddled with risky 20 year financial obligations to provide nearly risk free shareholder returns of 14% per year or more."[76]

Ultimately, Mr. Peress warns, affiliate transactions can hurt not only customers but also market participants. In Florida, this includes business, large or small, that lose opportunities to provide efficient solutions for electric service due to the control that the IOUs/their affiliates exert over the state's energy market. This is the rub, for instance, in FPL and DEF's decision to import more gas through the Southeast Market Pipeline Project instead of less costly, Florida-made solutions for them to provide an adequate and reliable supply of electricity.

In recent years, mergers between the IOUs and pipeline companies have proliferated[77]—growing the potential for the fallout described by Mr. Peress. Again, the Southeast Market Pipeline Project [78] is case in point: FPL and DEF back this pipeline even

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[75] Jonathan Peress, Testimony Before the Senate Energy and Natural Resources Committee (June 14, 2016), at 5, https://goo.gl/rPoudE.

[76] *Id.*

[77] *See* Exhibit C: Mergers between pipeline companies and IOUs/their affiliates.

[78] Sabal Trail is part of multiple pipeline expansions and a joint venture of DEF's parent, Duke Energy Corporation, and FPL's parent, NextEra.

though it would more than double the amount of natural gas that FPL and Duke themselves project needing.[79]

Coupled with the utilities' hedging programs, the recent mergers and affiliate transactions raise an acute threat of improper subsidization of pipeline companies by Florida electric utility customers.[80] Between 2002 and 2015, the four IOUs saddled their customers with more than a $6 billion bill for fuel costs higher than market price.[81] Public Counsel has protested this, citing the IOUs' own estimates of another $559 million in losses-borne again by customers.[82] If the Commission were to allow the utilities, now merged with pipeline companies, to increase their gas generation, customer bill could soar even higher.

As the Antitrust Division of the United States Department of Justice recognizes, this type of vertical integration "may be used by monopoly public utilities subject to rate regulation as a tool for circumventing that regulation. The clearest example is the acquisition by a regulated utility of a supplier of its fixed or variable inputs. After the merger, the utility would be selling to itself and might be able arbitrarily to inflate the prices of internal transactions. Regulators may have great difficulty in policing these practices, particularly if there is no independent market for the product (or service) purchased from the affiliate."[83] Vertical integration of the retail distribution and generation markets plus financial hedging of natural gas thus presents a clear conflict of interest whereby self-dealing practices can rampantly exploit the captive customer base.

To protect customers and diverse businesses in Florida, it is imperative for the Commission to reject the plans, and put all the utilities on a path to reduce, not increase, Florida's generation.

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[79] FPL admitted that it would only require 400,000 Dth/day by 2017 and 600,000 Dth/day by 2020, yet it moved forward with the construction of Sabal Trail, which will ship double that amount—800,000 Dth/day by 2017 and 1.1 billion Dth/day by 2020. *Compare* Testimony of Heather C. Stubblefield on behalf of the Florida Power & Light Co., FPSC Docket No. 130198, July 26, 2013 at 9:10-13, (testifying that FPL requested these amounts "based on FPL's analyses of its future gas transportation requirements"); Application by Florida Southeast Connection, LLC ("FSC") to FERC for a Certificate of Public Convenience and Necessity and for Related Authorizations, Sept, 26, 2014 at 2, (stating amount that Sabal Trail will ship).

[80] For example, the $3 billion Atlantic Sunrise gas pipeline expansion proposal pending before the Federal Energy Regulatory Commission (Docket No. CP15-138) would connect to delivery points in Florida, and FPL and DEF have intervened in the FERC proceeding, indicating they have a material interest in this pipeline.

[81] Office of Public Counsel Protest, Document No. 05102-16, at 2, filed July 15, 2016, in Docket No. 160096-EI (hereinafter "Public Counsel Protest of Hedging Losses").

[82] Public Counsel Protest of Hedging Losses, at 2.

[83] United States Department of Justice, Antitrust Division, Non-Horizontal Merger Guidelines § 4.3 Evasion of Rate Regulation, *available at* https://goo.gl/9xw0QB.

**D. The utilities acknowledge they can wait many months, even years before committing resources to add any gas generation, so they have time to pursue alternatives instead.**

The utilities cite no reason to move forward now with their proposals to add gas generation.[84] Indeed, the purpose of this generation is mainly to meet projected growth in peak demand.[85] We reiterate that this growth may never materialize. Even if it did, the utilities acknowledge they can wait many months, even years, before committing any resources to adding gas generation.[86] More specifically, November 2017 is the earliest "drop dead" date (for a 200 MW CT with a May 2020 in-service date), and that could be pushed back by six months.[87] The utilities thus have ample time to complete the missing RFPs and options analyses and revise their plans to pursue cost-effective alternatives instead.

**E. Florida's high-cost, high-risk coal generation reinforces the need for revised plans including the chronically missing options analyses.**

While the utilities are not proposing any new coal generation, their existing coal burning generation undermines their ability to provide least-cost service. Burning coal to generate electricity lost whatever economic edge it once had, as evidenced by the overwhelming national coal divestment trend.[88] To be sure, coal is a terrible deal: Not only is burning coal one of the priciest[89] and most polluting[90] ways to generate electricity, importing coal from out of state also stunts local economic growth.[91]

With no shortage of low-cost, low-risk alternatives in the market, all remaining coal owners and operators owe their regulators robust options analyses focusing on options for transitioning to the alternatives as soon as practicable. The regulators, in turn, are wise to

[84] Staff data request no. 42.

[85] As noted above, OUC and FPL propose adding CCs as well.

[86] *See* response to Staff data request no. 40; *See also* 2016 TYSP Schedule 9s.

[87] TECO 2016 TYSP; *See also* TECO response to Staff data request no. 40.

[88] *See*, *e.g.*, EIA, 'Coal made up more than 80% of retired electricity generating capacity in 2015' (Mar. 8, 2016) available at https://goo.gl/b0xcAq; *See also* Sierra Club, Open letter to coal industry: United States and the world are moving away from coal, toward clean energy (Apr. 21. 2016) *available at* http://goo.gl/kE94J6.

[89] *See* 2016 TYSP Comments, *supra* n. 3 (citing sources on how coal generation costs compare to alternatives).

[90] *See* Mother Jones, 'Environmentalists Hate Fracking. Are They Right?' (May 11, 2016) *available at* http://goo.gl/dGtFju.

[91] *See* Union of Concerned Scientists, Burning Coal, Burning Cash: 2014 Update; Fact Sheet: Florida's Dependence on Imported Coal (Jan. 2014) *available at* http://goo.gl/Y3Yw21.

disallow further expenditures on uncompetitive coal generation, as the Georgia Public Service Commission just did in the integrated resource planning proceeding it recently concluded for that state's largest electric utility Georgia Power.[92]

Yet in Florida, the utilities have continued their practice of presenting no options analyses regarding their existing coal generation. This is a grave omission, as we have consistently warned, because the utilities' own, incomplete regulatory compliance cost estimates for this generation range in the hundreds of millions to billions of dollars.[93] Moreover, when Staff asked for up-to-date information—underscoring the dearth of information in the plans—the utilities indicated that their analyses are still incomplete, and they failed to provide any estimate whatsoever for several existing regulations.[94]

One glaring omission concerns the Effluent Limitations Guidelines (ELGs), the new U.S. Environmental Protection Agency rule to protect our waters from the toxic pollutants in the discharge of coal generators. The ELGs became effective on January 4, 2016, and the default deadline is November 2018. As it took EPA decades to issue this rule, utilities have long anticipated and planned for it.[95] Indeed, the IOUs must report their compliance estimates under federal financial disclosure rules, and have in fact reported such estimates for ELGs, which are as high as $50 million for just one of a dozen Florida coal plants.[96]

With such massive costs looming over them, it is unacceptable for the utilities to continue to delay studying their options to transition to non-fossil generation.[97] Indeed, as we highlighted last year, Lakeland Electric stands out as the one Florida utility that already commissioned such a study. Lakeland compared several retrofit and retirement scenarios for its aging coal plant, showing that the analysis itself is eminently doable.[98] Predictably, Lakeland's conclusion, which the utility is now refining with further studies, is that

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[92] *See* Exhibit D – Georgia Power IRP Stipulation, at 3 ("minimiz[ing] all capital expenditures" on two large coal generation facilities); *See also* GPSC Docket No. 40161, Direct Testimony of T. Newsome and P. Hayet, at 7 and 51 (Commission staff expert recommending "all capital investment" on costly coal plants be "minimize[d].") (May 6, 2016) *available at* http://goo.gl/SF9rba.

[93] *See* Sierra Club 2015 Comments, at 7.

[94] *See generally* Utility responses to Staff data requests nos. 50-62.

[95] *See* Exhibit E – Sierra Club Comments to Florida Dep't of Environmental Protection (FDEP) re: ELGs.

[96] *See* Exhibit F – Sierra Club Comments to FDEP re: Crystal River Energy Center.

[97] To be clear, Sierra Club does not support new nuclear generation as it extremely high cost and high risk and thus a nonsensical choice given all of the better alternatives available in the market.

[98] nFront Consulting LLC, "Strategic Resource Plan, Lakeland Electric,"(Mar. 2015), *available at* http://goo.gl/B2BmRK.

renewables and energy efficiency will meet its load growth over the next 20 years more cost-effectively than all three fossil fuel expansion scenarios studied.[99]

## III. The Commission should require the utilities to file revised plans as soon as practicable.

For all the foregoing reasons, the Commission should reject the plans and require all the utilities to file revised plans as soon as practicable, including the chronically missing options analyses. The IOUs should file revised plans no later April 1, 2017, the annual deadline for plan revisions, to minimize the fallout from their conflict-ridden plans.

Thank you for your consideration.

Respectfully submitted,

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[99] *Id.* at 3-13, 3-24.

# EXHIBIT A

**Exhibit A: RFPs for Renewables in the Southeast**

The following is an illustrative list of RFPs for renewables in the Southeast.

**Alabama**

- The Alabama Public Service Commission (PSC) approved a proposal from Southern Company subsidiary Alabama Power, the state's dominant electricity provider, to procure up to 500 MW of renewable energy from 80 MW or smaller facilities. The utility's proposal cited both a need for renewables to meet Clean Power Plan emissions reductions requirements and customer demand. The utility's request for proposals (RFP) requires renewables projects to be priced below what it would expect to pay for other generation sources, unless the off-taker agrees to pay the difference.[1]
- On September 27, 2016, Alabama Power issued a request for proposals (RFP) for renewable energy resources. For a proposed project to be considered under this RFP, the generation resource must be either a renewable resource, as identified in Section 40-18-1(30), Code of Alabama (1975), or an environmentally specialized generating resource. Eligible projects include solar, wind, geothermal, tidal or ocean current, low-impact hydro and biomass.[2]

**Georgia**

- Georgia Power Company's 2015/2016 Advanced Solar Initiative Distributive Generation Program sought proposals and applications for solar photovoltaic generation. The Georgia public Service Commission has given approval to Georgia Power Co., a unit of Southern Co., to release a request for proposal for 495 MW of new solar power generation. The commission approved 425 MW of the requested amount on July 12, 2013 as part of the 2013 Georgia Power Co. Integrated Resource Plan and 70 MW as part of the utility's Advanced Solar Initiative November 20, 2012.[3]

**Kentucky**

- East Kentucky Power Cooperative RFP sought to obtain up to 300 MW of generation, including renewable resources with a capacity of 5 MW or larger. EKPC will retain all environmental attributes associated with the renewable resources.[4] (Closed August 30, 2012)

**Mississippi**

- The South Mississippi Electric Power Association RFP sought capacity and/or related energy from wind resources with up to 250 MW of nameplate capacity.[5] (Closed August 31, 2015)

**Tennessee**

- State of Tennessee RFP sought proposals for design, delivery, installation, operation and maintenance of renewable energy systems using solar photovoltaic electric generating technologies to supply energy to the State at multiple sites.[6] (Closed August 9, 2016).

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[1] https://goo.gl/dnY5Ea.
[2] https://goo.gl/XXCQAh.
[3] https://goo.gl/FkAz21.
[4] https://goo.gl/7GhgcP.
[5] https://goo.gl/OS1kKz.
[6] https://goo.gl/CsM2QY.

**Virginia**

- EPB RFP sought proposals from qualified contractors for the labor and materials needed to build the first of two community solar power generation facilities under its Solar Share pilot project. The first project will be built in the Bakewell community of northern Hamilton County and the second one is planned near existing EPB facilities in Chattanooga. The two projects will provide a combined 1.35 megawatt generation capacity.[7] (Closed May 15, 2016)
- The Council of Independent Colleges in Virginia (CICV) RFP sought proposals to construct and finance up to 37.8 MW solar photovoltaics (PV) systems at the campuses of some of its member colleges. The project is supported by the U.S. Department of Energy's SunShot Initiative. Bidders shall propose the construction of different types of PV systems under various financing mechanisms that creates net cost savings to participating colleges.[8] (Closed January 22, 2016)
- Solarize Harrisonburg RFP sought a single price/kW installed for a group of residential homeowners in Harrisonburg, Virginia. This price will be offered to all homeowners participating in the group. The PV projects are to be installed on the roofs of each of the properties and will be owned by the individual property owners.[9] (Closed September 11, 2014)
- Appalachian Power Company RFP sought proposals to solicit and subsequently pre-qualify companies who have an interest in participating in the company's RFP for obtaining up to 10 MW (AC) of ground-mounted solar energy resources via either an asset purchase with 100% ownership or 20-year PPA. Proposed projects must be located within Virginia, be interconnected to the PJM Regional Transmission Operator or Appalachian Power's distribution system, and have a minimum nameplate rating of 5 MW (AC).[10] (Closed February 5, 2016)

**North Carolina**

- The City of Raleigh RFP sought proposals from qualified solar energy developers to own, install, operate, and maintain solar systems on approximately 53 acres of city-owned land near the Neuse River Resource Recovery Facility.[11] (Closed January 8, 2016)
- NC GreenPower RFP sought proposals for up to 60,000 MWh of renewable energy through a purchase with either a one- or two-year term. The potential generator of renewable energy will be required to enter into a Power Purchase Agreement with a North Carolina electric utility and the generated power will be delivered to North Carolina's electrical supply.[12] (Closed January 6, 2016)
- NC GreenPower RFP sought proposals for up to 40,000,000 kWh of Renewable Energy Certificates (RECs) generated in North Carolina through one- or two-year terms from qualifying renewable energy projects.[13] (Closed November 25, 2014)

**South Carolina**

- Duke Energy Carolinas and Duke Energy Progress RFP sought approximately 40 MW and 13 MW of eligible photovoltaic generation capacity and all associated renewable attributes located in and

[7] https://goo.gl/y0a1sk.
[8] https://goo.gl/Ay3DUh.
[9] https://goo.gl/mWiAcl.
[10] https://goo.gl/vNNFbr.
[11] https://goo.gl/1fZ1sQ.
[12] https://goo.gl/Yrjj3M.
[13] https://goo.gl/2iZOSd.

directly interconnected to its retail service areas in South Carolina via a combination of Power Purchase Agreements and turnkey proposals with engineering, procurement and construction agreements in the form of Design-Build-Transfer Asset Purchase proposals.[14] (Closed October 27, 2015)

- Duke Energy Carolinas and Duke Energy Progress RFP sought approximately 4 MW and 1 MW of eligible photovoltaic generation capacity and all associated renewable attributes located in and directly interconnected to its retail service areas in South Carolina via a combination of Power Purchase Agreements and turnkey proposals with engineering, procurement and construction agreements in the form of Design-Build-Transfer Asset Purchase proposals. Proposals must comply with Duke Energy's "Shared Solar Program" requirements under the South Carolina Distributed Energy Resource Program Act and be in service by December 31, 2016.[15] (Closed October 27, 2015)
- South Carolina Electric & Gas Company RFP seeking bidders to provide solar power to the utility through purchased power agreements. SCE&G intends to work with solar developers to locate the solar farms on company-owned property in North Charleston (up to 500 kW) and Cayce (up to 4 MW).[16] (Closed October 3, 2014)

**<u>Louisiana</u>**

- State of Louisiana Department of Education RFP seeking bids for the installation of solar panels at Andrew Jackson Elementary School located in New Orleans, LA.[17] (Closed June 26, 2012)
- AEP Southwestern Electric Power Company (SWEPCO) RFP seeking long-term renewable energy to help fulfill energy-supply requirements for its customers. The request was issued as part of the Louisiana Public Service Commission's Renewable Energy Pilot Program. Proposals for approximately 31 megawatts of new renewable-energy resources deliverable to the Southwest Power Pool (SPP). Resources must be able to begin operating by Dec. 31, 2014, and have a minimum 10-year PPA.[18] (Closed June 15, 2011)

**<u>Multiple States in the Southeast Involved</u>**

- Southern Alliance for Clean Energy RFP sought a contractor to perform a transmission analysis for gigawatt-scale offshore wind energy off North Carolina, South Carolina and Georgia. (Phase 2C - Offshore Wind Energy Transmission Study).[19] (Closed February 16, 2011)
- Appalachian Power RFP sought up to 150 megawatts of wind power. Proposals should allow Appalachian Power to own one or more wind projects or purchase the output from wind projects under one or more 20-year renewable energy power purchase agreements. Qualified projects must be located within Virginia, West Virginia, eastern Indiana, Kentucky, Maryland, North Carolina, Ohio or Pennsylvania, be interconnected to the PJM Regional Transmission Operator, and have a minimum nameplate rating of 40 MW.[20] (Closed April 1, 2016)

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[14] https://goo.gl/uv2Mj8; https://goo.gl/K5U7TY.
[15] https://goo.gl/b4dpPR.
[16] https://goo.gl/toZd3Q.
[17] https://goo.gl/l2hDuK.
[18] https://goo.gl/iu1fM6.
[19] https://goo.gl/fLSBAe.
[20] https://goo.gl/8S6l5C.

# EXHIBIT B

**Exhibit B: Florida RFPs for solar**

The following is an illustrative list of recent RFPs in Florida.

1. JEA issued an RFP for solar PV Power Purchase Agreements (PPA) in April of 2015, and entered into seven PPAs.[1] In 2015, JEA awarded a total of 31.5 MW of solar PPAs. Agreements have been finalized for five projects for a total of 25.5 MW.[2] Additionally, in December of 2014, JEA issued a solar photovoltaic RFP. Earlier, in May of 2009, JEA entered into a PPA with Jacksonville Solar, LLC to receive up to 15 MW from the solar plant located in western Duval County. The facility consists of approximately 200,000 photovoltaic panels, and generated 20,132 MWh in 2015.[3]

2. Seminole issued a solar RFP in March 2015 for a minimum of 2 MW and maximum of 20 MW to be in operation before November 2, 2016. Seminole received seventeen different offers with photovoltaic technology to be in service by the end of 2016. Seminole also incorporated a 2 MW solar photovoltaic facility into Seminole's ten-year plan. Finally, on March 21, 2016, Seminole finalized agreements for a 2.2 MW solar facility to be constructed in Hardee County.[4]

3. The City of Tallahassee issued a RFP for a PPA for a 10 MW utility scale solar photovoltaic project.[5] During negotiations, the project developer offered double the capacity of the project, and the City Commission voted to authorize the PPA for 20 MW.[6]

4. Lakeland Electric issued an RFP in November of 2007, seeking an investor to purchase and install investor-owned photovoltaic systems totaling 24 megawatts. In October of 2008, the project was approved, and installed two years later. The projected reduction in annual fossil-fuel generation is expected to be 31,800 megawatt-hours. In addition, Lakeland Electric issued another RFP in November 2007 for the expansion of its Residential Solar Water Heating Program. Lakeland's proposal was for the installation and operation of 3,000 – 10,000 solar residential water heaters, and annual projected energy savings ranged between 7,500 and 25,000 megawatt-hours.[7]

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[1] Solar Photovoltaic Power Purchase Agreements, Dec. 22, 2014, *available at* https://goo.gl/X4C2hu.

[2] *See* JEA 2016 Ten-Year Site Plan, at 12.

[3] *See id.* at 3.

[4] Seminole response to Staff data request no. 36; *See also* Seminole 2016 Ten-year site plan, at 25; *See also* Seminole Electric Cooperative Issues Request for Proposals for Solar Energy, Mar. 31, 2015, https://goo.gl/fkRXXg.

[5] 2015 Solar Procurement in the South, Oct. 6, 2015, https://goo.gl/jFaYnj.

[6] *See* City of Tallahassee 2016 Ten-year site plan, at 41-42; *see also* Tallahassee prepares to add solar power to portfolio, Mar. 24, 2015, https://goo.gl/47IWrv.

[7] *See also* Lakeland Electric's 2016 Ten-Year Site Plan.

# EXHIBIT C

**Exhibit C: Mergers between pipeline companies and IOUs/their affiliates.**

The following is an illustrative list of mergers between pipeline companies and the IOUs/their affiliates.

1. AGL the largest natural gas distributor in the Southeast merged with Southern Company, which is the parent company of Gulf Power. The merger creates operations of more than 80,000 miles of pipelines.[1]

2. There is a pending merger between Duke Energy and Piedmont. Both are partners on a $5 billion Atlantic Coast Pipeline.[2]

3. NextEra Energy Partners, LP, parent company of Florida Power & Light, acquired NET Midstream, owner of seven long-term contracted natural gas pipeline assets.[3]

Mergers aside, Tampa Electric Company also has substantial stakes in gas infrastructure. TECO's subsidiary, SeaCoast Gas Transmission, L.L.C, operates a 25-mile pipeline system, which can deliver 100,000 MMBtus per day of natural gas to northeast Florida.[4] Another affiliate, New Mexico Gas Company, also owns and operates pipelines.[5]

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[1] Southern Company and AGL Resources complete merger, create a leading U.S. energy company, Southern Company, July 1, 2016, https://goo.gl/lHeHHU.
[2] North Carolina environmental groups oppose Duke-Piedmont merger, Crain's Raleigh-Durham, July 22, 2016, goo.gl/GSoCQ0
[3] NextEra Energy Partners, LP completes the acquisition of natural gas pipelines in Texas, PR Newswire, Oct. 5, 2015, goo.gl/WlaS4X.
[4] TECO Energy announces the formation of a new subsidiary, SeaCoast Gas Transmission, LLC, TECO Energy, Aug. 4, 2008, https://goo.gl/0ebj7J.
[5] Overview — New Mexico Gas Company, https://goo.gl/jQtnwL.

# EXHIBIT D

STATE OF GEORGIA

BEFORE THE GEORGIA PUBLIC SERVICE COMMISSION

| | | |
|---|---|---|
| IN RE: | ) | |
| | ) | |
| Georgia Power Company's 2016 Integrated Resource Plan and Application for Decertification of Plant Mitchell Units 3, 4A and 4B, Plant Kraft Unit 1 CT, and Intercession City CT | ) | Docket No. 40161 |
| | ) | |
| Georgia Power Company's Application for the Certification, Decertification, and Amended Demand Side Management Plan | ) | Docket No. 40162 |

**Stipulation**

The Georgia Public Service Commission (the "Commission") Public Interest Advocacy Staff ("PIA Staff"), Georgia Power Company ("Georgia Power" or the "Company") and the undersigned intervenors (collectively the "Stipulating Parties") agree to the following stipulation as a resolution of the above-styled proceedings to consider the Company's 2016 Integrated Resource Plan (the "2016 IRP") and the Application for the Certification, Decertification, and Amended Demand Side Management Plan (the "2016 DSM Plan"). The Stipulation is intended to resolve all of the issues in these Dockets. The Stipulating Parties agree as follows:

**Supply Side Plan**

1. The 2016 IRP is approved as amended by this Stipulation.

2. Plant Mitchell Units 3, 4A and 4B, Plant Kraft Unit 1CT and Intercession City CT shall be decertified and retired as provided for in the 2016 IRP.

3. The Renewable Energy Development Initiative ("REDI") is approved and shall be increased such that it will procure 1,200 MW (150 MW of Distributed Generation ("DG") and 1,050 MW of utility scale resources). Utility scale procurement shall take place through two separate Requests For Proposals ("RFP"). The first RFP will be issued to the marketplace in 2017 and will seek 525 MW of renewables with in service dates of 2018 and 2019. The second RFP will be issued to the marketplace in 2019 and will seek 525 MW of renewables with in service dates of 2020 and 2021. No more than a total of 300 MW of wind resources shall be procured through REDI. Bid fees for the utility scale solicitation shall be set at five thousand dollars ($5,000) or three hundred dollars per MW

($300/MW), whichever is greater. The cost to implement and administer the REDI program shall be recovered through the fuel clause. Provided, however, that any costs recovery related to the ASI Prime Program in excess of ongoing ASI Prime costs shall be allocated to REDI and shall not be recovered through the fuel clause. All bid fees collected will be credited to the fuel clause.

4. In 2017, the Company shall issue an RFP for 100 MW of DG greater than 1kW but not more than 3 MW with a commercial operation date of 2018 or 2019. Contract terms will be up to 35 years and solar DG projects must interconnect at Georgia Power's owned distribution system. Bid fees for the DG solicitations shall be set at $4/kW.

5. By the end of 2018, the Company shall procure an additional 50 MWs of customer sited DG projects. Such projects shall be greater than 1kW but not more than 3 MW and must have an installed DC capacity that is less than or equal to 125% of the actual annual peak demand of the customer's Premises in 2015 and be a current GPC customer at the time of award. Procurement shall be done through an application process and if oversubscribed, a lottery will be conducted. Participant fees for the DG solicitations shall be set at $3/kW. Any MWs that are unsubscribed from the customer sited program shall be allocated to the DG RFP reserve list. Customer sited projects will be paid avoided costs using the process as described below in item 8(a).

6. The specific process that will be utilized for the evaluation (such as whether to use a project and/or portfolio analysis) for projects submitted into REDI will be finalized during the review and approval of the REDI RFP documents.

7. The Renewable Cost Benefit framework ("RCB") as provided in paragraph 8(a) shall be utilized in the evaluation of bids received through the REDI RFPs for utility scale and DG projects. The Company and Staff will work collaboratively to develop a process and recommendations for the continued implementation of RCB. Within (4) months from the issuance of the Final Order in this case, the Company and Staff will file their proposal with the Commission for implementation of RCB. If an agreement is reached between the Company and Staff on implementation of RCB, the Company and Staff can recommend to the Commission utilization of the full RCB in REDI.

8. The RCB shall be modified for use in the REDI program as follows:

   (a) The Company shall evaluate the bids received in response to REDI RFPs using the RCB. The evaluation of REDI proposals will be limited to the consideration of Avoided Energy and Deferred Generation Capacity cost components consistent with the Framework methodology. Further, the Company will evaluate the appropriate transmission and distribution costs and benefits on a case by case basis as proposed in the Framework document.

   (b) Once the evaluation in 8(a) is concluded the Company will conduct, for information purposes only, an evaluation using the entire RCB as filed by the Company to allow Staff and the Independent Evaluator ("IE") to gain familiarity with the RCB. The evaluation will include all aspects of the Framework including specifically, Generation Remix, Support Capacity, and Bottom Out Adjustments. The Company will file its results with the Commission.

9. The Additional Sum for utility scale resources procured through REDI shall be set at 8.5% of shared savings. This amount shall be levelized and recovered annually for the term of the PPA.

10. The Company's closed ash pond solar demonstration project is approved as filed by the Company. The Company will be required to file quarterly construction monitoring reports and will be required to demonstrate the reasonableness and prudency of any recovery in excess of the budget for this project filed in the 2016 IRP. The Simple Solar program is approved with the modifications to the sourcing of the program as recommended by Staff.

    In addition, the Company's High Wind Study is approved as filed. The Company agrees to file quarterly reports providing the status of the High Wind Study. The Staff and Company will collaborate on what, if any, information from the wind study will be made available to interested parties.

11. The Commission approves an additional 200 MW of self-build capacity for use by the Company to develop additional renewable projects in collaboration with customers, including potential projects at Robins Air Force Base and Fort Benning. The projects must be at or below the Company's avoided costs. No more than 75 MW of the 200 MWs provided for in this provision may be used for non-military customer projects. For the non-military customer projects, the Company must demonstrate that the project meets a special public interest need and could not reasonably be achieved using the competitive bid process. The RECs for the non-military customer projects shall accrue to the benefit of all customers.

12. The Company shall consider the development of a renewable Commercial and Industrial Program. No more than 200 MW shall be allocated for such a program and such program must be approved by the Commission before implementation. The Company shall only consider program options that will result in delivering value to all of its customers and will benchmark such programs to the last accepted proposal from the Company's utility scale REDI program.

13. Staff and the Company shall work together to address retirement study and other modeling issues. This process should begin within six months of the final order being issued in this proceeding and must conclude at least 12 months prior to the Company's filing of the 2019 IRP.

14. For purposes of the Company's IRP evaluations the long term Southern System planning reserve margin shall be raised to 16.25%. The Company shall meet with Commission Staff within 6 months of a final order in this case to discuss the timing of future Expected

Unserved Energy studies. The Company will report to Staff once all operating companies have approved for utilization the long term planning reserve margin adopted by this provision.

15. The Company agrees to minimize all capital expenditures on Plant McIntosh Unit 1 and Plant Hammond Units 1-4 through July 31, 2019. The Company agrees to annual limits on all capital expenditures of $1 million for McIntosh 1 and $5 million for Hammond 1-4[1]. The Company agrees to make a filing with the Commission prior to incurring expenditures that exceed the annual limit.

16. The measures taken to comply with the existing government imposed environmental mandates necessary for the Company to implement its environmental and compliance plan as presented in Technical Appendix Volume 2, Summary of Capital Expenditures, Closures, and O&M Expenses filed as part of the 2016 IRP are approved subject to the limits outlined in No. 15 above regarding Plant McIntosh Unit 1 and Hammond Units 1-4. This approval does not preclude the Commission from reviewing prudence of the actual expenditures made to effectuate the compliance plan.

17. The remaining net book values of Plant Mitchell Unit 3 shall be reclassified as a regulatory asset and the Company shall continue to provide for amortization expense at the same rate as determined in the Company's 2013 base rate case. Recovery of the remaining balance as of December 31, 2019 will be deferred for consideration in the Company's 2019 base rate case. The Stipulating Parties reserve the right to make any arguments, including policy and legal arguments, on the recovery mechanism and appropriate period in which the costs should be recovered if applicable. Parties may argue their respective positions on that issue in the 2019 base rate case.

    Any unusable M&S inventory balance remaining at the date of the unit retirement shall be reclassified as a regulatory asset and deferred for consideration in the Company's 2019 base rate case. The Stipulating Parties reserve the right to make any arguments, including policy and legal arguments, on the recovery mechanism and appropriate period in which the costs should be recovered if applicable. Parties may argue their respective positions on that issue in the 2019 base rate case.

18. Any over or under recovered cost of removal balances for each Retirement Unit shall be deferred for consideration until the Company's 2019 base rate case. The Stipulating Parties reserve the right to make any arguments, including policy and legal arguments, on the appropriate period in which the costs should be recovered. Parties may argue their respective positions on that issue in the 2019 base rate case.

[1] The Hammond Units 1-4 $5 million value represents the cumulative annual amount for all four units. This provision does not apply to expenditures required for retirement obligations.

19. The Company shall report to the Commission concerning progress on the dismantlement and remediation of the Plant Kraft generating plant site and the Company shall provide the Commission with appraised values of any land at that site that the Company would propose to donate to the Georgia Ports Authority, including information regarding whether the appraised value exceeds the Company's net book value of such land.

20. The decision whether to accept, modify or defer consideration of the Company's request for authority to capitalize additional costs to preserve new nuclear shall be a policy decision for the Commission. Adoption of this provision within this stipulation does not preclude any Party from making any argument for or against the Company's request in this regard, nor does this agreement or this provision within this agreement suggest that the Commission must or should (or should not) consider this question as part of this IRP.

21. When filing the 2019 IRP or when filing any updates to the IRP prior to the 2019 IRP filing, the Company agrees to provide the Commission Staff working copies of all models used in the development of that IRP, with each configured to replicate inputs used to derive results incorporated in its base case scenario within 10 days after the IRP or update to the IRP is filed.

22. In conjunction with the ongoing level of review and analysis required by this agreement, Georgia Power will agree to pay for any reasonably necessary specialized assistance to the Staff in an amount not to exceed $300,000 annually. This amount paid by Georgia Power under this paragraph shall be deemed as necessary cost of providing service and the Company shall be entitled to recover the full amount of any costs charged to the utility.

23. The Electric Transportation Initiatives and associated costs identified in the 2016 IRP are not, and have not been converted into, jurisdictional expenses that become the responsibility of ratepayers. Each party reserves the right to address these costs and the merits of the program through the Annual Surveillance Report process and future rate cases.

<u>**Demand Side Plan**</u>

1. The Company's 2016 Demand Side Management ("DSM") Plan and Application for Certification, Decertification and Amended DSM Plan is approved as amended by this Stipulation.

2. Georgia Power will continue to treat DSM as a priority resource in accordance with prior Commission precedent. For the calculation of long term percentage rate impacts, the Company will work with Commission Staff to come up with a methodology within 12 months of the issuance of the final order.

3. Georgia Power will enter discussions over the next three years with Staff and DSMWG members on the value of a Residential Mid-Stream Retail Products Program.

4. Georgia Power will develop a Technical Reference Manual prior to the Company's next IRP filing and will update it every three years thereafter. The Company will work closely with Staff and members of the DSMWG and DSMWG members may also propose new measures to be added at any point in the measure evaluation process. The DSM Program Planning Approach filed as Staff Exhibit BSK8 will otherwise remain unchanged other than "Technology Catalog" will be replaced with "Technical Reference Manual" and the dates will be updated to reflect 2017 through 2019.

5. Georgia Power will agree to the budget adjustments as provided in exhibit 8 attached to this Stipulation as amended.

6. Georgia Power will receive an Additional Sum equal to 8.5% of actual net benefits based on net energy savings from the Program Administrators Cost Test ("PACT"). Once the Additional Sum amount as calculated exceeds the annual program costs, the portion of the Additional Sum that exceeds the program cost shall be calculated based on 4% of the actual net benefits based on net energy savings from the PACT.

7. Georgia Power will work with Staff and the Company's implementation contractor for the Residential Behavioral Program to find ways to include more customers in the program.

8. The Company will make a concerted effort to obtain at least 25% of portfolio savings each year from the Residential sector.

9. Once a program implementer is selected and plans for all proposed programs are drafted and completed, the plans will be provided to Staff for review prior to implementation of the programs. The current review and approval process reached in an agreement between Staff and the Company in 2014 will continue, and the Company agrees to discuss further refinements and revisions to the process. In order to change the process both Staff and the Company must agree to the recommended changes.

10. The Company will provide detailed evaluation plans for each of the approved DSM programs within 120 days of the selection of Program Implementers for each of the certified programs. If necessary, the Company may request, and Staff may unilaterally grant, additional time to complete the detailed evaluation plans for each of the approved DSM proposals.

11. The Company will agree to a Commercial and Residential Building Usage Data awareness option at the cost of $300,000 for 2017 and $100,000 annually for 2018 and 2019, and such costs will be added to the DSM Consumer Awareness budget. This option will be available to customers within one year from the date of the final order in

this docket. There will be no assumed energy savings or goals attributed to this customer awareness option.

12. The Company and Staff agree to a $2.5 million annual pilot budget for DSM and energy efficiency pilot programs. Staff will be notified before the start of such pilots.

13. The Company agrees to the Staff recommendation for the Learning Power program annual budget to be $3 million.

14. The Company agrees to the Staff recommendation against shifting residential and commercial customer awareness to cross-cutting costs.

15. The current DSM true-up process filed in Docket No. 36499 on October 18, 2013, will continue through 2020. Although the DSM tariffs will remain at current levels until rates are adjusted in 2020, the true-up review process will continue on an annual basis.

Agreed to this 23rd day of June, 2016.

Jeffrey Stair

On behalf of the Georgia Public Service Commission
Public Interest Advocacy Staff

Brandon F. Marzo

On behalf of Georgia Power Company

[Additional Signatures]

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On behalf of Clean Line Energy Partners LLC
David Berry
authorized person

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On behalf of

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On behalf of

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On behalf of

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On behalf of

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On behalf of

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On behalf of

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On behalf of

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[Additional Signatures]

Chas. B. Jones, III

On behalf of Georgia Association
Of Manufacturers

On behalf of Georgia Industrial
Group

On behalf of

On behalf of

On behalf of

On behalf of

On behalf of

On behalf of

On behalf of

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Agreed to this 23rd day of June, 2016.

Jeffrey Stair

On behalf of the Georgia Public Service Commission
Public Interest Advocacy Staff

Brandon F. Marzo

On behalf of Georgia Power Company

On behalf of Georgia Industrial Group

[Additional Signatures]

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On behalf of The Georgia Large Scale Solar Association

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On behalf of

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On behalf of

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On behalf of

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On behalf of

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On behalf of

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On behalf of

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On behalf of

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On behalf of

[Additional Signatures]

Keith Thomas

On behalf of Georgia State Building
and Construction Trades Council

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On behalf of

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On behalf of

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On behalf of

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On behalf of

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On behalf of

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On behalf of

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On behalf of

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On behalf of

[Additional Signatures]

Bruce H. Burcat

On behalf of Southern Wind Energy
Association

# EXHIBIT E

February 29, 2016

*Via Electronic Mail*

Supervisor Marc Harris
Power Plant NPDES Permitting, Industrial Wastewater Section
Florida Department of Environmental Protection

Re: *Bringing Florida Coal Plants Into Compliance With The New Effluent Limitations Guidelines*

Dear Supervisor Harris:

As you know, the U.S. Environmental Protection Agency ("EPA") updated the Effluent Limitations Guidelines ("ELGs") for steam electric power plants to protect our waters from the toxic pollutants in these generators' discharges.[1] Reflecting decades of advances in water quality science and control technology,[2] the ELGs became effective on January 4, 2016. Now coal-burning[3] power plants across the country must come into compliance with the ELGs "as soon as possible;" for many plants the deadline is November 1, 2018.[4] The undersigned groups and our tens of thousands of Florida members therefore urge you, as the supervisor of power plant NPDES permitting, to:

1. Promptly issue draft revised NPDES permits and fact sheets for Florida coal plants to require these plants to comply with the ELGs by November 1, 2018, unless you conclude that a later date is appropriate based on a well-documented justification that is consistent with EPA's guidelines in the final rule and the public interest in securing vital water protections as soon as possible.

2. Take public comment for no less than 60 days on draft NPDES permits and fact sheets for Florida coal plants that include your ELGs compliance determinations.

3. Work with the operators of the three Florida coal plants without NPDES permits or announced plans for retirement, and other stakeholders, to ensure that these plants achieve timely compliance with the applicable requirements in the ELGs.

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[1] U.S. EPA, *Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category*, 80 Fed. Reg. 67,837 (Nov. 3, 2015), codified at 40 C.F.R. part 423.
[2] *See* 80 Fed. Reg. at 67,840.
[3] *See* 80 Fed. Reg. at 67,839, n. 1 ("power plants covered by the ELGs use nuclear or fossil fuels, such as coal, oil, or natural gas, to heat water in boilers, which generate steam." [emphasis added]).
[4] *See, e.g.*, 40 C.F.R. § 423.13(g)(1)(i) (establishing deadline for compliance with FGD wastewater standards; identical language appears in the provisions for other regulated waste streams).

4. Work with all Florida coal plant operators, fellow regulators, and other stakeholders to determine compliance obligations and timelines for all other applicable water-side requirements.

As we discuss below, timing is critical. Through the permit renewal process, making prompt compliance determinations will help attain and maintain safe water quality in Florida. Prompt compliance determinations will also allow fellow regulators to assess whether it is more prudent to retire—rather than spend huge sums of public monies to retrofit—these aging coal plants in the rapidly evolving regulations and market conditions concerning coal and carbon.

<u>In short, our overarching request is that you take swift action to determine what it will take to bring *all* Florida coal plants into timely compliance with *all* applicable water-side requirements, set deadlines for the same, and meet with us to discuss the way forward</u>.

## I. DEP Should Promptly Issue Draft Permits And Fact Sheets For Florida Coal Plants Incorporating The ELGs And Specifying The "As Soon As Possible" Compliance Deadline.

The ELGs impose stringent, technology-based effluent limitations on the discharges of several common types of effluent (i.e., waste streams) from coal plants, including fly ash and bottom ash transport waters, and wastewater from flue gas desulphurization ("FGD") systems.[5] Under the Clean Water Act, it is the responsibility of state permitting authorities to incorporate the ELGs into the NPDES permits for coal plants "as a floor or a minimum level of control."[6] Just as it is the responsibility of the coal plant operators to "immediately begin"—"even prior to the permit renewal process"—their ELGs compliance analyses, and convey to state authorities the information they need to complete independent evaluations.[7]

In particular, when revising permits for direct dischargers—facilities that discharge to surface waters—state permitting authorities must determine the compliance deadline for the ELGs, which is to be "as soon as possible beginning November 1, 2018, but no later than December 31, 2023." To be clear, the phrase "as soon as possible" means November 1, 2018, unless the permitting authority establishes a later date based on a well-documented justification and the

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[5] *See* 40 C.F.R. § 423.13.
[6] 80 Fed. Reg. at 67,882.
[7] *Id.* at 67,882-83 ("Regardless of when a plant's NPDES permit is ready for renewal, the plant should <u>immediately begin</u> evaluating how it intends to comply with the requirements of the final ELGs. In cases where significant changes in operation are appropriate, the plant should discuss such changes with the permitting authority and evaluate appropriate steps and a timeline for the changes, <u>even prior to the permit renewal process</u>." [emphasis added]).

authority's case-by-case consideration of certain enumerated factors in the final rule, discussed further below.

The November 1, 2018, compliance deadline is achievable. EPA's rulemaking record shows that, depending on the scope of required retrofit at a particular coal plant, industry itself projects that the total time needed for fly ash and bottom ash system retrofits ranges from 27 to 36 months, from the start of conceptual engineering to final commissioning.[8] With appropriate planning and direction from state permitting authorities, many plants thus can and should be required to bring their operations into compliance by November 1, 2018, especially given that the updates to the ELGs were developed and thus anticipated by industry over several decades.

EPA rightly urges permitting authorities to "provide a well-documented justification for how [they] determined the 'as soon as possible' date in the fact sheet or administrative record for the permit," and to "explain why allowing additional time to meet the limitations is appropriate," if that is the authority's conclusion.[9] EPA specifies that any determination that a later date is appropriate should be substantiated by the public record and reflect consideration of the following factors:

- ◊ "Time to expeditiously plan (including time to raise capital), design, procure, and install equipment to comply with the requirements [in the ELGs]."[10] EPA explains that "the permitting authority should evaluate what operational changes are expected at the plant to meet the new BAT limitations for each waste stream, including the types of new treatment technologies that the plant plans to install, process changes anticipated, and the timeframe estimated to plan, design, procure, and install any relevant technologies."[11]

- ◊ Changes being made or planned to bring the coal plant into compliance with Clean Air Act requirements, as well as the requirements for the disposal of coal combustion residuals under Subtitle D of the Resource Conservation and Recovery Act.[12]

- ◊ For FGD wastewater requirements only, an initial commissioning period to optimize the installed equipment.[13] EPA explains that the "record demonstrates that plants installing

[8] Utility Water Act Group, *Comments on EPA's Proposed Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category* (Sept. 30, 2013), Attach. 11: Retrofitting Dry Bottom Ash Handling, Attach 13: Retrofitting Dry Fly Ash Handling.
[9] *See* U.S. EPA, Technical Development Document for the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category (Sept. 2015), at p. 14-11, *available at* http://goo.gl/PpzQ4F [hereinafter "TDD"].
[10] *Id.*
[11] *Id.*
[12] 40 C.F.R. § 423.11(t)(2).

the FGD technology basis spent several months optimizing its operation (initial commissioning period). Without allowing additional time for optimization, the plant would likely not be able to meet the limitations because they are based on the operation of optimized systems."[14]

◊ Other factors as appropriate.[15]

Consistent with these EPA guidelines and the public interest in securing vital water protections as soon as possible, you should incorporate the ELGs into the NPDES permits for eight Florida coal plants—Big Bend, Crist, Crystal River, Northside/St. Johns, Seminole, Stanton, Indiantown and Polk.

As you are aware, NPDES permits for the first six of these plants (Big Bend through Stanton) expire this year or next year. Therefore, you should be working with their operators to ensure that they do, in fact, "immediately begin" their ELGs compliance analyses, and are prepared to provide you and the public the information needed to evaluate and set the "as soon as possible" ELGs compliance deadline in their NPDES renewal permits.

Moreover, even if Indiantown and Polk's NPDES permits do not expire until 2019, their operators have the same responsibility to "immediately begin"—"even prior to the permit renewal process"—their ELGs compliance analyses, and, similarly, you should be working with these plant's operators to expeditiously set and achieve the "as soon as possible" ELGs compliance deadline.

Therefore, we urge you to make prompt compliance determinations for all eight coal plants, first, by collecting and making publicly available the information from their operators regarding their potential to comply with the ELGs by November 1, 2018, and, second, by closely scrutinizing and verifying this information as you revise NPDES permits and adjudicate any requests to extend the ELGs compliance deadline beyond November 1, 2018.

With respect to extension requests, we recognize that for other regulations, for instance, the Mercury and Air Toxics Standards, it has been the Department of Environmental Protection's ("DEP") practice to carefully review and grant such requests only in exceptional cases. Similarly, DEP should continue this practice here and use its broad information collection powers and stakeholder engagement process to help adjudicate the merits of any extension requests for ELGs compliance.

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[13] 40 C.F.R. § 423.11(t)(3).
[14] TDD at 14-11.
[15] 40 C.F.R. §423.11(t)(4).

## II. DEP Should Take Public Comment For No Less Than 60 Days On Draft NPDES Permits And ELGs Compliance Determinations For Coal Plants.

Because of the significance of the water protections in the ELGs and the findings you must make regarding the compliance date, as discussed above, we urge you to take public comment for no less than 60 days on these draft NPDES renewal permits and compliance determinations for the ELGs. Doing so is entirely consistent with DEP's mission to serve the public interest and to conduct its environmental oversight responsibilities with transparency.[16]

## III. DEP Should Work With Florida Coal Plant Operators That Do Not Have NPDES Permits, And Other Stakeholders, To Ensure That Their Plants Achieve Timely Compliance With The Applicable Requirements In The ELGs.

Three coal plants in Florida—C.D. McIntosh, Jr., Cedar Bay, and Deerhaven—are not covered by NPDES permits but nonetheless must assure that the toxic pollutants in their effluent are properly treated to meet the requirements in the ELGs. For example, the McIntosh plant in Lakeland discharges effluent containing toxic pollutants such as mercury to publicly owned treatment works. These discharges are subject to revised Pretreatment Standards for Existing Sources (PSES) in the ELGs.[17] The PSES are self-implementing, meaning these requirements apply directly, without the need for any permit revision, and must be met by the November 1, 2018, compliance deadline in the final rule.[18] Sierra Club provided McIntosh's operator, Lakeland Electric, with a compliance analysis specifying the implications of the PSES for this plant.[19] We urge you to work with the DEP PSES coordinator, the operators of all three plants, as well as other stakeholders, to ensure that they achieve timely compliance with the applicable requirements in the ELGs.

## IV. Timing Is Critical.

As we noted above, timing is critical. Through the water permit renewal process, you should make prompt ELGs compliance determinations for three key reasons:

First, prompt ELGs compliance determinations, including setting the "as soon as possible" deadline, are needed to secure safe water for Floridians. EPA updated the ELGs to address the "outstanding public health and environmental problem" related to the discharge of effluent containing toxic and other pollutants from power plants, including Florida's aging coal plants.[20]

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[16] *See, e.g.*, FDEP Mission Statement & Objectives, *available at* http://goo.gl/tTk3mp.
[17] *See* 40 C.F.R. § 423.16.
[18] *Id.*
[19] *See* Sierra Club letter to General Manager Ivy of January 26, 2016 and exhibits, on file with DEP.
[20] 80 Fed. Reg. at 67,840-41.

Indeed, the "ELGs that EPA promulgated and revised in 1974, 1977, and 1982 are out of date" and, as a result, permits issued to coal plants under those previous, outdated ELGs "do not adequately control the pollutants (toxic metals and other) discharged by this industry, nor do they reflect relevant process and technology advances that have occurred in the last 30-plus years."[21]

Furthermore, as you know, NPDES permits have a maximum term of five years.[22] The limited permit duration and the anti-backsliding requirement in the Clean Water Act aim to achieve gradual, iterative, but continual progress towards restoring the nation's waters. As the D.C. Circuit has explained, "[t]he essential purpose of this series of progressively more demanding technology-based standards was not only to stimulate but to press development of new, more efficient and effective technologies."[23] As pollution control technologies improve, higher standards are incorporated into the NPDES permits of existing facilities upon renewal. This makes timely renewal of NPDES permits a linchpin of the Clean Water Act, and an essential part of your office's responsibilities.

Second, prompt ELGs compliance determinations will help assure that coal plant operators do, in fact, reduce as soon as possible the toxic discharges into our waters, thus avoiding regulatory uncertainty and any avoidable delay in achieving these vital water protections.

Third, prompt ELGs compliance determinations will help level the playing field between coal plants with NPDES permits and those without them, so that all Florida coal plants achieve compliance with the ELGs as soon as possible.

For all these reasons, we urge you to make prompt determinations of what it will take to bring Florida coal plants into compliance with the ELGs, and promptly adjudicate any requests to extend the compliance deadline beyond November 1, 2018.

## V. DEP Should Do Its Part To Protect Consumers From Piecemeal Regulatory Compliance Decisions That Fail To Identify And Pursue Cost-Effective Alternatives To Spending Billions Of Dollars To Retrofit Florida's Aging Coal Plants.

As we noted above, fellow regulators are deciding whether to spend huge sums of public monies on retrofitting aging coal plants to meet several environmental regulations with fast-approaching compliance deadlines. Indeed, because burning coal is one of the most polluting and

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[21] 80 Fed. Reg. at 67,840 [emphasis added].
[22] *See* 33 U.S.C. § 1342(b)(1)(B).
[23] *Natural Res. Def. Council v. U.S. Envtl. Prot. Agency*, 822 F.2d 104, 124 (D.C. Cir. 1987).

increasingly costly ways to generate electricity, regulators—and coal plant operators—will soon decide whether to take as much as 4 billion dollars from Floridian families and businesses for retrofits, alone, to these plants.[24] Yet there has not been any comprehensive accounting of just how much more Floridians may have to pay to rely on these plants to keep the lights on, much less a fair comparison to available alternatives such as retiring these plants and investing instead in modern clean energy resources such as solar, wind, energy efficiency, and storage that are at record low prices.[25] Indeed, while operators project coal plant retrofits may cost 4 billion dollars or more, they admit this huge sum does not account for all the costs and risks associated with relying on coal plants in the rapidly evolving regulations and market conditions concerning coal and carbon.[26]

We urge you to do your part to fill this acute information gap, first, by providing much needed clarity regarding ELGs compliance obligations and timelines for coal plants and, second, by providing the same for other applicable water-side requirements. For example, four Florida coal plants—Big Bend, Crist, Crystal River, Northside—use antiquated once-through cooling systems that needlessly harm millions of aquatic organisms, potentially including federally listed species. In fact, it has been unlawful to use such rudimentary cooling systems when building new power plants since 2001,[27] and generally none have been built since the 1980's precisely because of their adverse biological impacts.[28] To be sure, aging coal plants such as Big Bend, Crist, Crystal River, and Northside also must come into compliance with modern, species-protecting cooling standards under the Endangered Species Act and the Cooling Water Intake Structure Rule. Therefore, we urge you to work closely with the operators, fellow regulators, and other stakeholders to comprehensively identify Florida coal plants' water-side compliance obligations and timelines. The sooner, the better. As we discussed above, huge sums of public monies and vitally important water resources are at stake.

Thank you for your consideration, and we look forward to the opportunity to meet with you to discuss the way forward.

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[24] *See, e.g.,* Sierra Club letter of December 12, 2015, Table 1 (showing electric utilities' incomplete regulatory compliance costs estimates totaling 3-4 billion dollars through 2024), *available at* http://goo.gl/CT8l1j [hereinafter "2015 Letter"].
[25] *See generally id.*
[26] *See* 2015 TYSP First Supplemental Staff Data Request No. 38*, available at* http://goo.gl/nhBGEi; *see also* 2015 Letter, 7-8 (discussing incomplete nature of utility retrofit cost estimates).
[27] *See* 66 Fed. Reg. 65256 (2001) ("Phase I Rules"); *see also* 40 CFR §§125.80(a), 125.81(a) (2008).
[28] *See*, *e.g.*, 65 Fed. Reg. 49060, 49087 and 49094 (Aug. 10, 2000) ("Draft Phase I Rules") (noting that since the 1970's there has been extensive and increasing recycling and reuse of cooling water and that by the year 2000 most new industrial facilities used closed-cycle cooling systems).

Sincerely,

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Sierra Club

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Susan Glickman
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Kathleen E. Aterno
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# EXHIBIT F

September 26, 2016

*Via email and postal mail*

Supervisor Marc Harris
Power Plant NPDES Permitting, Industrial Wastewater Section
Florida Department of Environmental Protection
marc.harris@dep.state.fl.us

**Re: Bringing coal burning operations at the Crystal Energy Generating Complex Units 4 and 5 into compliance with ground and surface water protection standards in the current NPDES permit renewal process (Permit No. FL0036366)**

Dear Supervisor Harris:

On behalf of our tens of thousands of Florida members and supporters and the undersigned groups, the Sierra Club respectfully submits these comments on the Draft Permit issued by the Florida Department of Environmental Protection ("DEP") for National Pollutant Discharge Elimination System Permit ("NPDES") Permit No. FL0036366. This permit governs discharges from Units 4 and 5 at Duke Energy Florida's ("DEF") Crystal River Energy Generating Complex ("CREC") into Crystal Bay, a Class II marine water and part of the Gulf of Mexico.

As stated in our prior letter of February 29, 2016,[1] we have a vital interest in bringing the toxic coal burning operations in Florida into compliance with the applicable public health and safety standards. Our comments here focus on the necessary changes to Permit No. FL0036366 to bring CREC into compliance with the revised effluent limitation guidelines for steam electric power plants ("ELGs")[2] and the new standards for coal combustion residuals ("CCR") [3] storage and disposal (the "CCR Rule").[4]

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[1] Letter from Diana Csank, Sierra Club, to Marc Harris, Florida Department of Environmental Protection (February 29, 2016).

[2] U.S. EPA, *Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category; Final Rule*, 80 Fed. Reg. 67,838 (Nov. 3, 2015) (revising 40 C.F.R. Part 423) [hereinafter "ELGs"].

[3] Coal combustion residuals include "fly ash, bottom ash, boiler slag, and flue gas desulfurization materials generated from burning coal for the purpose of generating electricity by electric utilities and independent power producers." 40 C.F.R. § 257.53.

[4] U.S. EPA, *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule*, 80 Fed. Reg. 21,302 (Apr. 17, 2015), as amended by Technical Amendments to the Hazardous and Solid Waste

To support our comments, we enclose two exhibits: Exhibit 1, by one of the state's preeminent hydrogeologists, Dr. Mark Stewart, assesses the coal disposal at CREC including the pathways for toxic contaminants in the Ash Landfill and Percolation Pond to leach into the Floridan aquifer and Crystal Bay. Exhibit 2, by Dr. Ranajit Sahu— an expert with over twenty-five years of experience in environmental, mechanical, and chemical engineering, including coal-fired power plants— examines the timeline for CREC Units 4 and 5 to achieve compliance with a zero discharge standard for bottom ash.

As detailed below and in the enclosed exhibits, per the ELGs, by November 1, 2018, the final permit should require DEF to eliminate all discharges of bottom ash and flue gas mercury control ("FGMC") wastewaters, and meet new limitations for pollutants in flue gas desulfurization ("FGD") wastewater and combustion residual leachate for the following reasons, again, detailed further below:

◊ The final permit should set November 1, 2018, as the "as soon as possible" deadline for DEF to eliminate bottom ash wastewater discharges from Units 4 and 5. [5] It is well documented that a zero discharge best available technology economically achievable ("BAT") standard for bottom ash wastewater can be readily achieved in 27 to 30 months, rather than the 44 months that DEF proposed and DEP has endorsed in the Draft Permit.[6] In fact, the permitting record here indicates that DEF is well-positioned to meet the standard in even less time, such that the default, November 1, 2018, deadline should apply.

◊ The final permit should include the applicable ELG provisions for CREC's FGMC and FGD wastewaters as they are discharged to groundwater in Percolation Ponds and directly hydrologically connected to Crystal Bay and the Gulf of Mexico, "waters of the United States."[7]

◊ The final permit should set November 1, 2018, as the deadline for DEF to meet the zero discharge standard for CREC's discharges of FGMC wastewater.[8] Additionally, before that deadline, the permit should require DEF to meet the best practicable control technology available ("BPT") limitations for total suspended solids ("TSS") and oil and grease effluent limits and begin monitoring flows daily.[9]

◊ The final permit should require the FGD wastewater to meet strict BAT effluent limits

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Management System; Disposal of Coal Combustion Residuals from Electric Utilities—Correction of the Effective Date, 80 Fed. Reg. 37,988 (Jul. 2, 2015) (revising 40 C.F.R. §§ 257 & 261) [hereinafter "CCR Rule"].

[5] *See* 40 C.F.R. § 423.11(t) (defining the phrase "as soon as possible" to mean Nov. 1, 2018, unless a later date is specifically justified); § 423.13(k)(1) (requiring compliance with bottom ash wastewater standards by Nov. 1, 2018 unless a later date up to Dec. 31, 2023 is specifically justified).

[6] *See* Exhibit 2.

[7] 33 U.S.C. §§ 1311(a), 1342(a), 1362(14); 40 C.F.R. § 423.13(g) and (i).

[8] 40 C.F.R. § 423.13(i)(1) (requiring compliance with FGMC wastewater standards by Nov. 1, 2018 unless a later date up to Dec. 31, 2023 is specifically justified).

[9] 40 C.F.R. § 423.12(b)(11).

for arsenic, mercury, selenium and nitrate/nitrite by December 2018, or even sooner if possible.[10] Additionally, the permit should require, effective immediately, FGD wastewater to meet the BPT TSS and oil and grease effluent limits and daily monitoring of the same.[11]

◊ The final permit should require combustion residual leachate to meet all applicable technology and water quality based effluent limits, not only for discharges that drain to the runoff collection system, but also for discharges to the seawater discharge canal and Crystal Bay.[12]

As detailed below and in the enclosed exhibits, per the CCR Rule, the final permit should require DEF to meet all of the applicable new safety standards for coal ash disposal. This includes the standards aimed at protecting groundwater and surface—here, most notably, the Floridan aquifer and Crystal Bay:

◊ Toxic coal ash contaminants associated with CCR—arsenic, boron, manganese, molybdenum, selenium, sulfate, and thallium—are exceeding state and federal safety limits at wells downgradient from the unlined Ash Landfill,[13] as DEP is aware and even predicted.[14] Because there is no protective barrier, CCR waste in the landfill is in direct contact with the Floridan aquifer and groundwater that is hydrologically connected to Crystal Bay.

◊ The CCR Rule requires cleanup of the CCR that has accumulated in the unlined Ash Landfill.[15] To prevent unauthorized discharges and further contamination, and to comply with federal and state waste and water quality regulations, the final permit should require DEF to take corrective action as soon as possible by removing all CCR from the Ash Landfill and decontaminating the site.

◊ CREC is in one of the country's most unstable areas, in karst terrain, and under the influence of multiple sinkholes, including 24 reported sinkholes within 5 miles of CREC. Siting CCR waste facilities here puts ground and surface waters at risk of releases of toxic CCR waste into the underlying aquifer, due to limestone dissolution and collapse.[16]

◊ DEF must comply with prohibitions, designed to protect public waters, on siting coal ash

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[10] *See* 40 C.F.R. §423.13(g)(1)(i) (requiring compliance with FGD wastewater standards by Nov. 1, 2018 unless a later date up to Dec. 31, 2023 is specifically justified).

[11] 40 C.F.R. § 423.12(b)(11).

[12] 40 C.F.R §§ 423.12(b)(11) and 423.13(l).

[13] *See* Exhibit 1 and Section G below; *see also* 40 C.F.R. §§ 141.62,141.66, 257.95(h); Fla. Admin. Code. R. 62-520.420 (2016).

[14] Memorandum from Don Kell to Hamilton Oven, Jr., July 15, 1981 at 3, 4, 7 (hereinafter "Ash Landfill Interoffice Memo").

[15] 40 C.F.R. §§ 257.95(g)(5); 257.96; 257.101(a).

[16] *See* Exhibit 1.

waste facilities in unstable areas (i.e., Florida's karst terrain).[17] To do so, DEF must move CCR disposal offsite if DEF fails to prove that the status quo—storing CCR in CREC's facilities—is somehow safe.[18] Because the Ash Landfill cannot meet the safety standards in the CCR Rule, and the facility cannot be effectively retrofitted, it cannot receive CCR after April 19, 2019. Instead, DEF will be required to close the landfill and move disposal offsite.

DEF applied to renew Permit No. FL0036366, governing surface water discharges from Units 4 and 5 in January 2016.[19] Notice of the Draft Permit was received by Sierra Club via email on Friday, August 26, 2016. The applicant's name is DEF Florida, LLC, and its address is 15760 Power Line St., Crystal River, FL 34428. The discharge covered by the proposed Draft Permit, File No. FL00036366-013-IW1S, is located in Citrus County.

We respectfully submit this material to help inform DEP's renewal of Crystal River's NPDES permit, to raise our concerns that the Draft Permit does not assure compliance with state and federal law, and to urge DEP to revise the Draft Permit and include requirements for CREC to comply with all applicable ground and surface water protection standards.

**BACKGROUND**

The Crystal River Energy Generating Complex ("CREC") is located in Citrus County, Florida and is owned and operated by DEF. CREC Units 4 and 5 are pulverized coal-burning steam electric generating units that were placed into service in 1982 and 1984 respectively. The 4,729-acre coastal site in Florida's Big Bend is connected to Crystal Bay, a Class II[20] marine water and part of the Gulf of Mexico, via a seawater discharge canal that releases the plant's wastewater.

Crystal Bay is a shallow embayment of the Gulf of Mexico, midway between the Withlacoochee River to the north and the Crystal River to the south. Undeveloped portions of CREC include wetlands and salt marshes. Crystal Bay includes a variety of habitats that support vital aquatic resources, including the federally-listed species identified below. Open water habitats in Crystal Bay cover saltwater, tidally-influenced water, and tidal freshwater areas and include artificial structures, coastal tidal rivers and streams, oyster reefs, salt marshes, subtidal unconsolidated marine/estuary sediment habitats, and submerged aquatic vegetation habitats such as seagrasses and algae. The bottom of Crystal Bay provides benthic habitats, with characteristics dictated by salinity, tides, and substrate type.[21]

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[17] 40 C.F.R. § 257.64.

[18] 40 C.F.R. §§ 257.64(5), 257.101(b)(1) (surface impoundments), 257.101(d)(1) (landfills).

[19] *See* Duke Energy Florida, Inc., Application to Renew NPDES Permit for Crystal River Units 4 & 5, Permit No. FL0036366, January 12, 2016.

[20] *See* Fla. Admin. Code. R. 62-302.400(16)(b)(9) (2016) (classifying "all coastal waters and tidal creeks" within Citrus County as Class II waters).. The Surface Water Quality Criteria are designed to to "protect fish consumption, recreation and the propagation and maintenance of a health, well-balanced population of fish and wildlife." Fla. Admin. Code. R. 62-302-400(4) (2016). Florida has set Surface Water Quality Criteria).

[21] U.S. Nuclear Regulatory Commission, Draft Environmental Impact Statement for Crystal River Unit 3, at 2-42

Water-related industries, such as commercial fishing and tourism, make up a large sector of the employment base in Citrus County.[22] These sectors of the local economy "depend upon the resources of the coastal fisheries and the West Indian (Florida) manatee."[23] Over ninety species of fish have been identified near CREC.[24]

Federally-listed threatened or endangered species in the vicinity of the CREC include, but are not limited to, the Gulf sturgeon, smalltooth sawfish, green turtle, hawksbill turtle, Kemp's ridley turtle, leatherback turtle, loggerhead turtle, the American alligator, the wood stork, the bald eagle, and the Florida manatee.[25] Manatees are known to dwell in Crystal River effluent and intake canals during the spring and fall[26] and nearby Crystal River/Kings Bay, an Outstanding Florida Water, is the largest winter refuge for manatees on the Florida Gulf Coast.[27]

As detailed in Exhibit 1, the CREC is located in one of the country's most unstable areas with 24 known sinkholes within a 5 mile distance. Indeed, coastal Citrus County is an active karst area with sandy sediment cover over limestone.[28] The near-surface limestone is deeply incised with solution channels and conduits that can cause additional sinkholes to form as surficial sands move into subsurface voids.[29] The permeable surficial sediments allow access to the shallow, unconfined aquifer below through solution cavities and along fractures. Groundwater at CREC flows towards Crystal Bay and the Gulf of Mexico via the seawater discharge canal, and tidal wetlands.

Wastewater from Units 4 and 5 includes runoff from coal, gypsum, and limestone storage handling areas and the Ash Landfill, overflow bottom ash sluice water, FGD wastewater, FGMC wastewater, and cooling tower blowdown. These wastewaters are combined and released into the seawater discharge canal, which connects the plant to Crystal Bay.

Bottom ash generated at CREC Units 4 and 5 is sluiced to handling tanks and dewatering bins, where bottom ash solids are separated out from the wastewater.[30] Overflow bottom ash

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(2011) (citing Florida Fish and Wildlife Conservation Commission (FWC, 2005)).).

[22] *See e.g.*, Tommy Thompson, *Time to Join the Crystal River Circus*, Florida Sportsman, February 1, 2006, *available at* http://www.floridasportsman.com/2006/02/01/fishing_crystal_river_powerplant/

[23] Citrus County Comprehensive Plan, Chapter 4, 4-13, October 28, 2014, *available at* https://www.citrusbocc.com/plandev/landdev/comp-plan/chapter-4.pdf.,

[24] U.S. Nuclear Regulatory Commission, Draft Environmental Impact Statement for Crystal River Unit 3, at 2-5.

[25] Duke Energy Florida, Inc. Crystal River Unit 3 Post-Shutdown Decommissioning Activities Report, at 25 (Dec. 2013) *available at* http://www.duke-energy.com/pdfs/3f1213-02_psdar.pdf.

[26] *See* Citrus County Comprehensive Plan, Chapter 13, October 28, 2014, *available at* https://www.citrusbocc.com/plandev/landdev/comp-plan/chapter-13.pdf.

[27] Southwest Florida Water Management District, *Crystal River/Kings Bay, Citrus County* https://www.swfwmd.state.fl.us/springs/kings-bay/

[28] *S*ee Exhibit 1.

[29] *Id.* at 4 (citing Dames and Moore 1994).

[30] Duke Energy Florida, Ash Storage/Disposal Area Operations Plan at 2, 5 (Dec. 2013); Duke Energy Florida, Response to Request for Additional Information, May 20, 2016 (hereinafter "RAI #2").

wastewater from the dewatering bins is permitted to flow through internal Outfall I-CH0, which is released through the main discharge canal at Outfall D-001 to Crystal Bay.

Fly ash and bottom ash solids from Units 4 and 5 are taken to CREC's Ash Landfill for disposal or storage. The 62-acre, unlined Ash Landfill began operating alongside Units 4 and 5 in the 1980's and receives a mixture of bottom ash, fly ash, gypsum, pyrites, FGD blowdown solids, mill rejects, and other CCR. [31] The Ash Landfill is unlined[32] as well as uncovered,[33] allowing water, such as precipitation, to enter and mix with the wastes inside, and subsequently leach CCR contaminants into the groundwater beneath the Ash Landfill, and then into the runoff collection system, the seawater discharge canal, and the waters of Crystal Bay.

Units 4 and 5 use a wet scrubber system for sulfur dioxide removal, which produces FGD wastewater as a byproduct. This wastewater is discharged to the plant's FGD Blowdown Ponds, two 1.5- and 4.5-acre solids settling ponds that became operational in 2010.[34] Solids are settled out in the FGD Blowdown Ponds and the remaining liquid is pumped to CREC's unlined Percolation Ponds to be absorbed into groundwater. FGMC wastewater is generated via the plant's mercury control system and is injected into the FGD absorber before also being discharged to the Percolation Ponds.[35] Gypsum solids are conveyed to the concrete-lined Gypsum Storage Pad and stored before disposal in the Ash Landfill or transport offsite for sale.

## LEGAL REQUIREMENTS

The wastewater and solid waste byproducts of burning coal at CREC fall under two new U.S. Environmental Protection Agency ("EPA") rules: the ELGs and the CCR Rule. These rules advance vital public health and environmental safeguards against the toxic metals and other pollutants found in CREC's waste streams.

CREC Units 4 and 5 discharge wastewater into Crystal Bay and are therefore required, pursuant to section 402 of the Clean Water Act ("CWA"), to obtain a NPDES permit. In enacting the CWA, Congress established as a national goal the elimination of all discharges of pollution into waters of the United States.[36] To this end, the Act's implementing regulations establish the NPDES permitting program. Under the program, no pollutant may be discharged from any "point source" without a permit, and failure to comply with such a permit constitutes a violation of the CWA.[37] The CWA defines a "point source" as "any discernible, confined and

[31] Ash Storage/Disposal Area CCR Landfill Annual Inspection Report, December 2015; Florida Department of Environmental Protection Inspection Report, July 28, 2015.

[32] The 62-acre landfill is unlined with the exception of a 5.5-acre horizontal expansion in June 2010 which used a geosynthetic clay liner. RAI #2.

[33] Approximately 11 acres of the landfill has been covered with a geosynthetic clay liner, 24-inches of protective soil cover, and sod. *Id.*

[34] Record Documentation of Units 4 and 5 FGD Blowdown Ponds Construction Quality Assurance (January 2010).

[35] RAI #2.1

[36] 33 U.S.C. § 1251(a)(1).

[37] 33 U.S.C. §§ 1311(a) and 1342(a); 40 C.F.R. § 122.41(a).

discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, [or] container … from which pollutants are or may be discharged."[38]

The CWA authorizes EPA to establish national, technology-based effluent limitations guidelines for discharges from categories of point sources, and requires that NPDES permits include effluent limits based on the performance achievable through the use of statutorily-prescribed levels of technology that "will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants."[39]

The ELGs became effective on January 4, 2016, and must be included in NPDES permits for such generators going forward. The ELGs impose technology-based effluent limitations—reflecting decades of advances in water quality science and control technology—on discharges of several common types of effluent (i.e., waste streams) from coal-burning power plants, including fly ash and bottom ash transport waters and wastewater from FGD and FGMC systems.

Under the CWA, it is the responsibility of state permitting authorities, such as DEP, to "incorporate the ELGs into NPDES permits as a floor or a minimum level of control."[40] November 1, 2018, is the default deadline for all coal-burning[41] power plants across the country.[42] Because we submitted comments to you in February detailing DEP's implementation responsibilities, we will not repeat ourselves here, but instead incorporate those comments by reference.[43]

EPA's CCR Rule, effective October 19, 2015, establishes national minimum requirements for the safe disposal of coal combustion residuals, or CCR, the solid waste byproducts of burning coal, commonly known as "coal ash." CCR contain toxic metals that for years have contaminated groundwater and put public drinking water supplies and surface waters at risk.[44] The CCR Rule advances public health and environmental safeguards, including enhanced groundwater monitoring, location restrictions for siting CCR waste facilities, liner and leachate collection requirements, and corrective action for cleaning up groundwater contamination.

Unlike the ELG requirements for direct dischargers, the CCR rule is self-implementing. EPA explains: "The federal standards apply directly to the facility (are self-implementing) and facilities are directly responsible for ensuring that their operations comply with these

[38] 33 U.S.C. § 1362(4).

[39] 33 U.S.C. § 1311(b)(2)(A)(i), *see also* § 1311(b)(1)(A);)

[40] 80 Fed. Reg. at 67,882.

[41] *Id*. at 67,839, n. 1 ("power plants covered by the ELGs use nuclear or fossil fuels, such as coal, oil, or natural gas, to heat water in boilers, which generate steam." [emphasis added]).

[42] *See, e.g.*, 40 C.F.R. § 423.13(g)(1)(i).

[43] Letter from Sierra Club et al. to Supervisor Marc Harris, Power Plant NPDES Permitting, DEP Industrial Wastewater Section Re: *Bringing Florida Coal Plants Into Compliance With The New Effluent Limitations Guidelines*, (Feb. 29, 2016), *available at* http://blog.cleanenergy.org/files/2016/05/2016-02-29-Letter-re-Water-Side-Reqts-for-Fla-Coal-Plants-vfin.pdf.

[44] 80 Fed. Reg. 21,396; *see also* 80 Fed. Reg. 21,326: EPA identified 157 cases of proven or potential groundwater contamination from CCR in states across the nation.

requirements."[45] To ensure full and timely compliance with the CCR Rule, states can adopt the applicable standards in NPDES permits.[46] Likewise, states and citizens can enforce the federal standards under the citizen suit authority of the Resource Conservation and Recovery Act ("RCRA").

## COMMENTS

In this section, we explain the changes DEP should make as it finalizes Permit No. FL0036366 to bring the CREC into compliance with the applicable public health and safety standards in the ELGs and the CCR Rule.

### A. DEP Should Require Compliance with a Zero Discharge Standard for Bottom Ash Wastewater No Later Than November 1, 2018

Under the ELGs, the BAT standard for bottom ash wastewater is zero discharge. DEP should require the CREC to meet this zero discharge standard by November 1, 2018. As Dr. Sahu explains in his enclosed report, and we repeat here for emphasis, nothing in the permitting record justifies any later compliance deadline; in fact, the record shows that DEF is well-positioned to meet the default compliance deadline:

- ◊ DEF has already spent more than three years planning to convert to dry bottom ash handling at the CREC to comply with the ELGs, and has not documented any possible reason for needing additional time to plan, nor for why planning was slated to begin in June 2016 in the proposed schedule. DEF admits that compliance options are readily available.

- ◊ Duke Energy has publicly reported projected costs for ELG compliance at CREC Units 4 and 5 since at least 2014, which required conceptual or detailed engineering evaluations and studies in order to develop cost estimates. An additional 6 months for budget approval is unnecessary.

In fact, while DEF has long anticipated a "late 2018" compliance deadline,[47] DEF proposed almost five more years—to December 31, 2023—to reach compliance—without any justification for such a huge delay.[48] DEP should reject DEF's unsubstantiated and improper extension request.

As Dr. Sahu explains, it is clear that a November 1, 2018, compliance deadline for the BAT standard is readily achievable: most of the planning is finished, procurement should take little to no time and DEF admits construction takes 18 months.

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[45] 80 Fed. Reg. 21,311.

[46] Additionally, states can continue to enforce state regulations under their independent state enforcement authority.

[47] Exhibit 1.

[48] Response to RAI 2, Attachment 1

Dr. Sahu concludes that Units 4 and 5 can convert to dry bottom ash handling in approximately 27 to 30 months, instead of the 44 months projected by DEF, reaching compliance by August to November 2018 at the latest.

Indeed, EPA's rulemaking record and comments from the Utility Water Act Group ("UWAG")[49] show that, depending on the scope of the required conversions (a.k.a., retrofits) at a particular coal plant, industry itself projects that the total time needed for bottom ash system retrofits ranges from 27 to 36 months, from the start of conceptual engineering to final commissioning.[50]

At Duke Energy's own Mayo Plant in North Carolina, a wet-to-dry bottom ash handling system conversion was completed in under a year and a half.[51] At the South Carolina Electric & Gas Company Wateree plant, for example, conversion to a closed-loop bottom ash handling system was completed in two and a half years.[52] Conversion to a closed-loop bottom ash handling system was completed in two and a half years at the South Carolina Electric & Gas Company Wateree plant.[53] In 2010, the BL England Station retrofitted a recycle system on two coal burning units (one is 125-MW, the other is 155-MW) as well as a 170-MW oil-burning unit in less than two years from award of contract to operation of the new system.[54]

Delaying compliance with the zero discharge standard for bottom ash wastewater beyond November 1, 2018, is unnecessary and puts public and environmental health at risk. Bottom ash wastewaters are known to contain a number of toxic metals in both suspended and dissolved form, including arsenic, cadmium, chromium, copper, iron, lead, mercury, selenium, and zinc.[55] In one example of the public and environmental health threats posed by CCR waste, EPA estimates that reductions in arsenic loadings from the final ELGs will reduce cancer risks to humans that consume fish exposed to steam electric power plant discharges—such as those caught in Crystal Bay.[56] Against this backdrop, DEP has all the more reason to require CREC to comply with the zero discharge standard by the November 1, 2018, deadline.[57]

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[49] Duke Energy is a UWAG member.

[50] Utility Water Act Group, *Comments on EPA's Proposed Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category* (Sept. 30, 2013), Attach. 11: Retrofitting Dry Bottom Ash Handling.

[51] *See* DEF Progress, Inc., Mayo Steam Electric Generating Plant, Quarterly Progress Report (January – March 2015) ("Dry bottom ash handling system began construction on December 14, 2012. As of March 31, 2014, construction of this system was 100% complete.").

[52] DCN SE03779. Final Notes from Site Visit at South Carolina Electric & Gas Company's Wateree Station on January 24, 2013, *available at* http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OW-2009-0819-1917.

[53] *See* Final Notes from Site Visit at South Carolina Electric & Gas Company's Wateree Station on January 24, 2013, EPA-HQ-OW-2009-0819-1917, at 2. Check, from SELC comments, change text

[54] Dennis Del Vecchio and Robert G. Walsh, Wet to Dry Bottom Ash Disposal Conversion Project - BL England Station, Power-Gen, December 2011, February 2008 - February 2010.

[55] *See e.g.*, U.S. EPA, *Steam Electric Power Generating Point Source Category: Final Detailed Study Report*, EPA 821-R-09-008, 3-19 (Oct. 2009), (hereinafter "EPA Detailed Study"); U.S. EPA, *Development Document for Final Effluent Limitations Guidelines, New Source Performance Standards, and Pretreatment Standards for the Steam Electric Point Source Category*, Table V-33 (Nov. 1982).

[56] 80 Fed. Reg. 67,874 (Nov. 8, 2015).

[57] 80 Fed. Reg. at 67,840-41.

### B. The ELGs Apply to FGD Wastewater and FGMC Wastewater From Units 4 and 5, Which Discharge to Crystal Bay and the Gulf of Mexico via Hydrologically Connected Groundwater

Steam electric power plants must meet strict new standards in EPA's revised ELGs for contaminants in FGD wastewater—including arsenic, mercury, selenium, and nitrate/nitrite—and a zero discharge standard for FGMC wastewater. Because Unit 4 and 5's FGD and FGMC wastewaters discharge to waters of the United States, these waste streams must meet the standards in EPA's revised ELGs, and DEP must include permit limits in the renewed NPDES permit for CREC Units 4 and 5.

As Dr. Stewart explains in his enclosed report, contaminants from the unlined Percolation Ponds travel through the aquifer into Crystal Bay. FGD and FGMC wastewaters from Units 4 and 5 are thus discharged to the Percolation Ponds and absorbed into groundwater, as DEP is already aware.[58] The Percolation Ponds are unlined, in direct communication with the Upper Floridan aquifer, and connected to Crystal Bay and the Gulf of Mexico.[59] The Percolation Ponds recharge the shallow groundwater aquifer, which conveys pollutants into the seawater discharge canal, tidal wetlands, and Crystal Bay.[60]

The Percolation Ponds and groundwater are hydrologically connected to "waters of the United States"—that is, Crystal Bay and the Gulf of Mexico—and therefore, by discharging pollutants into the Percolation Ponds, DEF is discharging to waters of the United States *via* the Ponds and the groundwater. The Percolation Ponds and groundwater are conduits to waters of the United States. Discharging the FGD and FGMC wastewater to the Percolation Ponds puts these waste streams under the jurisdiction of the CWA, and the Units 4 and 5 NPDES Permit, because the wastewaters, and pollutants, migrate from the pond directly into Crystal Bay through an underground "conveyance" or "conduit."[61]

When groundwater is a conduit for pollutants, CWA liability may attach to a discharge to that groundwater.[62] "[I]t would hardly make sense for the CWA to encompass a polluter who discharges pollutants via a pipe running from the factory directly to the riverbank, but not a polluter who dumps the same pollutants into a man-made settling basin some distance short of the river and then allows the pollutants to seep into the river via the groundwater."[63] EPA has asserted that its authority under the CWA extends to hydrologically connected groundwater.[64]

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[58] See e.g., Duke Energy Florida, Inc., Application to Renew NPDES Permit for Crystal River Units 4 & 5, Permit No. FL0036366, January 12, 2016; RAI #2,

[59] Exhibit 1 at 9.

[60] *Id*.

[61] 33 U.S.C. § 1362(14).

[62] *See Haw. Wildlife Fund v. Cnty. of Maui*, 24 F. Supp. 3d 980, 996 (D. Haw. 2014).

[63] *N. Cal. Riverwatch* v. *Mercer Fraser Co.*, No. C-04-4620 SC, 2005 U.S. Dist. LEXIS 42997, *7-*8 (N.D. Cal. Sep. 1, 2005).

[64] 66 Fed. Reg. 2960, 3015 (Jan. 12, 2001); 73 Fed. Reg. 70,418, 70,420 (Nov. 20, 2008); 55 Fed. Reg. 47990, 47997 (col. 3) (Nov. 16, 1990)

The courts agree and have held, definitively, that the CWA covers groundwater that is hydrologically connected to waters of the United States. [65] Eleventh Circuit jurisprudence, governing Florida, also suggests that CWA jurisdiction extends to discharges like those to CREC Percolation Ponds.[66]

In sum, the FGD and FGMC wastewaters from Units 4 and 5 are discharged to surface waters *through* groundwater, and since the groundwater under the Percolation Ponds is directly hydrologically connected to surface water, discharges to the percolation ponds are a discharge to waters of the United States and must be regulated under the CWA. Therefore— just as DEP has included ELG limits for leachate that migrates through groundwater to the runoff collection system (see Section E below)—the ELGs apply to discharges of FGD and FGMC wastewaters and must be included in the revised NPDES permit.

### C. DEP Should Require Compliance with a Zero Discharge Standard for FGMC Wastewater No Later Than November 1, 2018

Under the ELGs, FGMC wastewater at CREC must be monitored and subject to new effluent limits. Effective immediately, this discharge is subject to a BPT TSS effluent limit of 100/30 mg/L (daily max./30 day avg.) and oil and grease effluent limit of 20/15 mg/L (daily max./30 day avg.) and after November 1, 2018, a zero discharge standard applies.[67]

As explained above in Section B, FGMC wastewater at the plant is discharged to waters of the United States—Crystal Bay and the Gulf of Mexico—through hydrologically connected groundwater and must be regulated under the ELGs. Although the FGMC wastewater combines with FGD wastewater at CREC Units 4 and 5, the zero discharge standard still applies: "Whenever flue gas mercury control wastewater is used in any other plant process or is sent to a treatment system at the plant, the resulting effluent must comply with the [zero] discharge limitation in this paragraph."[68]

The final permit therefore must include BPT limits for FGMC wastewater until a zero discharge BAT standard applies after November 1, 2018. Again, the revised ELGs apply starting

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[65] *See e.g., Waterkeeper Alliance, Inc. v. U.S. EPA*, 399 F.3d 486, 514-515 (2d Cir. 2005) (upholding EPA's requirements for the discharge of pollutants to surface water via groundwater to be regulated, "as necessary, on a case-by-case basis."); *Dague v. City of Burlington*, 935 F.2d 1343, 1347 & 1355 (2d Cir. 1991), rev'd in part on other grounds, 505 U.S. 557 (1992) (finding the city liable for allowing groundwater to flow through a landfill and into a pond and wetlands that were waters of the United States); *U.S. Steel Corp. v. Train*, 556 F.2d 822, 852 (7th Cir. 1977) (the CWA "authorizes EPA to regulate the disposal of pollutants into deep wells, at least when the regulation is undertaken in conjunction with limitations on the permittee's discharges into surface waters"), overruled on other grounds by City of West Chicago v. U.S. Nuclear Regulatory Comm'n, 701 F.2d 632, 644 (7th Cir. 1983).

[66] *U.S. v Banks,* 115 F.3d 916 (11th Cir. 1997) (District Court not clearly erroneous in deciding that wetlands are adjacent to a waterbody because of a hydrological connection where a hydrological connection is largely through groundwater and a surface flow only appears during storms); *United States v. Tilton*, 705 F.2d 429, 431 (11th Cir. 1983) (a hydrological connection exists when flowing mainly through groundwater, even where surface water only connects at extreme high tides such as in hurricanes).

[67] 40 C.F.R. § 423.13(l).

[68] 40 C.F.R. § 423.13 (i)(1)(i).

November 1, 2018, or "as soon as possible" based on a well-documented justification of a later date and DEP's consideration of certain factors enumerated in the final rule.

Until the zero discharge BAT standard is met, DEP should incorporate monitoring requirements for the FGMC wastewater into revised NPDES permit and Conditions of Certification ("COC"). To meet both monthly average and daily maximum limits, quarterly monitoring is wholly inadequate. A daily maximum limit cannot be effectively enforced with monitoring conducted on a monthly basis. Monitoring frequency should be daily in order to effectively enforce these limits to meet both monthly average and daily maximum limits for TSS and oil and grease. Sampling should be performed prior to mixing with the FGD wastewater.

### D. DEP Must Require Compliance with New Limits on FGD Wastewater Pollutants No Later Than December 2018

DEP must include effluent limits for FGD wastewater in the revised NPDES permit. Effective immediately, this discharge is subject to a BPT TSS effluent limit of 100/30 mg/L (daily max./30 day avg.) and oil and grease effluent limit of 20/15 mg/L (daily max./30 day avg.).[69] After November 1, 2018, DEF must meet strict new BAT effluent limits for arsenic, mercury, selenium, and nitrate/nitrite for the untreated FGD wastewater that is discharged to the Percolation Pond and waters of the United States. [70] DEP must incorporate the ELGs for FGD wastewater into the revised NPDES permit, immediately apply BPT and monitoring requirements, and ensure that DEF meets the BAT standard by December 2018 or as soon as possible.

The revised ELGs set daily maximum and monthly average limits on arsenic, mercury, selenium, and nitrate/nitrite in discharges of FGD wastewater.[71] These limits are based on technology using chemical precipitation and an anoxic/anaerobic fixed-film biological treatment system.[72] The chemical precipitation achieves most of the mercury and arsenic reductions, while the biological reactor removes selenium and nitrogen and other dissolved heavy metals.

DEF is currently completing "construction of a new wastewater treatment system that will use chemical precipitation and a bioreactor" for treatment of FGD wastewater from Units 4 and 5 and will complete the project by December 2018.[73] DEF "evaluated several treatment options…and selected a strategy that uses a physical/chemical treatment system with a bioreactor treatment system to treat Flue Gas Desulfurization ("FGD") blowdown wastewater with discharge to surface water or percolation ponds."[74]

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[69] 40 C.F.R. § 423.12(b)(11).

[70] 40 C.F.R. § 423.13(g)(1)(i).

[71] *Id.*

[72] 80 Fed. Reg. at 67,850.

[73] Third Amendment to Consent Order, OGC No. 09-3463D, at ¶4; *see also* Duke Energy Florida, Inc., Application to Renew NPDES Permit for Crystal River Units 4 & 5, Permit No. FL0036366, January 12, 2016 at Attachment 4 p.2.

[74] Duke Energy Florida's Petition for Approval of Environmental Cost Recovery True-Up and 2017 Environmental Cost Recovery Clause Factors, Docket No. 160007-EI, Environmental Cost Recovery Clause Form 42-SP at 7 (August 31, 2016). 07181-16, PSC ECRC filing

In November 2011, DEP entered into a Consent Order[75] with the former CREC owner Progress Energy Florida ("PEF") following exceedances of groundwater standards for gross alpha standard, radium 226/228, and arsenic. In the third amendment to the Consent Order in March 2016, DEF agreed to complete construction of a new wastewater treatment system using chemical precipitation and a bioreactor for treating FGD wastewater by December 31, 2018.[76] Within 30 days following completion of the treatment system, DEF will remove all accumulated CCR from the FGD Blowdown Ponds.[77]

The Consent Order constitutes an additional and separate legal obligation (from the ELGs) to complete construction of the FGD wastewater treatment system by December 2018. Nevertheless, DEP is required to include the new effluent limits in the revised NPDES and to ensure that DEF's new treatment system meets the federal BAT standards for arsenic, mercury, selenium, and nitrate/nitrite—which are not specified in the Consent Order— "as soon as possible beginning November 1, 2018."

It is imperative that DEP ensure that DEF meets this timeline and its legal obligations and begins operating the new system and treating toxic FGD wastewater by December 2018 at the latest. DEF is on its way to meeting these new standards and anticipated[78] meeting the revised ELG requirements for FGD wastewater, in addition to its Consent Order obligations.

Attachment H— Groundwater Monitoring, Operation, and Maintenance Requirements—of CREC COC authorizes DEF to discharge a variety of wastewaters, including FGD wastewater from Units 4 and 5, to the Percolation Ponds.[79] Quarterly reporting is required for FGD wastewater flows at sampling point EFF-2, the discharge pipe into the Percolation Ponds.[80] However, no limits are imposed on the FGD wastewater flows. DEP must incorporate monitoring requirements for arsenic, mercury, selenium, nitrate/nitrite, and TSS into the revised NPDES permit, as well as the COC. Monitoring should be required twice weekly. For final limits, where both monthly average and daily maximum limits are set, quarterly monitoring is wholly inadequate. A daily maximum limit cannot be effectively enforced with monitoring conducted on a monthly basis. Monitoring frequency should be daily to effectively enforce these limits.

### E. Combustion Residual Leachate from the Ash Landfill is Subject to Technology and Water Quality Based Effluent Limits

[75] Consent Order, File No. 09-34652, Permit No. FLA016960, OGC File No. 09-3463 (Nov. 2011).

[76] Third Amendment to Consent Order, OGC No. 09-3463D ¶4 (March 22, 2016).

[77] Third Amendment to Consent Order, OGC No. 09-3463D ¶5 (March 22, 2016).

[78] Duke Energy Florida, Inc., Application to Renew NPDES Permit for Crystal River Units 4 & 5, Permit No. FL0036366, January 12, 2016 at Attachment 4 p. 1.

[79] Florida Department of Environmental Protection, Conditions of Certification: Duke energy Florida Crystal River Energy Complex, PA 77-09R, Attachment H, April 29, 2016.

[80] *Id.*

Combustion residual leachate ("CRL") is now a separately regulated waste stream under the revised ELGs. Leachate from coal ash and other CCRs that are discharged to waters of the United States must be included in the NPDES permit and subject BPT limits in TSS and oil and grease, as well as technology and water quality based effluent limits.

CREC has no leachate collection system for the unlined Ash Landfill, and instead of being discharged to surface waters through a permitted outfall, most leachate seeps into the groundwater, as discussed further below in Section G and in Exhibit 1. The "majority of the coal combustion residual leachate is discharged to ground water"[81] as "by design, the leachate generated in the [Ash Landfill] infiltrates to the groundwater underneath the [Ash Landfill]."[82] EPA correctly notes that "[u]nlined impoundments and landfills usually do not collect leachate, which would allow the leachate to potentially migrate to nearby ground waters, drinking water wells, or surface waters."[83]

Since groundwater beneath the Ash Landfill is hydrologically connected to surface waters, CRL wastewater discharging from the Ash Landfill to groundwater constitutes a discharge to waters of the United States. DEF's groundwater modeling shows that CRL from the unlined Ash Landfill at times flows towards portions of the runoff ditch at Units 4 and 5.[84] Following, DEP has incorporated new BPT limitations for oil and grease and TSS in the Draft Permit at monitoring well TWI-1R, in order to differentiate CRL from storm water collected in the runoff collection system.[85]

Additionally, as described in Dr. Stewart's assessment, groundwater under the Ash Landfill "flows toward the west-southwest and discharges into the seawater discharge canal, and ultimately into Crystal Bay."[86] Indeed, monitoring data shows that toxic pollutants from CCR leachate[87]—including arsenic, boron, manganese, molybdenum, selenium, and sulfate—are migrating from groundwater beneath the Ash Landfill and flowing to Crystal Bay.

Like CRL leachate that migrates through groundwater to the runoff collection system, and for the reasons articulated above in Section B for FGD and FGMC wastewater, the discharges of leachate to groundwater beneath the Ash Landfill and into the seawater discharge canal, and then Crystal Bay, are also subject to the CWA. The CWA prohibits the discharge of pollutants from a point source" — "any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, [or] container … from which pollutants are or may be discharged"[88]—to waters of the United States, except as

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[81] Draft Permit at 12.

[82] RAI #2 p. 9.

[83] 80 Fed. Reg. at 67,847.

[84] RAI #2.

[85] Draft Permit p. 12.

[86] Exhibit 1 at 6.

[87] *See* TDD Table 6-13. Pollutants of Concern – Combustion Residual Leachate.

[88] 33 U.S.C. § 1362(4); *see also, e.g.*, *Dague v. City of Burlington*, 935 F.2d 1343, 1347 & 1355 (2d Cir. 1991), rev'd in part on other grounds, 505 U.S. 557 (1992) (finding the city liable for allowing groundwater to flow through a landfill and into a pond and wetlands that were waters of the United States).

in compliance with a NPDES permit.[89] Thus, CRL from the Ash Landfill that is discharged to Crystal Bay via groundwater must be also regulated in the revised NPDES permit, and meet new BPT requirements as well as other water quality based requirements.

DEP must also conduct a reasonable potential analysis and determine whether additional water quality-based effluent limits ("WQBELs") are required for the CRL from the Ash Landfill, in order to protection of aquatic life and human health. After application of the most stringent treatment technologies available under the BAT standard, if a discharge causes or contributes, or has the reasonable potential to cause or contribute to a violation of water quality standards, the permitting agency must include any limits in the NPDES permits necessary to ensure that water quality standards (both narrative and numeric) are maintained and not violated.[90] EPA regulations require permitting authorities to characterize all effluents in order to determine the need for WQBELs in the permit.[91]

Ultimately, as explained below, the only way to prevent further contamination of ground and surface waters from the Ash Landfill is likely to remove all accumulated CCR from the Ash Landfill and decontaminate the site.

### F. There is No Barrier Between the Unlined Ash Landfill and Percolation Ponds and the Underlying Groundwater, Allowing Toxic Coal Ash Contaminants to Pollute the Floridan Aquifer and Crystal Bay

The Ash Landfill and Percolation Ponds are unlined, with no protective barrier between toxic coal ash and wastewater and the underlying groundwater. Additionally, there is no intermediate confining unit between the highly permeable soils onsite and the Floridan aquifer, signifying an elevated risk of groundwater contamination. As a result, the toxic CCR waste and wastewaters that are disposed of in the unlined Ash Landfill and Percolation Ponds are in direct hydraulic connection with the Floridan aquifer and with groundwater draining into Crystal Bay.

Sierra Club retained one of the state's preeminent hydrogeologists, Dr. Mark Stewart, to evaluate conditions at CREC and application of the technical requirements in the CCR Rule. As explained in his accompanying report, Exhibit 1, the Floridan aquifer at CREC is unconfined and in direct hydraulic connection with the water table. The area is a recharge zone for the shallow aquifer. The underlying Floridan aquifer, one of the largest and most productive sources of fresh groundwater in the world,[92] lies within a few feet of the land surface. Thus, the unlined Ash Landfill sits less than 5 feet from the water table in the Floridan aquifer.[93] Because the Ash

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[89] Section 301(a) of the Clean Water Act, 33 U.S.C. § 1311(a).

[90] *See* 40 C.F.R. § 122.44(d). "[T]he permit must contain effluent limits" for any pollutant for which the state determines there is a reasonable potential for the pollutant to cause or contribute to a violation. *Id.* 40 C.F.R. § 122.44(d)(1)(iii); *see also Am. Paper Inst. v. EPA*, 996 F.2d 346, 350 (D.C. Cir. 1993); *Waterkeeper Alliance, Inc. v. EPA*, 399 F.3d 486, 502 (2d. Cir. 2005).

[91] 40 CFR § 122.44(d).

[92] Exhibit 1 at 5 (citing Miller 1986).

[93] Exhibit 1..

Landfill and Percolation Pond are unlined, and because of the shallow, unconfined aquifer at CREC, these two facilities are in direct connection with underlying groundwater and Floridan aquifer.[94]

To protect groundwater from contamination from CCR wastes, the CCR Rule prescribes (a) a distance of at least 5 feet between the base of facilities containing CCR and the uppermost aquifer, or (b) other measures that eliminate the hydraulic connection between the base and the uppermost aquifer—safety standards that the Ash Landfill, a CCR landfill[95], does not meet. CCR surface impoundments and new or expanded landfills must be constructed with a base that is located no less than five feet above the upper limit of the uppermost aquifer, or must demonstrate that there will not be an intermittent, recurring, or sustained hydraulic connection between any portion of the base of the CCR unit and the uppermost aquifer due to normal fluctuations in groundwater elevations (including the seasonal high water table).[96] While the Ash Landfill is exempt from this common-sense restriction as an "existing landfill"—although any future expansions and new facilities would not be—and the Percolation Ponds do not fall under the CCR Rule,[97] it is clear why these safety standards have been promulgated and that the close proximity of the unlined facilities to the aquifer are contaminating the Floridan aquifer and Crystal Bay.

Groundwater monitoring data showing contamination at the unlined Ash Landfill and Percolation Pond are further evidence of a hydraulic connection between the unlined Ash Landfill and the underlying aquifer. Groundwater pollution at the site, as described next in Section G, indicates that the Ash Landfill is in direct hydraulic connection with a highly permeable fracture zone in the Upper Floridan aquifer and that toxic contaminants are leaching from the Ash Landfill, as well as the Percolation Ponds, into the groundwater beneath, and moving towards Crystal Bay.

### G. The Unlined Ash Landfill and Percolation Ponds Are Leaching Coal Ash Contaminants Into Groundwater and Crystal Bay

Groundwater contamination from toxic coal ash contaminants has been repeatedly documented at wells downgradient from the Ash Landfill. In fact, data from DEF's own groundwater monitoring wells downgradient of the unlined Ash Landfill have consistently shown contamination at levels that far exceed background levels and federal, state, and permit limits.[98] This threatens the Floridan aquifer and waters of Crystal Bay and the Gulf of Mexico.

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[94] Exhibit 1.

[95] The CREC Ash Landfill is an "existing CCR landfill," subject to regulation under the CCR Rule. It is an "area of land or an excavation that receives CCR and which is not a surface impoundment, an underground injection well, a salt dome formation, a salt bed formation, an underground or surface mine, or a cave" that received CCR both before and after October 19, 2015. 40 C.F.R. § 257.53.

[96] 40 C.F.R. § 257.60.

[97] *See* 40 C.F.R. § 257.53.

[98] *See* Florida Department of Environmental Protection, Conditions of Certification: Duke energy Florida Crystal River Energy Complex, PA 77-09R, Attachment H, April 29, 2016; 40 C.F.R. §§ 141.62 and 141.66; Fla. Admin. Code. R. 62-520.420 (2016).

Wells downgradient from the unlined Ash Landfill have regularly exceeded regulatory for toxic coal ash contaminants—arsenic, boron, manganese, molybdenum, selenium, sulfate, and thallium—since 2012.[99] Levels of arsenic, boron, manganese, molybdenum, and sulfate, in particular, have trended upward since that time and continue to exceed protective groundwater standards. Concentration of arsenic at wells downgradient from the Ash Landfill are *five times* higher than at wells upgradient from the facility.

The presence of these common coal ash contaminants at monitoring wells downgradient from the unlined Ash Landfill, in combination with groundwater flow direction at the site and high permeability conduits, is, in Dr. Stewart's view, "overwhelming evidence" that contaminants have leached from the CCR materials have reached the water table and the Floridan aquifer.[100]

Contaminants from the unlined Percolation Ponds are also being absorbed to groundwater, which flows towards the Gulf of Mexico. Arsenic in groundwater near the ponds has been associated with the FGD wastewater that is discharged to the ponds, thus driving the installation of the new FGD wastewater treatment system.[101]

DEP is currently investigating groundwater contamination from the Ash Landfill.[102]A July 2015 DEP inspection noted adverse impacts to water quality from the operation of the Ash Landfill and that "[g]roundwater trending data for background and intermediate groundwater monitoring wells indicates impacts to groundwater, specifically for Arsenic, Boron, Manganese, and Molybdenum."[103] Steps have been taken to address contamination at the Percolation Ponds under CREC's November 2011 Consent Order.[104]

While alarming, the groundwater contamination at the Ash Landfill is not at all surprising given that the facility is unlined and lacks a protective barrier, that the CCR materials within it are in direct hydraulic connection with the Floridan aquifer, and given the shallow, unconfined aquifer. In fact, DEP predicted that serious groundwater contamination would occur from the operation of the Ash Landfill:

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[99] Exhibit 1; Florida Department of Environmental Protection ("DEP"), 2015. Groundwater Review, WAVS UD 97667, Amaury Betancourt, Nov. 30, 2015; Florida Department of Environmental Protection ("DEP"), 2016. FDEP Automated Data Evaluation. Duke Energy (FKA PEF) Crystal River Energy Complex. February 1, 2016

[100] Exhibit 1 at 9.

[101] Geosyntec, 2013. Arsenic and radionuclide plan of study addendum, Crystal River Energy Complex, Crystal River, Florida, Rpt. No. FR2061/03, April 2013; Consent Order No. 09-34652. This groundwater contamination (under NPDES Permit No. FLA016960) remains unresolved, five years later. Further review of arsenic contamination is required, but not until December 31, 2017, and a plan to evaluate arsenic impacts on downgradient surface waters is required by June 30, 2018. Full compliance with arsenic limits is required by December 31, 2019. DEP should reopen NPDES Permit No. FL0036366 pending results of the required studies and strictly enforce corrective action to clean up groundwater contamination at the CREC.

[102] Email from Amaury Betancourt, P.E., Florida Department of Environmental Protection to Mr. Bob Stafford, Duke Energy, February 15, 2016.

[103] *See* Florida Department of Environmental Protection Inspection Report, July 28, 2015.

[104] Consent Order No. 09-34652.

> 'The highly transmissive characteristic of the shallow aquifer zone should provide and environment for the rapid dispersion of leachate which might infiltrate from the ash disposal site into the shallow aquifer.'…
>
> [Former CREC owner and applicant] FPC's application demonstrates succinctly that point at which such economico-politico maneuvering leads to very serious consequences when 1000 tons per day of truly hazardous wastes, generated each day that Units 4 and 5 would operate (for 30 years or more), would be dumped, for all practical purposes into the Floridan aquifer. …
>
> Thus leachate from the proposed ash disposal area can (on the basis of the data implicating the existing dump as a source of ground water pollution) be expected to flow into the Floridan aquifer at such rates that a number of WQ standards would be violated short term. (Perhaps many more violations would occur long term as pollutant activities build up on the ecosystem). Should the leachate move through existing or through <u>induced</u> Karst structures into deeper zones of the aquifer where hydraulic head may be reduced (or only appear to equal or even "slightly exceed" shallow depth heads by reason of statistically inadequate data or by greater <u>density</u> due to higher salinity or loading of leachate itself), then so much the worse for the Floridan aquifer.[105]

As Dr. Stewart explains in his assessment, there is no adequate liner or natural barrier to prevent CCR constituents from seeping out of the Ash Landfill into the underlying aquifer and eventually into Crystal Bay and the Gulf of Mexico. Until DEF removes the existing CCR material from the Ash Landfill and decontaminates the site, it will continue to leach toxic CCR contaminants into ground and surface waters. Furthermore, as explained next in Section H, as the CCR Rule requires corrective action to prevent further releases of CCR constituents into the environment, the CCR that have accumulated in the Ash Landfill should be removed and the site decontaminated.

### H. The CCR Rule Requires Corrective Action to Address the Groundwater Contamination from the Unlined Ash Landfill

Where coal ash contaminants from CCR units have leached into the environment in excess of federal regulatory limits, the CCR Rule requires corrective action to prevent further releases. Monitoring data at CREC show levels of arsenic, molybdenum, and thallium at wells downgradient from the Ash Landfill exceeding federal groundwater protection standards and triggering clean up requirements for DEF.

To ensure compliance with the CCR Rule and to prevent further releases of CCR constituents into Floridan waters, DEP should require DEF to immediately take action to remove the CCR that has accumulated and decontaminate the Ash Landfill.

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[105] Ash Landfill Interoffice Memo at 3, 4, 7 (emphasis original).

Owners and operators of CCR units must install a system of groundwater monitoring wells and establish a monitoring program to detect the presence of hazardous constituents and other monitoring parameters from covered CCR units.[106] Where groundwater monitoring shows exceedances of groundwater protection standards[107] for Appendix IV constituents—including arsenic, molybdenum, and thallium—the owner or operator must initiate corrective action, retrofit, and/or close the unit.[108]

For these Appendix IV CCR constituents of concern, "immediately upon detection of a release from a CCR unit" the owner/operator "must initiate an assessment of corrective measures to prevent further releases, to remediate any releases and to restore affected area [*sic*] to original conditions."[109] Then, the owner/operator must select and implement remedies certified by a qualified engineer to be consistent with the standards set out in the CCR Rule. Specifically, the "remedies must"

(1) Be protective of human health and the environment;

(2) Attain the groundwater protection standard as specified pursuant to §257.95(h);

(3) Control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of constituents in Appendix IV to this part into the environment;

(4) Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems; and

(5) Comply with standards for management of wastes as specified in §257.98(d).[110]

The requirement to "immediately" initiate an assessment of corrective measures is triggered by the detection of a release at any time after the effective date of the CCR Rule, October 19, 2015. This includes but is not limited to detection pursuant to a pre-existing groundwater monitoring program and/or the enhanced groundwater monitoring program that is required by the CCR Rule. The "zone of discharge" exemption to water quality standards under Florida law do not apply; "the point of compliance is the waste boundary" of CCR units.[111]

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[106] 40 C.F.R. § 257.94(a).

[107] Groundwater protection standards for Appendix IV constituents detected are based on either (1) the maximum contaminant limit ("MCL") established at 40 C.F.R. §§ 141.62 and 141.66; or (2) the background concentration for the constituent, where there is no MCL or where the background concentrations are higher than the MCL. 40 C.F.R. § 257.95(h).

[108] 40 C.F.R. §§ 257.95(g)(5); 257.101(a).

[109] 40 C.F.R. § 257.96.

[110] 40 C.F.R. § 257.97.

[111] EPA, Comment Summary and Response Document, Docket #EPA-HQ-RCRA-2009-0640, Volume 9: Groundwater and Corrective Action at 47; *see also* 40 C.F.R. § 257.53 (defining "waste boundary"); § 257.91 (requiring groundwater

Groundwater monitoring data for the Ash Landfill following October 19, 2015, show exceedances of groundwater protection standards[112] for arsenic, molybdenum, and thallium, all Appendix IV constituents, at wells downgradient from the Ash Landfill, an existing CCR landfill under the CCR Rule. With this knowledge, DEF is obligated to immediately begin an assessment of corrective measures and implementation of appropriate remedies. To meet the corrective action requirements in the CCR Rule, and to "eliminate, to the maximum extent feasible, further releases of constituents," Dr. Stewart recommends ceasing onsite CCR storage and disposal, which can exacerbate the ongoing contamination problem. The only way to effectively prevent such continued releases from the Ash Landfill is to remove the CCR that has accumulated and decontaminate the site.

## I. CREC is Located in Sinkhole-Prone Karst Terrain, Putting Ground and Surface Water Resources at (Further) Risk and Requiring Compliance with the CCR Rule's Location Restriction for Unstable Areas

Coastal Citrus County is an active karst area, marked by limestone and under the influence of sinkholes. As detailed in Dr. Stewart's assessment, the onsite and local hydrogeological conditions make CREC an inherently unstable area, under the influence of multiple sinkholes, including 24 reported sinkholes within 5 miles.

Most sinkholes in the region are cover subsidence sinkholes, whereby loose surficial sands migrate downward into solution cavities in the limestone and which can occur either slowly or abruptly. Because the Floridan aquifer is at or near land surface at CREC, sinkholes of any size would allow the movement materials under the CCR landfill into the voids, depressions, and caverns underneath, allowing materials, such as CCR waste in the Ash Landfill, to come into direct contact with the limestones and groundwater of the Floridan aquifer.

DEP is aware of the unstable nature of CREC and accompanying risks to ground and surface waters from the sinkhole-marked terrain. For example, in a staff analysis, DEP described CREC as "characterized by sinkholes and flowing springs" and concluded that:

> Due to the nature of the geologic formation under this area there will always be a chance of a sinkhole forming under the plant or its related facilities….
>
> It is not apparent that FPC has adequately considered the impact that future solution cavities may have on the operation of the coal piles, the ash disposal landfill, and related ditches. Acidic leachates can hasten formulation of solution cavities which could result in

monitoring at the waste boundary); § 257.94 (requiring enhanced groundwater monitoring for detected increases in certain CCR constituents at the waste boundary).

[112] There is no MCL for molybdenum; instead the groundwater protection standard is the background level. A background well (MWB-30R) at the CREC shows molybdenum levels of 18 mg/L. In contrast, the intermediate monitoring well and temporary monitoring wells around the Ash Landfill have exhibited molybdenum levels ranging from 44.5 – 135 mg/L—*seven times higher* than background levels.

subsidence of the land surface and allow for rapid contamination of ground and surface waters.[113]

Later, DEP rightly questioned the sensibility of locating a coal ash landfill at CREC:

Already a piece of heavy machinery has fallen into a sinkhole on site which collapsed beneath the weight of the machine. What would be the effect of the much greater loading due to 60 or more feet of stacked ash materials spread over some 100 acres? Even if a massive collapse did not take place, allowing direct introduction of the wastes into the aquifer, [studies] clearly indicate the high permeability of the upper …[114]

There is copious evidence, as documented in Dr. Stewart's assessment, DEP records[115], and other sources, showing sinkhole activity at and around CREC. There can be no question that CREC is in unstable, sinkhole terrain and that, as described next in Sections J and K, CREC cannot meet CCR Rule's safety standards for onsite storage and disposal.

### J. After April 19, 2019, the CCR Rule Prohibits Adding—Even On a Temporary Basis—CCR To CCR Units in Unstable Areas, Such As Florida's Karst Terrain, Unless a Qualified Engineer Can Certify That it is Safe To Do So

After April 19, 2019, the CCR Rule prohibits adding, even on a temporary basis, CCR to CCR units in unstable areas, such as Florida's karst terrain, unless a qualified engineer can certify that it is safe to do so by October 17, 2018.[116] Specifically, this is a certification "that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted."[117] This location restriction applies to all existing and new CCR units.

EPA defines unstable areas as:

a location that is susceptible to natural or human-induced events or forces capable of impairing the integrity, including structural components of some or all of the CCR unit that are responsible for preventing releases from such unit. Unstable areas can include poor foundation conditions, areas susceptible to mass movements, and karst terrains.[118]

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[113] "1978 Staff Analysis, at 44, (STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION, ELECTRIC POWER PLANT SITE CERTIFICATION REVIEW FOR FLORIDA POWER CORPORATION CRYSTAL RIVER UNITS 4 AND 5, CASE NO. PA 77-09, STAFF ANALYSIS. September 15, 1978) (emphasis added).

[114] Ash Landfill Interoffice Memo at 4.

[115] Florida Department of Environmental Protection, Conditions of Certification: Duke energy Florida Crystal River Energy Complex, PA 77-09R, Attachment H, April 29, 2016;; Ash Landfill Interoffice Memo; 1978 Staff Analysis; Terry Witt, Citrus County Chronicle, July 23, 2007 and July 30, 2007 articles, *in* "Proposed Haul Road Letter"; FGD Blowdown bond 2010 report.

[116] 40 C.F.R. §§ 257.101(b)(1) and 257.101(d)(1).

[117] 40 C.F.R. § 257.64(a).

[118] 40 C.F.R. § 257.53.

"Structural components" are defined as:

> liners, leachate collection and removal systems, final covers, run-on and run-off systems, inflow design flood control systems, and any other component used in the construction and operation of the CCR unit that is necessary to ensure the integrity of the unit and that the contents of the unit are not released into the environment."[119]

In the final CCR Rule, EPA enumerates safety factors that should be addressed in the certification of CCR units in Florida's karst terrain:

> For areas where the solution-weathered limestone is close to the surface (<u>e.g., Florida</u>) recognized and generally accepted good engineering practices dictate that there must be <u>no conduits beneath the CCR unit that allow piping of groundwater into the karst aquifer, or shallow caves that could cause sudden collapse of the unit foundation</u>. …
>
> Karst hydrogeology is complex, since contaminant flows can occur along paths and networks that are discreet and tortuous, and <u>groundwater monitoring wells must be capable of detecting any contaminants released from the CCR unit into the karst aquifer</u>. …
>
> Therefore, the owner or operator will need to ensure, with verification by a qualified professional engineer, that monitoring wells installed in accordance with § 257.91 will intercept these pathways. Verification will usually necessitate the use of tracers to track groundwater flow towards offsite seeps or springs from the uppermost aquifer beneath the facility. <u>Any engineered solution employed to mitigate weak ground strength in karst areas must be able to prevent the kind of foundation collapse and settlement that could lead to sudden release to the environment of CCR with its toxic constituents and associated leachate</u>. …
>
> <u>However, such engineered solutions are complex and costly, and the best protection is not to site CCR landfills and surface impoundments in karst areas</u>.[120]

In short, this safety certification is a tall order in Florida's karst terrain. Elsewhere in the rulemaking docket, EPA noted that it might even be "impossible" to obtain the safety certification for a CCR unit that has already been constructed without adequate safeguards.[121]

These safety standards were not incorporated into the design of the Ash Landfill when it was built, as discussed in Dr. Stewart's assessment. The Ash Landfill does not have structural reinforcements nor a liner that could help prevent movement of CCR materials into the

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[119] *Id.*

[120] 80 Fed. Reg. 21,368 (emphasis added).

[121] U.S. EPA, Comment Summary and Response Document, Volume 4: Location Restrictions, Docket # EPA-HQ-RCRA-2009-0640, December 2014, *available at* http://goo.gl/QVAXRi.

Floridan aquifer. Dr. Stewart explains that certain factors at the Ash Landfill even increase the risk of limestone dissolution and sudden collapse, such as including having no impermeable liner; having no cover to exclude precipitation from the exposed CCR waste; and CCR accumulating and increasing the static load on the underlying, unstable soils.

Moreover, the Ash Landfill cannot effectively, nor economically, be retrofitted using existing technologies to meet the CCR Rule's safety standards: it would be nearly impossible to ensure that all conduits, voids, and caves beneath the Ash Landfill were had been detected and intercepted. Attempting a retrofit of the Ash Landfill now could even trigger a sinkhole collapse.

CREC FGD Blowdown Ponds and Gypsum Storage Pad also lie on unstable karst terrain and a qualified professional engineer must make a demonstration showing "that recognized and generally accepted good engineering practices have been incorporated" into the design of these units by October 17, 2018 in order for them to continue operation. Although these units are at least lined, providing some measure of protection unlike the Ash Landfill, if a sinkhole were to rupture the liners or pipes at the FGD Blowdown Ponds, for example, the CCR wastes would be released into the Floridan aquifer, and flow into the seawater discharge canal, tidal wetlands, and Crystal Bay.

DEF reports that a preliminary assessment of the stability at the Ash Landfill has been performed and that the "preliminary conclusion is no karst remediation will be required."[122] This conclusion seems remarkable given the geological characteristics and history of the region and CREC site, as encapsulated above in Section I and in Dr. Stewart's review. Regardless of this conclusion, however a thorough evaluation must still be completed under the CCR Rule.

The CCR Rule location restriction and safety factors are designed to protect public waters from the risks of sinkhole and unstable terrain. To comply with federal regulations and protect the Floridan aquifer and waters of Crystal Bay, DEP must ensure that DEF completes the required engineering certifications. Because CREC's CCR units cannot be certified as safe under the CCR Rule, DEF will have to change its current practices of onsite CCR storage and disposal by the April 19, 2019 deadline in the CCR Rule.

### K. DEP Should Extend The Proposed Schedule for Permit Issuance To Allow For Meaningful Consideration of Public Comments

Finally, we urge DEP to revise its own proposed schedule for permit issuance to allow for meaningful consideration of and response to public comments. Under the proposed schedule,[123] DEP would submit the proposed permit to EPA on September 30th, only *one day* after the close of the public comment period on September 29, 2016. This plainly is not enough time for the Department to review let alone meaningfully consider and respond to all comments

[122] Duke Energy Florida's Petition for Approval of Environmental Cost Recovery True-Up and 2017 Environmental Cost Recovery Clause Factors, Docket No. 160007-EI (August 31, 2016). Recent PSC filing – 07181-16

[123] Draft Permit at 14.

in writing.[124] As we explained in our February 29, 2016, letter, due to the importance of the water impacts and protections at issue in this permit renewal, DEP should go above and beyond its routine public participation practices, not truncate them.

## CONCLUSION

For all the foregoing reasons, we respectfully ask that, in issuing Crystal River Unit 4 and 5's renewed NPDES permit, DEP:

1. Set a technology-based zero discharge standard for bottom ash wastewater and require compliance with the standard no later than November 1, 2018;

2. Set a technology-based zero discharge standard for FGMC wastewater and require compliance with the standard no later than November 1, 2018;

3. Set technology-based limits on arsenic, mercury, selenium and nitrate/nitrite in FGD wastewater and require compliance with the standard no later than December 2018;

4. Establish technology-based BPT effluent limits and daily monitoring requirements for FGD and FGMC wastewater flows, effective immediately;

5. Apply BPT limits to discharges of CRL from the Ash Landfill to the runoff collection system and to Crystal Bay, and conduct a reasonable potential analysis to determine whether WQBELs are needed for greater protection;

6. Require clean up and corrective action, as mandated by the CCR Rule, to swiftly address ongoing groundwater contamination from the unlined Ash Landfill and to take all measures necessary to protect against further leaching of toxic metals into ground and surface waters including, retrofitting or closing the unit; and

7. Require compliance with the CCR Rule's prohibition on siting CCR units in unstable areas, so as to further protect ground and surface waters.

Timing is critical: To meet the deadlines for implementing ground and surface water protections—which also protect the public use of those waters—DEF will have to undertake changes to coal operations at CREC Units 4 and 5. DEF must not delay, or be excused by DEP through extensions or deferrals to future permit renewal cycles, for which there is no justification let alone a well-documented one in this permitting record.

Thank you for your consideration.

Sincerely,

[124] Draft Permit at 15.

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# EXHIBIT 1

Preparing for the U.S. Environmental Protection Agency's Coal Combustion Residuals Rule:
Technical Assessment of Hydrogeologic Conditions and Groundwater Contamination at the Crystal River Energy Complex

August 28, 2016

By Mark Stewart, PhD, PG

## 1. EXECUTIVE SUMMARY

The Crystal River Energy Complex ("CREC") is located on unstable karst terrain, and the primary facility used for the storage and disposal of coal combustion residuals ("CCR") at CREC, the Ash Landfill, exhibits increasing contamination from toxic heavy metals associated with CCR waste. CCR disposal and storage at CREC puts local water resources at risk and fails to meet the new safety standards by the U.S. Environmental Protection Agency ("EPA") in December 2014 ("the CCR Rule") for several reasons:

- CREC is located in one of the country's most unstable areas, in karst terrain, and is under the influence of multiple sinkholes, including 24 reported sinkholes within 5 miles of CREC.

- The risk of limestone dissolution and sudden collapse beneath CREC's Ash Landfill is increased by many factors, including (a) having no impermeable liner; (b) having no cover to exclude precipitation from the exposed ash waste; and (c) CCR accumulating at the Ash Landfill increasing the static load on the underlying, unstable soils and rock.

- To assure the safety of CCR storage and disposal in such unstable areas, EPA's CCR Rule requires the detection and interception of (a) all of the possible conduits that allow piping of groundwater into underlying karst aquifers; (b) all of the possible shallow caves that could cause a sudden foundation collapse; and (c) all of the possible pathways for CCR constituents to be released from CCR storage and disposal facilities into karst aquifers. Consulting reports state that at CREC, "most [groundwater] flow is through solution cavities and conduits." These safety standards were not incorporated into the design of the Ash Landfill when it was built, and it is now nearly impossible to do so.

- The Ash Landfill was not built to structurally withstand the influence of sinkholes. It lacks the structural reinforcement that would be necessary, but may nevertheless be insufficient, to prevent a sudden foundation collapse. The Ash Landfill cannot be retrofitted now to be safe. Attempting a retrofit could trigger a sinkhole collapse that could rapidly spread CCR contamination in the underlying karst aquifers.

- To protect public waters, the CCR Rule requires (a) a distance of at least 5 feet between the base of CCR storage and disposal facilities and the uppermost aquifer, or (b) other measures that eliminate any hydraulic connection between CCR storage and disposal facilities and the aquifer—CREC Ash Landfill does not meet either standard. In fact, the available monitoring data are indicative of an ongoing hydraulic connection that allows CCR constituents, including arsenic and other heavy metals associated with CCR leachate, to reach the underlying karst aquifers.

- Water quality samples from wells downgradient from the Ash Landfill show consistent and increasing contamination since 2012 with toxic constituents associated with CCR, such as arsenic, boron, molybdenum, manganese, selenium, sulfate, and thallium, indicating that the Ash Landfill has contaminated the Surficial and Floridan Aquifer at the site.

- Groundwater beneath CREC Ash Landfill, FGD Blowdown Ponds, and Percolation Ponds flows towards the seawater discharge canal, tidal wetlands, and Crystal Bay.

For these reasons, discussed in detail in the full report, the Ash Landfill cannot meet the safety standards in the CCR Rule. Additionally, as the CCR Rule requires corrective action to prevent further releases of CCR constituents into the environment, the CCR that have accumulated in the Ash Landfill should be removed and the site decontaminated. The only way to prevent such continued releases from the Ash Landfill is to remove the CCR that has accumulated and decontaminate the site.

## 2. INTRODUCTION

This is an assessment of coal combustion residuals ("CCR") storage and disposal at the Crystal River Energy Complex ("CREC"). This assessment evaluates hydrogeologic conditions at the Ash Landfill, FGD Blowdown Ponds, Gypsum Storage Pad, and Percolation Ponds, existing groundwater contamination at CREC, and compliance with the U.S. Environmental Protection Agency's ("EPA") new rule on the disposal of CCR from electric utilities ("CCR Rule," U.S. EPA 2015). More specifically, this assessment considers whether CREC's CCR facilities satisfy the safety standards in the CCR Rule for CCR disposal in karst terrain and away from the uppermost aquifer and for preventing groundwater contamination.

The karst-specific safety factors under CCR Rule can be summarized as follows:

1. The historical record of local sinkhole development;
2. The presence of a local hydraulic gradient that points downward at shallow depths;
3. The presence of subsurface conduits that allow piping of groundwater into the karst aquifer, or shallow conduits or caves that could cause sudden collapse of the structure's foundation; and
4. The use of engineering solutions to "prevent the kind of foundation collapse and settlement that could lead to sudden release to the environment of CCR with its toxic constituents and associated leachate." (U.S. EPA 2015).

As discussed below, these factors support the conclusion that CREC Ash Landfill cannot continue to safely receive CCR, nor can it meet the requirements of the CCR Rule.

Additionally, the CCR Rule requires (a) a distance of at least 5 feet between the base of certain CCR storage and disposal facilities and the uppermost aquifer, or (b) other measures that eliminate any hydraulic connection between the facilities and the aquifer. As discussed below, the Ash Landfill does not meet either of these standards.

Water quality samples from wells downgradient from the Ash Landfill show consistent and increasing contamination from common CCR constituents, such as arsenic, boron, molybdenum, manganese, selenium, sulfate, and thallium, indicating that the Ash Landfill has already contaminated the Surficial and Floridan Aquifer at the site.

The Ash Landfill cannot meet the safety standards in the CCR Rule. Additionally, as the CCR Rule requires corrective action to prevent further releases of CCR constituents into the environment, the CCR that have accumulated in the Ash Landfill should be removed and the site decontaminated. The only way to prevent such continued releases from the Ash Landfill is to remove the CCR that has accumulated and decontaminate the site.

## 3. ASSESSMENT

### A. CREC is in one of the country's most unstable areas, under the influence of multiple sinkholes

CREC is located in Citrus County, an active karst area under the influence of sinkholes (FGS 1985). The sandy sediment cover over the limestone in coastal Citrus County is thin, and sinkholes that form tend to be smaller, i.e., less than 10 feet ("ft") in diameter, and not as deep as in areas with thicker, more cohesive sediments covering the limestone. However, the near-surface limestone is deeply incised with solution channels and conduits that can cause small sinkholes to form as surficial sands move into the subsurface voids (Dames and Moore 1994).

#### a. Hydrogeology of coastal West Florida: Karst terrain, solution conduits, and sinkholes

Coastal Citrus County is a region that is underlain by a thick sequence of carbonate rocks, commonly called "limestone" (Miller 1986). These rocks can be dissolved by the chemical action of acidic groundwaters. This creates voids in the rock and a distinctive geologic terrain called karst.[1] Karst terrains are characterized by solution features such as caves and collapse features caused by surface materials falling into voids created by the solution of the underlying rocks. A vertical collapse or solution feature created by karst activity is called a sinkhole (Tihansky 2013).

Small sinkholes are common in western Citrus County (FGS 2016; Tihansky 2013). These voids or depressions at the surface are caused by the movement of unconsolidated surficial materials into pre-existing voids in the underlying limestone. Sinkholes can form rapidly by collapse or slowly by movement of surficial materials into underlying voids in the carbonate rock. Most sinkholes in coastal Citrus County are cover subsidence sinkholes. These sinkholes form when loose surficial sands migrate downward into solution cavities in the limestone. Cover subsidence sinkholes can form slowly, or abruptly, especially after heavy rainfall (Tihansky 2013).

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[1] Geologists generally use the term "terrane" to refer to three-dimensional areas including the surface and subsurface, and "terrain" to refer to the surface configuration or topography only. This assessment uses "terrain" to refer to both surface and subsurface areas unless otherwise noted.

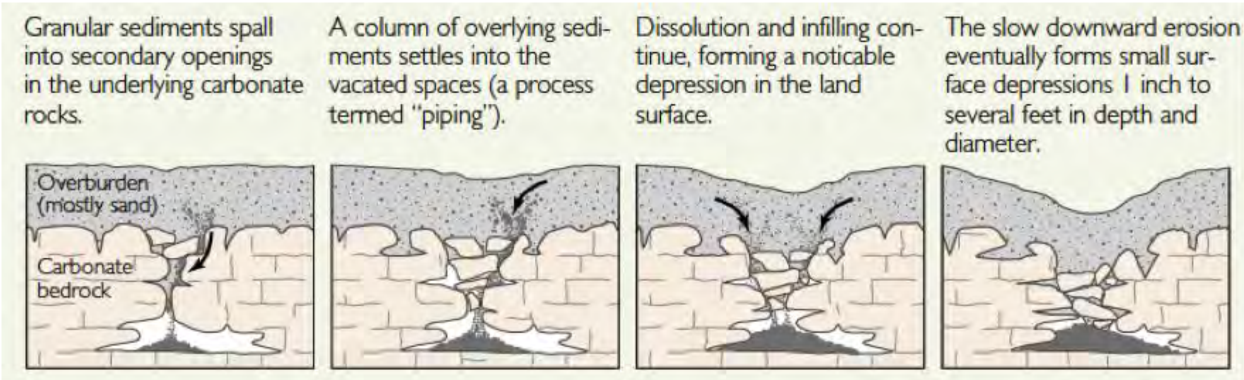


**Figure 1. Cover subsidence sinkhole schematic (Tihansky 2013)**

Paleosinks or paleo-sinkholes are also common in West Central Florida (Tihansky 2013). These are cover subsidence sinkholes that have been filled by sediments or water and do not have recognizable depressions at the surface. Such sediment-filled sinkholes can create a vertical column of permeable materials that allow contaminants introduced at the water table to reach the Floridan Aquifer. In addition to sinkholes, the limestone underlying CREC contains many solution enlarged fractures that form preferred conduits for groundwater flow and allow for downward movement of surficial sands into the underlying limestone (Dames and Moore 1994).

Groundwater, particularly groundwater in the Surficial and Floridan Aquifers,[2] supplies the region's public drinking water. The Floridan Aquifer is one of the largest and most productive sources of fresh groundwater in the world (Miller 1986). It is comprised of the carbonate rocks of Eocene to Miocene age in West Central Florida. In coastal western Citrus County, the Floridan Aquifer is unconfined and water table elevations represent the potentiometric surface of the Floridan Aquifer. This area is a recharge zone for the shallow Floridan Aquifer, which is at or within a few feet of land surface at CREC. More specifically, shallow groundwater flows downward from the water table and the shallow sands of the Surficial Aquifer into the Floridan Aquifer. Near CREC, the deeper and intermediate portions of the Floridan Aquifer are discharge zones, and groundwater has a component of flow toward the surface.

**b. Hydrogeology of CREC site**

The Florida Geological Survey ("FGS") sinkhole database (FGS 2016) documents 24 reported sinkholes within 5 miles of CREC site. As the FGS sinkhole data are self-reported, the 24 reported sinkholes are the minimum number of sinkholes that have occurred in recent years near CREC site. The FGS database is biased toward residential and commercial areas where sinkholes are more likely to be reported than in rural areas and industrial sites. Most of the reported sinkholes near CREC site are reported along the U.S. Highway 19 corridor east of CREC site and associated residential areas. The reported sinkholes are smaller than sinkholes that occur in central Florida, generally less than 10 ft in

[2] The Surficial and Floridan Aquifers are U.S. EPA designated Underground Sources of Drinking Water, and Florida Department of Environmental Protection ("DEP") designated Type G-II (Surficial) and G-I (Floridan) groundwaters.

diameter and up to 10 ft in depth. Using the 24 sinkholes as a representative data set, 95% (two standard deviations) of reported sinkholes within 5 miles of CREC have diameters less than 7 ft. They are indicative of the extensive karst solution cavities that are present in the shallow subsurface in western Citrus County.

Dames and Moore (1994) describe the geology and hydrogeology of CREC site. The following discussion is a summary of the geology and hydrogeology of CREC site from that report.

Dames and Moore report that the Upper Floridan Aquifer at CREC site contains abundant "solution enlarged fractures," "long linear depressions" in the limestone surface, and "underground channels and caverns." They also report that during removal of coal ash from the area of the former CREC south ash pond, "local superficial channels/sinkholes concealed by ash deposits had caused a continuous series of incidents and delayed removal/transportation activities." The report also states that "most flow is through the solution channels and cavities" and that the upper zone from the surface to a depth of about 30 feet contains many large interconnected solution cavities and channels that are highly permeable.

The surficial deposits at CREC consist of predominantly sandy, unconsolidated materials with some silt and clay. There is no distinct Surficial Aquifer at the site, and the Floridan Aquifer is within a few feet of the land surface. Water reaching the water table from the surface is effectively recharging the upper part of the Floridan Aquifer. The permeable surficial sediments are in direct hydraulic connection with the limestones of the Upper Floridan Aquifer. As a result of the lack of extensive low permeability surficial materials, the Floridan Aquifer at CREC site is an unconfined aquifer in direct hydraulic connection with the water table. Soils at the site typically have seasonal water tables within 1-2 ft of the land surface and are described as poorly drained. The undisturbed soils at CREC are subject to frequent and prolonged flooding.

The near-surface Floridan Aquifer units present at the site are the limestones of the Ocala Group, specifically the lower member of the Ocala Group, the Inglis Formation. The Inglis Formation is an Eocene limestone with extensive solution features. The Avon Park Formation underlies the Inglis Formation. The Avon Park Formation consists of limestones and dolostones and forms the bottom of the Upper Floridan Aquifer (Miller 1986). The permeability of the Avon Park decreases with depth. This results in enhancement of horizontal ground water flow in the Inglis Formation limestones. Dames and Moore (1994) report that most groundwater flow at the site is through "solution cavities and channels." In test borings that encountered voids, about 10% of the total aquifer volume is void space, generally within 50 ft of land surface. A zone in the Inglis Formation from land surface to a depth of about 30 ft consists of "many large solution cavities and channels that are highly permeable." A lower high permeable zone occurs between depths of about 40 to 60 ft at the contact between the Inglis and Avon Park Formations. Aquifer performance data suggest that the transmissivity of the Upper Floridan Aquifer at the site is about 2E05 $ft^2$/day, a very high value.

In a study to support installation of CREC Units 4 and 5 at CREC (ESE 1982), Dames and Moore (1994) report that test borings could be divided into "void" borings that encountered voids during drilling, and "non-void" borings that encountered solid limestone. The eight void wells responded faster to recharge events and tides and were assumed to connect with solution cavities and channels. The water levels for the void group wells were found to "form a trough running northeast to southwest under the ash disposal site…this trough roughly coincides with the known subsurface cavities in this area and likely reflects a fracture zone of high permeability." The general groundwater flow direction under the Ash Landfill indicated by the void and non-void wells is northeast to southwest, toward CREC intake and discharge canals and wetlands to west of CREC. Groundwater that flows under the Ash Landfill through the "trough" delineated by Dames and Moore (1994) flows toward the west-southwest and discharges into the seawater discharge canal, and ultimately into Crystal Bay.

The water table "trough" under the Ash Landfill reported by Dames and Moore (1994) includes monitor wells MWI-2R2, TWI-5, and TWI-3 (Figures 2 and 3). These three monitor wells are located on the west side of the Ash Landfill. As described further below, groundwater monitoring reports (DEP 2015) indicate that these three wells have been contaminated with arsenic, sulfate, thallium, selenium, molybdenum, manganese, and boron, all of which are contaminants associated with CCR leachate. This indicates that the Ash Landfill is in direct hydraulic connection with a highly permeable fracture zone in the Upper Floridan Aquifer, and that contaminants associated with CCR wastes have entered the Upper Floridan Aquifer.

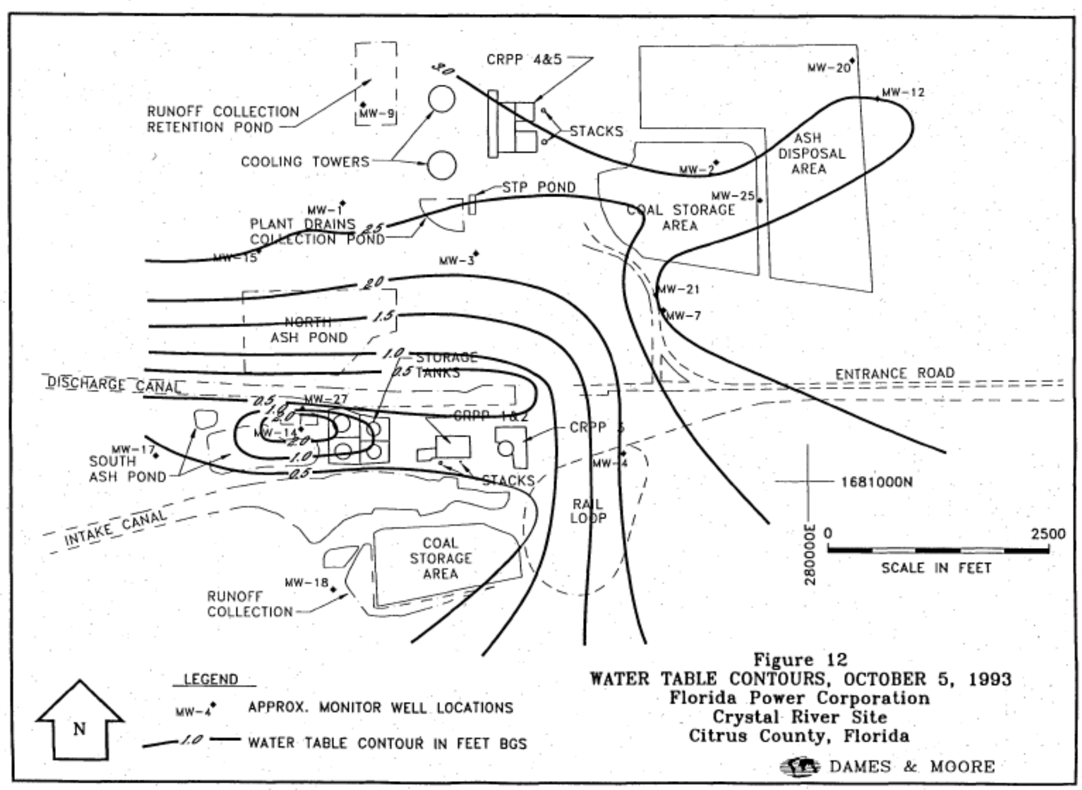


**Figure 2. Water table elevations under the Ash Landfill (Dames and Moore 1994)**

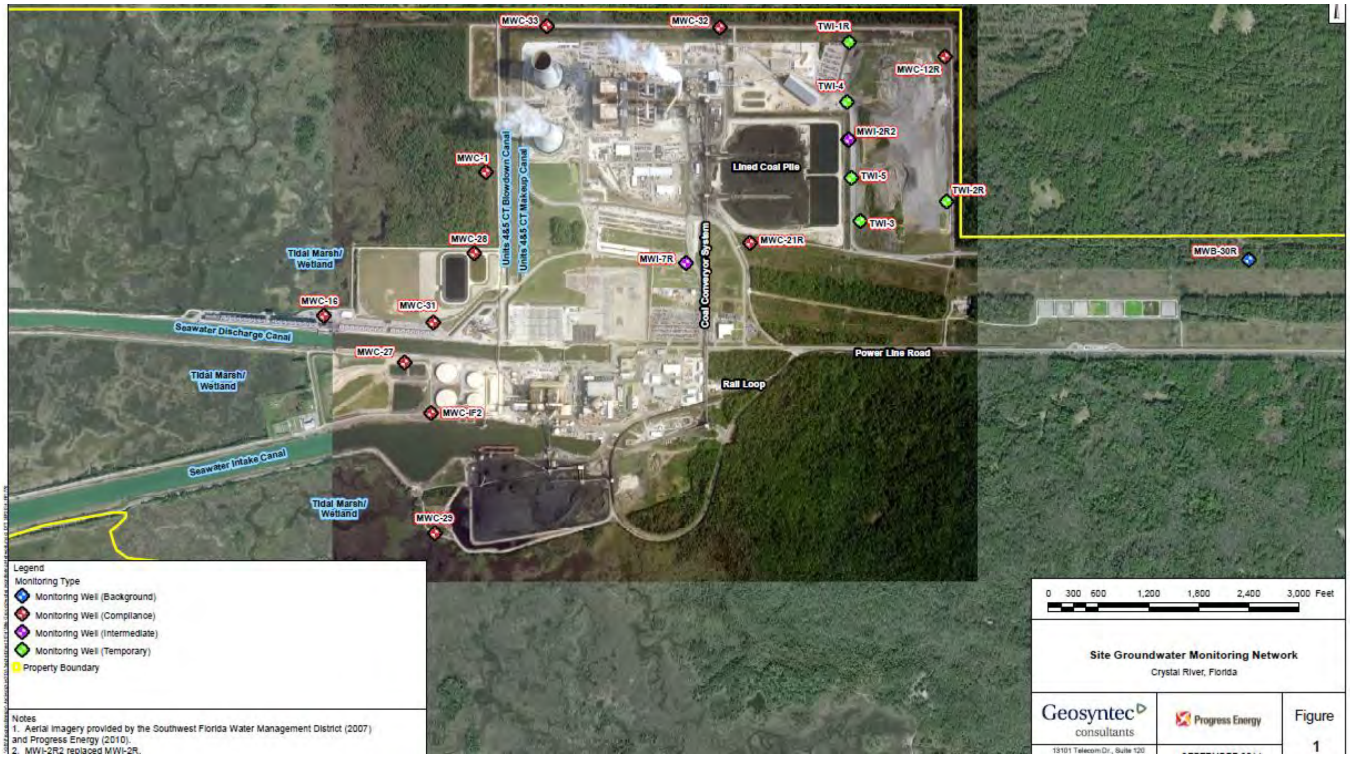


**Figure 3. Groundwater Monitoring Network at CREC (Geosyntec 2013)**

### B. CREC Ash Landfill cannot meet the CCR Rule's safety standards for unstable areas

Historical records of sinkhole activity in the region and reports prepared for CREC site clearly indicate that the site is within an active karst zone, with numerous, unlocated channels and voids. Consulting reports (Dames and Moore 1984; ESE 1982) state that at CREC "most [groundwater] flow is through solution cavities and conduits" and these reports document that the site contains numerous solution enlarged channels, voids, and caves, with one documented high permeability conduit located directly under the Ash Landfill (Dames and Moore 1994). These channels, conduits, limestone surface depressions, and voids create a sinkhole hazard for the Ash Landfill.

The Floridan Aquifer is at or near land surface at CREC site (Dames and Moore 1994) and any size sinkhole is likely to allow movement of unconsolidated materials under the CCR landfill into the voids, depressions, and caverns under the landfill will, and likely has (ESE 1982), allowed CCR materials to come into direct contact with the limestones and groundwater of the Upper Floridan Aquifer. The Ash Landfill does not have structural reinforcements or a liner[3] to prevent vertical movement of CCR materials into the Upper Floridan Aquifer, as occurred at the site of the former CREC south ash pond (ESE 1982).

[3] Only 5.5 acres of the 62-acre Ash Landfill are lined.

To ensure the safety of CCR storage and disposal in unstable karst areas, the CCR Rule requires the detection and interception of (a) *all* of the possible conduits that allow piping of groundwater into the underlying karst aquifers; (b) *all* of the possible shallow caves that could cause a sudden foundation collapse; and (c) *all* of the possible pathways for CCR constituents to be released from CCR storage and disposal facilities, such as the Ash Landfill, into the karst aquifers (U.S. EPA 2015).

These safety standards were not incorporated into the design of the Ash Landfill when it was built. Detection and interception of *all* possible conduits, depressions, voids, and shallow caves in a complex karst terrain such as CREC site is extremely difficult technically, if not practically and economically infeasible. With any currently known sinkhole remediation technology, the Ash Landfill cannot be "upgraded" to meet the CCR Rule requirements for facilities in karst terrains as it would be nearly impossible to determine that all conduits, voids, and caves had been detected and intercepted. As the Ash Landfill does not meet the CCR Rule's safety standards and instructions for engineering practices in karst areas, the CCR materials currently onsite should be removed and the groundwater and soils decontaminated.

In addition to the Ash Landfill, CREC site contains a Gypsum Storage Pad, which receives gypsum solids before disposal in the Ash Landfill or transport offsite, and FGD Blowdown Ponds and Percolation Ponds on the west side of the site, adjacent to the seawater discharge canal, that receive waste and wastewater from coal operations. The FGD Blowdown Ponds are lined with synthetic impermeable liners. However, the FGD Blowdown Ponds, Percolation Ponds, and Gypsum Storage Pad are in the same unstable karst environment as the Ash Landfill. There is a potential for failure of the FGD Blowdown Pond liner system or piping as result of sinkhole activity. If a sinkhole punctured the liner or caused a FGD pipe to leak, the FGD wastes would be introduced directly into the Upper Floridan Aquifer, discharging to the seawater discharge canal, tidal wetlands, and ultimately Crystal Bay. The liner system would need to be able to span sinkholes 10 ft in diameter or greater without failing to avoid contaminating the Upper Floridan Aquifer with FGD wastes. The Percolation Ponds are unlined and are in direct communication with the Upper Floridan Aquifer. The Percolation Ponds recharge the shallow groundwater aquifer and discharge into the seawater discharge canal, tidal wetlands, and Crystal Bay (Figures 2 and 3).

### C. The Upper Floridan Aquifer exhibits contamination from CCR Leachate at CREC

Contaminants such as sulfate, arsenic, selenium, thallium, boron, molybdenum, and manganese are common constituents of CCR leachate (EPRI 2004). The presence of several of these constituents, at any detectable level above background values, in groundwater downgradient from a CCR storage and disposal unit is overwhelming evidence that contaminants that have leached from the CCR materials have reached the water table and the aquifer. Groundwater sampling results from September 2012 for monitoring well MZ-3, which is in an upgradient, undisturbed area approximately one mile east of CREC facility, indicate that background arsenic concentrations in the shallow, intermediate, and deep portions of the aquifer are 2.1, 6.3, and <2.0 micrograms/liter, respectively (Geosyntec 2013). Arsenic levels in groundwater >10.0 micrograms/liter are indications of contamination of the aquifer system by CCR.

Dames and Moore (1994) state that the “void wells” near the Ash Landfill define a “trough” in the water table surface underneath the landfill (Figure 2). They attribute this water table trough to a “fracture zone of high permeability.” Three monitor wells on the west side of the Ash Landfill are located in or near this high permeability fracture zone: wells MWI-2R2, TWI-5, and TWI-3 (Figure 3).

Water samples from these three wells have regularly exceeded federal and state regulatory levels for arsenic, sulfate, thallium, selenium, molybdenum, manganese, and boron since 2012. For arsenic, boron, manganese, and molybdenum levels of these contaminants in groundwater in this fracture zone have trended upward from 2012 to 2015 (Figures 4, 5, 6, and 7). Water quality data obtained in January 2016, continue to show levels of contaminants in excess of groundwater standards in wells downgradient of the Ash Landfill in wells MWI-2R2, TWI-1R, TWI-3, and TWI-5 (DEP 2016).

These supporting lines of evidence, the definition of the water table trough, the presence of high permeability conduits at the site, and the presence of common CCR leachate constituents at increasing concentrations in wells downgradient from the Ash Landfill are overwhelming evidence that the landfill has contaminated local groundwater with toxic materials associated with CCR leachate. As the purpose of the standards enumerated under the CCR Rule is to prevent groundwater contamination from CCR facilities, the presence of these contaminants at the existing site is evidence that that the existing Ash Landfill does not meet the conditions specified in the rule.

Geosyntec (2013) has prepared a report that maintains that the arsenic found in groundwater downgradient from the Ash Landfill is the result of complex geochemical conditions and a natural source of arsenic. They note that arsenic was detected in borings at a proposed coal ash storage site east, and upgradient, of the current Ash Landfill, suggesting a natural source of arsenic. However, the concentrations of arsenic detected downgradient of the Ash Landfill are up to five times as high as the concentrations detected upgradient. In addition, the associated CCR contaminants sulfate, selenium, thallium, boron, molybdenum, and manganese have been detected in wells downgradient of the Ash Landfill. The Geosyntec report does not explain the presence of these CCR associated contaminants.

To prevent such contamination, the CCR Rule prescribes (a) a distance of at least 5 feet between the base of facilities containing CCR and the uppermost aquifer, or (b) other measures that eliminate the hydraulic connection between the base and the uppermost aquifer—safety standards that the Ash Landfill does not meet. According to public records, the base of the Ash Landfill has an elevation of 4 to 8 feet above sea level, while the water table near the Ash Landfill has reported elevations greater than 3 feet (Geosyntec 2013). This indicates that the base of the Ash Landfill is within 5 feet of the water table in the Surficial/Floridan Aquifer. The Ash Landfill is unlined, meaning that the CCR materials are in direct hydraulic connection with the Floridan Aquifer. Furthermore, natural soils at CREC site are poorly drained and flood seasonally (Dames and Moore 1994), indicating that the water table seasonally approaches the land surface.

As the CCR Rule requires corrective action to prevent further releases of CCR constituents into the environment, the CCR that have accumulated in the Ash Landfill should be removed and the site should be decontaminated.

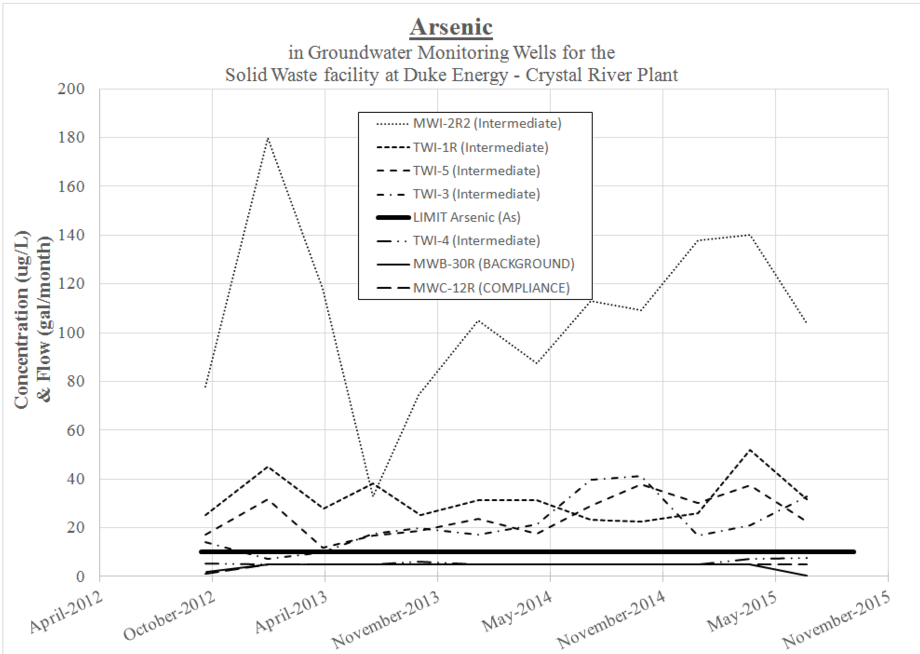


**Figure 4. Arsenic levels in groundwater samples from wells at CREC site, October 2012 to July 2015 (DEP 2015)**

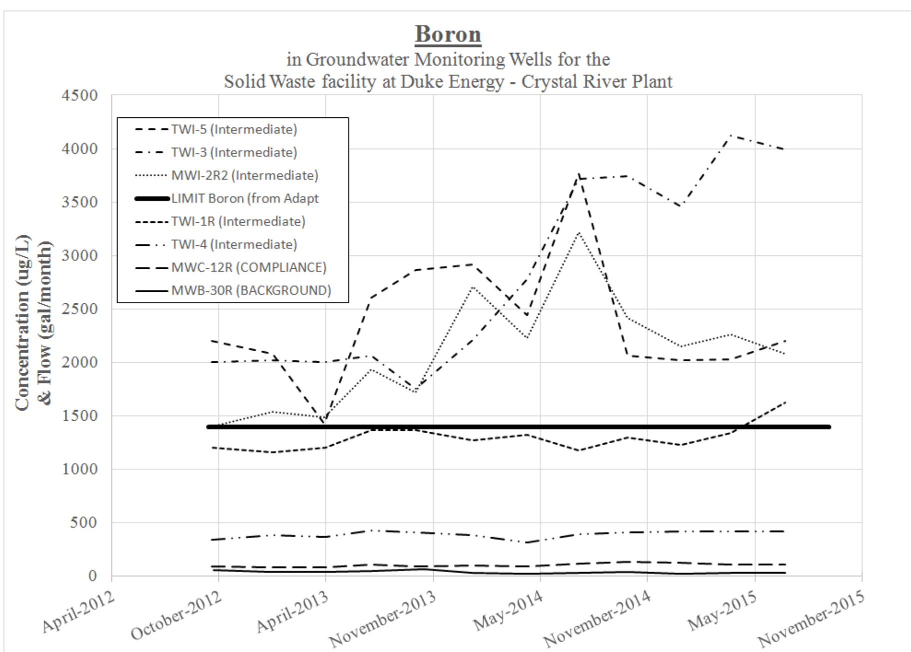


**Figure 5. Boron levels in groundwater samples from wells at CREC site, October 2012 to July 2015 (DEP 2015)**

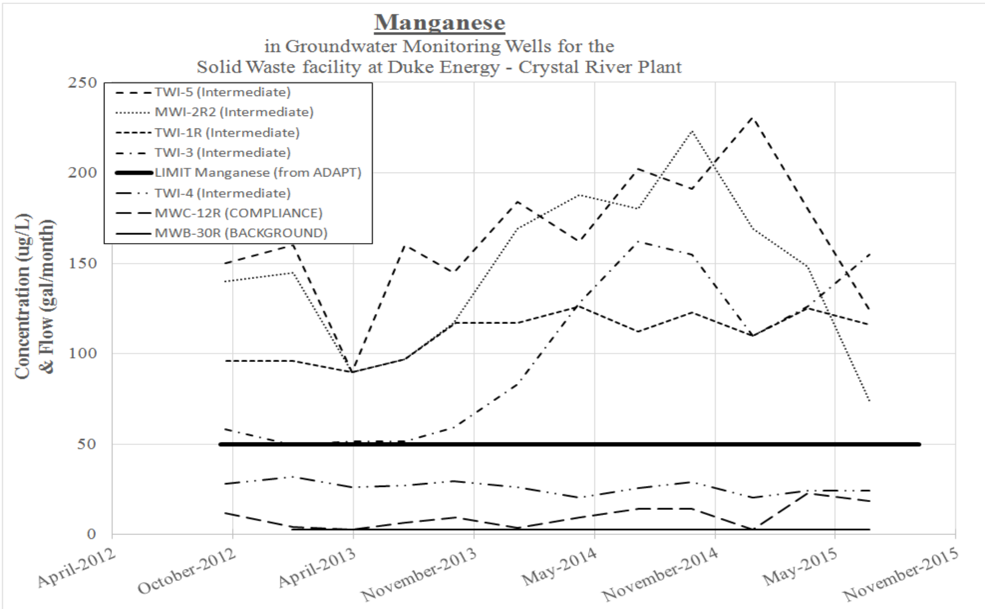


**Figure 6. Manganese levels in groundwater samples from wells at CREC site, October 2012 to July 2015 (DEP 2015)**

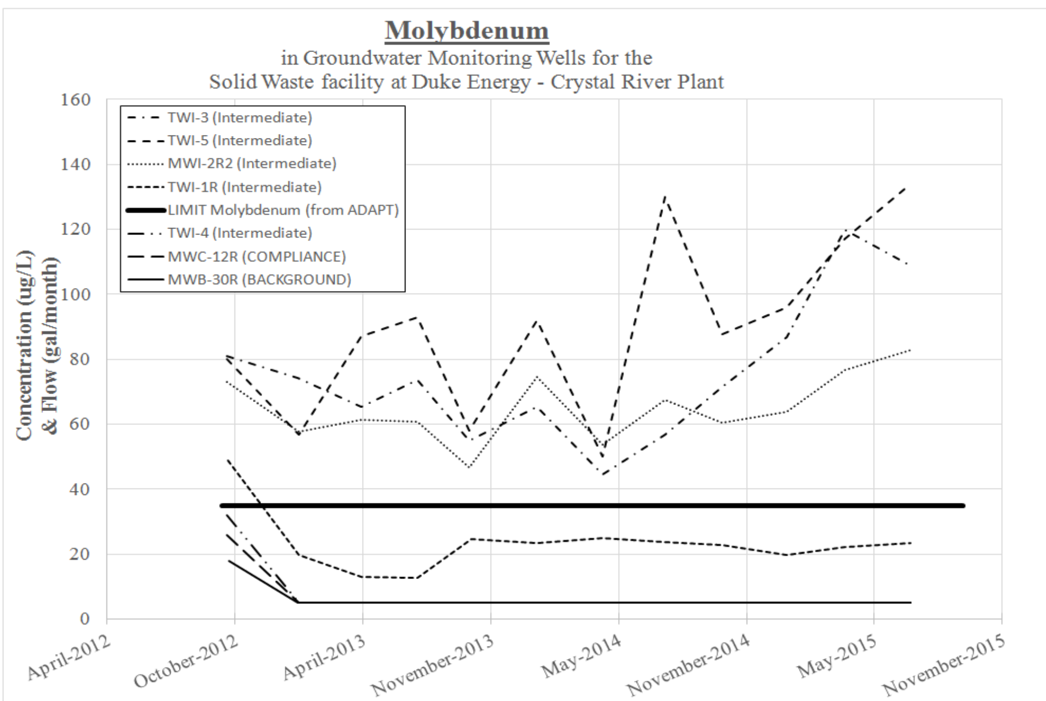


**Figure 7. Molybdenum levels in groundwater samples from wells at CREC site, October 2012 to July 2015 (DEP 2015)**

## 4. SUMMARY

CREC Ash Landfill does not meet the safety criteria for CCR landfills and impoundments enumerated in the EPA's CCR Rule. The facility is located in a documented unstable, karst area, putting local water resources at risk. It would be technically challenging, if not impossible to upgrade the Ash Landfill to meet the CCR Rule standards for active facilities in karst areas. In addition, there is overwhelming evidence that the Ash Landfill has contaminated local ground water with arsenic, selenium, molybdenum, manganese, boron, and thallium. The source of these contaminants is the Ash Landfill as documented by the presence of these contaminants in water samples from downgradient wells. The Ash Landfill is uncovered and open to infiltration of rainwater, the facility is unlined, and it is in direct hydraulic connection with the Upper Floridan Aquifer. The remedy to prevent further contamination of the aquifer and of Crystal Bay, is to remove the CCR materials currently on site and to decontaminate the Floridan Aquifer and local soils.

## 5. AUTHOR'S EXPERTISE AND QUALIFICATIONS

The author of this technical assessment, Dr. Mark Stewart, PhD, PG, is a Professor Emeritus at the University of South Florida School of Geosciences. Dr. Stewart is a registered Professional Geologist in the State of Florida. He has an extensive publication record and expertise in the hydrogeology of Florida, water resources management, karst hydrology, applied geophysics, and the geology of sinkholes. He has been qualified in hearings of the Division of Administrative Hearings and in State and Federal courts as an expert in hydrogeology, water resources management, karst hydrology, the geology of sinkholes, hydrologic modeling, and environmental geophysics. Dr. Stewart has an undergraduate degree in geological sciences from Cornell University, and graduate degrees in geology and water resources management from the University of Wisconsin-Madison.

The primary materials reviewed and used in the preparation of this assessment were Florida Department of Environmental Protection ("DEP") regulatory files, which include groundwater monitoring reports, reports on the geology and hydrogeology of CREC site, and reports on the construction and operation of waste material facilities and disposal of generated wastes, all of which were prepared by Duke/Progress Energy/FPC and their consultants and submitted to the DEP. Additional materials referenced for this report include: publications, data, and maps from the U.S. Geological Survey and Florida Geological Survey; peer-reviewed journal articles; and publically-available documents related to coal and coal combustion residuals, hydrogeology, sinkholes, and karst hydrology.

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# EXHIBIT 2

Technical Assessment of Converting a Zero Discharge Standard for Bottom Ash Wastewater at the Crystal River Energy Complex:

Expert Report by Dr. Ranajit (Ron) Sahu

Ranajit Sahu

September 26, 2016

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## 1. EXECUTIVE SUMMARY

This is an assessment of Duke Energy Florida's ("DEF") plans for achieving compliance with the U.S. Environmental Protection Agency's ("EPA") revised effluent limitations guidelines ("ELGs") for bottom ash wastewater generated at DEF's Crystal River Energy Generating Complex ("CREC") Units 4 and 5. Specifically, this assessment evaluates DEF's contention that February 1, 2020, should be the deadline for these units under the ELGs.

DEF's 44-month schedule to achieve compliance with the bottom ash BAT standard is simply unsupported. CREC can achieve a zero discharge standard for bottom ash wastewater within 27 to 30 months, roughly August to November 2018.

Construction time for bottom ash retrofits at Units 4 and 5 are anticipated to take, with a built in contingency, only 18 months. Other, related, tasks for achieving compliance should take significantly less time than DEF proposes, particularly as DEF began planning for and evaluating strategies to comply with the revised ELGs as far back as 2012. Beginning in 2014, Duke Energy began publicly reporting projected compliance costs, suggesting that conceptual or detailed engineering evaluations and studies were undertaken and that Duke Energy's Board has been aware of these changes and costs for some time.

DEF does not need until February 1, 2020, to achieve compliance with a zero discharge standard for bottom ash wastewater at CREC Units 4 and 5. Rather, compliance can be achieved by November 2018 if not sooner. The Florida Department of Environmental Protection ("DEP") should carefully review the unsupported schedule provided by DEF and require that Units 4 and 5 comply with a zero discharge bottom ash standard by no later than November 2018.

## 2. INTRODUCTION

This is an assessment of Duke Energy Florida's ("DEF") plans for achieving compliance with the U.S. Environmental Protection Agency's ("EPA") revised effluent limitations guidelines ("ELGs") for bottom ash transport water[1] or "wastewater" generated at DEF's Crystal River Energy Generating Complex ("CREC") Units 4 and 5. Specifically, this assessment evaluates DEF's contention that February 1, 2020, should be the deadline for these units' under the ELGs.

## 3. BOTTOM ASH HANDLING AND WASTEWATER AT CREC UNITS 4 AND 5

[1] 40 C.F.R. § 423.11(f) (defining the term "bottom ash" as "the ash, including boiler slag, which settles in the furnace or is dislodged from furnace walls. Economizer ash is included in this definition when it is collected with bottom ash); § 423.11(p) (defining the term "transport water" as "any wastewater that is used to convey fly ash, bottom ash, or economizer ash from the ash collection or storage equipment, or boiler, and has direct contact with the ash. Transport water does not include low volume, short duration discharges of wastewater from minor leaks (e.g., leaks from valve packing, pipe flanges, or piping) or minor maintenance events (e.g., replacement of valves or pipe sections)."

CREC is operated by DEF and is located adjacent to Crystal Bay, part of the Gulf of Mexico, in Citrus County, Florida. Units 1 (built in 1966, rated at 395 MW), 2 (built in 1969, rated at 520 MW), 4 (built in 1982, rated at 769 MW), and 5 (built in 1984, rated at 767 MW) are Duke Energy's only coal-fired units in Florida.[2] DEF applied to renew the NPDES Permit No. FL0036366 for Units 4 and 5 in January 2016.[3]

As described by DEF, Units 4 and 5 produce bottom ash wastewater that discharges from dewatering bins to an intenral canal and then to Crystal Bay via a discharge canal:

> The bottom ash handling system collects and removes bottom ash from Crystal River North Unit 4 & 5. Bottom ash collected in ash hoppers beneath the steam generator is periodically removed with ash sluice water to a transfer tank. From the transfer tank, an ash slurry pump transports slurry to a selected dewatering bin where bottom ash is separated from the transport water. When dewatered, bottom ash is either directly sent for beneficial reuse or deposited in an ash storage area for later beneficial reuse. All transport water from the dewatering bin is sent to a surge tank where it is pumped back to the ash hoppers to transport more bottom ash. Several process streams also feed into the bottom ash transport water system. While they provide needed make-up water, these sources may also, at times, cause the surge tank to overflow. The overflow runs into the coal area stormwater runoff ditch which discharges infrequently through NPDES internal outfall I-CHO.[4]

DEF further describes:

> The facility currently utilizes a wet-sluicing system for bottom ash, in which most of the bottom ash transport water is reused after exiting the dewatering basins. However, due to water balance issues at the facility, an overflow structure is used to discharge excess water from the dewatering basins into the runoff collection system, and then through Internal Outfall I-CHO to eventually Internal Outfall I-0CO, Outfall D-001 and waters of the State.[5]

Additional details are provided in the NPDES permit renewal application and other documents in the permitting record.[6]

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[2] *See Coal-Fired Plants*, Duke Energy, https://www.duke-energy.com/power-plants/coal-fired.asp (last visited Sep. 26, 2016).

[3] Duke Energy Florida, Inc., Application to Renew NPDES Permit for Crystal River Units 4 & 5, Permit No. FL0036366, January 12, 2016.

[4] Duke Energy Florida, Response to Request for Additional Information, Attachment 1 at 1, May 20, 2016.

[5] Draft Permit at 12.

[6] *See e.g.*, DEF's Coal Combustion Product (CCP)/Solid Waste Materials Management Plan, Revision 6, December 2013.

## 4. THE ELGS

After many years of work,[7] EPA finalized the ELGs in November 2015.[8] The ELGs revise and strengthen technology-based effluent limitations guidelines and standards for wastewater discharges from steam electric power plants, including coal-fired units such as CREC Units 4 and 5.

The final ELGs set federal limits on the discharge toxic metals and other harmful pollutants from wastewater at steam electric power plants. The ELGs are based on technology improvements in the steam electric power industry over the last three decades and establish new requirements for wastewater streams from the following processes and byproducts associated with flue gas desulfurization, fly ash, bottom ash, flue gas mercury control, and gasification of fuels such as coal and petroleum coke.

The ELGs require a zero discharge best available technology ("BAT") standard for bottom ash wastewater to be achieved by November 1, 2018, or "as soon as possible."[9] The phrase "as soon as possible" means November 1, 2018, unless permitting authorities, such as the Florida Department of Environmental Protection ("DEP"), establish a later date based on a well-documented justification.[10]

## 5. CONSULTATION WITH VENDORS AND INDUSTRY REGARDING BOTTOM ASH CONVERSIONS

### A. Vendor Experience and Discussions During ELG Rulemaking

As EPA has stated, "to gather information on handling fly ash and bottom ash, EPA … contacted several ash handling and ash storage vendors. The vendors provided the following types of information for EPA's analyses:

- Type of fly ash and bottom ash handling systems available for reducing or eliminating ash transport water;
- Equipment, modifications, and demolition required to convert wet-sluicing fly ash and bottom ash handling systems to dry ash handling or closed-loop recycle systems;
- Equipment that can be reused as part of the conversion from wet to dry handling or in a closed-loop recycle system;

---

[7] As EPA noted in the preamble to the final ELG Rule, "….EPA initiated a steam electric ELG rulemaking following a detailed study in 2009. EPA published the proposed rule on June 7, 2013, and took public comments until September 20, 2013." 80 Fed. Reg. 67,844.

[8] The Final ELG Rule was published in the Federal Register on November 3, 2015. 80 Fed. Reg. 67,838.

[9] *See* 40 C.F.R. § 423.11(t) (defining the phrase "as soon as possible" to mean Nov. 1, 2018, unless a later date is specifically justified); § 423.13(k)(1) (requiring compliance with bottom ash wastewater standards by Nov. 1, 2018 unless a later date up to Dec. 31, 2023 is specifically justified).

[10] 40 C.F.R. § 423.11(t) (emphasis added).

- Outage time required for the different types of ash handling systems;
- Maintenance required for each type of system;
- Operating data for each type of system;
- Purchased equipment, other direct, and indirect capital costs for fly ash and bottom ash conversions;
- Specifications for the types of ash storage available (*e.g.*, steel silos or concrete silos) for the different types of handling systems;
- Equipment and installation capital costs associated with the storage of fly ash and bottom ash; and
- Operation and maintenance costs for fly ash and bottom ash handling systems."[11]

The vendor community has been well aware of the rule requirements and participated fully in the rulemaking. There are numerous well-qualified U.S. vendors (and foreign vendors that are active in the U.S. market) that are capable of providing equipment and services for ash handling and conversion of bottom ash transport water at coal-fired units such as Units 4 and 5. Major vendors include United Conveyer Corporation ("UCC"),[12] Clyde Bergemann,[13] and Magaldi.[14] Others such as GE, Veolia, Nalco, Aquatech, Heartland, LB Industrial Systems, and many others also have potential capabilities and solutions for specific aspects of ash handling. The ELGs docket shows that EPA consulted expensively with at least UCC and Clyde Bergemann with respect to bottom ash transport water and handling during rule development.[15].

That the vendor community is robust is not surprising given that the US coal-fired power plant fleet is over 800 units strong, with each one generating copious amounts of bottom ash that must be handled and managed. Further, as the ELGs rulemaking record shows, a significant portion of the U.S. coal fleet already meets the ELGs BAT standard for bottom ash wastewater and are dry systems. These vendors already have many technology solutions and offerings for achieving

---

[11] Technical Development Document for the Effluent Limitation Guidelines and Standards for the Steam Electric Power Generating Point Source Category, U.S. Environmental Protection Agency, EPA-821-R-15-007 at p. 3-21 and 3-22 (Sep. 2015).

[12] UCC offers various hydraulic, mechanical, pneumatic, and vibratory systems for dry bottom ash handling.

*See Bottom Ash*, United Conveyor Corporation, http://unitedconveyor.com/bottom_ash/ (last visited Sep. 26, 2016).

[13] Clyde Bergemann offers a trademarked "DRYCON" system for dry bottom ash handling.

*See DRYCON*, Clyde Bergemann Power Group, http://www.cbpg.com/en/products-solutions-materials-handling-bottom-ash/drycon%E2%84%A2 (last visited Sep. 26, 2016).

[14] Magaldi offers a dry ash handling system called MAC. A variant of this system appears to have been installed in either CREC Unit 1 or 2 or both.

*See Magaldi Solutions for Ash Handling*, Magaldi, http://www.magaldi.com/en/magaldi_solutions_for/Ash-Handling-Mac__9_11.php#tab_fototab (last visited Sep. 26, 2016).

[15] See, for example, EPA-HQ-OW-2009-0819-0580 (pertaining to EPA and its contractor's discussions with UCC) (*available at* https://www.regulations.gov/document?D=EPA-HQ-OW-2009-0819-0580) and EPA-HQ-OW-2009-0819-6232 (pertaining to EPA and its contractor's discussions with Clyde Bergemann) (*available at* https://www.regulations.gov/document?D=EPA-HQ-OW-2009-0819-6232).

a zero discharge bottom ash standard. As the preamble to the ELG Rule states:

> …technologies for control of bottom ash transport water are demonstrably available. Based on survey data, more than 80 percent of coal-fired generating units built in the last 20 years have installed dry bottom ash handling systems. In addition, EPA found that more than half of the entities that would be subject to BAT requirements for bottom ash transport water are already employing zero discharge technologies (dry handling or closed-loop wet ash handling) or planning to do so in the near future.[16]

Thus, DEF has a good selection of experienced vendors to select from to achieve compliance with the bottom ash ELGs. As discussed below, the record also shows that DEF and previous CREC owner Progress Energy Florida ("PEF") appear to have actively consulted with at least one vendor, UCC, with regards to bottom ash dry conversion systems, as far back as 2012.

### B. <u>Vendor Discussions Pertaining to DEF and CREC in the Rulemaking Docket</u>

The ELG rulemaking docket indicates that DEF already consulted vendors regarding the conversion to bottom ash dry conversion systems. Specifically, the docket shows that DEF has a long-standing relationship with one of the vendors, Magaldi,[17] and has been discussions with another vendor DRYCON™.[18] In addition, the docket shows DEF has experience with other vendors through its pursuit of dry systems at its other plants/units. Moreover, DEF and its predecessor, Progress Energy Florida (PEF), have been engaged for years in developing a compliance strategy for bottom ash transport water for Units 4 and 5. As EPA notes in a memorandum provided by its contractor ERG in May 2012:

> UCC noted the wet to dry conversions in the recent past or in process:
>
> …
>
> - <u>Duke Energy's</u> Gibson plant is in the process of converting their wet sluicing system to a dry fly ash handling system;
>
> …
>
> - <u>Progress Energy's</u> Mayo plant is planning to convert their current bottom ash handling system to a PAX system (100 percent dry

[16] 80 Fed. Reg. 67,852.

[17] *See* Final Seminole Site Visit Notes, EPA-HQ-OW-2009-0819-1891 (Jan. 2013) (*available at* https://www.regulations.gov/document?D=EPA-HQ-OW-2009-0819-1891).

[18] *See* Memorandum to the Steam Electric Rulemaking Record: Ash Handling Documentation from Comunications with Clyde Bergemann Power Group, EPA-HQ-OW-2009-0819-6232 (Sep. 2015) (*available at* https://www.regulations.gov/document?D=EPA-HQ-OW-2009-0819-6232).

> vacuum), which is currently scheduled to be commissioned in 2013;
> …
>
> UCC explained that Duke Energy's plants (i.e., Marshall, Allen, Wabash, and Gibson) are going dry to avoid violations, or risks of violations, with NPDES permits. Additionally, Duke Energy is exploring ash handling technologies in anticipation of changing regulations. Additionally, UCC reports that Gibson engaged UCC for quotes for a bottom ash handling conversion.
>
> UCC also reported that Progress Energy wants to convert ash handling systems to dry to get ahead of the industry. UCC stated that Progress is likely going with a PAX bottom ash handling system for the plants that still operate wet sluicing systems. UCC stated that this system because [*sic*] operational at Crystal River 15 years ago.[19]

These notes show that DEF/PEF has already made significant progress on dry conversion for its plants/units, including not only installing such a system at its Mayo plant in 2013, but also for its other plants including CREC where only Units 4 and 5 use wet bottom ash sluicing. Moreover, the fact that these discussions took place in mid-2012 show that significant development work was completed on or before by that time—more than four years ago. The discussions also show significant preparations by DEF parent company to convert to dry handling systems in anticipation of the ELGs.

### C. Utility Water Act Group (UWAG) Comments During the ELG Rule Development

Lastly, while numerous parties provided comments to the EPA during its ELG rulemaking, it is particularly important to note certain relevant portion of comments provided by the Utility water Act Group ("UWAG"), an industry consortium, which includes almost all utilities as its members.[20] Duke is a member of UWAG as was PEF.

In its comments, pertaining to bottom ash conversions, UWAG states that

[19] *See* Teleconference Notes Between Kevin McDonough & Mike Kippis, United Conveyor Corporation, Ron Jordan and Jezebele Alicea-Virella, USEPA, TJ Finseth, Elizabeth Sabol, ERG, Inc., EPA-HQ-OW-2009-0819-0580 (May 24, 2012) (*available at* https://www.regulations.gov/document?D=EPA-HQ-OW-2009-0819-0580) (emphasis added).

[20] As UWAG's comment's note, "UWAG is a voluntary, *ad hoc*, non-profit, unincorporated group of 198 individual energy companies and three national trade associations of energy companies: the Edison Electric Institute, the National Rural Electric Cooperative Association, and the American Public Power Association. The individual energy companies operate power plants and other facilities that generate, transmit, and distribute electricity to residential, commercial, industrial, and institutional customers." Utility Water Act Group Comments on EPA's Proposed Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category, at 1 n.1.

> [I]n the case study presented in the attachment, it would take 30-36 months to convert from a wet bottom ash hopper to a dry bottom ash hopper for a large unit…..Another case study for adding a remote wet ash hopper and submerged flight conveyor would take 27-33 months.[21]

The project implementation timeframes referenced in this section, which are already considerably shorter than what DEF has proposed (i.e., 44 months, as discussed in Section 7), are relevant for situations in which no initial planning or assessment has been completed. However, since, as shown next, there are clear indications that Duke Energy and PEF have undertaken significant, multi-year efforts to begin planning for a conversion to dry bottom ash handling, and that the implementation schedule at CREC Units 4 and 5 should be shorter.

## 6. DUKE ENERGY'S PUBLIC STATEMENTS AND PLANNING TO COMPLY WITH THE BOTTOM ASH ELGS

Public statements from Duke Energy corroborate that DEF has already evaluated options and developed likely costs for compliance with the ELGs at CREC Units 4 and 5, and that implementation can and should occur more quickly than in the schedules proposed by DEF and DEP.

### A. <u>Duke Energy's 2013 Annual Report and SEC Form 10-K Filing</u>

In a brief discussion in its 2013 Annual Report, Duke Energy provided the following general statement, (although no cost estimates) regarding compliance with the then-proposed revised ELGs for steam electric power plants:

> *Steam Electric Effluent Limitation Guidelines*
>
> On June 7, 2013, the EPA proposed Steam Electric Effluent Limitations Guidelines (ELGs). The EPA is under a court order to finalize the rule by May 22, 2014. The EPA has proposed eight options for the rule, which vary in stringency and cost. The proposed regulation applies to seven waste streams, including wastewater from air pollution control equipment and ash transport water. Most, if not all of the steam electric generating facilities the Duke Energy Registrants own are likely affected sources. Compliance is proposed as soon as possible after July 1, 2017, but may extend until July 1, 2022. The Duke Energy Registrants are unable to predict the outcome of the rulemaking, but the impact

[21] *Id.* at 84.

could be significant.[22]

## B. Duke Energy's 2014 Annual Report and SEC Form 10-K Filing

Again in 2014, Duke Energy considered compliance with the proposed ELGs, this time offering cost estimates:

> *Steam Electric Effluent Limitation Guidelines*
>
> On June 7, 2013, the EPA proposed Steam Electric Effluent Limitations Guidelines. The EPA is under a revised court order to finalize the rule by September 30, 2015. The EPA has proposed eight options for the rule, which vary in stringency and cost. The proposed regulation applies to seven waste streams, including wastewater from air pollution control equipment and ash transport water. Most, if not all, of the steam electric generating facilities the Duke Energy Registrants own are likely affected sources. Requirements to comply with the Final rule may begin as early as late 2018 for some facilities.
>
> *Estimated Cost and Impacts of Rulemakings*
>
> …
>
> The following table provides estimated costs, excluding AFUDC, of new control equipment that may need to be installed on existing power plants, including conversion of plants to dry disposal of bottom ash and fly ash, to comply with the above regulations over the five years ended December 31, 2019
>
> …

| (in millions) | Estimated 5 Year Cost |
|---|---|
| Duke Energy | $ 1,850 |
| Duke Energy Carolinas | 675 |
| Progress Energy | 525 |
| Duke Energy Progress | 475 |
| Duke Energy Florida | 50 |
| Duke Energy Ohio | 75 |
| Duke Energy Indiana | 575 |

[23]

[22] Available at https://www.duke-energy.com/investors/financials-sec-filings/annual.asp.

Even though the ELGs had not yet been finalized, Duke Energy recognized that the rule would likely be final by September 2015 and had already developed cost estimates for compliance. Duke Energy necessarily would have had to complete considerable planning and engineering work in the 2013-2014 time period to be able to share such cost estimates.

The statement above also shows that Duke anticipated that compliance would be required "as early as late 2018" which is consistent with EPA's final compliance schedule beginning in November 2018.

Specific to CREC units, the cost estimate of $50 million presented to shareholders and the SEC for DEF relate directly to Units 4 and 5, since these are DEF's only non-retired coal units.

## C. Duke Energy's 2015 Annual Report and SEC Form 10-K Filing

Finally, in 2015, Duke Energy again projected compliance dates and costs for the ELGs:

> *Steam Electric Effluent Limitations Guidelines*
>
> On January 4, 2016, the final Steam Electric Effluent Limitations Guidelines (ELG) rule became effective. The rule establishes new requirements for wastewater streams associated with steam electric power generation and includes more stringent controls for any new coal plants that may be built in the future. Affected facilities must comply between 2018 and 2023, depending on timing of new Clean Water Act permits. Most, if not all, of the steam electric generating facilities the Duke Energy Registrants own are likely affected sources. The Duke Energy Registrants are well-positioned to meet the requirements of the rule due to current efforts to convert to dry ash handling.
>
> *Estimated Cost and Impacts of Rulemakings*
>
> Duke Energy will incur capital expenditures to comply with the environmental regulations and rules discussed above. The following five-year table provides estimated costs, excluding AFUDC, of new control equipment that may need to be installed on existing power plants primarily to comply with the Coal Ash Act requirements for conversion to dry disposal of bottom ash and fly ash, MATS, Clean Water Act 316(b) and ELGs, through December 31, 2020.

[23] Duke Energy 2014 Annual Report at 59 *available at* https://www.duke-energy.com/investors/financials-sec-filings/annual.asp.

| (in millions) | Five-Year Estimated Costs |
| --- | --- |
| **Duke Energy** | **$ 1,350** |
| Duke Energy Carolinas | 625 |
| Progress Energy | 350 |
| Duke Energy Progress | 300 |
| Duke Energy Florida | 50 |
| Duke Energy Ohio | 100 |
| Duke Energy Indiana | 275 |

"[24]

The 2015 filing does not change the 2014 cost estimate of $50 million for DEF's compliance with the ELGs, indicating no significant alterations in its compliance strategy. Notably, Duke Energy states that "[t]he Duke Energy Registrants are well-positioned to meet the requirements of the rule due to current efforts to convert to dry ash handling."[25] This statement is not surprising and is consistent with DEF's ability to meet a compliance deadline of late 2018.

## 7. CRITIQUE OF DEF'S PROPOSED COMPLIANCE SCHEDULE

As detailed above, Duke Energy and DEF have made considerable progress in preparations for compliance with the bottom ash wastewater provisions in the ELGs. Nothing in the record suggests that Units 4 and 5 cannot achieve compliance with the BAT requirements for bottom ash wastewater by November 1, 2018. Yet DEF has, surprisingly, proposed February 1, 2020, as the compliance deadline for the bottom ash BAT standard at CREC Units 4 and 5.

In its initial NPDES permit renewal application, DEF proposed the following schedule for "[e]valuation of the Dry Bottom Ash Dewatering system to eliminate the water overflows" and stated that "Duke Energy is in the process of conducting this evaluation:"[26]

- Complete evaluation of the Dry Bottom Ash Dewatering System and submit to the Department a list of actions with deadlines – July 31, 2018.
- Completion of actions and compliance with the ELG Rule no later than December 31, 2023.[27]

---

[24] Duke Energy 2015 Annual Report at 63 *available at* https://www.duke-energy.com/investors/financials-sec-filings/annual.asp (emphasis added).

[25] *Id.*

[26] Duke Energy Florida, Inc., Application to Renew NPDES Permit for Crystal River Units 4 & 5, Permit No. FL0036366, January 12, 2016, at attachment 4 p.1-2.

[27] *Id.*

In other words, DEF did not commit to compliance before December 31, 2023, the final deadline for compliance with the revised ELGs, nor provide any support for why it would take until late 2023, eight years after the finalization of the ELGs.

Subsequently, in reponse to Florida DEP's request for additional information, DEF amended its initial proposed schedule for compliance and stated that:

> DEF intends to promptly initiate the formal planning process on June 1, 2016, based on an assumption that the enclosed additional information will result in a complete application and no significant modification to DEF's compliance plans. Due to time needed for planning, procurement, permitting, construction and testing, DEF is requesting that the Department approve a date of completion February 1, 2020, 44 months from June 1, 2016.[28]

DEF now proposes February 1, 2020, as the compliance deadline for the zero discharge standard for bottom ash wastewater. While this is an improvement over the previous, unsupported December 31, 2023, compliance date proposal, this is still too long, and not supported by an justificaiton, as describe next.

As support for a project duration of 44 months, DEF provided a project schedule, shown below.[29]

**Table 1- CRN Unit 4 & 5 : Dry Bottom Ash**

| Task Number | Task Name | Duration (Months) |
|---|---|---|
| 1 | Bottom Ash Water Balance | 6 |
| 2 | Review Bottom Ash Modification Options | 2 |
| 3 | Finalize Bottom Ash Modification Options | 3 |
| 4 | Project Budget Approval | 6 |
| 5 | Detailed Engineering of Selected Modifications | 3 |
| 6 | Implementation of Modifications | 18 |
| 7 | Review of Modifications/Contingency | 6 |
| **Total** (months - excluding task overlaps) | | 44 |

DEF's discussion of each Task Number, as shown in the schedule in F is provided below in

[28] Duke Energy Florida, Response to Request for Additional Information at 1, May 20, 2016.

[29] Duke Energy Florida, Response to Request for Additional Information, at attachment 1, May 20, 2016.

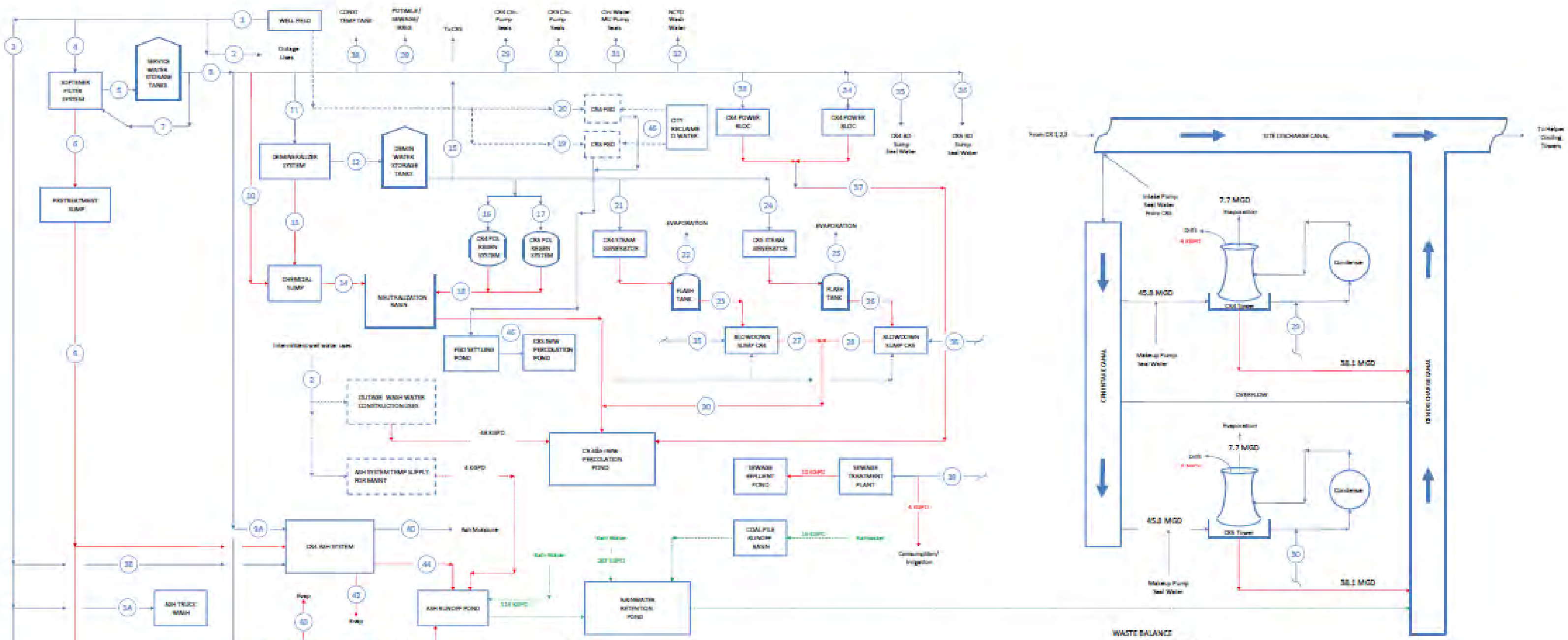
italics followed by critique and commentary:

- ***Task 1 - Bottom Ash Water Balance Review***

*An internal water balance was developed on the bottom ash system several years ago and identified water streams and approximate amounts contributing to the bottom ash system. Review of the information on the on bottom ash system water balance will include verifying all streams indicated, data verification, and review of system as pertains to new ELG regulation. Approximately six (6) months are necessary to perform these actions, which provides time if additional information is required for the evaluation.*

DEF asserts that an internal water balance must be developed, yet in its January 2016 application for NPDES permit renewal, just months ago, DEF provided a detailed water balance, as reproduced below.

The January 2016 renewal application was required be accurate and complete. Unless DEF failed to meet that requirement, which DEF has not indicated it has, DEF already has developed an accurate and complete water balance and should not need another six months to redevelop such a balance. Any verification needed can be made in a shorter time frame—and in parallel with the tasks described next.  Thus, the six months built into the schedule for this task are a significant and unnecessary slack.



**NOTES:**

A. Water balances base on 2008 data. 2009 was atypical due to extended outages through out the year for Scrubber and SCR construction work.

B. Saltwater balances based on 2008 data with November 2009 data substituted for November 2008 to correct for clean air project extended outage for clean air project work. This substitution results in a normal outage pattern for the units.

C. Saltwater balances were done on per unit basis and results are shown as 2 unit average. Saltwater balances are driven by load profile and climate conditions; differences for one year will average out over time. Both units are identical and are about the same age.

D. Ash system evaporation loss occurs a t the bottom of the boiler (refractory cooling, wet bottom pool, etc)

## CRYSTAL RIVER UNITS 4 AND 5 WATER BALANCE

| STREAM NO. | 1 | 2 | 3 | 3A | 3B | 3C | 3D | 4 | 5 | 6 | 7 | 8 | 9A | 9B | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FLOW (KGPD) | 1009 | 92 | 69 | 8 | 11 | 11 | 3 | 824 | 824 | 102 | 102 | 822 | 78 | 78 | 5 | 411 | 376 | 37 |
| FLOW (GPM) | 701 | 64 | 29 | 6 | 8 | 8 | 2 | 942 | 942 | 71 | 71 | 571 | 54 | 54 | 3 | 285 | 260 | 26 |

| STREAM NO. | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FLOW (KGPD) | 4 | 86 | 15 | 15 | 60 | 1200 | 1200 | 145 | 86 | 79 | 145 | 66 | 79 | 82 | 82 | 35 | 35 |
| FLOW (GPM) | 3 | 59 | 10 | 10 | 31 | 834 | 834 | 101 | 60 | 55 | 101 | 46 | 55 | 57 | 57 | 24 | 24 |

| STREAM NO. | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FLOW (KGPD) | 22 | 38 | 4 | 6 | 5 | 5 | 92 | 6 | 14 | 60 | 60 | 39 | 34 | 58 | 58 | 850 | 680 |
| FLOW (GPM) | 16 | 26 | 3 | 3 | 3 | 3 | 64 | 3 | 10 | 42 | 40 | 27 | 27 | 40 | 40 | 590 | 480 |

- ***Task 2 - Review Bottom Ash Modification Options***

*After review and finalization of a bottom ash water balance, a review of inputs and outputs will be performed. The review will indicate options available for managing the streams in the process. This could include a review of switching mechanical seals on pumps from wet to dry seals, evaluating rerouting streams to other locations, and system modifications required to meet the ELG regulations. The review of bottom ash modification options will last approximately two (2) months and will entail a review of possible pipe reroutes, potential changes in system operations, and system modifications required for ELG compliance.*

- ***Task 3 - Finalize Bottom Ash Modification Options***

*Once DEF outlines the modification options, the next step is to determine which modifications and piping reroutes will needed. A three (3) month schedule is proposed for this activity, which includes review of modifications and reroutes from an economical, operational, and environmental standpoint with DEF's management team members with responsibility over these different functional areas. Additional time is included to resolve unexpected questions or missing data that may arise when finalizing the modification options considered in Task 2.*

DEF's proposed 5-month duration for Tasks 2 and 3 to review and finalize bottom ash modification options is inexplicably long. So much time may be reasonable for a plant that has never before undertaken such reviews, but that is not the case here. Duke Energy already reported costs to the SEC and its shareholders for such modifications. It would be inconsistent with Duke's SEC and shareholder reporting obligations to report such costs without analytic support. Similar to Task 1, any further confirmation of Duke's options can be done in much less time. More specifically, if such confirmation is done in parallel with Task 1, any competent consultant, in-house engineer, or vendor should be able to complete Tasks 1-3 in no more than 2 to 3 months, including development of a budget estimate, as discussed next.

- ***Task 4 - Budget Approval***

*The final modification plan will include appropriate budgetary estimates. In accordance with company fiduciary duties, DEF will conduct an in-depth financial review of these budgetary estimates prior to securing the requested funds. Depending on the budgetary amount required and the number of modifications necessary, several review stages may be required prior to fund approval. The project budget approval time is anticipated to last six (6) months.*

DEF has already developed a budget estimate and Duke Energy has publicly reported this estimate since 2014. It is therefore unnecessary to schedule 6 additional months for budget approval. As Duke Energy's filing indicates, its Board has long been aware of the need to spend $50 million for ELG compliance at CREC. Anticipated cost expenditures reported to shareholders are typically based on appropriate engineering and planning studies and analyses, including budgetary quotes obtained from vendors for equipment and labor. This is especially true for publicly traded corporations such as Duke

Energy, which have significant legal obligations in its SEC filings. As a result, it is unreasonable to allow six additional months for internal budget approval.

- ***Task 5 - Detailed Engineering of Modifications***

*Once the modifications are selected and the budgetary approval finalized, the project will enter a detailed engineering design phase. This phase will likely include, but not limited to, pump sizing, pipe rerouting, vessel sizing, building additions or modifications, chemical sizing, system sizing, etc. An engineering firm may need to be identified and hired to help facilitate detailed engineering of the required modifications. DEF estimates it will take three (3) months to select an engineering firm with the requisite expertize and then work with the firm to finalize the detailed engineering design.*

If DEF were to hire the same engineering firm or consultant to confirm Tasks 1, 2, and 3, Task 5 can be run in parallel with those tasks, saving more time. Alternatively, Duke could save as much if not even more time if DEF were to complete Tasks 1, 2, 3, and 5 with in-house engineering staff and/or Duke's corporate engineering staff.

- ***Task 6 - Implementation of Modifications***

*Depending on bottom ash system modifications selected, construction or implementation may or may not be an extensive process. The ideal modifications selected would have minimal capital and operational and maintenance cost associated with them. However, lead times on components and routing of streams to alternative locations may nevertheless prolong the estimated duration, as well as, any unforeseen circumstances such as weather. Some modifications may require a unit outage to complete. Recognizing the current uncertainty associated with implementing plant modifications that have not yet been conceived, DEF conservatively estimates that eighteen (18) months will be required to retain a labor and construction firm to perform the selected modifications from Task 5 and includes time to implement modifications that may require a long term outage.*

Depending on the option selected, "implementation may or may not be an extensive process…" Thus, the possibility that this task will take 18 months, is a worst case estimate, with enough contingency already built in. For example, if DEF chooses to not replace the current almost closed loop system with a complete dry system, and instead chooses to engineer and build additional margin so that there is no possibility of any overflow of the bottom ash transport water under any circumstances to receiving waters, then implementation will likely take significantly less time.

- ***Task 7 - Review of Modifications/Contingency***

*Approximately six (6) months have been added to the compliance schedule for review of system modifications and/or contingency needed due to unforeseen events that may arise in other tasks. If the dry bottom ash system modifications have unintended or undesirable impacts on other processes or do not obtain satisfactory results, then additional modifications and reviews may be required to resolve.*

DEF's proposal of six months of additional contingency, on top of the contingency already built into Task 6, is simply unjustified additional slack in the schedule.

In summary, Tasks 1-5 can be reasonably completed in 6 to 9 months, if not less. Even assuming that Task 6 takes all of 18 months, which is highly unlikely, and allowing for a reasonable contingency of 3 months in Task 7, the overall project duration should be in the range of 27 to 30 months, instead of the 44 months projected by DEF, a saving of 17 months. This would allow compliance to be achieved by roughly August to November 2018. DEP should carefully review the unsupported schedule provided by DEF and, reasonably, require that Units 4 and 5 achieve bottom ash wastewater BAT compliance by no later than November 2018.

## 8. COMPARISON OF DEF'S COMPLIANCE SCHEDULE WITH THAT OF OTHER LARGE PROJECTS

DEF's 44-month schedule to achieve compliance with the bottom ash wastewater BAT provisions of the ELGs is simply unsupported. In part, this is due to DEF's unjustified and long projected timelines for certain tasks, particularly given the strong evidence of DEF and Duke's prior planning for compliance with these provisions, which began as far back as mid-2012.

Additionally, in comparison to other major projects at coal-fired units, the 44-month schedule proposed by DEF for bottom ash ELG BAT compliance is simply unreasonable and too long. Here, comparisons are made using the expected timelines for implementing complex,air pollution control projects at coal-fired boilers. These include the installation of wet or dry flue gas desulfurization ("FGD") or scrubbers for $SO_2$ control and the installation of Selective Catalytic Reduction ("SCR") for NOx control. These projects, for units of similar size to CREC Units 4 and 5, often cost hundreds of million dollars. Yet, while often complex and challenging to implement, timelines for such projects are in the range of 3 to 5 years—starting from conceptual engineering through completion during scheduled outages.

Three example timelines are shown below—for dry FGD, wet FGD, and SCR projects, respectively—as developed by a contractor for MISO, the independent system operator for the U.S..[30] These timelines are generally conservative– i.e., the timelines shown are generally high, reflecting the most complex installations, with typical projects capable of implementation in less time. Nonetheless, as the charts below show, the expected durations for implementing dry FGD or SCR are around 46 months and the same for wet FGD is around 56 months.

Given the far greater complexity associated with these projects, DEF's assertion is untenable that the relatively much simpler conversion of Unit 4 and Unit 5's wet sluicing bottom ash system to a dry system will take 44 months. If DEF decides to achieve compliance without

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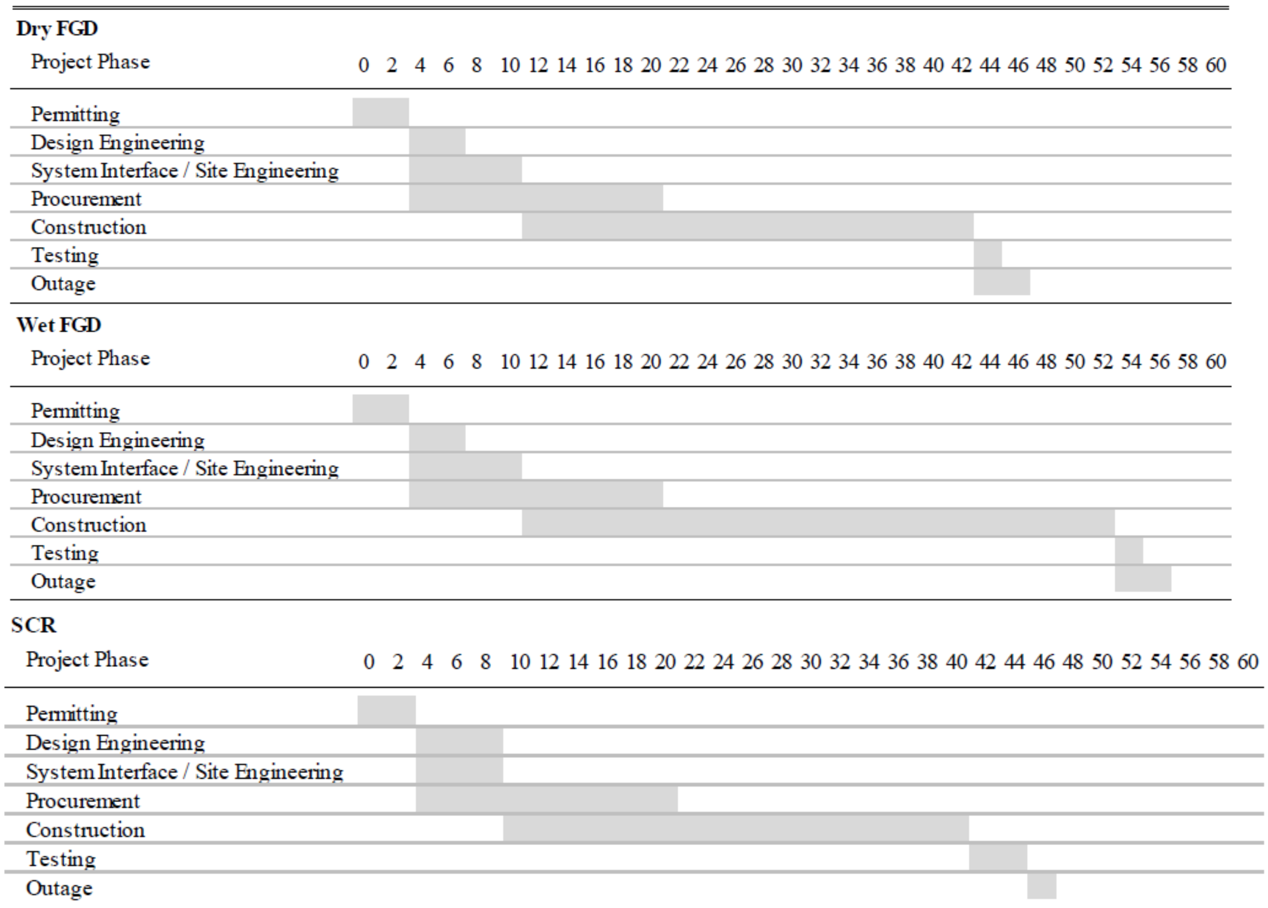
[30] The Brattle Group, *Supply Chain and Outage Analysis of MISO Coal Retrofits for MATS*, Appendix A (May 2012) (available at http://www.brattle.com/news-and-knowledge/news/brattle-economists-identify-challenges-for-miso-s-coal-fleet-to-comply-with-epa-s-mats-rule).

switching to a dry system, implementation times will be even shorter.

**Typical Timelines for Dry FGD, Wet FGD, DSI and ACI Retrofit Projects**




## 9. CONCLUSIONS

DEF does not need till February 1, 2020 to achieve compliance with a zero discharge standard for bottom ash wastewater at CREC Units 4 and 5. Rather, compliance can be achieved by November 2018, if not sooner.

Construction for bottom ash retrofits at Units 4 and 5 is anticipated to take, with a built in contingency, only 18 months. Other proposed tasks for acheving compliance should take signficiantly less time than DEF forecasts, particularly as DEF began ancticipating and planning for the revised ELGs as far back as 2012. Beginning in 2014, Duke Energy began publicly reporting projected compliance costs, suggesting that conceptual or detailed engineering evaluations and studies were undertaken and that Duke Energy's Board has been aware of these changes and costs for some time.

DEF's 44-month schedule to achieve compliance with the bottom ash BAT standard is simply unsupported. Comparisons to similar retrofits and other large-scale, more complex projects at coal-burning units show far shorter timelines and demonstrate that DEF's proposed schedule is inflated. Moreover, as DEF is aware, there is a robust vendor community with experience in handling the types of retrofits needed to achieve compliance.

The available evidence does not support a 44-month timeline for eliminating bottom ash wastewtater discharges at CREC Units 4 and 5. In renewing the NPDES permit for CREC Units 4 and 5, DEP should require DEF to achieve compliance with the bottom ash wastewater ELGs no later than November 2018.

## 10. AUTHOR'S EXPERTISE AND QUALIFICATIONS

Dr. Ranajit Sahu has over twenty-five years of experience in the fields of environmental, mechanical, and chemical engineering including: program and project management services; design and specification of pollution control equipment for a wide range of emissions sources; soils and groundwater remediation including landfills as remedy; combustion engineering evaluations; energy studies; multimedia environmental regulatory compliance (involving statutes and regulations such as the Federal CAA and its Amendments, Clean Water Act, TSCA, RCRA, CERCLA, SARA, OSHA, NEPA as well as various related state statutes); transportation air quality impact analysis; multimedia compliance audits; multimedia permitting (including air quality NSR/PSD permitting, Title V permitting, NPDES permitting for industrial and storm water discharges, RCRA permitting, etc.), multimedia/multi-pathway human health risk assessments for toxics; air dispersion modeling; and regulatory strategy development and support including negotiation of consent agreements and orders.

Over the last twenty-three years, Dr. Sahu has consulted on several municipal landfill related projects addressing landfill gas generation, landfill gas collection, and the treatment/disposal/control of such gases in combustion equipment such as engines, turbines, and flares. In particular, Dr. Sahu has executed numerous projects relating to flare emissions from sources such as landfills as well as refineries and chemical plants. He has served as a peer-reviewer for EPA in relation to flare combustion efficiency, flare destruction efficiency, and flaring emissions.

A significant portion of Dr. Sahu's educational background and consulting experience deals with addressing environmental impacts due to coal-fired power plants including all aspects of air emissions from such plants but also environmental impacts from water/waste water, cooling water, and solid/hazardous wastes at such plants and impacts due to coal mining, transportation, and stockpiling.

Dr. Sahu holds a B.S., M.S., and Ph.D., in Mechanical Engineering, the first from the Indian Institute of Technology (Kharagpur, India) and the latter two from the California Institute of Technology (Caltech) in Pasadena, California. His research specialization was in the combustion of coal and, among other things, understanding air pollution aspects of coal combustion in power plants as well as the formation of ash during combustion.

The opinions expressed in the report are Dr. Sahu's and are based on the data and facts available at the time of writing. Should additional relevant or pertinent information become available, Dr. Sahu reservesthe right to supplement the discussion and findings.

## ATTACHMENT A - RESUME

## RANAJIT (RON) SAHU, Ph.D, QEP, CEM (Nevada)

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## EXPERIENCE SUMMARY

Dr. Sahu has over twenty five years of experience in the fields of environmental, mechanical, and chemical engineering including: program and project management services; design and specification of pollution control equipment for a wide range of emissions sources; soils and groundwater remediation including landfills as remedy; combustion engineering evaluations; energy studies; multimedia environmental regulatory compliance (involving statutes and regulations such as the Federal CAA and its Amendments, Clean Water Act, TSCA, RCRA, CERCLA, SARA, OSHA, NEPA as well as various related state statutes); transportation air quality impact analysis; multimedia compliance audits; multimedia permitting (including air quality NSR/PSD permitting, Title V permitting, NPDES permitting for industrial and storm water discharges, RCRA permitting, etc.), multimedia/multi-pathway human health risk assessments for toxics; air dispersion modeling; and regulatory strategy development and support including negotiation of consent agreements and orders.

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He has over twenty-three years of project management experience and has successfully managed and executed numerous projects in this time period. This includes basic and applied research projects, design projects, regulatory compliance projects, permitting projects, energy studies, risk assessment projects, and projects involving the communication of environmental data and information to the public. Notably, he has successfully managed a complex soils and groundwater remediation project with a value of over $140 million involving soils characterization, development and implementation of the remediation strategy including construction of a CAMU/landfill and associated groundwater monitoring, regulatory and public interactions and other challenges.

He has provided consulting services to numerous private sector, public sector and public interest group clients. His major clients over the past twenty three years include various steel mills, petroleum refineries, cement companies, aerospace companies, power generation facilities, lawn and garden equipment manufacturers, spa manufacturers, chemical distribution facilities, and various entities in the public sector including EPA, the US Dept. of Justice, California DTSC, various municipalities, etc.). Dr. Sahu has performed projects in over 44 states, numerous local jurisdictions and internationally.

In addition to consulting, Dr. Sahu has taught numerous courses in several Southern California universities including UCLA (air pollution), UC Riverside (air pollution, process hazard analysis), and Loyola Marymount University (air pollution, risk assessment, hazardous waste management) for the past seventeen years. In this time period he has also taught at Caltech, his alma mater (various engineering courses), at the University of Southern California (air pollution controls) and at California State University, Fullerton (transportation and air quality).

Dr. Sahu has and continues to provide expert witness services in a number of environmental areas discussed above in both state and Federal courts as well as before administrative bodies.

## EXPERIENCE RECORD

2000-present **Independent Consultant.** Providing a variety of private sector (industrial companies, land development companies, law firms, etc.) public sector (such as the US Department of Justice) and public interest group clients with project management, air quality consulting, waste remediation and management consulting, as well as regulatory and engineering support consulting services.

1995-2000 Parsons ES, **Associate, Senior Project Manager and Department Manager for** Air Quality/Geosciences/Hazardous Waste Groups, Pasadena. Responsible for the management of a group of approximately 24 air quality and environmental professionals, 15 geoscience, and 10 hazardous waste professionals providing full-service consulting, project management, regulatory compliance and A/E design assistance in all areas.

Parsons ES, **Manager for Air Source Testing Services**. Responsible for the management of 8 individuals in the area of air source testing and air regulatory permitting projects located in Bakersfield, California.

1992-1995 Engineering-Science, Inc. **Principal Engineer and Senior Project Manager** in the air quality department. Responsibilities included multimedia regulatory compliance and permitting (including hazardous and nuclear materials), air pollution engineering (emissions from stationary and mobile sources, control of criteria and air toxics, dispersion modeling, risk assessment, visibility analysis, odor analysis), supervisory functions and project management.

1990-1992 Engineering-Science, Inc. **Principal Engineer and Project Manager** in the air quality department. Responsibilities included permitting, tracking regulatory issues, technical analysis, and supervisory functions on numerous air, water, and hazardous waste projects. Responsibilities also include client and agency interfacing, project cost and schedule control, and reporting to internal and external upper management regarding project status.

1989-1990 Kinetics Technology International, Corp. **Development Engineer.** Involved in thermal engineering R&D and project work related to low-NOx ceramic radiant burners, fired heater NOx reduction, SCR design, and fired heater retrofitting.

1988-1989 Heat Transfer Research, Inc. **Research Engineer**. Involved in the design of fired heaters, heat exchangers, air coolers, and other non-fired equipment. Also did research in the area of heat exchanger tube vibrations.

## EDUCATION

1984-1988 Ph.D., Mechanical Engineering, California Institute of Technology (Caltech), Pasadena, CA.

1984 M. S., Mechanical Engineering, Caltech, Pasadena, CA.

1978-1983 B. Tech (Honors), Mechanical Engineering, Indian Institute of Technology (IIT) Kharagpur, India

## TEACHING EXPERIENCE

Caltech

"Thermodynamics," Teaching Assistant, California Institute of Technology, 1983, 1987.

"Air Pollution Control," Teaching Assistant, California Institute of Technology, 1985.

"Caltech Secondary and High School Saturday Program," - taught various mathematics (algebra through calculus) and science (physics and chemistry) courses to high school students, 1983-1989.

"Heat Transfer," - taught this course in the Fall and Winter terms of 1994-1995 in the Division of Engineering and Applied Science.

"Thermodynamics and Heat Transfer," Fall and Winter Terms of 1996-1997.

U.C. Riverside, Extension

"Toxic and Hazardous Air Contaminants," University of California Extension Program, Riverside, California. Various years since 1992.

"Prevention and Management of Accidental Air Emissions," University of California Extension Program, Riverside, California. Various years since 1992.

"Air Pollution Control Systems and Strategies," University of California Extension Program, Riverside, California, Summer 1992-93, Summer 1993-1994.

"Air Pollution Calculations," University of California Extension Program, Riverside, California, Fall 1993-94, Winter 1993-94, Fall 1994-95.

"Process Safety Management," University of California Extension Program, Riverside, California. Various years since 1992-2010.

"Process Safety Management," University of California Extension Program, Riverside, California, at SCAQMD, Spring 1993-94.

"Advanced Hazard Analysis - A Special Course for LEPCs," University of California Extension Program, Riverside, California, taught at San Diego, California, Spring 1993-1994.

"Advanced Hazardous Waste Management" University of California Extension Program, Riverside, California. 2005.

Loyola Marymount University

"Fundamentals of Air Pollution - Regulations, Controls and Engineering," Loyola Marymount University, Dept. of Civil Engineering. Various years since 1993.

"Air Pollution Control," Loyola Marymount University, Dept. of Civil Engineering, Fall 1994.

"Environmental Risk Assessment," Loyola Marymount University, Dept. of Civil Engineering. Various years since 1998.

"Hazardous Waste Remediation" Loyola Marymount University, Dept. of Civil Engineering. Various years since 2006.

University of Southern California

"Air Pollution Controls," University of Southern California, Dept. of Civil Engineering, Fall 1993, Fall 1994.

"Air Pollution Fundamentals," University of Southern California, Dept. of Civil Engineering, Winter 1994.

University of California, Los Angeles

"Air Pollution Fundamentals," University of California, Los Angeles, Dept. of Civil and Environmental Engineering, Spring 1994, Spring 1999, Spring 2000, Spring 2003, Spring 2006, Spring 2007, Spring 2008, Spring 2009.

International Programs

"Environmental Planning and Management," 5 week program for visiting Chinese delegation, 1994.

"Environmental Planning and Management," 1 day program for visiting Russian delegation, 1995.

"Air Pollution Planning and Management," IEP, UCR, Spring 1996.

"Environmental Issues and Air Pollution," IEP, UCR, October 1996.

## PROFESSIONAL AFFILIATIONS AND HONORS

President of India Gold Medal, IIT Kharagpur, India, 1983.

Member of the Alternatives Assessment Committee of the Grand Canyon Visibility Transport Commission, established by the Clean Air Act Amendments of 1990, 1992-present.

American Society of Mechanical Engineers: Los Angeles Section Executive Committee, Heat Transfer Division, and Fuels and Combustion Technology Division, 1987-present.

Air and Waste Management Association, West Coast Section, 1989-present.

## PROFESSIONAL CERTIFICATIONS

EIT, California (# XE088305), 1993.

REA I, California (#07438), 2000.

Certified Permitting Professional, South Coast AQMD (#C8320), since 1993.

QEP, Institute of Professional Environmental Practice, since 2000.

CEM, State of Nevada (#EM-1699). Expiration 10/07/2017.

## ATTACHMENT B – LIST OF PUBLICATIONS AND PRESENTATIONS

### PUBLICATIONS (PARTIAL LIST)

"Physical Properties and Oxidation Rates of Chars from Bituminous Coals," with Y.A. Levendis, R.C. Flagan and G.R. Gavalas, *Fuel*, **67**, 275-283 (1988).

"Char Combustion: Measurement and Analysis of Particle Temperature Histories," with R.C. Flagan, G.R. Gavalas and P.S. Northrop, *Comb. Sci. Tech.* **60**, 215-230 (1988).

"On the Combustion of Bituminous Coal Chars," PhD Thesis, California Institute of Technology (1988).

"Optical Pyrometry: A Powerful Tool for Coal Combustion Diagnostics," *J. Coal Quality*, **8**, 17-22 (1989).

"Post-Ignition Transients in the Combustion of Single Char Particles," with Y.A. Levendis, R.C.Flagan and G.R. Gavalas, *Fuel*, **68**, 849-855 (1989).

"A Model for Single Particle Combustion of Bituminous Coal Char." Proc. ASME National Heat Transfer Conference, Philadelphia, **HTD-Vol. 106**, 505-513 (1989).

"Discrete Simulation of Cenospheric Coal-Char Combustion," with R.C. Flagan and G.R.Gavalas, *Combust. Flame*, **77**, 337-346 (1989).

"Particle Measurements in Coal Combustion," with R.C. Flagan, in "**Combustion Measurements**" (ed. N. Chigier), Hemisphere Publishing Corp. (1991).

"Cross Linking in Pore Structures and Its Effect on Reactivity," with G.R. Gavalas in preparation.

"Natural Frequencies and Mode Shapes of Straight Tubes," Proprietary Report for Heat Transfer Research Institute, Alhambra, CA (1990).

"Optimal Tube Layouts for Kamui SL-Series Exchangers," with K. Ishihara, Proprietary Report for Kamui Company Limited, Tokyo, Japan (1990).

"HTRI Process Heater Conceptual Design," Proprietary Report for Heat Transfer Research Institute, Alhambra, CA (1990).

"Asymptotic Theory of Transonic Wind Tunnel Wall Interference," with N.D. Malmuth and others, Arnold Engineering Development Center, Air Force Systems Command, USAF (1990).

"Gas Radiation in a Fired Heater Convection Section," Proprietary Report for Heat Transfer Research Institute, College Station, TX (1990).

"Heat Transfer and Pressure Drop in NTIW Heat Exchangers," Proprietary Report for Heat Transfer Research Institute, College Station, TX (1991).

"NOx Control and Thermal Design," Thermal Engineering Tech Briefs, (1994).

"From Puchase of Landmark Environmental Insurance to Remediation: Case Study in Henderson, Nevada," with Robin E. Bain and Jill Quillin, presented at the AQMA Annual Meeting, Florida, 2001.

"The Jones Act Contribution to Global Warming, Acid Rain and Toxic Air Contaminants," with Charles W. Botsford, presented at the AQMA Annual Meeting, Florida, 2001.

## PRESENTATIONS (PARTIAL LIST)

"Pore Structure and Combustion Kinetics - Interpretation of Single Particle Temperature-Time Histories," with P.S. Northrop, R.C. Flagan and G.R. Gavalas, presented at the AIChE Annual Meeting, New York (1987).

"Measurement of Temperature-Time Histories of Burning Single Coal Char Particles," with R.C. Flagan, presented at the American Flame Research Committee Fall International Symposium, Pittsburgh, (1988).

"Physical Characterization of a Cenospheric Coal Char Burned at High Temperatures," with R.C. Flagan and G.R. Gavalas, presented at the Fall Meeting of the Western States Section of the Combustion Institute, Laguna Beach, California (1988).

"Control of Nitrogen Oxide Emissions in Gas Fired Heaters - The Retrofit Experience," with G. P. Croce and R. Patel, presented at the International Conference on Environmental Control of Combustion Processes (Jointly sponsored by the American Flame Research Committee and the Japan Flame Research Committee), Honolulu, Hawaii (1991).

"Air Toxics - Past, Present and the Future," presented at the Joint AIChE/AAEE Breakfast Meeting at the AIChE 1991 Annual Meeting, Los Angeles, California, November 17-22 (1991).

"Air Toxics Emissions and Risk Impacts from Automobiles Using Reformulated Gasolines," presented at the Third Annual Current Issues in Air Toxics Conference, Sacramento, California, November 9-10 (1992).

"Air Toxics from Mobile Sources," presented at the Environmental Health Sciences (ESE) Seminar Series, UCLA, Los Angeles, California, November 12, (1992).

"Kilns, Ovens, and Dryers - Present and Future," presented at the Gas Company Air Quality Permit Assistance Seminar, Industry Hills Sheraton, California, November 20, (1992).

"The Design and Implementation of Vehicle Scrapping Programs," presented at the 86th Annual Meeting of the Air and Waste Management Association, Denver, Colorado, June 12, 1993.

"Air Quality Planning and Control in Beijing, China," presented at the 87th Annual Meeting of the Air and Waste Management Association, Cincinnati, Ohio, June 19-24, 1994.

## ATTACHMENT C – PREVIOUS EXPERT WITNESS TESTIMONY

**1. Occasions where Dr. Sahu has provided Written or Oral testimony before Congress:**

(a) In July 2012, provided expert written and oral testimony to the House Subcommittee on Energy and the Environment, Committee on Science, Space, and Technology at a Hearing entitled "Hitting the Ethanol Blend Wall – Examining the Science on E15."

**2. Matters for which Dr. Sahu has provided affidavits and expert reports include:**

(b) Affidavit for Rocky Mountain Steel Mills, Inc. located in Pueblo Colorado – dealing with the technical uncertainties associated with night-time opacity measurements in general and at this steel mini-mill.

(c) Expert reports and depositions (2/28/2002 and 3/1/2002; 12/2/2003 and 12/3/2003; 5/24/2004) on behalf of the United States in connection with the Ohio Edison NSR Cases. *United States, et al. v. Ohio Edison Co., et al.*, C2-99-1181 (Southern District of Ohio).

(d) Expert reports and depositions (5/23/2002 and 5/24/2002) on behalf of the United States in connection with the Illinois Power NSR Case. *United States v. Illinois Power Co., et al.*, 99-833-MJR (Southern District of Illinois).

(e) Expert reports and depositions (11/25/2002 and 11/26/2002) on behalf of the United States in connection with the Duke Power NSR Case. *United States, et al. v. Duke Energy Corp.*, 1:00-CV-1262 (Middle District of North Carolina).

(f) Expert reports and depositions (10/6/2004 and 10/7/2004; 7/10/2006) on behalf of the United States in connection with the American Electric Power NSR Cases. *United States, et al. v. American Electric Power Service Corp., et al.*, C2-99-1182, C2-99-1250 (Southern District of Ohio).

(g) Affidavit (March 2005) on behalf of the Minnesota Center for Environmental Advocacy and others in the matter of the Application of Heron Lake BioEnergy LLC to construct and operate an ethanol production facility – submitted to the Minnesota Pollution Control Agency.

(h) Expert Report and Deposition (10/31/2005 and 11/1/2005) on behalf of the United States in connection with the East Kentucky Power Cooperative NSR Case. *United States v. East Kentucky Power Cooperative, Inc.*, 5:04-cv-00034-KSF (Eastern District of Kentucky).

(i) Affidavits and deposition on behalf of Basic Management Inc. (BMI) Companies in connection with the BMI vs. USA remediation cost recovery Case.

(j) Expert Report on behalf of Penn Future and others in the Cambria Coke plant permit challenge in Pennsylvania.

(k) Expert Report on behalf of the Appalachian Center for the Economy and the Environment and others in the Western Greenbrier permit challenge in West Virginia.

(l) Expert Report, deposition (via telephone on January 26, 2007) on behalf of various Montana petitioners (Citizens Awareness Network (CAN), Women's Voices for the Earth (WVE) and the Clark Fork Coalition (CFC)) in the Thompson River Cogeneration LLC Permit No. 3175-04 challenge.

(m) Expert Report and deposition (2/2/07) on behalf of the Texas Clean Air Cities Coalition at the Texas State Office of Administrative Hearings (SOAH) in the matter of the permit challenges to TXU Project Apollo's eight new proposed PRB-fired PC boilers located at seven TX sites.

(n) Expert Testimony (July 2007) on behalf of the Izaak Walton League of America and others in connection with the acquisition of power by Xcel Energy from the proposed Gascoyne Power Plant – at the State of Minnesota, Office of Administrative Hearings for the Minnesota PUC (MPUC No. E002/CN-06-1518; OAH No. 12-2500-17857-2).

(o) Affidavit (July 2007) Comments on the Big Cajun I Draft Permit on behalf of the Sierra Club – submitted to the Louisiana DEQ.

(p) Expert Report and Deposition (12/13/2007) on behalf of Commonwealth of Pennsylvania – Dept. of Environmental Protection, State of Connecticut, State of New York, and State of New Jersey (Plaintiffs) in connection with the Allegheny Energy NSR Case. *Plaintiffs v. Allegheny Energy Inc., et al.,* 2:05cv0885 (Western District of Pennsylvania).

(q) Expert Reports and Pre-filed Testimony before the Utah Air Quality Board on behalf of Sierra Club in the Sevier Power Plant permit challenge.

(r) Expert Report and Deposition (October 2007) on behalf of MTD Products Inc., in connection with *General Power Products, LLC v MTD Products Inc.*, 1:06 CVA 0143 (Southern District of Ohio, Western Division) .

(s) Expert Report and Deposition (June 2008) on behalf of Sierra Club and others in the matter of permit challenges (Title V: 28.0801-29 and PSD: 28.0803-PSD) for the Big Stone II unit, proposed to be located near Milbank, South Dakota.

(t) Expert Reports, Affidavit, and Deposition (August 15, 2008) on behalf of Earthjustice in the matter of air permit challenge (CT-4631) for the Basin Electric Dry Fork station, under construction near Gillette, Wyoming before the Environmental Quality Council of the State of Wyoming.

(u) Affidavits (May 2010/June 2010 in the Office of Administrative Hearings))/Declaration and Expert Report (November 2009 in the Office of Administrative Hearings) on behalf of NRDC and the Southern Environmental Law Center in the matter of the air permit challenge for Duke

Cliffside Unit 6. Office of Administrative Hearing Matters 08 EHR 0771, 0835 and 0836 and 09 HER 3102, 3174, and 3176 (consolidated).

(v) Declaration (August 2008), Expert Report (January 2009), and Declaration (May 2009) on behalf of Southern Alliance for Clean Energy in the matter of the air permit challenge for Duke Cliffside Unit 6. *Southern Alliance for Clean Energy et al., v. Duke Energy Carolinas, LLC*, Case No. 1:08-cv-00318-LHT-DLH (Western District of North Carolina, Asheville Division).

(w) Declaration (August 2008) on behalf of the Sierra Club in the matter of Dominion Wise County plant MACT.us

(x) Expert Report (June 2008) on behalf of Sierra Club for the Green Energy Resource Recovery Project, MACT Analysis.

(y) Expert Report (February 2009) on behalf of Sierra Club and the Environmental Integrity Project in the matter of the air permit challenge for NRG Limestone's proposed Unit 3 in Texas.

(z) Expert Report (June 2009) on behalf of MTD Products, Inc., in the matter of *Alice Holmes and Vernon Holmes v. Home Depot USA, Inc., et al.*

(aa) Expert Report (August 2009) on behalf of Sierra Club and the Southern Environmental Law Center in the matter of the air permit challenge for Santee Cooper's proposed Pee Dee plant in South Carolina).

(bb) Statements (May 2008 and September 2009) on behalf of the Minnesota Center for Environmental Advocacy to the Minnesota Pollution Control Agency in the matter of the Minnesota Haze State Implementation Plans.

(cc) Expert Report (August 2009) on behalf of Environmental Defense, in the matter of permit challenges to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(dd) Expert Report and Rebuttal Report (September 2009) on behalf of the Sierra Club, in the matter of challenges to the proposed Medicine Bow Fuel and Power IGL plant in Cheyenne, Wyoming.

(ee) Expert Report (December 2009) and Rebuttal reports (May 2010 and June 2010) on behalf of the United States in connection with the Alabama Power Company NSR Case. *United States v. Alabama Power Company*, CV-01-HS-152-S (Northern District of Alabama, Southern Division).

(ff) Pre-filed Testimony (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed White Stallion Energy Center coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(gg) Pre-filed Testimony (July 2010) and Written Rebuttal Testimony (August 2010) on behalf of the State of New Mexico Environment Department in the matter of Proposed Regulation 20.2.350 NMAC – *Greenhouse Gas Cap and Trade Provisions,* No. EIB 10-04 (R), to the State of New Mexico, Environmental Improvement Board.

(hh) Expert Report (August 2010) and Rebuttal Expert Report (October 2010) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana) – Liability Phase.

(ii) Declaration (August 2010), Reply Declaration (November 2010), Expert Report (April 2011), Supplemental and Rebuttal Expert Report (July 2011) on behalf of the United States in the matter of DTE Energy Company and Detroit Edison Company (Monroe Unit 2). *United States of America v. DTE Energy Company and Detroit Edison Company*, Civil Action No. 2:10-cv-13101-BAF-RSW (Eastern District of Michigan).

(jj) Expert Report and Deposition (August 2010) as well as Affidavit (September 2010) on behalf of Kentucky Waterways Alliance, Sierra Club, and Valley Watch in the matter of challenges to the NPDES permit issued for the Trimble County power plant by the Kentucky Energy and Environment Cabinet to Louisville Gas and Electric, File No. DOW-41106-047.

(kk) Expert Report (August 2010), Rebuttal Expert Report (September 2010), Supplemental Expert Report (September 2011), and Declaration (November 2011) on behalf of Wild Earth Guardians in the matter of opacity exceedances and monitor downtime at the Public Service Company of Colorado (Xcel)'s Cherokee power plant. No. 09-cv-1862 (District of Colorado).

(ll) Written Direct Expert Testimony (August 2010) and Affidavit (February 2012) on behalf of Fall-Line Alliance for a Clean Environment and others in the matter of the PSD Air Permit for Plant Washington issued by Georgia DNR at the Office of State Administrative Hearing, State of Georgia (OSAH-BNR-AQ-1031707-98-WALKER).

(mm) Deposition (August 2010) on behalf of Environmental Defense, in the matter of the remanded permit challenge to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(nn) Expert Report, Supplemental/Rebuttal Expert Report, and Declarations (October 2010, November 2010, September 2012) on behalf of New Mexico Environment Department (Plaintiff-Intervenor), Grand Canyon Trust and Sierra Club (Plaintiffs) in the matter of *Plaintiffs v. Public Service Company of New Mexico* (PNM), Civil No. 1:02-CV-0552 BB/ATC (ACE) (District of New Mexico).

(oo) Expert Report (October 2010) and Rebuttal Expert Report (November 2010) (BART Determinations for PSCo Hayden and CSU Martin Drake units) to the Colorado Air Quality Commission on behalf of Coalition of Environmental Organizations.

(pp) Expert Report (November 2010) (BART Determinations for TriState Craig Units, CSU Nixon Unit, and PRPA Rawhide Unit) to the Colorado Air Quality Commission on behalf of Coalition of Environmental Organizations.

(qq) Declaration (November 2010) on behalf of the Sierra Club in connection with the Martin Lake Station Units 1, 2, and 3. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Case No. 5:10-cv-00156-DF-CMC (Eastern District of Texas, Texarkana Division).

(rr) Pre-Filed Testimony (January 2011) and Declaration (February 2011) to the Georgia Office of State Administrative Hearings (OSAH) in the matter of Minor Source HAPs status for the proposed Longleaf Energy Associates power plant (OSAH-BNR-AQ-1115157-60-HOWELLS) on behalf of the Friends of the Chattahoochee and the Sierra Club).

(ss) Declaration (February 2011) in the matter of the Draft Title V Permit for RRI Energy MidAtlantic Power Holdings LLC Shawville Generating Station (Pennsylvania), ID No. 17-00001 on behalf of the Sierra Club.

(tt) Expert Report (March 2011), Rebuttal Expert Report (June 2011) on behalf of the United States in *United States of America v. Cemex, Inc.*, Civil Action No. 09-cv-00019-MSK-MEH (District of Colorado).

(uu) Declaration (April 2011) and Expert Report (July 16, 2012) in the matter of the Lower Colorado River Authority (LCRA)'s Fayette (Sam Seymour) Power Plant on behalf of the Texas Campaign for the Environment. *Texas Campaign for the Environment v. Lower Colorado River Authority,* Civil Action No. 4:11-cv-00791 (Southern District of Texas, Houston Division).

(vv) Declaration (June 2011) on behalf of the Plaintiffs MYTAPN in the matter of Microsoft-Yes, Toxic Air Pollution-No (MYTAPN) v. State of Washington, Department of Ecology and Microsoft Corporation Columbia Data Center to the Pollution Control Hearings Board, State of Washington, Matter No. PCHB No. 10-162.

(ww) Expert Report (June 2011) on behalf of the New Hampshire Sierra Club at the State of New Hampshire Public Utilities Commission, Docket No. 10-261 – the 2010 Least Cost Integrated Resource Plan (LCIRP) submitted by the Public Service Company of New Hampshire (re. Merrimack Station Units 1 and 2).

(xx) Declaration (August 2011) in the matter of the Sandy Creek Energy Associates L.P. Sandy Creek Power Plant on behalf of Sierra Club and Public Citizen. *Sierra Club, Inc. and Public Citizen, Inc. v. Sandy Creek Energy Associates, L.P.,* Civil Action No. A-08-CA-648-LY (Western District of Texas, Austin Division).

(yy) Expert Report (October 2011) on behalf of the Defendants in the matter of *John Quiles and Jeanette Quiles et al. v. Bradford-White Corporation, MTD Products, Inc., Kohler Co., et al.,* Case No. 3:10-cv-747 (TJM/DEP) (Northern District of New York).

(zz) Declaration (February 2012) and Second Declaration (February 2012) in the matter of *Washington Environmental Council and Sierra Club Washington State Chapter v. Washington State Department of Ecology and Western States Petroleum Association,* Case No. 11-417-MJP (Western District of Washington).

(aaa) Expert Report (March 2012) and Supplemental Expert Report (November 2013) in the matter of *Environment Texas Citizen Lobby, Inc and Sierra Club v. ExxonMobil Corporation et al.,* Civil Action No. 4:10-cv-4969 (Southern District of Texas, Houston Division).

(bbb) Declaration (March 2012) in the matter of *Center for Biological Diversity, et al. v. United States Environmental Protection Agency,* Case No. 11-1101 (consolidated with 11-1285, 11-1328 and 11-1336) (US Court of Appeals for the District of Columbia Circuit).

(ccc) Declaration (March 2012) in the matter of *Sierra Club v. The Kansas Department of Health and Environment*, Case No. 11-105,493-AS (Holcomb power plant) (Supreme Court of the State of Kansas).

*(ddd)* Declaration (March 2012) in the matter of the Las Brisas Energy Center *Environmental Defense Fund et al., v. Texas Commission on Environmental Quality,* Cause No. D-1-GN-11-001364 (District Court of Travis County, Texas, 261st Judicial District).

(eee) Expert Report (April 2012), Supplemental and Rebuttal Expert Report (July 2012), and Supplemental Rebuttal Expert Report (August 2012) on behalf of the states of New Jersey and Connecticut in the matter of the Portland Power plant *State of New Jersey and State of Connecticut (Intervenor-Plaintiff) v. RRI Energy Mid-Atlantic Power Holdings et al.,* Civil Action No. 07-CV-5298 (JKG) (Eastern District of Pennsylvania).

(fff) Declaration (April 2012) in the matter of the EPA's EGU MATS Rule, on behalf of the Environmental Integrity Project.

(ggg) Expert Report (August 2012) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana) – Harm Phase.

(hhh) Declaration (September 2012) in the Matter of the Application of *Energy Answers Incinerator, Inc.* for a Certificate of Public Convenience and Necessity to Construct a 120 MW Generating Facility in Baltimore City, Maryland, before the Public Service Commission of Maryland, Case No. 9199.

(iii) Expert Report (October 2012) on behalf of the Appellants (Robert Concilus and Leah Humes) in the matter of Robert Concilus and Leah Humes v. Commonwealth of Pennsylvania Department of Environmental Protection and Crawford Renewable Energy, before the Commonwealth of Pennsylvania Environmental Hearing Board, Docket No. 2011-167-R.

(jjj) Expert Report (October 2012), Supplemental Expert Report (January 2013), and Affidavit (June 2013) in the matter of various Environmental Petitioners v. North Carolina

DENR/DAQ and Carolinas Cement Company, before the Office of Administrative Hearings, State of North Carolina.

(kkk) Pre-filed Testimony (October 2012) on behalf of No-Sag in the matter of the North Springfield Sustainable Energy Project before the State of Vermont, Public Service Board.

(lll) Pre-filed Testimony (November 2012) on behalf of Clean Wisconsin in the matter of Application of Wisconsin Public Service Corporation for Authority to Construct and Place in Operation a New Multi-Pollutant Control Technology System (ReACT) for Unit 3 of the Weston Generating Station, before the Public Service Commission of Wisconsin, Docket No. 6690-CE-197.

(mmm) Expert Report (February 2013) on behalf of Petitioners in the matter of Credence Crematory, Cause No. 12-A-J-4538 before the Indiana Office of Environmental Adjudication.

(nnn) Expert Report (April 2013), Rebuttal report (July 2013), and Declarations (October 2013, November 2013) on behalf of the Sierra Club in connection with the Luminant Big Brown Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 6:12-cv-00108-WSS (Western District of Texas, Waco Division).

(ooo) Declaration (April 2013) on behalf of Petitioners in the matter of *Sierra Club, et al., (Petitioners) v Environmental Protection Agency et al. (Resppondents),* Case No., 13-1112, (Court of Appeals, District of Columbia Circuit).

(ppp) Expert Report (May 2013) and Rebuttal Expert Report (July 2013) on behalf of the Sierra Club in connection with the Luminant Martin Lake Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 5:10-cv-0156-MHS-CMC (Eastern District of Texas, Texarkana Division).

(qqq) Declaration (August 2013) on behalf of A. J. Acosta Company, Inc., in the matter of *A. J. Acosta Company, Inc., v. County of San Bernardino*, Case No. CIVSS803651.

(rrr) Comments (October 2013) on behalf of the Washington Environmental Council and the Sierra Club in the matter of the Washington State Oil Refinery RACT (for Greenhouse Gases), submitted to the Washington State Department of Ecology, the Northwest Clean Air Agency, and the Puget Sound Clean Air Agency.

(sss) Statement (November 2013) on behalf of various Environmental Organizations in the matter of the Boswell Energy Center (BEC) Unit 4 Environmental Retrofit Project, to the Minnesota Public Utilities Commission, Docket No. E-015/M-12-920.

(ttt) Expert Report (December 2013) on behalf of the United States in *United States of America v. Ameren Missouri*, Civil Action No. 4:11-cv-00077-RWS (Eastern District of Missouri, Eastern Division).

(uuu) Expert Testimony (December 2013) on behalf of the Sierra Club in the matter of Public Service Company of New Hampshire Merrimack Station Scrubber Project and Cost Recovery, Docket No. DE 11-250, to the State of New Hampshire Public Utilities Commission.

(vvv) Expert Report (January 2014) on behalf of Baja, Inc., in *Baja, Inc., v. Automotive Testing and Development Services, Inc. et. al*, Civil Action No. 8:13-CV-02057-GRA (District of South Carolina, Anderson/Greenwood Division).

(www) Declaration (March 2014) on behalf of the Center for International Environmental Law, Chesapeake Climate Action Network, Friends of the Earth, Pacific Environment, and the Sierra Club (Plaintiffs) in the matter of *Plaintiffs v. the Export-Import Bank (Ex-Im Bank) of the United States*, Civil Action No. 13-1820 RC (District Court for the District of Columbia).

(xxx) Declaration (April 2014) on behalf of Respondent-Intervenors in the matter of *Mexichem Specialty Resins Inc., et al., (Petitioners) v Environmental Protection Agency et al.,* Case No., 12-1260 (and Consolidated Case Nos. 12-1263, 12-1265, 12-1266, and 12-1267), (Court of Appeals, District of Columbia Circuit).

(yyy) Direct Prefiled Testimony (June 2014) on behalf of the Michigan Environmental Council and the Sierra Club in the matter of the Application of DTE Electric Company for Authority to Implement a Power Supply Cost Recovery (PSCR) Plan in its Rate Schedules for 2014 Metered Jurisdictional Sales of Electricity, Case No. U-17319 (Michigan Public Service Commission).

(zzz) Expert Report (June 2014) on behalf of ECM Biofilms in the matter of the US Federal Trade Commission (FTC) v. ECM Biofilms (FTC Docket #9358).

(aaaa) Direct Prefiled Testimony (August 2014) on behalf of the Michigan Environmental Council and the Sierra Club in the matter of the Application of Consumers Energy Company for Authority to Implement a Power Supply Cost Recovery (PSCR) Plan in its Rate Schedules for 2014 Metered Jurisdictional Sales of Electricity, Case No. U-17317 (Michigan Public Service Commission).

(bbbb) Declaration (July 2014) on behalf of Public Health Intervenors in the matter of *EME Homer City Generation v. US EPA* (Case No. 11-1302 and consolidated cases) relating to the lifting of the stay entered by the Court on December 30, 2011 (US Court of Appeals for the District of Columbia).

(cccc) Expert Report (September 2014), Rebuttal Expert Report (December 2014) and Supplemental Expert Report (March 2015) on behalf of Plaintiffs in the matter of *Sierra Club and Montana Environmental Information Center (Plaintiffs) v. PPL Montana LLC, Avista Corporation, Puget Sound Energy, Portland General Electric Company, Northwestern Corporation, and Pacificorp (Defendants)*, Civil Action No. CV 13-32-BLG-DLC-JCL (US District Court for the District of Montana, Billings Division).

(dddd) Expert Report (November 2014) on behalf of Niagara County, the Town of Lewiston, and the Villages of Lewiston and Youngstown in the matter of CWM Chemical Services, LLC New

York State Department of Environmental Conservation (NYSDEC) Permit Application Nos.: 9-2934-00022/00225, 9-2934-00022/00231, 9-2934-00022/00232, and 9-2934-00022/00249 (pending).

(eeee) Pre-filed Direct Testimony (March 2015) and Rebuttal Testimony (August 2015) on behalf of Friends of the Columbia Gorge in the matter of the Application for a Site Certificate for the Troutdale Energy Center before the Oregon Energy Facility Siting Council.

(ffff) Expert Report (March 2015) on behalf of Plaintiffs in the matter of *Conservation Law Foundation v. Broadrock Gas Services LLC, Rhode Island LFG GENCO LLC, and Rhode Island Resource Recovery Corporation (Defendants)*, Civil Action No. 1:13-cv-00777-M-PAS (US District Court for the District of Rhode Island).

(gggg) Direct Prefiled Testimony (May 2015) on behalf of the Michigan Environmental Council, the Natural Resources Defense Council, and the Sierra Club in the matter of the Application of DTE Electric Company for Authority to Increase its Rates, Amend its Rate Schedules and Rules Governing the Distribution and Supply of Electric Energy and for Miscellaneous Accounting Authority, Case No. U-17767 (Michigan Public Service Commission).

(hhhh) Expert Report (July 2015) and Rebuttal Expert Report (July 2015) on behalf of Plaintiffs in the matter of *Northwest Environmental Defense Center et. al., v. Cascade Kelly Holdings LLC, d/b/a Columbia Pacific Bio-Refinery, and Global Partners LP (Defendants)*, Civil Action No. 3:14-cv-01059-SI (US District Court for the District of Oregon, Portland Division).

(iiii) Declaration (August 2015, Docket No. 1570376) in support of "Opposition of Respondent-Intervenors American Lung Association, et. al., to Tri-State Generation's Emergency Motion;" Declaration (September 2015, Docket No. 1574820) in support of "Joint Motion of the state, Local Government, and Public Health Respondent-Intervenors for Remand Without Vacatur," *White Stallion Energy Center, LLC v. US EPA*, Case No. 12-1100 (US Court of Appeals for the District of Columbia).

(jjjj) Expert Report (November 2015) on behalf of Appellants in the matter of *Sierra Club, et al. v. Craig W. Butler, Director of Ohio Environmental Protection Agency ey al.,* ERAC Case No. 14-256814.

**3. Occasions where Dr. Sahu has provided oral testimony <u>in depositions, at trial or in similar proceedings</u> include the following:**

(kkkk) Deposition on behalf of Rocky Mountain Steel Mills, Inc. located in Pueblo, Colorado – dealing with the manufacture of steel in mini-mills including methods of air pollution control and BACT in steel mini-mills and opacity issues at this steel mini-mill.

(llll) Trial Testimony (February 2002) on behalf of Rocky Mountain Steel Mills, Inc. in Denver District Court.

(mmmm) Trial Testimony (February 2003) on behalf of the United States in the Ohio Edison NSR Cases, *United States, et al. v. Ohio Edison Co., et al.*, C2-99-1181 (Southern District of Ohio).

(nnnn) Trial Testimony (June 2003) on behalf of the United States in the Illinois Power NSR Case, *United States v. Illinois Power Co., et al.*, 99-833-MJR (Southern District of Illinois).

(oooo) Deposition (10/20/2005) on behalf of the United States in connection with the Cinergy NSR Case. *United States, et* al. *v. Cinergy Corp., et al.*, IP 99-1693-C-M/S (Southern District of Indiana).

(pppp) Oral Testimony (August 2006) on behalf of the Appalachian Center for the Economy and the Environment re. the Western Greenbrier plant, WV before the West Virginia DEP.

(qqqq) Oral Testimony (May 2007) on behalf of various Montana petitioners (Citizens Awareness Network (CAN), Women's Voices for the Earth (WVE) and the Clark Fork Coalition (CFC)) re. the Thompson River Cogeneration plant before the Montana Board of Environmental Review.

(rrrr) Oral Testimony (October 2007) on behalf of the Sierra Club re. the Sevier Power Plant before the Utah Air Quality Board.

(ssss) Oral Testimony (August 2008) on behalf of the Sierra Club and Clean Water re. Big Stone Unit II before the South Dakota Board of Minerals and the Environment.

(tttt) Oral Testimony (February 2009) on behalf of the Sierra Club and the Southern Environmental Law Center re. Santee Cooper Pee Dee units before the South Carolina Board of Health and Environmental Control.

(uuuu) Oral Testimony (February 2009) on behalf of the Sierra Club and the Environmental Integrity Project re. NRG Limestone Unit 3 before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

(vvvv) Deposition (July 2009) on behalf of MTD Products, Inc., in the matter of *Alice Holmes and Vernon Holmes v. Home Depot USA, Inc., et al.*

(wwww) Deposition (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed Coleto Creek coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(xxxx) Deposition (October 2009) on behalf of Environmental Defense, in the matter of permit challenges to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(yyyy) Deposition (October 2009) on behalf of the Sierra Club, in the matter of challenges to the proposed Medicine Bow Fuel and Power IGL plant in Cheyenne, Wyoming.

(zzzz) Deposition (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed Tenaska coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH). (April 2010).

(aaaaa) Oral Testimony (November 2009) on behalf of the Environmental Defense Fund re. the Las Brisas Energy Center before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

(bbbbb) Deposition (December 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed White Stallion Energy Center coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(ccccc) Oral Testimony (February 2010) on behalf of the Environmental Defense Fund re. the White Stallion Energy Center before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

(ddddd) Deposition (June 2010) on behalf of the United States in connection with the Alabama Power Company NSR Case. *United States v. Alabama Power Company*, CV-01-HS-152-S (Northern District of Alabama, Southern Division).

(eeeee) Trial Testimony (September 2010) on behalf of Commonwealth of Pennsylvania – Dept. of Environmental Protection, State of Connecticut, State of New York, State of Maryland, and State of New Jersey (Plaintiffs) in connection with the Allegheny Energy NSR Case in US District Court in the Western District of Pennsylvania. *Plaintiffs v. Allegheny Energy Inc., et al.,* 2:05cv0885 (Western District of Pennsylvania).

(fffff) Oral Direct and Rebuttal Testimony (September 2010) on behalf of Fall-Line Alliance for a Clean Environment and others in the matter of the PSD Air Permit for Plant Washington issued by Georgia DNR at the Office of State Administrative Hearing, State of Georgia (OSAH-BNR-AQ-1031707-98-WALKER).

(ggggg) Oral Testimony (September 2010) on behalf of the State of New Mexico Environment Department in the matter of Proposed Regulation 20.2.350 NMAC – *Greenhouse Gas Cap and Trade Provisions,* No. EIB 10-04 (R), to the State of New Mexico, Environmental Improvement Board.

(hhhhh) Oral Testimony (October 2010) on behalf of the Environmental Defense Fund re. the Las Brisas Energy Center before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

(iiiii) Oral Testimony (November 2010) regarding BART for PSCo Hayden, CSU Martin Drake units before the Colorado Air Quality Commission on behalf of the Coalition of Environmental Organizations.

(jjjjj) Oral Testimony (December 2010) regarding BART for TriState Craig Units, CSU Nixon Unit, and PRPA Rawhide Unit) before the Colorado Air Quality Commission on behalf of the Coalition of Environmental Organizations.

(kkkkk) Deposition (December 2010) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana).

(lllll) Deposition (February 2011 and January 2012) on behalf of Wild Earth Guardians in the matter of opacity exceedances and monitor downtime at the Public Service Company of Colorado (Xcel)'s Cherokee power plant. No. 09-cv-1862 (D. Colo.).

(mmmmm) Oral Testimony (February 2011) to the Georgia Office of State Administrative Hearings (OSAH) in the matter of Minor Source HAPs status for the proposed Longleaf Energy Associates power plant (OSAH-BNR-AQ-1115157-60-HOWELLS) on behalf of the Friends of the Chattahoochee and the Sierra Club).

(nnnnn) Deposition (August 2011) on behalf of the United States in *United States of America v. Cemex, Inc.*, Civil Action No. 09-cv-00019-MSK-MEH (District of Colorado).

(ooooo) Deposition (July 2011) and Oral Testimony at Hearing (February 2012) on behalf of the Plaintiffs MYTAPN in the matter of Microsoft-Yes, Toxic Air Pollution-No (MYTAPN) v. State of Washington, Department of Ecology and Microsoft Corporation Columbia Data Center to the Pollution Control Hearings Board, State of Washington, Matter No. PCHB No. 10-162.

(ppppp) Oral Testimony at Hearing (March 2012) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana).

(qqqqq) Oral Testimony at Hearing (April 2012) on behalf of the New Hampshire Sierra Club at the State of New Hampshire Public Utilities Commission, Docket No. 10-261 – the 2010 Least Cost Integrated Resource Plan (LCIRP) submitted by the Public Service Company of New Hampshire (re. Merrimack Station Units 1 and 2).

(rrrrr) Oral Testimony at Hearing (November 2012) on behalf of Clean Wisconsin in the matter of Application of Wisconsin Public Service Corporation for Authority to Construct and Place in Operation a New Multi-Pollutant Control Technology System (ReACT) for Unit 3 of the Weston Generating Station, before the Public Service Commission of Wisconsin, Docket No. 6690-CE-197.

(sssss) Deposition (March 2013) in the matter of various Environmental Petitioners v. North Carolina DENR/DAQ and Carolinas Cement Company, before the Office of Administrative Hearings, State of North Carolina.

(ttttt) Deposition (August 2013) on behalf of the Sierra Club in connection with the Luminant Big Brown Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 6:12-cv-00108-WSS (Western District of Texas, Waco Division).

(uuuuu) Deposition (August 2013) on behalf of the Sierra Club in connection with the Luminant Martin Lake Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 5:10-cv-0156-MHS-CMC (Eastern District of Texas, Texarkana Division).

(vvvvv) Deposition (February 2014) on behalf of the United States in *United States of America v. Ameren Missouri*, Civil Action No. 4:11-cv-00077-RWS (Eastern District of Missouri, Eastern Division).

(wwwww) Trial Testimony (February 2014) in the matter of *Environment Texas Citizen Lobby, Inc and Sierra Club v. ExxonMobil Corporation et al.,* Civil Action No. 4:10-cv-4969 (Southern District of Texas, Houston Division).

(xxxxx) Trial Testimony (February 2014) on behalf of the Sierra Club in connection with the Luminant Big Brown Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 6:12-cv-00108-WSS (Western District of Texas, Waco Division).

(yyyyy) Deposition (June 2014) and Trial (August 2014) on behalf of ECM Biofilms in the matter of the *US Federal Trade Commission (FTC) v. ECM Biofilms* (FTC Docket #9358).

(zzzzz) Deposition (February 2015) on behalf of Plaintiffs in the matter of *Sierra Club and Montana Environmental Information Center (Plaintiffs) v. PPL Montana LLC, Avista Corporation, Puget Sound Energy, Portland General Electric Company, Northwestern Corporation, and Pacificorp (Defendants)*, Civil Action No. CV 13-32-BLG-DLC-JCL (US District Court for the District of Montana, Billings Division).

(aaaaaa) Oral Testimony at Hearing (April 2015) on behalf of Niagara County, the Town of Lewiston, and the Villages of Lewiston and Youngstown in the matter of CWM Chemical Services, LLC New York State Department of Environmental Conservation (NYSDEC) Permit Application Nos.: 9-2934-00022/00225, 9-2934-00022/00231, 9-2934-00022/00232, and 9-2934-00022/00249 (pending).

(bbbbbb) Deposition (August 2015) on behalf of Plaintiff in the matter of *Conservation Law Foundation (Plaintiff) v. Broadrock Gas Services LLC, Rhode Island LFG GENCO LLC, and Rhode Island Resource Recovery Corporation (Defendants)*, Civil Action No. 1:13-cv-00777-M-PAS (US District Court for the District of Rhode Island).

(cccccc) Testimony at Hearing (August 2015) on behalf of the Sierra Club in the matter of *Amendments to 35 Illinois Administrative Code Parts 214, 217, and 225* before the Illinois Pollution Control Board, R15-21.

(dddddd) Deposition (May 2015) on behalf of Plaintiffs in the matter of *Northwest Environmental Defense Center et. al., (Plaintiffs) v. Cascade Kelly Holdings LLC, d/b/a Columbia Pacific Bio-Refinery, and Global Partners LP (Defendants)*, Civil Action No. 3:14-cv-01059-SI (US District Court for the District of Oregon, Portland Division).

(eeeeee) Trial Testimony (October 2015) on behalf of Plaintiffs in the matter of *Northwest Environmental Defense Center et. al., (Plaintiffs) v. Cascade Kelly Holdings LLC, d/b/a Columbia Pacific Bio-Refinery, and Global Partners LP (Defendants)*, Civil Action No. 3:14-cv-01059-SI (US District Court for the District of Oregon, Portland Division).

February 29, 2016

*Via Electronic Mail*

Supervisor Marc Harris
Power Plant NPDES Permitting, Industrial Wastewater Section
Florida Department of Environmental Protection

Re: *Bringing Florida Coal Plants Into Compliance With The New Effluent Limitations Guidelines*

Dear Supervisor Harris:

As you know, the U.S. Environmental Protection Agency ("EPA") updated the Effluent Limitations Guidelines ("ELGs") for steam electric power plants to protect our waters from the toxic pollutants in these generators' discharges.[1] Reflecting decades of advances in water quality science and control technology,[2] the ELGs became effective on January 4, 2016. Now coal-burning[3] power plants across the country must come into compliance with the ELGs "as soon as possible;" for many plants the deadline is November 1, 2018.[4] The undersigned groups and our tens of thousands of Florida members therefore urge you, as the supervisor of power plant NPDES permitting, to:

1. Promptly issue draft revised NPDES permits and fact sheets for Florida coal plants to require these plants to comply with the ELGs by November 1, 2018, unless you conclude that a later date is appropriate based on a well-documented justification that is consistent with EPA's guidelines in the final rule and the public interest in securing vital water protections as soon as possible.

2. Take public comment for no less than 60 days on draft NPDES permits and fact sheets for Florida coal plants that include your ELGs compliance determinations.

3. Work with the operators of the three Florida coal plants without NPDES permits or announced plans for retirement, and other stakeholders, to ensure that these plants achieve timely compliance with the applicable requirements in the ELGs.

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[1] U.S. EPA, *Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category*, 80 Fed. Reg. 67,837 (Nov. 3, 2015), codified at 40 C.F.R. part 423.
[2] *See* 80 Fed. Reg. at 67,840.
[3] *See* 80 Fed. Reg. at 67,839, n. 1 ("power plants covered by the ELGs use nuclear or fossil fuels, such as coal, oil, or natural gas, to heat water in boilers, which generate steam." [emphasis added]).
[4] *See, e.g.*, 40 C.F.R. § 423.13(g)(1)(i) (establishing deadline for compliance with FGD wastewater standards; identical language appears in the provisions for other regulated waste streams).

4. Work with all Florida coal plant operators, fellow regulators, and other stakeholders to determine compliance obligations and timelines for all other applicable water-side requirements.

As we discuss below, timing is critical. Through the permit renewal process, making prompt compliance determinations will help attain and maintain safe water quality in Florida. Prompt compliance determinations will also allow fellow regulators to assess whether it is more prudent to retire—rather than spend huge sums of public monies to retrofit—these aging coal plants in the rapidly evolving regulations and market conditions concerning coal and carbon.

<u>In short, our overarching request is that you take swift action to determine what it will take to bring *all* Florida coal plants into timely compliance with *all* applicable water-side requirements, set deadlines for the same, and meet with us to discuss the way forward</u>.

## I. DEP Should Promptly Issue Draft Permits And Fact Sheets For Florida Coal Plants Incorporating The ELGs And Specifying The "As Soon As Possible" Compliance Deadline.

The ELGs impose stringent, technology-based effluent limitations on the discharges of several common types of effluent (i.e., waste streams) from coal plants, including fly ash and bottom ash transport waters, and wastewater from flue gas desulphurization ("FGD") systems.[5] Under the Clean Water Act, it is the responsibility of state permitting authorities to incorporate the ELGs into the NPDES permits for coal plants "as a floor or a minimum level of control."[6] Just as it is the responsibility of the coal plant operators to "immediately begin"—"even prior to the permit renewal process"—their ELGs compliance analyses, and convey to state authorities the information they need to complete independent evaluations.[7]

In particular, when revising permits for direct dischargers—facilities that discharge to surface waters—state permitting authorities must determine the compliance deadline for the ELGs, which is to be "as soon as possible beginning November 1, 2018, but no later than December 31, 2023." To be clear, the phrase "as soon as possible" means November 1, 2018, unless the permitting authority establishes a later date based on a well-documented justification and the

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[5] *See* 40 C.F.R. § 423.13.
[6] 80 Fed. Reg. at 67,882.
[7] *Id.* at 67,882-83 ("Regardless of when a plant's NPDES permit is ready for renewal, the plant should <u>immediately begin</u> evaluating how it intends to comply with the requirements of the final ELGs. In cases where significant changes in operation are appropriate, the plant should discuss such changes with the permitting authority and evaluate appropriate steps and a timeline for the changes, <u>even prior to the permit renewal process</u>." [emphasis added]).

authority's case-by-case consideration of certain enumerated factors in the final rule, discussed further below.

The November 1, 2018, compliance deadline is achievable. EPA's rulemaking record shows that, depending on the scope of required retrofit at a particular coal plant, industry itself projects that the total time needed for fly ash and bottom ash system retrofits ranges from 27 to 36 months, from the start of conceptual engineering to final commissioning.[8] With appropriate planning and direction from state permitting authorities, many plants thus can and should be required to bring their operations into compliance by November 1, 2018, especially given that the updates to the ELGs were developed and thus anticipated by industry over several decades.

EPA rightly urges permitting authorities to "provide a well-documented justification for how [they] determined the 'as soon as possible' date in the fact sheet or administrative record for the permit," and to "explain why allowing additional time to meet the limitations is appropriate," if that is the authority's conclusion.[9] EPA specifies that any determination that a later date is appropriate should be substantiated by the public record and reflect consideration of the following factors:

- ◊ "Time to expeditiously plan (including time to raise capital), design, procure, and install equipment to comply with the requirements [in the ELGs]."[10] EPA explains that "the permitting authority should evaluate what operational changes are expected at the plant to meet the new BAT limitations for each waste stream, including the types of new treatment technologies that the plant plans to install, process changes anticipated, and the timeframe estimated to plan, design, procure, and install any relevant technologies."[11]

- ◊ Changes being made or planned to bring the coal plant into compliance with Clean Air Act requirements, as well as the requirements for the disposal of coal combustion residuals under Subtitle D of the Resource Conservation and Recovery Act.[12]

- ◊ For FGD wastewater requirements only, an initial commissioning period to optimize the installed equipment.[13] EPA explains that the "record demonstrates that plants installing

[8] Utility Water Act Group, *Comments on EPA's Proposed Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category* (Sept. 30, 2013), Attach. 11: Retrofitting Dry Bottom Ash Handling, Attach 13: Retrofitting Dry Fly Ash Handling.
[9] *See* U.S. EPA, Technical Development Document for the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category (Sept. 2015), at p. 14-11, *available at* http://goo.gl/PpzQ4F [hereinafter "TDD"].
[10] *Id.*
[11] *Id.*
[12] 40 C.F.R. § 423.11(t)(2).

the FGD technology basis spent several months optimizing its operation (initial commissioning period). Without allowing additional time for optimization, the plant would likely not be able to meet the limitations because they are based on the operation of optimized systems."[14]

◊ Other factors as appropriate.[15]

Consistent with these EPA guidelines and the public interest in securing vital water protections as soon as possible, you should incorporate the ELGs into the NPDES permits for eight Florida coal plants—Big Bend, Crist, Crystal River, Northside/St. Johns, Seminole, Stanton, Indiantown and Polk.

As you are aware, NPDES permits for the first six of these plants (Big Bend through Stanton) expire this year or next year. Therefore, you should be working with their operators to ensure that they do, in fact, "immediately begin" their ELGs compliance analyses, and are prepared to provide you and the public the information needed to evaluate and set the "as soon as possible" ELGs compliance deadline in their NPDES renewal permits.

Moreover, even if Indiantown and Polk's NPDES permits do not expire until 2019, their operators have the same responsibility to "immediately begin"—"even prior to the permit renewal process"—their ELGs compliance analyses, and, similarly, you should be working with these plant's operators to expeditiously set and achieve the "as soon as possible" ELGs compliance deadline.

Therefore, we urge you to make prompt compliance determinations for all eight coal plants, first, by collecting and making publicly available the information from their operators regarding their potential to comply with the ELGs by November 1, 2018, and, second, by closely scrutinizing and verifying this information as you revise NPDES permits and adjudicate any requests to extend the ELGs compliance deadline beyond November 1, 2018.

With respect to extension requests, we recognize that for other regulations, for instance, the Mercury and Air Toxics Standards, it has been the Department of Environmental Protection's ("DEP") practice to carefully review and grant such requests only in exceptional cases. Similarly, DEP should continue this practice here and use its broad information collection powers and stakeholder engagement process to help adjudicate the merits of any extension requests for ELGs compliance.

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[13] 40 C.F.R. § 423.11(t)(3).
[14] TDD at 14-11.
[15] 40 C.F.R. §423.11(t)(4).

## II. DEP Should Take Public Comment For No Less Than 60 Days On Draft NPDES Permits And ELGs Compliance Determinations For Coal Plants.

Because of the significance of the water protections in the ELGs and the findings you must make regarding the compliance date, as discussed above, we urge you to take public comment for no less than 60 days on these draft NPDES renewal permits and compliance determinations for the ELGs. Doing so is entirely consistent with DEP's mission to serve the public interest and to conduct its environmental oversight responsibilities with transparency.[16]

## III. DEP Should Work With Florida Coal Plant Operators That Do Not Have NPDES Permits, And Other Stakeholders, To Ensure That Their Plants Achieve Timely Compliance With The Applicable Requirements In The ELGs.

Three coal plants in Florida—C.D. McIntosh, Jr., Cedar Bay, and Deerhaven—are not covered by NPDES permits but nonetheless must assure that the toxic pollutants in their effluent are properly treated to meet the requirements in the ELGs. For example, the McIntosh plant in Lakeland discharges effluent containing toxic pollutants such as mercury to publicly owned treatment works. These discharges are subject to revised Pretreatment Standards for Existing Sources (PSES) in the ELGs.[17] The PSES are self-implementing, meaning these requirements apply directly, without the need for any permit revision, and must be met by the November 1, 2018, compliance deadline in the final rule.[18] Sierra Club provided McIntosh's operator, Lakeland Electric, with a compliance analysis specifying the implications of the PSES for this plant.[19] We urge you to work with the DEP PSES coordinator, the operators of all three plants, as well as other stakeholders, to ensure that they achieve timely compliance with the applicable requirements in the ELGs.

## IV. Timing Is Critical.

As we noted above, timing is critical. Through the water permit renewal process, you should make prompt ELGs compliance determinations for three key reasons:

First, prompt ELGs compliance determinations, including setting the "as soon as possible" deadline, are needed to secure safe water for Floridians. EPA updated the ELGs to address the "outstanding public health and environmental problem" related to the discharge of effluent containing toxic and other pollutants from power plants, including Florida's aging coal plants.[20]

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[16] *See, e.g.*, FDEP Mission Statement & Objectives, *available at* http://goo.gl/tTk3mp.
[17] *See* 40 C.F.R. § 423.16.
[18] *Id.*
[19] *See* Sierra Club letter to General Manager Ivy of January 26, 2016 and exhibits, on file with DEP.
[20] 80 Fed. Reg. at 67,840-41.

Indeed, the "ELGs that EPA promulgated and revised in 1974, 1977, and 1982 are out of date" and, as a result, permits issued to coal plants under those previous, outdated ELGs "do not adequately control the pollutants (toxic metals and other) discharged by this industry, nor do they reflect relevant process and technology advances that have occurred in the last 30-plus years."[21]

Furthermore, as you know, NPDES permits have a maximum term of five years.[22] The limited permit duration and the anti-backsliding requirement in the Clean Water Act aim to achieve gradual, iterative, but continual progress towards restoring the nation's waters. As the D.C. Circuit has explained, "[t]he essential purpose of this series of progressively more demanding technology-based standards was not only to stimulate but to press development of new, more efficient and effective technologies."[23] As pollution control technologies improve, higher standards are incorporated into the NPDES permits of existing facilities upon renewal. This makes timely renewal of NPDES permits a linchpin of the Clean Water Act, and an essential part of your office's responsibilities.

Second, prompt ELGs compliance determinations will help assure that coal plant operators do, in fact, reduce as soon as possible the toxic discharges into our waters, thus avoiding regulatory uncertainty and any avoidable delay in achieving these vital water protections.

Third, prompt ELGs compliance determinations will help level the playing field between coal plants with NPDES permits and those without them, so that all Florida coal plants achieve compliance with the ELGs as soon as possible.

For all these reasons, we urge you to make prompt determinations of what it will take to bring Florida coal plants into compliance with the ELGs, and promptly adjudicate any requests to extend the compliance deadline beyond November 1, 2018.

## V. DEP Should Do Its Part To Protect Consumers From Piecemeal Regulatory Compliance Decisions That Fail To Identify And Pursue Cost-Effective Alternatives To Spending Billions Of Dollars To Retrofit Florida's Aging Coal Plants.

As we noted above, fellow regulators are deciding whether to spend huge sums of public monies on retrofitting aging coal plants to meet several environmental regulations with fast-approaching compliance deadlines. Indeed, because burning coal is one of the most polluting and

[21] 80 Fed. Reg. at 67,840 [emphasis added].
[22] *See* 33 U.S.C. § 1342(b)(1)(B).
[23] *Natural Res. Def. Council v. U.S. Envtl. Prot. Agency*, 822 F.2d 104, 124 (D.C. Cir. 1987).

increasingly costly ways to generate electricity, regulators—and coal plant operators—will soon decide whether to take as much as 4 billion dollars from Floridian families and businesses for retrofits, alone, to these plants.[24] Yet there has not been any comprehensive accounting of just how much more Floridians may have to pay to rely on these plants to keep the lights on, much less a fair comparison to available alternatives such as retiring these plants and investing instead in modern clean energy resources such as solar, wind, energy efficiency, and storage that are at record low prices.[25] Indeed, while operators project coal plant retrofits may cost 4 billion dollars or more, they admit this huge sum does not account for all the costs and risks associated with relying on coal plants in the rapidly evolving regulations and market conditions concerning coal and carbon.[26]

We urge you to do your part to fill this acute information gap, first, by providing much needed clarity regarding ELGs compliance obligations and timelines for coal plants and, second, by providing the same for other applicable water-side requirements. For example, four Florida coal plants—Big Bend, Crist, Crystal River, Northside—use antiquated once-through cooling systems that needlessly harm millions of aquatic organisms, potentially including federally listed species. In fact, it has been unlawful to use such rudimentary cooling systems when building new power plants since 2001,[27] and generally none have been built since the 1980's precisely because of their adverse biological impacts.[28] To be sure, aging coal plants such as Big Bend, Crist, Crystal River, and Northside also must come into compliance with modern, species-protecting cooling standards under the Endangered Species Act and the Cooling Water Intake Structure Rule. Therefore, we urge you to work closely with the operators, fellow regulators, and other stakeholders to comprehensively identify Florida coal plants' water-side compliance obligations and timelines. The sooner, the better. As we discussed above, huge sums of public monies and vitally important water resources are at stake.

Thank you for your consideration, and we look forward to the opportunity to meet with you to discuss the way forward.

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[24] *See, e.g.,* Sierra Club letter of December 12, 2015, Table 1 (showing electric utilities' incomplete regulatory compliance costs estimates totaling 3-4 billion dollars through 2024), *available at* http://goo.gl/CT8l1j [hereinafter "2015 Letter"].
[25] *See generally id.*
[26] *See* 2015 TYSP First Supplemental Staff Data Request No. 38*, available at* http://goo.gl/nhBGEi; *see also* 2015 Letter, 7-8 (discussing incomplete nature of utility retrofit cost estimates).
[27] *See* 66 Fed. Reg. 65256 (2001) ("Phase I Rules"); *see also* 40 CFR §§125.80(a), 125.81(a) (2008).
[28] *See*, *e.g.*, 65 Fed. Reg. 49060, 49087 and 49094 (Aug. 10, 2000) ("Draft Phase I Rules") (noting that since the 1970's there has been extensive and increasing recycling and reuse of cooling water and that by the year 2000 most new industrial facilities used closed-cycle cooling systems).

Sincerely,

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