

JULY 2021

# CLEANING UP COAL ASH FOR GOOD

How clean closure of coal ash impoundments provides jobs, economic benefits and redevelopment opportunities for host communities



## **ACKNOWLEDGEMENTS**

We are grateful to KirK Engineering & Natural Resources, Inc. and the Applied Economics Clinic who provided the technical analysis for this report and whose contributions made this report possible. This report was prepared by Lisa Evans and Kate French. Invaluable research and support were provided by Western Organization of Resource Councils; Northern Plains Resource Council; Frank Holleman and Nick Torrey, Southern Environmental Law Center; Indra Frank, Hoosier Environmental Council; Jenny Harbine, Earthjustice; Patricia Shuba, Labadie Environmental Organization; and the community advocates in Michigan City, IN, including Ashley Williams, La'Tonya Troutman and Susan Thomas of Just Transition NWI, and Nancy Moldenhauer, Chair, Michigan City Sustainability Commission; and Nancy Kolasa, former member People In Need of Environmental Safety (P.I.N.E.S.).

Responsibility for all mistakes rests solely with the author. Design by Stuart Cox, Jr. All views and opinions expressed in this report are those of Earthjustice and do not necessarily reflect the views of Earthjustice's funders.

## TABLE OF CONTENTS

Executive Summary .....	3
Introduction .....	8
Methodology .....	11
Findings .....	13
Community Case Study: Grainger Generating Station .....	17
Community Case Study: Michigan City Generating Station .....	20
Community Case Study: Colstrip Steam Electric Station .....	23
Conclusion .....	26

## LIST OF FIGURES AND TABLES

Table 1: Annual average short-term impacts of coal ash pond closure alternatives at three plants .....	4
Table 2: Description of Closure Plans Analyzed at the Three Coal Plants .....	9
Figure 1: Cross-section of the leaking coal ash pond at the Ameren Labadie Energy Center in Missouri .....	10
Figure 2: Average Annual Income (\$m) Generated for Closure Alternatives at Three Plant Sites .....	3
Figure 3: Average Annual Total Jobs for Closure Alternatives at Three Plant Sites .....	13
Figure 4: Average annual job impacts for “closure phase” of coal ash pond cleanup at Grainger .....	14
Figure 5: Average annual income impacts for “closure phase” of coal ash pond cleanup at Grainger.....	14
Figure 6: Average annual job impacts for “closure phase” of coal ash pond cleanup at Michigan City .....	15
Figure 7: Average annual income impacts for “closure phase” of coal ash pond cleanup at Michigan City .....	15
Figure 8: Average annual job impacts for coal ash pond cleanup and remediation at Colstrip .....	16
Figure 9: Average annual income impacts for coal ash pond cleanup and remediation at Colstrip .....	16
Table 3: Grainger: Comparison of Clean Closure vs Cap-in-Place Benefits .....	18
Table 4: Michigan City: Comparison of Clean Closure vs Leave-in-Place Benefit.....	21
Table 5: Colstrip: Comparison of Clean Closure vs Cap-in-Place Benefits.....	24

## TECHNICAL STUDIES

KirK Engineering & Natural Resources, Inc.. Coal Combustion Residual Closure Analysis: Cost and Jobs Associated with Different Closure Alternatives, (“KirK Engineering Study”)

Applied Economics Clinic. Background Report: Benefits of Coal Ash Cleanup and Remediation, (“AEC Study”)

KirK Engineering & Natural Resources, Inc. Reuse and Economics Impacts: NIPSCO Power Generation Facility, Michigan City, IN, (KirK Engineering Reuse Study)

## EXECUTIVE SUMMARY

Coal combustion residuals (“CCR”) or “coal ash” is the toxic waste generated by the combustion of coal. Coal ash is one of the largest industrial waste streams in the U.S.<sup>1</sup> and includes fly ash, bottom ash, boiler slag, and flue gas desulfurization sludge. Across the U.S., nearly all coal-burning power plants have severely contaminated groundwater by disposing of their toxic ash in leaking impoundments and landfills.<sup>2</sup> The pressing problem of how to clean up these contaminated sites is a high-stakes question for communities near coal plants. When comparing the economic, environmental, and community impacts of different closure methods, this analysis finds that there are significantly higher benefits from a clean closure when all ash is removed from leaking ponds and the local community is engaged in closure and redevelopment planning processes. The recommendations outlined in this report will help regulators, policymakers and communities choose effective coal ash pond closures that achieve safe and healthy environments as well as brighter economic futures.

Many hundreds of polluting coal ash sites around the country will be closed in the next few years to comply with federal CCR regulations. Coal ash ponds, or impoundments, often contain millions of tons of heavy-metal laden waste spanning hundreds of acres.<sup>3</sup> Recent industry data demonstrate that 92 percent of coal ash ponds are polluting the underlying groundwater to levels that exceed federal drinking water standards.<sup>4</sup> Coal ash contaminates groundwater with carcinogens, neurotoxins, developmental toxins and other dangerous chemicals, including arsenic, boron, lithium, chromium, cobalt, lead, lithium, manganese, molybdenum, and radium. This groundwater can flow to drinking water wells<sup>5</sup> or pollute nearby surface water.

There are two primary ways to close coal ash impoundments: draining the surface water and capping the pond (cap-in-place), or entirely removing the ash from the impoundment to a lined landfill or for beneficial reuse (clean closure). The electric power industry has shown a preference for cap-in-place closure because it is easier to implement as well as relatively low cost. Cap-in-place closure, however, does not prevent the continued release of contaminants to groundwater underneath the cap if the ash is in contact with the aquifer.<sup>6</sup> Cap-in-place also leaves CCR surface impoundments permanently vulnerable to catastrophic failure due to floods or cap failure during extreme storms.

In contrast, a clean closure approach includes excavation and removal of CCR either to a landfill compliant with federal regulations<sup>7</sup> or for beneficial reuse as a raw material in products such as concrete or drywall. Removal of CCR typically mitigates both the source of groundwater pollution and the risk of catastrophic spills from impoundment failures due to floods or other extreme weather events.

These different closure approaches result in varying environmental, economic, and public health outcomes for a local community. Quantifying these different impacts can help inform regulators, public officials and area residents as they determine the appropriate closure for specific sites.

**When comparing the economic, environmental, and community impacts of different closure methods, this analysis finds that there are significantly higher benefits from a clean closure when all ash is removed from leaking ponds and the local community is engaged in closure and redevelopment planning processes.**

**Table 1: Annual average short-term impacts of coal ash pond closure alternatives at three plants<sup>10</sup>**

	Closure Method	Direct	Indirect	Induced	Total
<b>Grainger Jobs (Avg annual FTEs) 2013 - 2020</b>	Clean Closure	29	23	15	67
	Cap-in-Place	13	7	5	24
<b>Grainger Income (\$m) 2013 - 2020</b>	Clean Closure	\$1.6	\$1.5	\$0.6	\$3.8
	Cap-in-Place	\$0.7	\$0.4	\$0.2	\$1.3
<b>Michigan City Jobs (Avg annual FTEs) 2021 - 2034</b>	Clean Closure	21	30	19	70
	Leave-in-Place	3	4	3	10
<b>Michigan City Income (\$m) 2021 - 2034</b>	Clean Closure	\$1.6	\$2.0	\$0.9	\$4.5
	Leave-in-Place	\$0.3	\$0.2	\$0.1	\$0.6
<b>Colstrip Jobs (Avg annual FTEs) 2020 - 2029</b>	Clean Closure	218	75	111	404
	Cap-in-Place	92	24	43	158
<b>Colstrip Income (\$m) 2021 - 2029</b>	Clean Closure	\$16.6	\$4.3	\$5.4	\$26.3
	Cap-in-Place	\$7.9	\$1.7	\$2.4	\$12.0

These impacts should also be considered when decision makers evaluate and design rules and policies to guide ash pond closures across the country.

This report provides an analysis of closure and cleanup of coal ash ponds located at three coal-fired power plants in the U.S. The report begins with a summary of the findings and follows with three technical studies by environmental engineers and economists who calculated the economic and environmental impact of closure at three coal-burning power plants: the Grainger Generating Station in South Carolina, the Michigan City Generating Station in Indiana, and the Colstrip Steam Electric Station in Montana. At each of the three plants evaluated in this study, CCR was disposed of in unlined surface impoundments or fill areas that are in contact with groundwater. For each site, the team compared the outcomes for a cap-in-place (or leave-in-place) alternative and a clean closure alternative.<sup>8</sup> The economic analysis further quantified the full spectrum of job creation, income, and gross domestic product (GDP) impacts of each closure scenario.<sup>9,10</sup>

**Clean closures resulted in 2 to 7.5 times greater positive economic impact for each community over the cap or leave-in-place alternative.**



Michigan City Generating Station on Lake Michigan at sunrise, Michigan City, IN. Photo by EJ Rodriguez / Getty Images

**In each case, the job creation, economic activity, and environmental benefits were far greater for clean closure than for cap-in-place.** These benefits are shown in Table 1.

Clean closures resulted in 2 to 7.5 times greater positive economic impacts for each community over the cap or leave-in-place alternative. A clean closure requires far more labor in the short term “closure phase” than the cap- or leave-in-place alternative. While the cap- or leave-in-place alternative requires slightly more labor and expenses in the longer term “Operation and Maintenance” period, these increases are very minimal in comparison.<sup>11</sup>

Ultimately, this report demonstrates the great importance of safe and appropriate closure and cleanup of coal ash pollution for the local community. Improper and ineffective cleanup such as cap-in-place may lead to legacy pollution that can devastate both the social fabric and economic well-being of a community. While this analysis focuses on the increase in jobs and economic benefits from effective coal ash cleanup, it is also critical to consider additional benefits that flow from proper cleanup, such as improved public health outcomes, increased property values, healthy freshwater ecosystems, and redevelopment opportunities. Our report does not quantify these additional benefits, but they are addressed in a special discussion section on the potential redevelopment opportunities in Michigan City, Indiana.<sup>12</sup>

**The message of this report is extremely time sensitive. Hundreds of ash ponds must be closed over the next several years, and many plant owners are proposing inadequate and sometimes illegal and dangerous closures.**

Further, it is important to recognize that the social, economic and health burdens of coal ash pollution nationwide is carried disproportionately by communities of color and low-income communities.<sup>13</sup> These communities are unlikely to have the resources to test their drinking water, and they often lack access to adequate medical care and legal assistance. In addition, these communities frequently confront multiple toxic threats from industrial pollution and the impacts of poverty that accentuate health risks. Finally, such communities often lack the political power necessary to garner the attention and assistance of regulatory agencies and elected officials. In sum, coal ash creates environmental injustice, where harm falls disproportionately on our nation's most vulnerable communities. Each of the sites examined in this report is located near populations that have a disproportionate percentage of low-income residents and/or people of color.

The message of this report is extremely time sensitive. Hundreds of ash ponds must be closed over the next several years, and many plant owners are proposing inadequate and sometimes illegal and dangerous closures. To make matters worse, federal and state regulators often fail to provide oversight and are willing to rubber stamp industry plans. It is clear that thorough cleanup will not happen just because it is a good idea. Complete and effective coal ash closures and cleanups depend on strong regulations, rigorous enforcement and oversight from regulatory agencies, and fully-funded community engagement. It is incumbent on our national leaders and agencies to strengthen and enforce federal coal ash regulations and ensure no coal plant community is left with a toxic waste legacy. The recommendations below are aimed at ensuring that proper closure and cleanup are carried out at every coal ash site in the United States.<sup>14</sup>

## RECOMMENDATIONS

### The U.S. Environmental Protection Agency ("EPA") must:

1. **Enforce** the 2015 federal CCR Rule's prohibition on cap-in-place closure when the coal ash impoundment is in contact with groundwater.<sup>15</sup> Failure to enforce this provision is resulting in the closure of toxic dumps in groundwater, ensuring that hazardous chemicals will continue to leak into water in perpetuity.
2. **Enforce** the CCR Rule's prohibition on cap-in-place closure when the coal ash impoundment is located in a floodplain and susceptible to floods that may destabilize the toxic waste.<sup>16</sup> Failure to enforce this provision will result in significant and long-term threats to water resources throughout the United States.
3. **Provide financial assistance** to frontline communities through *EPA's Technical Assistance Services for Communities (TASC) Program* and other grant programs to empower residents to participate meaningfully in the cleanup and closure of toxic coal ash dumps and achieve just transition.
4. **Provide oversight** in communities where closure and cleanup are occurring to ensure coal ash excavation, transport, reuse and disposal are done safely and without the release

of toxic contaminants to air, soil or water in the host communities, at the work sites, in communities along transport routes, and at the final disposal site. Excavation and transport of coal ash requires air monitoring and protective measures to prevent the inhalation of toxic ash by cleanup workers and nearby residents. Finally, ensure that final disposal does not disproportionately burden communities of color and low-income communities.

**State and Local Officials must:**

1. **Provide oversight and enforcement** to ensure that the requirements of the 2015 CCR Rule are followed by all owners and operators in a timely manner. States have the authority to enforce all provisions of the CCR Rule, or equivalent state regulations, including the prohibition on leaving coal ash in groundwater and floodplains and the requirement to initiate a timely cleanup of contaminated groundwater.
2. **Provide support and resources to local communities.** State and local officials must consider the local economic and environmental impacts of coal pond closures and assist communities in advocating for the most positive result.

**The U.S. Congress must:**

**Provide financial resources for just transition:** The U.S. Congress must recognize that additional financial resources are needed in communities facing coal plant closures. The U.S. Congress must recognize that additional financial resources are needed in communities facing coal plant closures. Funding is imperative to ensure equitable and just transitions: it will enable affected communities to build capacity to meaningfully participate in the planning for site reuse, ensure workers are protected, and provide safe and healthy transitions of their environments and economies.





Cooling tower at the Michigan City Generating Station, Michigan City, IN. Permission from Just Transition NWI

## INTRODUCTION

This report summarizes the analysis of closure and cleanup of coal combustion residual impoundments located at three coal-fired steam electric generating stations in the U.S., evaluating the benefits, cost, and direct job creation under two different closure plans for each facility based on detailed studies by economists and environmental engineers. The plants evaluated include the Michigan City Generating Station (MCGS) in Indiana, the Grainger Generating Station in South Carolina, and the Colstrip Stream Electric Station in Montana.

While permanently removing toxic coal ash from a leaking impoundment has substantial and well-recognized health and environmental benefits, the myriad *economic and employment advantages* of safe and thorough impoundment closure previously had not been closely examined across multiple sites, leaving the public and regulators ill-equipped to demand the most appropriate closure and cleanup plan for each plant. This report and the underlying expert studies aim to remedy this situation by providing a more complete understanding of the potential job creation and overall economic benefits of CCR cleanup projects for local communities and what regulators can do to ensure that proper cleanup is achieved at every coal ash site in the country.

The goal of the analysis is to evaluate and compare the estimated economic, environmental and job creation impacts of a cap-in-place closure approach versus a thorough, clean closure approach.

**Table 2: Description of Closure Plans Analyzed at the Three Coal Plants**

	<b>Alternative 1 (Cap-in-Place)</b>	<b>Alternative 2 (Clean Closure)</b>	<b>Notes</b>
<b>Grainger</b>	Cap-in-place for all ponds, monitored natural attenuation for existing pollution	Excavation of all coal ash in ponds and 1-ft of underlying soil, ponds reclaimed to wetlands	Site closed via clean closure
<b>Michigan City</b>	Excavation of ponds, but legacy ash fill left in place; plan proposed by NIPSCO.	Excavation of coal ash ponds AND all coal ash fill (not proposed by NIPSCO)	NIPSCO plan for removal of some of ash is approved, but community is seeking complete removal.
<b>Colstrip</b>	Cap-in-place for all impoundments, passive pond dewatering	Excavation of all ponds in contact with groundwater, active dewatering for ponds above the aquifer	Clean closure plan approved by Montana Department of Environmental Quality

## BACKGROUND

Historically much of the CCR generated by coal plants has been disposed of in unlined surface impoundments often referred to as coal ash “ponds.” Groundwater pollution is rampant from unlined surface impoundments as revealed in the groundwater monitoring data that have been collected and published since the federal CCR Rule came into effect.<sup>17</sup> CCR leachate is commonly high in arsenic, boron, cobalt, lithium, manganese, molybdenum, sulfate, and other toxic chemicals.<sup>18</sup> Coal ash contaminants include carcinogens, neurotoxins, developmental toxins and other dangerous chemicals that can cause harm to every major organ in the human body.<sup>19</sup> Other coal ash toxins, like selenium, are lethal to aquatic life at low levels. CCR-contaminated groundwater may flow to drinking water wells or pollute nearby surface water. Based on industry data, 92 percent of coal ash ponds throughout the U.S. pollute the underlying groundwater to levels that exceed federal drinking water standards.<sup>20</sup>

The method of coal pond closure can have huge impacts on the health and economy of the host community. There are two primary ways to close impoundments: draining the surface water and capping the pond (cap-in-place) or entirely removing the ash from the impoundment (clean closure).

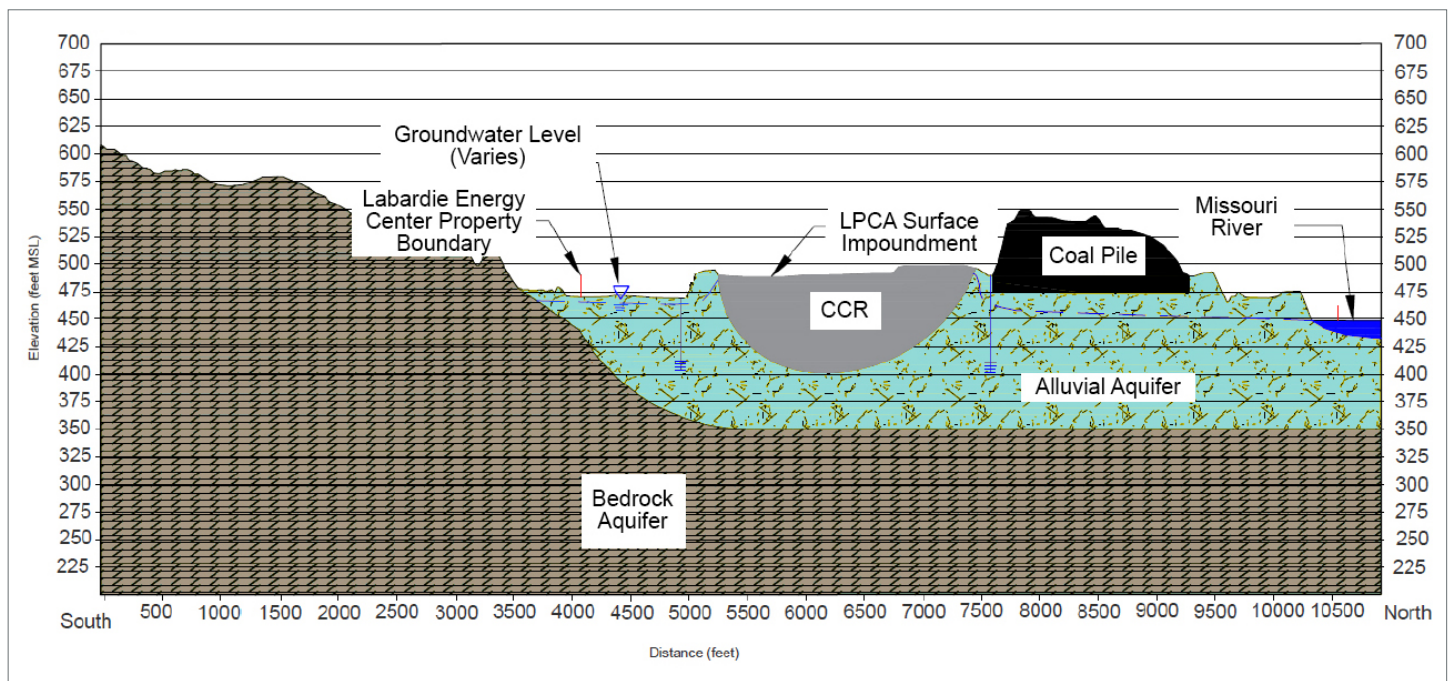
The electric power industry has shown a preference for cap-in-place closure of CCR impoundments because it is easier to implement as well as relatively low cost. Cap-in-place eliminates most of the precipitation-induced leaching of contaminants from the CCR but does not prevent leaching by groundwater contact with CCR underneath the cap, if the ash in the impoundment is in contact with the aquifer. And if coal ash is left in contact with groundwater, toxic contaminants will continue to leach into water in perpetuity. Cap-in-place also leaves CCR surface impoundments vulnerable to catastrophic failure due to floods or cap failure during extreme storms. The risk of impoundment failure is exacerbated by the fact that impoundments are commonly constructed adjacent to

surface water features and in floodplains. These risks are heightened due to the greater incidence of flooding and severity of storms caused by climate change.

With clean closures, coal ash is either transferred to a landfill and/or beneficially reused. CCR disposal in engineered landfills that comply with EPA standards typically provides superior environmental protection compared to leaving the CCR in surface impoundments. This is because the CCR in landfills is drained and stored relatively dry, and because the landfills more often have liners and leachate collection systems. In addition, landfills do not pose the same risk of catastrophic spills into water supplies and waterways that many coal ash impoundments do. Clean closure can also result in a substantial volume of CCR being beneficially reused as a raw material in products such as concrete or drywall. CCR reused in these types of applications is “encapsulated,” meaning it is bound with other materials that limit the exposure to and leaching potential of the hazardous contaminants contained in the CCR.

**Simply stated, clean closure of coal ash ponds is a more thorough process that employs more people and therefore leads to greater wages and spending in the community. Clean closure also removes coal ash from contact with groundwater and moves it away from waterbodies, which is a permanent solution to water pollution and which allows restoration of wetlands, rivers, streams and lakes.**

It is important to note that the federal CCR Rule prohibits the closure of coal ash impoundments in contact with groundwater.<sup>21</sup> In other words, cap-in-place closure is not allowed if the underlying ash is in constant or periodic contact with the underlying aquifer. This prohibition, however, has not stopped many utilities from proceeding with closure in groundwater, and state and federal regulators have failed to consistently enforce the prohibition.



**Figure 1: Cross-section of the leaking coal ash pond containing more than 16 million tons of ash at the Ameren Labadie Energy Center, Franklin Co., MO. The ash pond extends 75 feet into the alluvial aquifer and is about 900 yards from the Missouri River. Ameren capped the unlined pond in place, leaving ash in contact with the aquifer, in the flood plain, and in close proximity to the Missouri River. Haley & Aldrich Inc., Corrective Measures Assessment (prepared for Ameren), May 2019 (color adjusted to indicate aquifer).**

Currently, there are numerous permits pending for coal ash pond closure in groundwater. For example, at every site in Alabama, the utilities are proposing some version of cap-in-place. Most, if not all, of these sites have ash in the groundwater. In Georgia, which has an EPA-approved CCR permit program, the Georgia Environmental Protection Division is in the process of issuing permits for all of Georgia Power Company's 29 coal ash ponds. The utility has applied for permits authorizing closure in place with waste submerged in groundwater at five plants, representing roughly half of the 100 million tons of coal ash in Georgia.

For most closures to date, utilities typically propose to pay for coal ash closure and cleanup costs by recovering the costs from ratepayers. Thus, this report includes an analysis of potential ratepayer impacts for each type of closure scenario at both the Grainger and Michigan City sites. And in these cases, this analysis finds the ratepayer impact is extremely minimal or nonexistent. However, it is important to note that the rate impacts reported here reflect cost recovery for a single site. In some cases, a utility must close many sites at once and this is where the issue of cost recovery from ratepayers becomes more concerning for the public. Where total costs of closure and cleanup of multiple sites have proven large, state regulatory agencies and utility commissions have sometimes limited the amount that utilities can recover from ratepayers for ash pond closures and cleanups and have required assistance to low-income ratepayers.<sup>22, 23</sup> The costs of coal ash closure and cleanup also become problematic when a utility goes bankrupt; however, some states have enacted policies that address this issue. For example, Illinois passed the Coal Ash Pollution Prevention Act in 2019, which requires owners of coal ash lagoons to set aside money for cleanup and closure in the form of performance bonds.<sup>24</sup> This ensures a utility's ability to pay for closure/cleanup activities and ultimately protects taxpayers from potentially paying for abandoned coal ash impoundment closures.

While the cases analyzed here represent a range of geographic locations, site conditions, and community characteristics, they are also indicative of some general truths about coal ash cleanup. Simply stated, clean closure of coal ash ponds is a more thorough process that employs more people and therefore leads to greater wages and spending in the community. Clean closure also removes coal ash from contact with groundwater and moves it away from waterbodies, which is a permanent solution to water pollution and which allows restoration of wetlands, rivers, streams and lakes. Cap-in-place closures are generally faster and less expensive to implement, but they fail to provide commensurate local benefits or completely remove risk of toxic contamination and spills.

## **METHODOLOGY**

The research team, consisting of environmental engineers, hydrogeologists, geochemists, and economists, analyzed and compared two closure and cleanup alternatives for each plant site, so that a cap-in-place closure could be compared with a more thorough clean closure approach. At each site, one alternative had either been proposed or completed by the plant owners, while the engineering team designed the second alternative using groundwater monitoring data and other publicly available site data. The terms "clean closure" and "cap-in-place-based closure" are applied broadly here so comparisons can be made between limited and thorough cleanups. The differences in cleanup approaches for each site are described in more detail below.

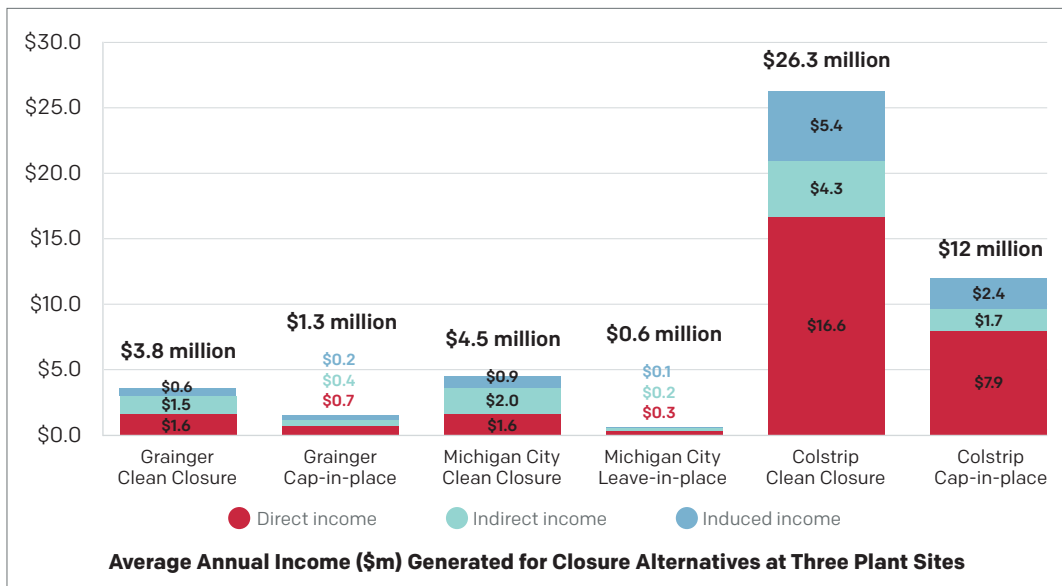
For each site, KirK Engineering & Natural Resources Inc. first evaluated the labor needs and direct spending associated with each cleanup scenario at the coal ash site. KirK developed cost and job schedules that illustrated capital and operation and maintenance (O&M) expenditures and construction and O&M-related jobs over the course of the cleanup and post-closure timeline, depending on the nature of the proposed alternative. Jobs quantified as part of this analysis are denoted as Full-Time Employee (FTE), which represents the number of jobs per position per year. KirK's analysis was conducted under a set of assumptions based on the data available for each site and the scope of the analysis, which was limited to direct costs and jobs. Plant decommissioning (building removal, demolition, salvage net costs, etc.) and potential additional contaminant handling were not part of the evaluation. Any reclamation activities evaluated as part of the analysis were limited to grading and revegetation and did not include detailed reuse and redevelopment plans or institutional controls needed for specific reuse options.

Utilizing the findings from KirK, the economics team at Applied Economics Clinic (AEC) used IMPLAN,<sup>25, 26</sup> a regional economic impact model, to estimate the total impacts to employment, labor income, and state gross domestic product (GDP) of all activities associated with the two remediation scenarios for each site.<sup>27</sup> IMPLAN provides key economic data for 546 industries for a customized region (in this case the three-county study area), and models the interactions between these industries based on the flow of goods, services, and workers in and out of that region as well as how each of the industries rely on one another.

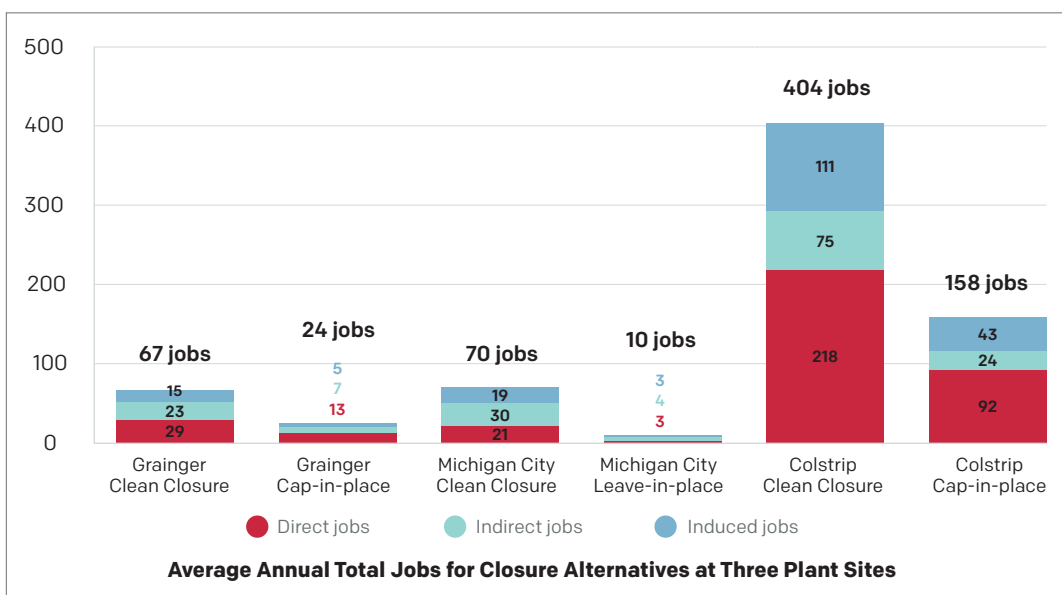
This report summarizes the direct, indirect, induced, and total impacts of job creation, labor wages, and GDP over impacted county areas in the operating vicinity of each plant site. A full description of the methodology and detailed findings can be found in the underlying expert studies by KirK Engineering & Natural Resources and the Applied Economics Clinic.

## FINDINGS

**In all three cases, the clean closure alternative generated more jobs, income, and GDP than the cap-in-place alternative.** The total economic impacts were developed in terms of job-years, labor income, and GDP. These impacts are composed of work being done on-site (“direct”), supplies needed to support that work (“indirect”), and re-spending of workers’ wages locally (“induced”). For Grainger and Michigan City, economic impacts are only reported here for the most labor-intensive initial phase of closure (typically the first 5 to 10 years); the economic impacts of the later, longer-term phase of cleanup (which includes O&M, ongoing groundwater monitoring, etc.) are much less and these findings can be found in the AEC study. For Colstrip, impacts are reported for both phases of cleanup since groundwater remediation will be a much more extensive and labor-intensive process. Finally, electricity rate impacts were estimated for the cleanups at Grainger and Michigan City. It is important to note that the difference in impact between clean closure and cap-in-place on residential customers’ electric rates as a result of coal ash remediation is almost imperceptible.



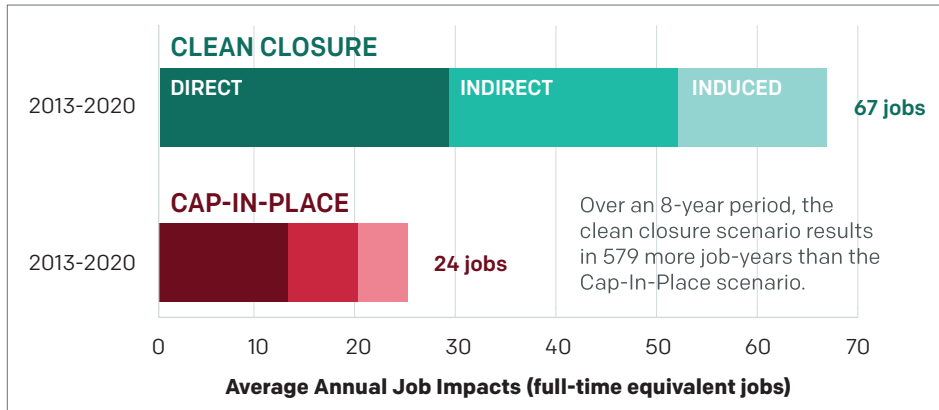
**Figure 2:** Average Annual Income (\$m) Generated for Closure Alternatives at Three Plant Sites



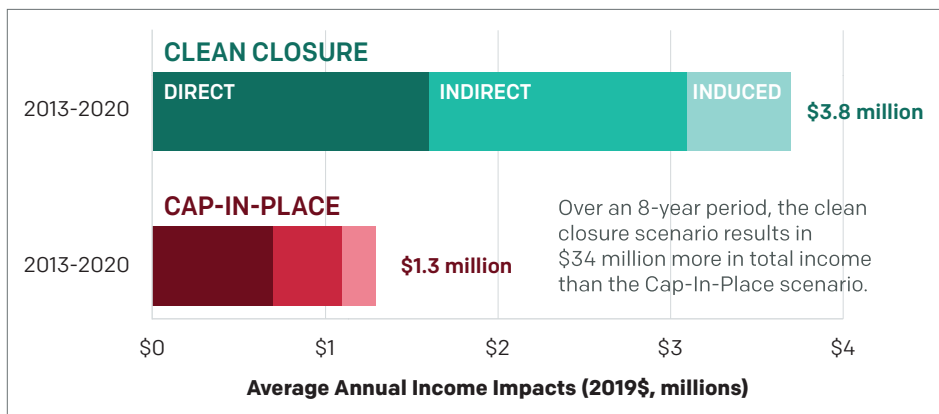
**Figure 3:** Average Annual Total Jobs for Closure Alternatives at Three Plant Sites. Figures are rounded totals.

## GRAINGER GENERATING STATION

In terms of South Carolina GDP (which includes labor income, profits and taxes), clean closure at Grainger results in an estimated \$67 million additional GDP (an average of \$8.3 million per year) above cap-in-place over the eight-year closure phase. At Grainger, there is no evidence that there was any rate increase for residential customers resulting from clean closure over the analysis period.



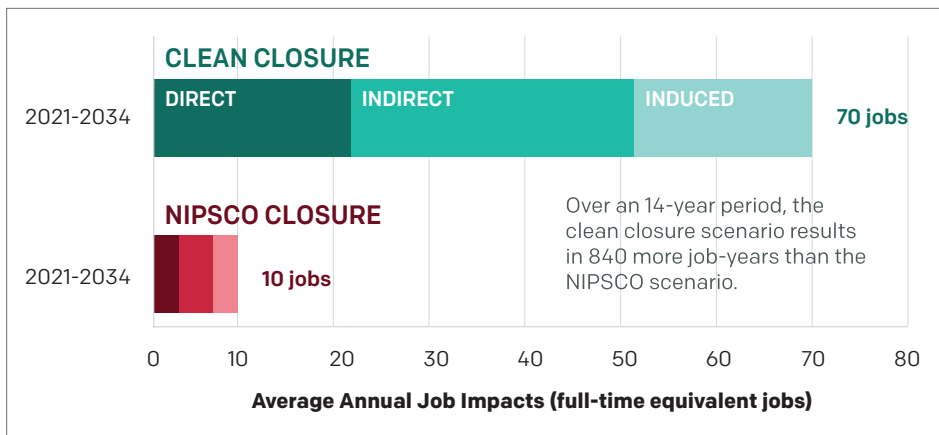
**Figure 4:** Average annual job impacts for "closure phase" of coal ash pond cleanup at Grainger. Income generated by clean closures exceeds cap-in-place closures by 2 to 7.5 times in the three communities.



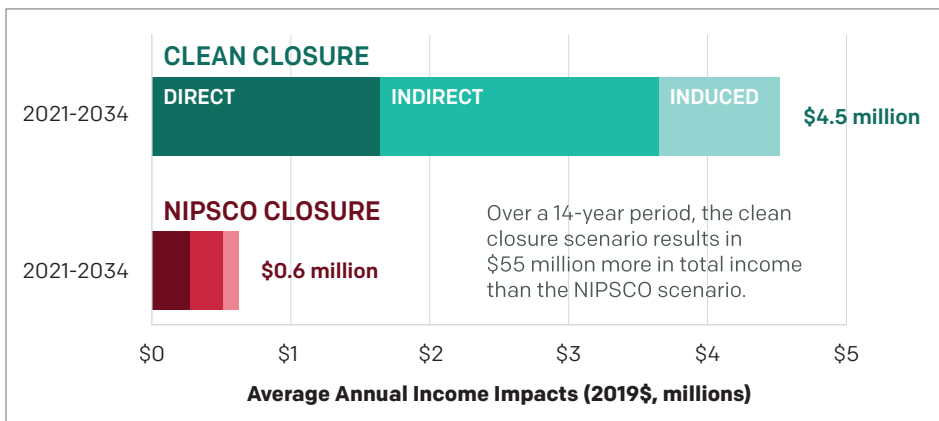
**Figure 5:** Average annual income impacts for "closure phase" of coal ash pond cleanup at Grainger

## MICHIGAN CITY GENERATING STATION

In terms of Indiana GDP, clean closure results in an estimated additional \$113 million (an average of \$8.1 million per year) above NIPSCO's Leave-in-Place closure over the 14-year closure phase. In other words, clean closure is responsible for seven times more state GDP per year than the NIPSCO Leave-in-Place closure proposal. For clean closure, we estimate an electric bill increase of approximately 22 cents per month for residential customers over the analysis period relative to NIPSCO's Leave-in-Place Closure.



**Figure 6:** Average annual job impacts for “closure phase” of coal ash pond cleanup at Michigan City



**Figure 7:** Average annual income impacts for “closure phase” of coal ash pond cleanup at Michigan City

## COLSTRIP STEAM ELECTRIC STATION

The clean closure proposal at Colstrip (NPRC’s “Doing it Right”) creates 2.5 times more jobs than the cap-in-place proposal offered by Colstrip’s managing plant owner, Talen Energy Corporation.

A full accounting of the job types required for each cleanup alternative can be found in the Kirk Engineering Study, Attachment 1.

Finally, this research reviewed the various other economic, social, and environmental benefits of thorough cleanup; these analyses and discussions can be found in AEC Study and Kirk Engineering Jobs Study.

Overall, the positive impacts of thorough ash pond cleanup via a true clean closure approach bring about myriad benefits to host communities and the surrounding areas in addition to jobs and wages. These other impacts include improved groundwater for drinking water and agricultural operations, improved ecological function (such as wetland mitigation of highwater events and habitat for aquatic life), improved public health outcomes, foundation for future redevelopment, improved recreational opportunities, and increased property values for the area.

Of course, even clean closure cleanups require local input and engagement to ensure the needs of the public and workers are addressed. For instance, clean closure often requires transporting ash offsite to be stored in a CCR-compliant landfill or to be beneficially reused (material for concrete manufacturing, etc.). Transporting coal ash without air monitoring and secured, sift-proof vehicles



will lead to dangerous fugitive dust blanketing communities along the way. Likewise, excavation of ash requires careful monitoring of site conditions to avoid dangerous air emissions, and workers dealing directly with coal ash must be provided proper training and personal protective equipment (PPE) to protect them from inhaling toxic coal ash dust. Finally, local economic impacts of coal ash cleanup are maximized if local workers are hired and are fairly compensated for these jobs. The unfortunate fact remains that coal ash is a hazardous substance that must be regulated and handled in a very cautious way at every step of cleanup, even with an ideal clean closure approach.

This report finds that a thorough and careful clean closure across various sites will bring much needed economic relief and security to communities in the long run.

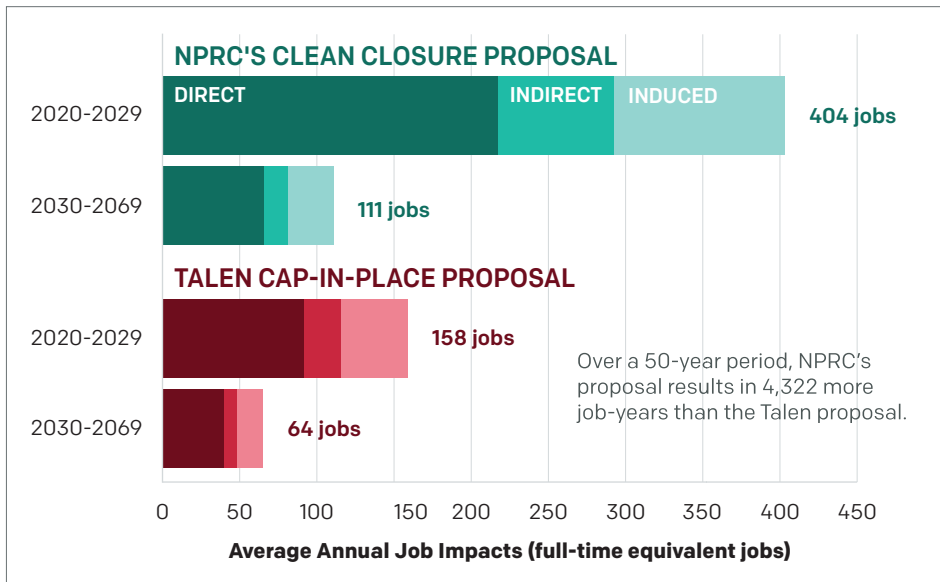


Figure 8: Average annual job impacts for coal ash pond cleanup and remediation at Colstrip

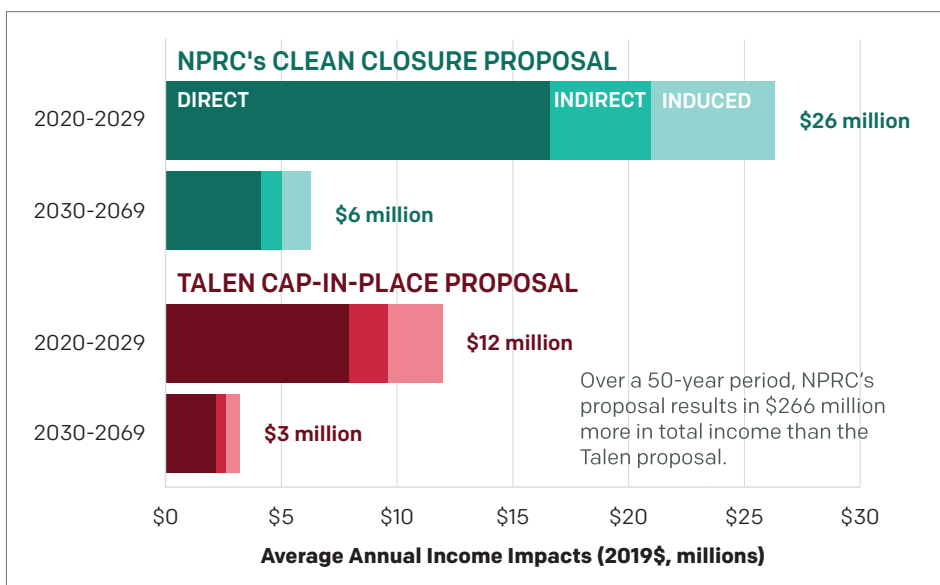


Figure 9: Average annual income impacts for coal ash pond cleanup and remediation at Colstrip

## Grainger Generating Station, Conway, South Carolina

Excavation and reuse prevents another coal ash disaster in the Southeast



**Coal ash contaminated the groundwater in the Grainger plant area with heavy metals and toxins, including arsenic contamination of 450 ppb (45x the state and federal drinking water standard). After excavation, some monitoring wells show arsenic contamination has dropped more than 90%. Anthony Brown / Permission from Southern Environmental Law Center**

The Grainger plant ash pond closure is a case study in the positive environmental and economic impacts of clean closure. Grainger Generating Station was a 170-MW coal-fired power station located in the community of Conway, South Carolina. Constructed in 1966, the power plant stored coal ash waste in two 40-acre unlined ponds. The plant was retired in 2012 because it was uneconomical to comply with the air emission standards and, pursuant to litigation, the plant owner/operator Santee Cooper was required to close its coal ash ponds to stop severe groundwater contamination. Groundwater monitoring in the area showed arsenic contamination at more than 3000 parts per billion, which is 300 times over the state and federal standard for drinking water.<sup>28</sup>

### PLANT SUMMARY

- 170-MW plant retired in 2012
- Ash impoundments: Two 40-acre unlined ponds containing 1.7 million tons of coal ash
- 2021 Ash pond status: Closed by excavation and reclaimed to wetlands

Initially, the utility proposed a cap-in-place closure plan, but that was strongly opposed by local advocacy groups, the community, and the Conway City Council who argued that closure by removal was the only acceptable approach. The various litigants reached an agreement for a clean closure and restoration of the site back to wetlands.<sup>29</sup> Closure planning and activities were initiated in 2013. The excavated coal ash was transported offsite for beneficial reuse in the concrete/cement market. Soil underneath the ponds (1-foot deep) was also removed and disposed of at a nearby Class 3 landfill. Restoration activities included replanting wetland vegetation and ongoing groundwater monitoring.<sup>30</sup>

An economic analysis of the closure shows that clean closure created **4 to 5 times greater economic benefits** to the area over a potential cap-in-place closure scenario.

Closure costs expanded as a number of storm events hit the area during the closure construction period. Santee Cooper enacted significant mitigation measures to prevent contaminated materials from flooding into the Waccamaw River, which would have been an environmental disaster for the area.<sup>31</sup> During this period, the site experienced several extreme weather events including the two highest-ever recorded floods of the Waccamaw River during Hurricanes Matthew in October 2016 and Florence in September 2018. These events required a rapid and complex emergency response by Santee Cooper and made clear the long-term risk of catastrophic failure if the impoundments had been left capped in place.

Fortunately, Santee Cooper did not have to lay off any employees when they decommissioned the Grainger Station; most workers were transferred to other sites and at least 30 were retained for the coal ash closure project. Other workers were hired to fill the remaining needed positions, especially for the trucking and hauling tasks. These jobs typically fall under the construction and transportation industries, both of which were depressed industries in South Carolina where many workers had been laid off.

In 2012, South Carolina had an average monthly unemployment rate of 8.3 percent, 1.1 percent higher than the U.S. average.<sup>32</sup> Two of the top four declining industries were “Construction” and “Transportation and Warehousing.”

The South Carolina Department of Labor described that the late 2000s recession had “hit the construction industry most acutely” and led to many lay-offs.<sup>33</sup> Thus, the Grainger coal ash closure created jobs in industries where South Carolina workers had suffered high job losses and were looking for employment.

An environmental justice analysis of the population

<b>Grainger: Comparison of clean closure vs Cap-in-Place Benefits</b>			
		<b>Direct</b>	<b>Total</b>
<b>Jobs, FTEs (2013-2020)</b>	Clean Closure	29	67
	Cap-in-Place	13	24
<b>Income (2013-2020)</b>	Clean Closure	\$1.6m	\$3.8m
	Cap-in-Place	\$0.7m	\$1.3m
<b>GDP (2013-2020)</b>	Clean Closure	\$2.1m	\$7.3m
	Cap-in-Place	\$0.8m	\$2.2m

residing within three miles of the Grainger Plant finds that low-income populations and people of color were disproportionately impacted by the site's toxic threat. The percentage of people of color near the Grainger site is 42 percent, which exceeds the state average of 36 percent. The percent of the population that is low income is 47 percent, significantly exceeding the state average of 36 percent.<sup>34</sup>

The Grainger cleanup also led to numerous other economic benefits. The Grainger plant and ash ponds were located on the Waccamaw River and next to the Waccamaw National Wildlife Refuge, which is home to 280 threatened or endangered species.<sup>35</sup> The Waccamaw River is an incredibly scenic black water river and is part of one of the most biologically diverse watersheds in the United States. This watershed provides drinking water for several surrounding communities, and the wetlands serve as flood control during high water events. Recreationalists flock to the area for boating, fishing, and hunting. And now that the majority of the site has been restored back to wetlands, community leaders are looking to annex a 12-acre area along Highway 501 for redevelopment. Ideas for redevelopment are not solidified but leaders have discussed infrastructure for more tourism, including an inland marina.<sup>36, 37</sup>

The location of the Grainger impoundments presented an important consideration for closure design. The impoundments were very poorly sited to begin with, both built in contact with groundwater and adjacent to a river subject to frequent flooding. It is lucky that the impoundments survived their more than 50-year lifespan. Cap-in-place closure would have presented a long-term risk to groundwater and aquatic life in the Waccamaw River. Additionally, the impoundments presented a very significant long-term risk of catastrophic failure during extreme weather fueled by climate change and a long-term liability for maintenance of the cap, erosion controls, and emergency preparedness.<sup>38</sup> Removing the ash from this precarious site and returning it to the natural wetland state was an important step in mitigating the damage of industrial pollution. But perhaps even more importantly, it eliminated the very real threat of catastrophic pond failure.

In another positive development for South Carolina, Santee Cooper announced in 2019 that they plan to transition away from coal completely and begin relying more heavily on solar generation and energy efficiency. The utility has said it wants to ensure their current 200 workers will have the option of moving to new positions in the company during this transition.<sup>39</sup>

# Michigan City Generating Station, Michigan City, IN

The economic impacts and redevelopment opportunity of a true clean closure



The Michigan City site has tremendous redevelopment potential that could provide space for community public space, recreation, and ecosystem connectivity - but this all requires a complete clean closure of the site. *Permission from Just Transition NWI*

Michigan City Generating Station is a coal-fired power station located in Michigan City, Indiana on the shore of Lake Michigan. The plant is scheduled to be decommissioned in 2028. The Northern Indiana Public Service Company (NIPSCO) purchased the property in 1928, constructed the first power generation plant in 1931 and began disposing of coal ash onsite at that time.<sup>40</sup> NIPSCO used coal ash as fill material to build man-made land into Lake Michigan and installed sheet piling to create a large surface impoundment adjacent to the lake.<sup>41</sup> This impoundment was eventually filled to capacity with coal ash waste. In the 1970s, NIPSCO reworked the large impoundment to construct the five unlined ash ponds that were used until the 2010s.<sup>42</sup> The Indiana Department of Environmental Management has approved the NIPSCO partial removal plan in March 2021, but the community is seeking full removal.

## PLANT SUMMARY

- 469-MW plant scheduled for retirement in 2028
- Coal ash onsite: five unlined impoundments and legacy coal ash fill containing approximately 2.02 million tons total of coal ash
- 2021 ash pond status: Plan for partial removal of ash is approved, but community is seeking complete removal.

The groundwater under the current CCR management area is contaminated by arsenic, boron, and selenium. Arsenic is the most acute groundwater pollutant, with levels up to 50 times the federal maximum contaminant level (MCL) for drinking water.<sup>43</sup> Groundwater at the site flows towards Trail Creek and Lake Michigan, so the fear is that contamination in the groundwater is impacting lake sediment, aquatic life or surface water. However, like at many sites around the U.S., monitoring data for off-site contamination are scant, incomplete, or non-existent.

Although NIPSCO characterizes its closure proposal as “clean closure,” it actually only excavates ash from the five most recent ponds and leaves the decades of legacy coal ash fill in place. A true clean closure alternative was developed for this analysis, one that includes removal of all coal ash fill and impoundment structures, to compare the economic and environmental outcomes of each strategy. This analysis estimates that the surrounding counties could benefit economically **7.5-fold more** from a true clean closure than from NIPSCO’s “leave-in-place” proposal.

The additional estimated cleanup jobs, income, and GDP generated from a true clean closure of the Michigan City site will do much to alleviate the economic losses of the plant decommissioning.<sup>44</sup> These benefits will be maximized if the local workforce in the immediate vicinity of the plant have access to these cleanup jobs. The communities surrounding the Michigan City plant, especially in Ward 3 on the city’s west side, have been disproportionately impacted by plant pollution and very few have benefitted from the plant’s economic impact. LaPorte County had an average unemployment rate of 4.3 percent (1 percent higher than in the state as a whole), but hit a high of 21 percent in April 2020, coinciding with the start of the COVID-19 crisis.<sup>45</sup> Michigan City can be aptly characterized as a frontline community – one that has borne the brunt of industrial pollution and enjoyed too few of the economic gains.

An environmental justice analysis of the population residing within three miles of the Michigan City Generating Station finds that low-income populations and people of color are disproportionately impacted by the site’s toxic threats. The percentage of people of color near the Michigan City site is 39 percent, which is nearly twice the state average of 21 percent. The percent of the population that is low income is 46 percent,

significantly exceeding the state average of 33 percent.<sup>46</sup>

In fact, the NAACP, in their 2016 Coal-Blooded Report designated the Michigan City plant with a failing grade due to its impact on low-income communities and communities of color.<sup>47</sup>

Local and state leaders could maximize these economic benefits for frontline communities in a few distinct ways. First, they could require any closure plan include

Michigan City: Comparison of clean closure vs Leave-in-Place Benefit			
		Direct	Total
<b>Jobs, FTEs (2021-2034)</b>	Clean Closure	21	70
	NIPSCO Plan	3	10
<b>Income (2021-2034)</b>	Clean Closure	\$1.6m	\$4.5m
	NIPSCO Plan	\$0.3m	\$0.6m
<b>GDP (2021-2034)</b>	Clean Closure	\$2.2m	\$9.3m
	NIPSCO Plan	\$0.4m	\$1.2m

provisions for a local-hire preference. The local plant union could negotiate for the appropriate wages and benefits for all cleanup workers. The state could enact appropriate job training and placement programs to help local residents access these cleanup jobs, particularly within the West Side community of Michigan City that houses the plant. It is also worth mentioning that NIPSCO plans to retire its entire 2,100-MW coal fleet by 2028,<sup>48</sup> so any job training and placement programs would help workers at other sites in Indiana as well.

In each closure scenario, coal ash waste would be transported and stored at the nearby R.M. Schahfer Generating Station landfill in Jasper County. Encapsulated beneficial reuse is also very appealing to community groups; NIPSCO, however, has invested very little time or resources into potential reuse options. Fugitive dust and traffic safety are a concern for any coal ash excavation project as it impacts wider community wellbeing.<sup>49</sup> Additionally, the area has suffered from dangerous misuse of coal ash, most dramatically in the Town of Pines where unencapsulated coal ash from NIPSCO's Michigan City and Bailey Generating Stations was disposed of in a leaking landfill and utilized extensively as road and yard fill. This resulted in the contamination of the town's water supply and the EPA's declaration of the town as a Superfund site.<sup>50</sup> The solution to these issues is to engage the community residents and leaders in all transportation and reuse planning. In addition, NIPSCO must put proper safety protocols into place, such as air monitoring, to mitigate the harms of the coal ash cleanup, but to date NIPSCO has refused to commit to using air monitors, and the Indiana Department of Environmental Management has refused to require the safeguards. Such safeguards for workers and communities are often only required when the local community is engaged in the process from the beginning – and even then, it can be an uphill battle.

Finally, this wider socioeconomic and historic context shapes the community dialogue around what type of closure is appropriate and how the site will be redeveloped after cleanup. The true clean closure alternative includes topsoil replacement and revegetation, laying the groundwork for a myriad of potential redevelopment scenarios. Local community members worry about developers eyeing Michigan City and the NIPSCO site for high-end real estate. Many in the community see this as a venue for gentrification and another way in which local residents will be left out of economic and social benefits. Many residents see the enormous potential for inclusive redevelopment of the site into something that the entire community could enjoy, including park land and public infrastructure. If the ecological function and integrity of the site are restored, this would also connect the important ecosystems surrounding Michigan City, including the Lake Michigan lakeshore and Indiana Dunes National Park. A community-led redevelopment plan that considers these redevelopment alternatives could mitigate some of the legacy economic and health impacts residents have endured living next to a coal-fired power plant for over 100 years. Developing a plan like this could also ensure environmental justice is linked to redevelopment, generate revenue for the city and local businesses, and enhance quality of life for city residents. For additional discussion of redevelopment opportunities in Michigan City, see the Kirk Engineering Jobs Study.

# Colstrip Steam Electric Station, Colstrip, MT

Creating jobs and protecting agriculture



**Clean closure at Colstrip is projected to create 2.5 times more jobs and local income than an inadequate cap-in-place approach. A clean closure strategy was approved by the Montana Department of Environmental Quality in 2020, a historically important decision for coal ash cleanup in the West.** *Northern Plains Resource Council*

The Colstrip Steam Electric Station is a 2,094-MW coal-fired plant located in rural, isolated Colstrip, MT (pop. 2,440).<sup>51</sup> Unlike the other power station facilities evaluated in this report, Colstrip was built near the coal source and far away from the supply of cooling water. The plant is located in the heart of Powder River Basin coal country, constructed on top of reclaimed strip mine lands, and surrounded by the active Rosebud Mine that supplies coal to the plant.

## PLANT SUMMARY

- 2,094-MW plant, partially retired in 2020
- Ash impoundments: Ash pond complex of 837 total acres with 38 million cubic yards of coal ash
- 2021 ash pond status: Clean closure plan approved

The scale of the Colstrip pond complex is enormous, with a total of 38 million cubic yards of CCR disposed of in 20 individual ponds or cells, which combined cover more than 800 acres.<sup>52, 52, 54</sup> In addition to coal ash ponds, each site also has water management ponds that store process water from the coal ash slurry system and contaminated groundwater pumped from the groundwater



capture system. There are also smaller cells containing brine solids from the water treatment system.

Even though the ash waste management was permitted as a closed-loop system with no discharge, these ponds have been leaking 200 million gallons per year into the area’s groundwater for more than 30 years.<sup>55</sup> This ash pond leakage contaminated the area’s aquifer with toxic levels of boron, sulfate, molybdenum, manganese, lithium, selenium and cobalt, which pose a danger to human health and agricultural production in the area. Pursuant to a legal settlement (the Administrative Order on Consent, or AOC) plant owners were required to develop cleanup and closure plans for each coal ash pond that would finally end this contamination problem; the Montana Department of Environmental Quality (DEQ) was charged with approving these plans.<sup>56</sup>

In 2015, the managing plant owner, Talen Energy Corporation proposed a closure plan that relied primarily on cap-in-place to close the ponds, despite the fact that many of the ponds had subpar liners (or no liners at all) and intercepted the area’s aquifer.<sup>57</sup> Some of the ponds were located far above the water table, but the overwhelming leakage from these very large ponds connected the contaminated water with the aquifer, and this pressure pushed contamination far into the groundwater system.

Despite historical tensions, ranchers and plant workers began talking about what it would take to adequately clean up the ash ponds. The contamination has threatened area ranchers for decades, and workers at the coal plant were worried about both their job security and the environmental legacy of their work.<sup>58</sup> Northern Plains Resource Council (“NPRC”) and Council, a Montana grassroots organization, began bringing these groups together and brainstorming solutions to the complex community problems. Eventually Northern Plains and the plant workers’ union (the IBEW Local 1638) partnered on a study to investigate the number of jobs that would be created

from subpar cleanup versus responsible cleanup.<sup>59</sup> A grant from the Montana Department of Labor (DoLI) allowed the partners to hire a team of engineering and economic experts to provide a technical analysis of the situation.<sup>60</sup> For comparison, this team designed an alternative closure plan that would excavate the ash from the ponds situated within the groundwater and utilize aggressive dewatering for the ponds that sat above the water table, so they would be high, dry, and disconnected from the aquifer before capping. The

<b>Colstrip: Comparison of clean closure vs Cap-in-Place Benefits</b>			
		<b>Direct</b>	<b>Total</b>
<b>Jobs, FTEs (2020-2029)</b>	Clean Closure	218	404
	Cap-in-Place	92	158
<b>Jobs, FTEs (2030-2069)</b>	Clean Closure	66	111
	Cap-in-Place	40	64
<b>Income (2020-2029)</b>	Clean Closure	\$16.6m	\$26.3m
	Cap-in-Place	\$7.9m	\$12.0m
<b>Income (2030-2069)</b>	Clean Closure	\$4.1m	\$6.3m
	Cap-in-Place	\$2.2m	\$3.2m

clean closure plan would stop the source of the contamination, which would allow for groundwater remediation to occur — rather than just rely on the pump-back well system to keep the problem at bay until 2070.

This research showed that, for the first 10 years, the clean closure plan (NPRC plan) would require an average of 218.2 full-time workers each year, whereas a subpar, cap-in-place cleanup (Talen’s plan) would only create an average of 91.6 workers each year.<sup>61</sup>

In November 2020, the DEQ approved the clean closure plan that closely resembled the alternative designed by the NPRC research team; it was the most protective proposed alternative, and this approval was a major win for the community, workers, and ranchers. As the DEQ wrote in their decision document: “Alternative 10 [the clean closure alternative] is the only alternative that permanently eliminates mass discharge of COIs [constituents of interest] from the ash to the groundwater, resulting in a permanent achievement of cleanup criteria at the point of compliance, and provides the most effective source control management through construction of a new landfill.”<sup>62</sup> The DEQ also argued that this alternative would be the only one that would comply with the intent of the federal CCR rule in the long run.

**The jobs created by this clean closure plan will benefit the local workforce for years to come.**

The jobs created by this clean closure plan will benefit the local workforce for years to come. It is especially impactful for the neighboring Northern Cheyenne reservation community, where 38 percent of people live below the poverty line.<sup>63</sup> Due to strong cultural, familial, and historic ties to the area, the Northern Cheyenne plant and mine workers are, understandably, less likely to transfer to another out-of-state job site. Local jobs are critical for these workers and their families during this transition. The Northern Cheyenne Tribal Council and local leaders advocated strongly for the clean closure option with the Montana DEQ during their evaluation process.

An environmental justice analysis of the population residing within three miles of the Colstrip plant finds that people of color are disproportionately impacted by the site’s toxic threats. The percentage of people of color near the Colstrip site is 32 percent, which is more than twice the state average of 14 percent.<sup>64</sup>

Other measures have been taken to ensure that coal ash cleanup jobs truly benefit the local workforce. Thanks to SB 264, passed during the 2019 Montana legislative session, cleanup jobs at Colstrip will be paid at prevailing wage rates.<sup>65</sup> Some examples include \$28.95/hour for Mobile Heavy Equipment Mechanics, \$28.20/hour for Operating Engineers and Heavy Equipment Operators, and \$37.74/hour for Construction Managers.<sup>66</sup> The Montana DoLI commissioned another analysis to determine if the existing labor force had the necessary skills and experience to conduct ash pond closure/cleanup tasks. Overall, there was the most skills overlap between local mine workers and coal ash closure/cleanup workforce requirements.<sup>67</sup> This overlap in skillset helps to bolster the argument that these jobs should be offered first to the local, impacted workforce before out-of-state contract workers. The local labor unions are also working to ensure that the workforce is represented by a labor union so workers have full benefits and their safety is prioritized.



The Michigan City Generating Station looms over Trail Creek and nearby parks in Michigan City, IN. Photo by Don Barrett / CC BY-NC-ND 2.0

## CONCLUSION

This analysis provides a window into the myriad economic, environmental, and community benefits that result from complete coal ash pond closures. As reported here, clean closures result in significantly higher job creation, local incomes, and state GDP when compared to cap-in-place closures. Further, thorough cleanup stops groundwater contamination permanently, which leads to increased property values, clean drinking water, improved public health, and the potential for sustainable redevelopment. All these outcomes help to mitigate the economic hardship of a local power plant closure. These findings and this report's recommendations will aid regulators, communities, and lawmakers in ensuring the best possible closures for impoundments across the United States.

## RECOMMENDATIONS

### The U.S. Environmental Protection Agency ("EPA") must:

1. **Enforce** the 2015 federal CCR Rule's prohibition on cap-in-place closure when the coal ash impoundment is in contact with groundwater. Failure to enforce this provision is resulting in the closure of toxic dumps in groundwater, ensuring that hazardous chemicals will continue to leak into water in perpetuity.

2. **Enforce** the CCR Rule's prohibition on cap-in-place closure when the coal ash impoundment is located in a floodplain and susceptible to floods that may destabilize the toxic waste. Failure to enforce this provision will result in significant and long-term threats to water resources throughout the United States.
3. **Provide financial assistance** to frontline communities through EPA's *Technical Assistance Services for Communities (TASC) Program* or other grant programs to empower residents to participate meaningfully in the cleanup and closure of toxic coal ash dumps and achieve just transition.
4. **Provide oversight** in communities where closure and cleanup are occurring to ensure coal ash excavation, transport, reuse and disposal are done safely and without the release of toxic contaminants to air, soil or water in the host communities, at the work sites, in communities along transport routes, and at the final disposal site. Excavation and transport of coal ash requires air monitoring and protective measures to prevent the inhalation of toxic ash by cleanup workers and nearby residents. Finally, ensure that final disposal does not disproportionately burden communities of color and low-income communities.

#### **State and Local Officials must:**

1. **Provide oversight and enforcement** to ensure that the requirements of the 2015 CCR Rule are followed by all owners and operators in a timely manner. States have the authority to enforce all provisions of the CCR Rule, or equivalent state regulations, including the prohibition on leaving coal ash in groundwater and floodplains and the requirement to initiate a timely cleanup of contaminated groundwater.
2. **Provide support and resources to local communities.** State and local officials must consider the local economic and environmental impacts of coal pond closures and assist communities in advocating for the most positive result.

#### **The U.S. Congress must:**

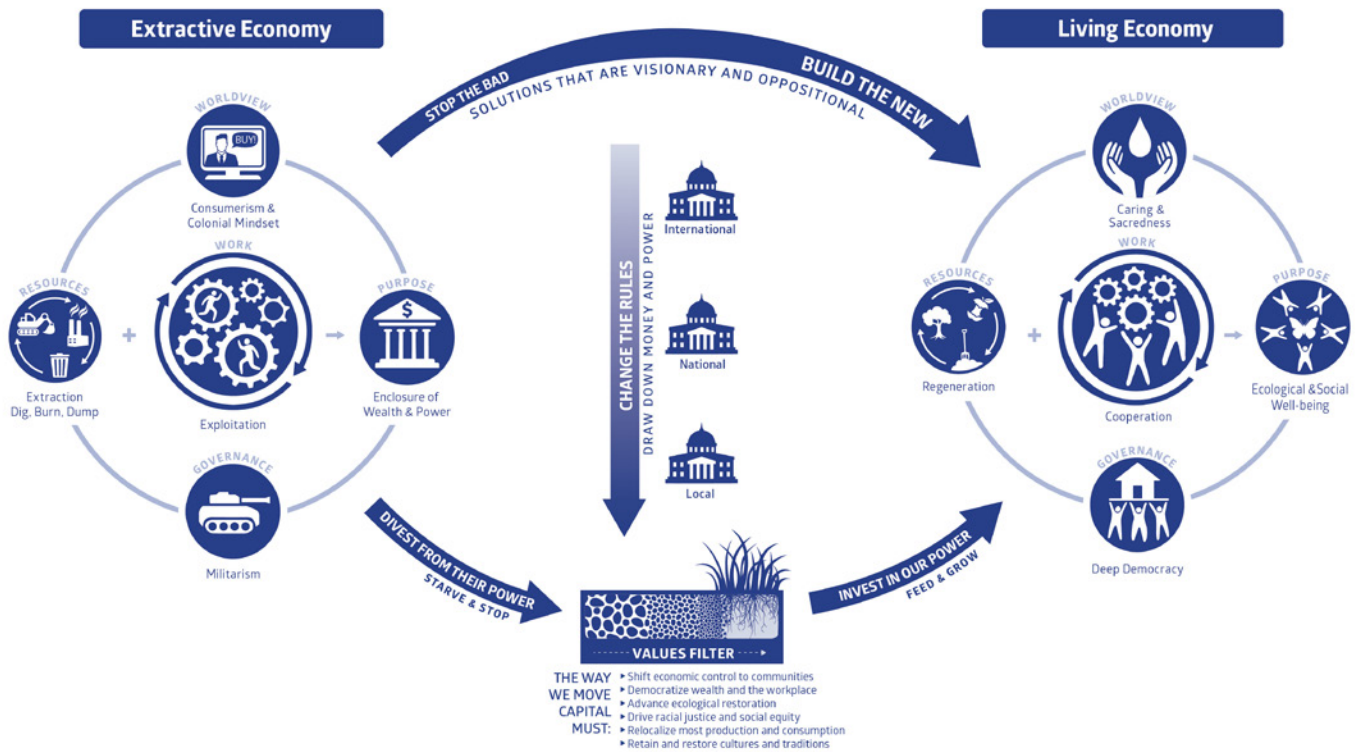
**Provide financial resources for just transition:** The U.S. Congress must recognize that additional financial resources are needed in communities facing coal plant closures. Funding is imperative to ensure equitable and just transitions: it will enable affected communities to build capacity to meaningfully participate in the planning for site reuse, ensure workers are protected, and provide safe and healthy transitions of their environments and economies.

Finally, it is also important to put comprehensive remediation in context of the longer-term, more complex work needed for coal plant communities to successfully transition into the clean energy future — what is commonly referred to as “just transition.” Creating a more resilient and regenerative local economy requires first addressing the legacy environmental and social harms of the previous industry. It takes years for new, local entrepreneurs to get started; to place or train the local workforce in new industries; to replace revenue for local services; and to plan for

redevelopment of a closed coal ash facility. This report's in-depth analysis of redevelopment opportunities for the Michigan City site underscores both the potential for building long-term community assets and the fact that redevelopment does not happen overnight. So while coal ash cleanup work is temporary, it is critical because it can provide a bridge to longer-term solutions that diversify and strengthen the local economy.

## A STRATEGY FRAMEWORK FOR JUST TRANSITION

RESIST — RETHINK — RESTRUCTURE



An illustration of a Just Transition framework developed by Movement Generation with Our Power Campaign *Movement Generation*

## ENDNOTES

1. According to U.S. EPA, in 2012, over 470 coal-fired electric utilities burned over 800 million tons of coal, generating approximately 110 million tons of CCR in 47 states and Puerto Rico. See <https://www.epa.gov/coalash>.
2. Environmental Integrity Project & Earthjustice, *Coal's Poisonous Legacy: Groundwater Contaminated by Coal Ash Across the U.S.* ((Mar. 2, 2019, rev. July 11, 2019) ("Coal's Poisonous Legacy"), available at <https://www.environmentalintegrity.org/reports/coal-poisonous-legacy/>.
3. See Earthjustice, *Mapping the Coal Ash Contamination*, available at <https://earthjustice.org/features/map-coal-ash-contaminated-sites>.
4. See "Coal's Poisonous Legacy," fn.2, supra.
5. See sites where coal ash contaminated drinking water wells, <https://earthjustice.org/features/map-coal-ash-contaminated-sites>.
6. Federal regulations prohibit utilities from capping coal ash ponds in place when ash is in contact with underlying groundwater (even intermittently). 40 C.F.R. § 257.102(d). Numerous utilities, however, are planning to disregard the federal prohibition.
7. See Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities, 80 Fed. Reg. 21,302 (Apr. 17, 2015), hereinafter "CCR Rule."
8. Leave-in-place" is the most appropriate shorthand for the Michigan City closure plan proposed by the plant owner/operator NIPSCO. Their plan actually calls for excavation of the coal ash ponds, which is a good first step, but proposes to leave a massive amount of unencapsulated coal ash fill on the property. The "clean closure" alternative would excavate both the pond and fill ash. "Cap-in-place" is the most appropriate term for the less protective alternatives analyzed at Colstrip and Grainger. For the sake of simplicity, "Cap-in-place" is the term this report utilizes to refer to both cap-in-place and leave-in-place when describing closure approaches broadly.
9. Direct, indirect, and total impacts were all quantified for a specified region surrounding each power plant.
10. Direct jobs and income refer to jobs needed specifically for the project and the income generated from those jobs. Total jobs and income refer to the combination of these direct impacts along with indirect and induced impacts (additional jobs and wages created in the community due to the increased spending associated with the closure project, etc.). Values may not sum to totals due to rounding.
11. At the Grainger site, cap-in-place would require an average of 3 FTEs per year and the clean closure scenario would create no jobs over the O&M time frame (2021 - 2047). At Colstrip, cap-in-place would require an average of 40 FTEs per year and the clean closure would require 66 FTEs per year in the O&M phase (2030 - 2069). At Michigan City, cap-in-place would require 1 FTE per year and clean closure would require 1 FTE per year in the O&M phase (2035 - 2053). Income and GDP impacts would be a similar scale for each site for the O&M phase.
12. KirK Engineering & Natural Resources, Inc. "Reuse and Economics Impacts: NIPSCO Power Generation Facility, Michigan City, IN," April 20, 2021. <https://earthjustice.org/documents/report/kirk-engineering-reuse-study>
13. In 2016, the United States Commission on Civil Rights found that "communities that live downstream from coal ash impoundments tend to have a higher than average minority and low-income population." U.S. Commission on Civil Rights, 2016 Environmental Justice: Examining the Environmental Protection Agency's Compliance and Enforcement of Title VI and Executive Order 12,898 (2016).
14. For a listing of all federally regulated coal ash disposal sites in the U.S., see [www.earthjustice.org/coalash/map](http://www.earthjustice.org/coalash/map).
15. See 40 C.F.R. § 257.102(d). Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities, 80 Fed. Reg. 21,302 (Apr. 17, 2015), hereinafter "CCR Rule."
16. 40 C.F.R. § 257.102(d).
17. 40 C.F.R. § 257.90. See, Earthjustice, "Mapping the Coal Ash Contamination," <https://earthjustice.org/features/map-coal-ash-contaminated-sites>. See also, Environmental Integrity Project & Earthjustice, *Coal's Poisonous Legacy: Groundwater Contaminated by Coal Ash Across the U.S.* ((Mar. 2, 2019, rev. July 11, 2019) ("Coal's Poisonous Legacy"), available at <https://www.environmentalintegrity.org/reports/coal-poisonous-legacy/>.
18. In the 2015 CCR Rule, EPA identified 21 constituents of concern in CCR leachate, for which they require groundwater monitoring. These constituents include boron, calcium, chloride, fluoride, pH, sulfate, total dissolved solids (TDS) (Appendix III to 40 C.F.R. Part 257) and antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, fluoride, lead, lithium, mercury, molybdenum, selenium, thallium, and radium 226 and 228 combined (Appendix IV to 40 C.F.R. Part 257).
19. See "Harm to Human Health from Breathing and Ingesting Coal Ash Toxicants," [https://earthjustice.org/sites/default/files/files/coal-ash-man\\_COMPLETE\\_2017-07-20\\_light.pdf](https://earthjustice.org/sites/default/files/files/coal-ash-man_COMPLETE_2017-07-20_light.pdf)

20. See fn 17, supra.
21. 40 C.F.R. § 257.102(d).
22. Gheorghiu, I. (2019, Aug 7). Virginia rejects Dominion bid to recover environmental spending on coal units slated for shutdown. Utility Dive. Retrieved from: <https://www.utilitydive.com/news/virginia-rejects-dominion-bid-to-recoverenvironmental-spending-on-coal-uni/560374/>
23. Weinstein, A. (2021, Jan 25). Duke Energy customers to save \$1.1 billion in settlement over coal ash cleanup costs. Charlotte Observer. Retrieved from: <https://www.charlotteobserver.com/news/business/article248745190.html#:~:text=Duke%20Energy%20agreed%20to%20a,much%20of%20the%20cleanup%20costs>
24. Earthjustice (2019, June 30). Milestone Bill to Clean Up Coal Ash Pollution in Illinois Becomes Law. Retrieved from: <https://earthjustice.org/news/press/2019/milestone-bill-to-clean-up-coal-ash-pollution-in-illinois-becomes-law>
25. IMPLAN. 2020. "Application". Available at: <https://www.implan.com/application/>
26. The Colstrip economic analysis was originally conducted by Bioeconomics using the IMPLAN model. AEC reviewed these results as well for this report.
27. Applied Economics Clinic conducted the economic analysis for the Grainger and Michigan City sites. For Colstrip, this report cites data provided by the POWER Cleanup Jobs Study Research funded through the POWER grant awarded to the Montana Department of Labor and Industry. For the POWER research, Kirk engineering conducted the engineering analysis and Bioeconomics conducted the economic analysis using IMPLAN.
28. Southern Environmental Law Center (2016, June 1). Arsenic pollution plummets at Grainger Site as coal ash is removed in South Carolina. [Press Release]. Retrieved from: <https://www.southernenvironment.org/news-and-press/press-releases/arsenic-pollution-plummets-at-grainger-site-as-coal-ash-is-removed-in-south>
29. Southern Environmental Law Center (2013, Nov. 19). Another South Carolina utility agrees to remove coal ash from river shared by North and South Carolina. [Press Release]. Retrieved from: <https://www.southernenvironment.org/news-and-press/press-releases/another-south-carolina-utility-agrees-to-remove-coal-ash-from-river-shared>
30. Details on the Grainger cleanup were confirmed with Santee Cooper spokespeople in October and November 2020.
31. Northey, H. & Wittenberg, A. (2018, Sept. 26). Greens see 'tale of two utilities' in Florence response. E&E News. Retrieved from: <https://www.eenews.net/stories/1060099817>
32. South Carolina Department of Employment and Workforce (2012). "State of Workforce Report: Putting South Carolinians back to work." South Carolina Department of Employment and Workforce Labor Market Information Division. P.7 retrieved from: <http://lmi.dew.sc.gov/lmi%20site/Documents/StateOfWorkforceReport.pdf>
33. Ibid.
34. Low-income population is defined as individuals in households where the household income is less than or equal to twice the federal poverty level. Demographic estimates were generated using the 2012-2016 American Community Survey (ACS) from the U.S. Census Bureau, available in EPA's EJSCREEN Standard Reports. EJSCREEN was designed in the context of EPA's environmental justice policies and is a screening tool that can help identify areas that may warrant additional consideration, analysis, assistance and outreach.
35. Ellis, C. (2018, July 13). Southeast river runs part 5: Coal ash on the Waccamaw River. Southern Alliance for Clean Energy. Retrieved from: <https://cleanenergy.org/blog/southeast-river-runs-part-5-coal-ash-on-the-waccamaw-river/>
36. Perry, C. (2019, Sept. 17). Conway leaders still looking to annex, redevelop Grainger plant site. My Horry News. Retrieved from: [https://www.myhorrynews.com/news/local/conway/conway-leaders-still-looking-to-annex-redevelop-grainger-plant-site/article\\_31058938-d984-11e9-9dc8-072c790096c0.html](https://www.myhorrynews.com/news/local/conway/conway-leaders-still-looking-to-annex-redevelop-grainger-plant-site/article_31058938-d984-11e9-9dc8-072c790096c0.html)
37. Blondin, A. (2020, July 17). From hazardous eyesore to wetlands: Grainger power plant's transformation nearly complete. Myrtle Beach Online. Retrieved from: <https://www.myrtlebeachonline.com/news/local/article244272297.html>
38. While cap-in-place closures do create some long-term jobs, these are minimal when compared to the short-term job creation from clean closures, even taking into account the extended duration of the former by comparing job years from cap-in-place closures to job years from clean closures (see Applied Economics Clinic, "Background Report: Benefits of Coal ash Cleanup and Remediation," for details). Further, while cap-in-place closures require maintenance in perpetuity to maintain the safety and stability of the unit, there is no guarantee that such maintenance will occur, and it is not specifically required by federal regulations after the termination of the 30-year post-closure period. The emergency preparedness and response that would be needed in the event of a catastrophic impoundment failure would undoubtedly require a sizeable workforce for a short amount of time, but the overall economic, social,

and environmental damage of a catastrophic failure would negate any positive contribution of those dangerous jobs.

39. Fretwell, S. (2019, Aug. 28). Coal jobs being cut at Santee Cooper as utility moves to shutter power plants. Greenville News. Retrieved from: <https://www.greenvilleonline.com/story/news/2019/08/28/coal-jobs-cut-santee-cooper-moves-shutter-power-plants/2140558001/>
40. Wood Environment & Infrastructure Solutions, Inc., 2018. NIPSCO Michigan City Generating Station Surface Impoundment Closures (CCR Final Rule and RCRA Regulated) Closure Application. Prepared for Northern Indiana Public Service Company, December 2018.
41. Hoosier Environmental Council (2020). Michigan City coal ash closure. Webpage: <https://www.hecweb.org/issues/environmental-health-justice/coal-ash/michigan-city-coal-ash/>
42. Ibid.
43. See: KirK Engineering & Natural Resources, Inc., "Coal Combustion Residual Closure Analysis: Cost and Jobs Associated with Different Closure Alternatives, p. 13. <https://earthjustice.org/documents/report/kirk-engineering-study>
44. For more information: Indiana Utility Regulatory Commission (2020, Aug 14). "21st Century Energy Policy Development Task Force." P. 62. Retrieved from: <https://www.in.gov/iurc/files/2020-Report-to-the-21st-Century-Energy-Policy-Development-Task-Force.updated-min.pdf>
45. U.S. Department of Labor. (2020). Bureau of Labor Statistics, Local Area Unemployment Statistics, Washington, D.C. Reported by Headwaters Economics' Economic Profile System, [headwaterseconomics.org/eps](http://headwaterseconomics.org/eps)
46. Estimates were generated using the 2012–2016 American Community Survey (ACS) from the United States Census Bureau, which available in the U.S. EPA's EJSCREEN's Standard Reports. EJSCREEN was designed in the context of EPA's environmental justice policies and is a screening tool that can help identify areas that may warrant additional consideration, analysis, or outreach. See <https://earthjustice.org/features/map-coal-ash-contaminated-sites>
47. National Association for the Advancement of Colored People, Indigenous Environmental Network, & Little Village Environmental Justice Organization (2016). Coal blooded: Putting profits before people. Retrieved from: <https://naacp.org/resources/coal-blooded-putting-profits-people>
48. Northern Indiana Public Service Company (NIPSCO) (2020, Apr 16). NIPSCO to retire ash ponds at Michigan City Generating Station. [Press Release]. Retrieved from: <https://www.nipsco.com/our-company/news-room/news-article/nipsco-to-retire-ash-ponds-at-michigan-city-generating-station>
49. Colias-Pete, M. (2020, May 17). Environmentalists concerned about NIPSCO plan to move coal ash from Michigan City Generating Station. Chicago Tribune. Retrieved from: <https://www.chicagotribune.com/suburbs/post-tribune/ct-ptb-nipsco-coal-ash-st-0517-20200515-imxzd5fsjfdupjtyvo62rc654-story.html>
50. US EPA, Superfund Site: Town of Pines Groundwater Plume, Town of Pines, IN, <https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0508071>
51. Roemer, K., Raimi, D., & Glaser, R. (2021). Coal communities in transition: A case study of Colstrip, Montana. Resources for the Future and Environmental Defense Fund. Retrieved from: [https://media.rff.org/documents/RFF\\_Report\\_21-01\\_Colstrip\\_Case\\_Study.pdf](https://media.rff.org/documents/RFF_Report_21-01_Colstrip_Case_Study.pdf)
52. Geosyntec Consultants (2018, January). Colstrip wastewater facility closure plan: Units 3&4 Effluent Holding Pond Site. Report prepared for Talen Montana, LLC. P. 3 – 14.
53. Geosyntec Consultants (2018, January). Colstrip wastewater facility closure plan: Units 1&2 Stage I&II Evaporation Pond Site. Report prepared for Talen Montana, LLC. P. 3 – 11.
54. Geosyntec Consultants (2018, January). Colstrip wastewater facility closure plan: Plant site. Report prepared for Talen Montana, LLC. P. 3 – 13.
55. Montana Department of Environmental Quality [DEQ] (n.d.). Colstrip Steam Electric Station Coal Ash Ponds: FAQs. Retrieved from: <https://deq.mt.gov/cleanupandrec/Programs/colstrip>
56. PPL Montana, LLC as Operator of the Colstrip Steam Electric Station and Montana Department of Environmental Quality. (2012, July 30). Administrative Order on Consent regarding impacts related to wastewater facilities comprising the closed-loop system at Colstrip Steam Electric Station, Colstrip MT. Retrieved from <https://deq.mt.gov/Files/DEQAdmin/MFS/Colstrip/COLSTRIPAOCFINALOFFICIALRECORD.pdf>
57. See footnotes: 34 - 36.
58. The power plant and Rosebud mine together employed approximately 800 people as of 2017. Haggerty, J., Walsh, K. B., Haggerty, M., & Rose, J. (2017). Colstrip: The status of key policies and decision processes. Montana State University. Retrieved from [https://www.montana.edu/energycommunities/documents/Colstrip\\_Status\\_Report-FINAL.pdf](https://www.montana.edu/energycommunities/documents/Colstrip_Status_Report-FINAL.pdf)



59. Northern Plains Resource Council (2018). Doing it right: Job creation through Colstrip cleanup. Retrieved from: [https://northernplains.org/wp-content/uploads/2018/07/DoingItRight\\_FullStudy\\_FNL\\_WEB.pdf](https://northernplains.org/wp-content/uploads/2018/07/DoingItRight_FullStudy_FNL_WEB.pdf)
60. Northern Plains Resource Council (2019). Cleanup jobs study research. Retrieved from: <https://northernplains.org/cleanup-jobs-study-research/>
61. Northern Plains Resource Council (2018). Doing it right II: Colstrip's bright future with cleanup. Retrieved from: [https://northernplains.org/wp-content/uploads/2019/04/DIRTII\\_FINAL\\_WEB.pdf](https://northernplains.org/wp-content/uploads/2019/04/DIRTII_FINAL_WEB.pdf)
62. Montana Department of Environmental Quality (2020). P. 12. Retrieved from: [https://deq.mt.gov/Files/DEQAdmin/MFS/Colstrip/Colstrip/DEQ\\_DecisionDocument\\_Units1&2RER\\_FINAL.pdf](https://deq.mt.gov/Files/DEQAdmin/MFS/Colstrip/Colstrip/DEQ_DecisionDocument_Units1&2RER_FINAL.pdf)
63. U.S. Department of Commerce. 2019. Census Bureau, American Community Survey Office, Washington, D.C., reported by Headwaters Economics' Populations at Risk, [headwaterseconomics.org/par](http://headwaterseconomics.org/par)
64. Estimates were generated using the 2012–2016 American Community Survey (ACS) from the United States Census Bureau, which available in the U.S. EPA's EJSCREEN's Standard Reports. EJSCREEN was designed in the context of EPA's environmental justice policies and is a screening tool that can help identify areas that may warrant additional consideration, analysis, or outreach.
65. Roemer, K. et al. (2021). P.11.
66. Northern Plains Resource Council (2019). Cleanup jobs study research. Appendix C. Retrieved from: <https://northernplains.org/cleanup-jobs-study-research/>
67. Ibid.
68. See 40 C.F.R. § 257102(d). Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities, 80 Fed. Reg. 21,302 (Apr. 17, 2015), hereinafter "CCR Rule."
69. 40 C.F.R. § 257102(d).
70. See Kirk Engineering & Natural Resources, Inc. "Reuse and Economics Impacts: NIPSCO Power Generation Facility, Michigan City, IN," <https://earthjustice.org/documents/report/kirk-engineering-reuse-study>
71. Environmental Integrity Project & Earthjustice, Coal's Poisonous Legacy: Groundwater Contaminated by Coal Ash Across the U.S. ((Mar. 2, 2019, rev. July 11, 2019) ("Coal's Poisonous Legacy"), available at <https://www.environmentalintegrity.org/reports/coals-poisonous-legacy/>.

## TECHNICAL STUDIES

Read the KirK Engineering & Natural Resources, Inc.. Coal Combustion Residual Closure Analysis: Cost and Jobs Associated with Different Closure Alternatives (“KirK Engineering Study”) at <https://earthjustice.org/documents/report/kirk-engineering-study>

Read the Applied Economics Clinic. Background Report: Benefits of Coal Ash Cleanup and Remediation at <https://earthjustice.org/documents/report/aec-study>

Read the KirK Engineering & Natural Resources, Inc. Reuse and Economics Impacts: NIPSCO Power Generation Facility, Michigan City, IN, (KirK Engineering Reuse Study) at <https://earthjustice.org/documents/report/kirk-engineering-reuse-study>