DOING IT RIGHT II:
Job creation through Colstrip cleanup
This report is a publication of the Northern Plains Resource Council. Utilizing research and data from experts in the fields of engineering, hydrology, and economics, Northern Plains’ lead researcher Kate French prepared and authored this report. While this report utilizes data from the public sphere as well as outside expert analyses, any official policy or advocacy recommendations in this document are the position of Northern Plains and may not necessarily reflect the views of outside parties.

Northern Plains Resource Council (Northern Plains) is a grassroots conservation and family agriculture group that organizes Montana citizens to protect our water quality, family farms and ranches, and unique quality of life. The organization was founded in 1972 by local ranchers, including ranchers in the Colstrip area, and community members who wanted to address the impacts that coal development would have on the water quality and livelihoods of central and eastern Montanans. Northern Plains continues to advocate for clean water and the health of the entire community.
DOING IT RIGHT II:
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April 2019
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I. INTRODUCTION

This report illustrates the significant job creation potential in responsible cleanup of coal ash ponds. Coal ash is the waste by-product of coal-fired power plants and, at over 800 acres, the Colstrip power plant ash pond complex is one of the largest in the nation. Current research shows that cleanup can be a big job creator, so the massive scale of Colstrip’s complex offers job creation on an equally massive scale.

Northern Plains Resource Council has spent years studying the relationship between coal ash cleanup and job creation. This report builds upon our 2018 study which evaluated coal ash pond closure around the United States (Doing it Right: Colstrip’s bright future with cleanup), and incorporates research from our ongoing investigation of remediation at Colstrip. The overall takeaway from these analyses is that robust cleanup creates more jobs, better environmental protection, and greater economic benefits for the local community. Thorough cleanup is a true win-win scenario.

These findings are particularly salient for Colstrip, a rural, isolated community in southeastern Montana that is defined by both its mine-mouth coal plant and multi-generational agricultural history. The plant’s leaking coal ash ponds have posed serious threats to water quality and ranch operations for decades. Local ranchers, the Northern Cheyenne nation, and Rosebud County homeowners continue waiting for the ponds to stop leaking and the groundwater contamination to be cleaned up permanently. Simultaneously, hundreds of workers are facing potential lay-offs with the pending retirements of power plant Units 1 and 2 and the uncertain future of Units 3 and 4.

There is a simple solution to these problems. A cleanup plan that ensures coal ash is stored in a dry location high above the aquifer is the best outcome for both the Colstrip community and the environment. A project that involves excavating coal ash, dewatering it, and permanently repairing the groundwater will create hundreds of jobs—jobs that should be first offered to the local workforce.

It’s up to the state of Montana to enforce this kind of responsible cleanup and demand that it be fully funded by power plant owners.

Many of the Colstrip ash ponds are in contact with the groundwater and are likely to remain so into the future. Around the country, removing (excavating) coal ash from these areas and fully dewatering ponds that are above the water table—to prevent future leaking into that groundwater—is a proven method to stop contamination quickly and permanently. We will hereafter refer to this “high and dry” excavation and dewatering strategy as “Doing It Right.”

The Colstrip plant owners’ current cleanup proposal (headed by Talen Montana, LLC, and hereafter referred to as “Talen’s Proposal”) would leave coal ash in contact with the groundwater and would leave excess water in the ponds, allowing the contamination plume to rebound after only a few decades. This proposal would also provide for fewer cleanup jobs than more robust cleanup.
KEY TAKEAWAYS FROM THIS REPORT:

- **Doing It Right would permanently halt contamination by stopping the leakage from the bottom of the ponds.** In contrast, Talen’s Proposal to cap the ponds in place does not address the source of the problem—e.g., existing polluting contaminants.

- **Doing It Right would create twice as many jobs as Talen’s Proposal.** In this report, a “job” is defined as a full-time equivalent (FTE). For the first 10 years, on average, Doing It Right would create 218.2 direct jobs per year, while Talen’s proposal would only create 91.6 direct full-time jobs per year.

- **In looking at long-term jobs for the next 40 years, Doing It Right would create 66.4 direct jobs per year, while Talen’s proposal would only lead to 39.5 jobs per year.**

- **Doing It Right would create more jobs in a variety of categories (professional, skilled, and unskilled).** While Talen’s plan would create jobs in each of those categories, Doing It Right would create far more of each.

- **Doing It Right would create far more jobs in the community overall.** Direct jobs needed for a project also create and support additional local jobs such as mechanics, electricians, restaurant employees, etc. For the first 10 years, Doing It Right would create an average of 403.8 total jobs per year, while Talen’s proposal would only create 158.4 jobs per year.

In Doing It Right, Montana can support the workers and agricultural community of Colstrip by ensuring that cleanup would meet legal obligations (groundwater standards), stop the contamination permanently, and be fully funded by the plant owners (avoiding a long-term taxpayer burden). It’s up to the state of Montana to enforce this kind of responsible cleanup and demand that it be fully funded by power plant owners.

### Nature of this Analysis

As mentioned above, the Northern Plains Resource Council has spent the past several years investigating the job creation potential of cleaning up the Colstrip ash ponds.

The first stage of this analysis (*Doing it Right: Colstrip’s bright future with cleanup*) involved researching ash pond closure and remediation around the country to understand available strategies, the environmental impact of those remediation projects, and the jobs they created. The 2018 report evaluated those case studies and found that power plants that closed ash ponds responsibly—by moving the ash away from surface and groundwater—created far more jobs than those that closed ponds by simply covering the top, also known as cap-in-place.

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1. The community area is defined as Rosebud County and Yellowstone County in Montana.
Northern Plains also received a federal POWER grant (Partnerships for Opportunity and Workforce and Economic Revitalization) to study the specific workforce requirements at Colstrip for various cleanup approaches and their effectiveness. Results from that study were submitted to local institutions (such as regional community colleges) to inform future retraining programs. For the second investigation, a team of Montana-licensed engineers, hydrologists, and economists provided the Colstrip-specific technical review and analysis.

This report (Doing it Right II: Job creation through Colstrip cleanup) includes findings from the two prior analyses as well as Northern Plains’ continued research in the burgeoning field of ash pond closure and remediation.

The cleanup alternatives described here were analyzed based on publicly available documents submitted by plant owners to the Montana Department of Environmental Quality (DEQ). Utilizing these documents, a variety of cleanup alternatives were designed and likely workforce requirements for each alternative were estimated.

**COLSTRIP CONTEXT**

**At over 800 surface acres, the Colstrip ash pond complex is one of the largest in the country.** Coal ash produced from all four units is stored with water in large impoundments (more commonly referred to as coal ash ponds, sometimes as wet coal ash ponds). The Environmental Protection Agency (EPA) recently found that 95% of wet coal ash ponds are leaking and introducing contaminants into nearby surface or groundwater supplies; this is the case for both lined and unlined ponds. Colstrip, in particular, has had decades of documented leakage and groundwater contamination at all three site areas.

The Colstrip Plant is co-owned by Talen Montana, LLC; PacifiCorp; Puget Sound Energy, Inc.; Portland General Electric Company; Avista Corporation; and NorthWestern Corporation (which owns NorthWestern Energy). The three pond areas are:

- Unit 1 & 2 Stage I Evaporation Pond (SOEP) and neighboring Stage II Evaporation Pond (STEP)
- The Unit 3 and 4 Effluent Holding Pond (EHP)
- The Plant Site ponds

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3 The 2019 analysis (“POWER Cleanup Jobs Study”) was conducted for and funded by the Montana Department of Labor and Industry with a POWER MT Grant; the “Cleanup Jobs Study” provides the data for the Colstrip-specific workforce and economic findings described in this report. The opinions expressed in this white paper are those of Northern Plains Resource Council and do not reflect the opinions or recommendations of the Montana Department of Labor nor the state of Montana. Access the electronic copy by visiting [https://www.northernplains.org/cleanup-jobs-study-research](https://www.northernplains.org/cleanup-jobs-study-research)

4 Pursuant to the aforementioned Administrative Order on Consent, Units 3&4 will be converting entirely to dry storage for coal ash by mid-2022. Dry storage technology has been utilized for these units to varying degrees in recent years; however, for the majority of the units’ operation, ash has been stored in effluent (wet) impoundments.


Units 1 and 2 of the plant, which have operated since 1975 and 1976, are required by a court settlement related to air quality to shut down no later than the end of 2022. Units 3 and 4, which have operated since 1984 and 1986, are slated to operate with modifications to their coal ash management for an indeterminate number of years.

At Colstrip, coal ash contamination is reaching the local groundwater and aquifers in two ways. The first is that the contaminated pond water itself drains out of the impoundment and flows into the aquifers; it is roughly estimated that the Colstrip ponds cumulatively leak 367 gallons per minute. Additionally, the groundwater (or water table) is in contact with the ponds; therefore, fresh groundwater seeps into the ponds, becomes contaminated from mixing with the coal ash, and then leaches back out. The rate of this groundwater flow through the coal ash is not publicly known and has not been reported by Talen.

Colstrip plant management has constructed an elaborate system of wells and trenches to capture contaminated groundwater and pump it back into the plant water circuit. This system has generally prevented contamination from spreading farther than the present plume but has not been effective in restoring water quality to meet legal standards in the impacted aquifers. Furthermore, if the capture system were shut down while water is still flowing through the coal ash (as is likely at many ponds if they are capped-in-place), contamination would resume spreading into groundwater and area creeks. Liners have not proven to be an effective barrier to prevent groundwater from entering ponds or prevent pond water from leaking out into the aquifer.

*Figure 1:* This map shows the three main sites of the Colstrip coal ash pond complex. The Units 1 & 2 ponds are also known as the Stage One Evaporation Pond and Stage Two Evaporation Pond (SOEP and STEP). The Units 3 & 4 ponds are also known as the Effluent Holding Ponds (EHP). The area with ponds at the plant site is known as the Plant Site. 

(Credit: Kirk Engineering & Natural Resources, Inc., 2019)
The ash-contaminated groundwater is hazardous to human, wildlife, and livestock health. **The coal ash pond water has dangerously high levels of selenium, manganese, cobalt, molybdenum, and radium 226 and 228, some of which are several hundred times over drinking water standards or the regional background levels.** This is the water that is flowing into the groundwater and contaminating the aquifer.

Some of the contaminants, like boron and sulfates, sound innocuous but are **deadly to cattle in the high doses found in the contamination plume.** Currently, the town of Colstrip is supplied with drinking water from the Yellowstone River. However, if the capture system were to fail or the contamination plume were to rebound after plant owners ceased operating the capture system, the impact would be devastating for agricultural producers and area well-users not supplied with Yellowstone River water.

The engineering analysis of the pond construction, along with the reported groundwater levels in the area, reveals that several ponds are currently in contact with the area’s groundwater and are reasonably anticipated to be in contact with the groundwater in the future. Most notably, these ponds include:

- **SOEP/STEP:** Stage One Pond, Cell A, Cell E, Old Clearwell.

- **Plant Site:** Several smaller ponds, most notably the Units 1 and 2 Fly ash A pond, and Units 1 and 2 Fly ash B pond.

At the EHP (Effluent Holding Pond) site (related to Units 3 and 4), the ponds are located on a hill and are some distance above the historic water table. Decades of pond leakage have, however, resulted in the mass of seepage being hydrologically connected to the groundwater. It is likely that this is an area where adequate pond and sub-pond soil dewatering could isolate the coal ash in the ponds from the groundwater table. But if not fully dewatered, the EHP ponds would likely contaminate groundwater for decades into the future.

Talen Montana LLC, the plant’s operating manager, is in the process of submitting cleanup proposals for approval by the DEQ. The DEQ is reviewing these plans and seeking public input during this process. Under the law, plant owners are...

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**Figure 2:** This groundwater contamination map was submitted to the Montana Department of Environmental Quality (DEQ) by Colstrip plant owners. Even with extensive groundwater capture, the contamination plume extends far beyond the pond perimeters and is not fully contained.
financially responsible for cleanup, and have begun posting partial bonds toward that obligation. However, if the state of Montana approves an inadequate cleanup plan (and sets artificially low projected costs and bonding rates), taxpayers could be left on the hook to cover decades of legacy clean-up costs if plant owners are no longer around. To protect taxpayers, workers, the environment, and the community of Colstrip, the state needs to get it right the first time.

**IF NOT FULLY DEWATERED, THE EFFLUENT HOLDING PONDS WOULD LIKELY CONTAMINATE GROUNDWATER FOR DECADES INTO THE FUTURE.**
At Colstrip, there are two separate but related components to cleanup. The first is closing the ash ponds and stopping future contamination, which is sometimes shortened to just “pond closure” or contamination “source control.” The other cleanup component is fixing the existing groundwater contamination—or “groundwater remediation.”

**Coal Ash Pond Closure**

The key to stopping future contamination from coal ash ponds is to ensure the ash is kept *high and dry*. As described earlier, some of the ponds at Colstrip are currently in contact with the groundwater, and will likely be in contact with groundwater well into the future. Because of this, our analysis targeted these ponds for *excavation*—or removing the ash from the ponds and storing it in a secure location.

Removing the coal ash is an effective solution for stopping future contamination: if there’s no more ash in the ponds, it won’t leach into the groundwater.

Cap-in-place is another method sometimes used for closing ash ponds and, while it can work, it is effective *only in cases where the ponds are far above the water table*. Excavation is a more labor-intensive process, and therefore more expensive up-front, than cap-in-place. But excavation has also been proven across the country to drastically and quickly reduce groundwater contamination.

The other critical factor for ash pond closure is *full dewatering*, which is required by the current federal coal ash rule. At present, all the ponds at Colstrip are leaking into the groundwater and, while some of the ponds are lined, this has not stopped the leaking. This problem will continue if any water is left in the ponds upon closure.

In their current proposal, plant operators try to get around this by:

- Only removing some of the water and leaving the harder-to-treat water near the bottom of the pond; or
- Proposing to allow the water to drain into the aquifer slowly.

This is insufficient. Full dewatering means actively removing all pond water through forced evaporation or mechanical methods, like pumping or employing capture wells in the ponds.

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7 According to the federal 2015 Coal Combustions Residuals Rule (40 CFR Part 257), acceptable storage for excavated coal ash is in a lined landfill that is located far from any surface or groundwater. Recycling the ash (or beneficial reuse) as a valuable ingredient for concrete manufacturing is also acceptable under the CCR rule and is quite popular with utilities, community advocates, and environmentalists. At Colstrip, the current limitation to coal ash recycling is the distance to market. However, storage in an onsite landfill does not preclude future beneficial reuse. If this option becomes available, it would provide an elegant win-win solution.
For the existing contamination in the groundwater, there are a variety of strategies that can be used together to remove pollutants and restore the aquifer. Right now, the Colstrip plant runs hundreds of capture wells that pump water out of the ground and return it to the plant site. Much of this water is treated and reused in plant operations. Additional treatment processes or facilities could be utilized to remove contaminants more quickly, making the water safer for onsite storage or, perhaps eventually, discharge.

The key here is to ensure that there are numerous, correctly-placed wells monitoring the current plume as well as adequate capacity at treatment facilities to treat the captured water. This “pump-and-treat” method for remediating contaminated groundwater is the fastest and most effective strategy for addressing widespread groundwater pollution. **Full dewatering of ash ponds is the first necessary step of this “pump-and-treat” process.**

The other critical factor for success is ensuring there are adequate funds to pay for equipment and workers for decades into the future.
CLEANUP JOBS ANALYSIS

Using the cleanup alternatives above (Figure 3), an environmental engineering team extrapolated the workforce that would be needed for each project. These are the *direct jobs* created for each alternative. It is worth noting that the pond closure strategy (excavation vs. cap-in-place) has the most impact on the number and types of jobs created (see Table 1 below).

Table 1: Average number of yearly jobs for Colstrip cleanup

<table>
<thead>
<tr>
<th>Cleanup Approach</th>
<th>Yearly Direct Jobs (FTEs) (2020-2029)</th>
<th>Yearly Direct Jobs (FTEs) (2030-2069)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talen’s Proposal</td>
<td>91.6</td>
<td>39.5</td>
</tr>
<tr>
<td>“Doing it Right”</td>
<td>218.2</td>
<td>66.4</td>
</tr>
</tbody>
</table>

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8 The other way to describe the number of jobs created is full-time equivalents (FTE’s). Labor economists prefer data described in these terms, though it is not the most intuitive to read for a layperson. In this report, one job is equivalent to one FTE.
What kind of jobs?
Skilled, unskilled, and professional jobs are needed for ash pond cleanup, though good cleanup requires many more people to complete the work. A deeper dive into the workforce skills required for one specific pond—the STEP A Pond—illustrates these distinctions (See Table 2 below).

**Table 2: Workforce analysis of STEP A Pond**

<table>
<thead>
<tr>
<th>Cleanup Approach</th>
<th>Professional FTEs (2020-2029)</th>
<th>Skilled FTEs (2020-2029)</th>
<th>Unskilled FTEs (2020-2029)</th>
<th>Total FTEs (2020-2029)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talen’s Proposal</td>
<td>3.5</td>
<td>9.5</td>
<td>.5</td>
<td>13.5</td>
</tr>
<tr>
<td>(Cap-in-place)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“Doing it Right”</td>
<td>30.1</td>
<td>47.3</td>
<td>7.4</td>
<td>84.8</td>
</tr>
<tr>
<td>(Excavate STEP A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Professional positions include: Professional land surveyor (PLS), construction manager, health and safety manager, engineer, planner, estimator, designer, and management.

Skilled positions include: Excavator operator, truck driver, dozer operator, drum compactor operator, auger operator, cement truck driver, PLS assistant, well drilling assistants, pump and conveyance system installer, heavy machinery mechanics, auger assistant laborer, liner installer, surface runoff collection installer, leachate collection system installer.

Unskilled positions include: Construction laborer.

Because the STEP A Pond would be excavated under the Doing it Right proposal, a significant number of heavy equipment operators (37 FTEs, all categorized as skilled labor) would be needed. Additionally, excavation is a more complex endeavor than laying a cap over the top of the ash, so many more professional positions are required to plan, design, and manage the project.

Another example of the differences in workforce requirements is illustrated by the Stage One Evaporation Pond (or SOEP). This pond was capped-in-place in 2002, but it is now saturated in groundwater and leaching into the aquifer. The Colstrip owners have not proposed excavating this obviously problematic site. Doing it Right includes SOEP excavation, and it is clear that leaving coal ash pollution in the ground would not only lead to long-term environmental harm, but would also leave many potential jobs on the table. Going back and closing the SOEP properly via excavation would create 147.3 FTEs altogether, many of which would be skilled and professional positions (see Table 3 on page 12).
With the Doing It Right approach, an additional 237.8 FTEs would be needed to build the federally-compliant landfills to store the excavated coal ash waste. These jobs are only included in Doing it Right and not in Talen’s Proposal\(^9\) (see Table 4 below).

**Table 3**: 10-year workforce analysis of SOEP Pond Closure

<table>
<thead>
<tr>
<th>Cleanup Approach</th>
<th>Professional FTEs (2020-2029)</th>
<th>Skilled FTEs (2020-2029)</th>
<th>Unskilled FTEs (2020-2029)</th>
<th>Total FTEs (2020-2029)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talen’s Proposal (Cap-in-place)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>“Doing it Right” (Excavate SOEP)</td>
<td>54.2</td>
<td>80.1</td>
<td>13.0</td>
<td>147.3</td>
</tr>
</tbody>
</table>

With the Doing It Right approach, an additional 237.8 FTEs would be needed to build the federally-compliant landfills to store the excavated coal ash waste. These jobs are only included in Doing it Right and not in Talen’s Proposal\(^9\) (see Table 4 below).

**Table 4**: 10-year workforce analysis of building federally-compliant coal ash landfills

<table>
<thead>
<tr>
<th>Cleanup Approach</th>
<th>Professional FTEs (2020-2029)</th>
<th>Skilled FTEs (2020-2029)</th>
<th>Unskilled FTEs (2020-2029)</th>
<th>Total FTEs (2020-2029)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talen’s Proposal (No landfills)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>“Doing it Right” (Build 2 CCR-compliant landfills)</td>
<td>71.3</td>
<td>148.1</td>
<td>18.4</td>
<td>237.8</td>
</tr>
</tbody>
</table>

**Big Picture on Jobs**

In addition to the jobs needed specifically for the project, labor economists also look at all the other “induced and indirect” jobs that would be created in the area to support the project. Those jobs are defined on the following page.

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\(^9\) The Doing it Right cleanup includes building two federally compliant CCR landfills on land owned by the Colstrip operators: one specifically for plant site coal ash and one for SOEP/STEP coal ash. This eliminates the need for long-haul transport of coal ash on public roads.
**Direct Jobs:** Jobs directly needed for the project (e.g., someone to run an excavator).

**Indirect Jobs:** Jobs needed in the area to help that project along (e.g., the person who sells the excavator or sells spare excavator parts).

**Induced Jobs:** Wider jobs in the community that are created when workers spend their money (e.g., new waiter hired in the local café to serve all the new workers in town).

**Total Jobs:** The sum of direct, induced, and indirect jobs created.

Because Doing it Right requires so many additional direct jobs, it also vastly increases the overall job numbers due to the "ripple effect" of induced and indirect jobs in the community. Economists call this a multiplier effect. For a complete picture of the total jobs, Table 5 (below) compares the job creation of a likely water treatment strategy with each pond closure strategy.

### Table 5: Annual average jobs

<table>
<thead>
<tr>
<th>Cleanup Approach</th>
<th>Direct Jobs (FTEs) (2020-2029)</th>
<th>Total Direct, Induced, &amp; Indirect Jobs (FTEs) (2020-2029)</th>
<th>Direct Jobs (FTEs) (2030-2069)</th>
<th>Total Direct, Induced, &amp; Indirect Jobs (FTEs) (2030-2069)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talen’s Proposal</td>
<td>91.6</td>
<td>158.4</td>
<td>39.5</td>
<td>64.4</td>
</tr>
<tr>
<td>“Doing it Right”</td>
<td>218.2</td>
<td>403.8</td>
<td>66.4</td>
<td>111.1</td>
</tr>
</tbody>
</table>

Ash pond closure and remediation has been a major job creator around the country. North Carolina was one of the first states to aggressively demand responsible and timely ash pond cleanup, much of which is being done via excavation. Recently, the state’s utility company, Duke Energy, revealed that its ash pond closure efforts since 2013 had created over 3,700 jobs in the region—and much more work is yet to be done.\(^\text{10}\)

A look at some of the plants in North Carolina (see Table 6 on page 14) demonstrates the same trend observed in our Colstrip analysis. Excavation tends to create far more jobs than the less effective cap-in-place method.

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**Table 6**: Job comparison chart from Doing it Right case study analysis

<table>
<thead>
<tr>
<th>Plant Name/Location</th>
<th>Pond Size</th>
<th>Cleanup Jobs</th>
<th>Coal Plant Jobs</th>
<th>Cleanup Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riverbend Station</td>
<td>69 acres</td>
<td>75</td>
<td>145</td>
<td>Excavation + Transport + New Treatment Plant + Water Treatment</td>
</tr>
<tr>
<td>(North Carolina)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asheville Plant</td>
<td>76 acres</td>
<td>190</td>
<td>200</td>
<td>Excavation + Transport + Water Treatment</td>
</tr>
<tr>
<td>(North Carolina)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belews Creek</td>
<td>283 acres</td>
<td>163</td>
<td>300</td>
<td>Cap-in-place + New Treatment Plant</td>
</tr>
<tr>
<td>(North Carolina)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colstrip Station</td>
<td>~800 acres</td>
<td>Unknown</td>
<td>388</td>
<td>Cap-in-place + Expand Capture System</td>
</tr>
<tr>
<td>(Montana)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

“Cleanup Jobs” described are at the height of yearly employment (FTE). Cleanup timeframes for the North Carolina plants are approximately 5 years, not including preparation time. “Coal Plant Jobs” are the average number of jobs (FTE) for a single year at peak operation.
IV. Economic Impact

From the workforce profiles associated with each cleanup alternative, it is possible to estimate levels of personal income in the local economic region that will result from direct spending in the economy. Table 7 (below) shows estimates for average annual direct, indirect, induced and total personal income which would be generated for Rosebud and Yellowstone counties by the levels of direct cleanup spending shown in Table 8 (see page 16). The income estimates in the table are presented in millions of 2019 dollars.

The short-term income from direct jobs is $16.61 million for Doing It Right and just $7.91 million for Talen’s Proposal. In other words, Doing it Right would generate 2.1 times more direct income than Talen’s Proposal from 2020-2029.

**Table 7:** Estimated annual personal income in the Rosebud-Yellowstone County economy resulting from spending on Colstrip ash pond closure, groundwater treatment, and monitoring activities (millions of 2019 US dollars)

<table>
<thead>
<tr>
<th>Cleanup Approach</th>
<th>Direct Income (2020-2029)</th>
<th>Total Income (2020-2029)</th>
<th>Direct Income (2030-2069)</th>
<th>Total Income (2030-2069)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talen’s Proposal</td>
<td>$7.91 M</td>
<td>$11.96 M</td>
<td>$2.17 M</td>
<td>$3.22 M</td>
</tr>
<tr>
<td>“Doing it Right”</td>
<td>$16.61 M</td>
<td>$26.34 M</td>
<td>$4.13 M</td>
<td>$6.18 M</td>
</tr>
</tbody>
</table>

The estimates modelled in this analysis are based on 2017 economic data in the region, but span 50 years. Changes in the economic region, particularly potential growth and diversification in Yellowstone County, would influence economic impacts described in these tables.
Another important caveat to bear in mind is the large degree of uncertainty related to cleanup strategies that will be followed and the ultimate schedule of those activities. Thus, these estimates do not consider the varied impacts of timing across years and the associated “time value of monies” either spent in the cleanup or earned by workers. Finally, wage numbers may vary widely and these numbers are probably most illustrative of overall differences in wage trends between the alternatives rather than precise earnings estimates.

Altogether, it’s clear that Doing it Right is not only better from an environmental and job creation standpoint, but also much more beneficial economically for the Rosebud and Yellowstone County regions generally.

Other impacts to consider are the stabilization of property values, population retention, and associated tax revenue. If more people are employed in the community, even for a shorter multi-year bridge until the next opportunity, that will have wide-ranging impacts for the region. These wider economic impacts were not included in the economic analysis described above, but they are nevertheless a significant piece of the puzzle and one for decision-makers to bear in mind.

OVERALL COSTS

The price tag for cleanup isn’t small, but it represents a cost that the Colstrip owners have shifted to the future for decades. Colstrip plant owners have been aware of the contamination problem at the site for decades and have been legally and financially liable to stop the contamination since 2006. Some of the owners have put aside funds to finance this remediation; specifically, Puget Sound Energy has an account with approximately $400 million available to close and remediate the site. On the other hand, Talen Energy funnelled $500 million to shareholders not long after purchasing their share of the plant in 2015 – despite being well-aware of the liability and costs associated with cleanup.

Table 8: Total cleanup cost comparison, 2020-2069

<table>
<thead>
<tr>
<th>Cost Breakdown</th>
<th>Capital cost only through 2069</th>
<th>Total cost through 2069</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talen’s Proposal</td>
<td>$126,581,080</td>
<td>$409,398,320</td>
</tr>
<tr>
<td>“Doing it Right”</td>
<td>$593,953,319</td>
<td>$925,657,290</td>
</tr>
</tbody>
</table>

At $925 million, Doing It Right is the more expensive alternative, but is also the best strategy for stopping contamination and **protecting taxpayers from absorbing future financial burdens.**

The costs for Talen’s Proposal (see Table 8) come from the Remedy Reports and Facility Closure Plans that Talen submitted to the DEQ in September 2018. Talen’s costs appear to be low considering the scope of work described. Other owners have estimated the total cost of remediation would be closer to $700 million. The bulk of spending would be in the first few years of closure; the long-term operations and maintenance costs should be relatively similar between all the alternatives.

Montana has a long history of companies claiming poverty or skipping town when the time comes to pay for decades of pollution or poor management decisions. In these cases, taxpayers are often the ones saddled to fix the remaining problem. It’s a common and sad story that everyone wants to avoid in Colstrip.

Colstrip and the state of Montana deserve the best cleanup possible, and deserve for that cleanup to be fully funded by plant owners. The community’s future may well depend on it.

**WORKER AND COMMUNITY SAFETY**

While straightforward in concept, coal ash excavation is still a complex endeavor and there are legitimate safety concerns that must be addressed. In some areas, removed coal ash must be transported by rail or truck over hundreds of miles to a federally-compliant landfill or recycling plant. At Colstrip, this will not be an issue because it is likely that a coal ash landfill can be safely sited (far from any surface or groundwater) on the plant’s property. Thus, coal ash would probably not have to be transported on public roadways and, if it did, it would only be for very short, likely slow, stretches.

Worker safety is also a critical concern for all coal ash cleanup projects. During a recent Tennessee Valley Authority (TVA) spill cleanup, 40 workers died and hundreds were sickened after improperly handling coal ash. The employer was found liable in court for this tragedy because they lied to workers about the dangers of coal ash exposure. Such a case highlights the need for proper training, rigorous oversight, and worker protections as would be necessary in any contamination cleanup project. Although coal ash has not been federally classified as a hazardous material, this misclassification should be considered a regulatory failure and not a valid determination from a human health and safety perspective. Luckily, proper oversight and equipment can protect workers—this should be a top priority for the state and regulatory agencies.

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V. Conclusion

Thorough cleanup at Colstrip will require coal ash to be stored high above the aquifer, in a dry location (“high and dry”). The plant owners need to excavate ash ponds that are in contact with groundwater and fully dewater the rest of the ponds to prevent future contamination.

A “high and dry” cleanup plan—keeping coal ash away from the aquifer—would create hundreds of additional jobs for decades to come and is a permanent fix to groundwater pollution. Talen’s proposed cleanup would employ less than 100 workers and allow groundwater pollution to re-emerge in coming years. This would be a threat to the local agricultural community who depends on unspoiled groundwater as well as local taxpayers who could be stuck with the bill for a permanent fix.

The Montana DEQ should only approve a plan that protects water quality and community well-being permanently. Talen’s current proposal would not meet federal or state legal requirements, but more importantly, it puts the community of Colstrip and the rest of Montana at risk economically and environmentally. Good cleanup will not replace all the jobs that will be lost at the plant and the mine, but it can bridge a critical gap for many workers and soften the blow of rapid change.

Thorough cleanup is critical for the future of Colstrip and is the responsibility of the plant owners. The state of Montana must hold plant owners to this standard.