



COAL MINE CLEANUP WORKS:

A Look at the Potential Employment Needs for Mine Reclamation in the West



220 South 27th St, Ste B
Billings, MT 59101
www.worc.org
406/252-9672

ABOUT WORC

WORC is a regional network of grassroots community organizations that include 18,620 members and 41 local chapters. WORC's network includes: Dakota Resource Council (North Dakota); Dakota Rural Action (South Dakota); Idaho Organization of Resource Councils; Northern Plains Resource Council (Montana); Powder River Basin Resource Council (Wyoming); Western Colorado Alliance for Community Action; and Western Native Voice. WORC's mission is to advance the vision of a democratic, sustainable, and just society through community action.

ABOUT THIS REPORT

The western coal industry's twilight years are upon us. Reclaiming the many thousands of acres mined for coal is required by law and presents a significant opportunity to extend employment for miners, with substantial economic benefits for coalfield communities. This report builds upon our previous publications on this topic by analyzing the workforce required to complete reclamation at surface coal mines on Colorado, Montana, Navajo Nation, Hopi Tribe, Arizona, New Mexico, North Dakota, Utah, and Wyoming lands.

ACKNOWLEDGEMENTS

We are grateful to Jim Kuipers who provided the technical analysis for this report and whose contributions made this report possible. This report was prepared by Kate French. Invaluable research and editing support was provided by Dan Cohn. Many thanks to the editors for their contributions to the final draft: Angel Amaya, Shannon Anderson, Sara Kendall, Roger Carver, Tina Carver, Alex Cunha, Michele Irwin, and Briana Bergeron. Responsibility for all mistakes rests solely with the author. Design by Angel Amaya, Marvel Karch, and Spake Media. All views and opinions expressed in this report are those of WORC and do not necessarily reflect the views of WORC's funders.

TABLE OF CONTENTS

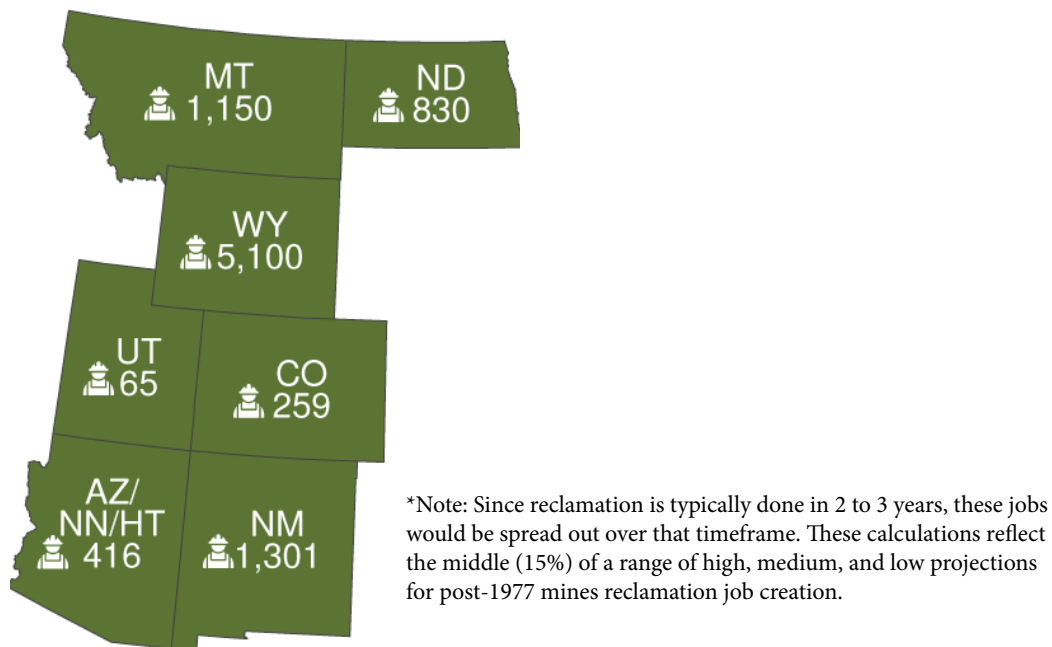
Introduction	4
Methodology	7
Findings	8
• Reclamation jobs provide years of employment at the end of mine life	8
• Mine reclamation can and should be done by the local workforce	12
• Reclamation timing affects who does reclamation work	13
Recommendations	14
Case Studies	
• Eagle Butte Mine, Wyoming	16
• North Antelope Rochelle Mine, Wyoming	18
• Rosebud Mine, Montana	19
• Absaloka Mine, Montana	21
• Freedom Mine, North Dakota	23
• Colowyo Mine, Colorado	25
• Navajo Mine, New Mexico	27
• Kayenta Mine, Arizona	29
References	32

INTRODUCTION

As the coal industry's decline continues, workers and communities face an uncertain future. One bright spot is that reclamation requires a sizable workforce that can mitigate the impact of layoffs associated with mine closure. The Western Organization of Resource Councils (WORC) estimates that the workforce needed to complete surface mine reclamation is between 6,081 and 12,161 job-years on Colorado, Montana, Navajo Nation, Hopi Tribe, Arizona, New Mexico, North Dakota, Utah, and Wyoming lands. Much of this work could be completed within a relatively quick timeframe¹, both during mining and after closure. Thus, each year of reclamation will require thousands of workers².

This is an enormous opportunity to mitigate the negative impacts of the coal industry's downturn, but decision makers need to act decisively to ensure this work is fully funded by coal companies, and that the jobs are made available to local workers.

Image 1: Projected Coal Mine Reclamation Job-Years by State in the West



Western coal communities have a lot to grapple with as the coal industry declines. Communities suffer from mass lay-offs and local budgets shrink significantly from reduced tax revenues. Many coal communities have mine-mouth facilities where the local mine supplies all the coal for the local power plant, and the shut-down of one facility typically guarantees the imminent closure of the other. And, when mining and plant jobs end, there are often scarce alternatives available in isolated, rural coal towns so the sudden nature of mine layoffs can devastate workers, families, and communities for many years. In 2019, surface mines in this intermountain west area employed 8,540 workers³.

There is no one simple answer to these myriad impacts but reclamation provides one of the few, immediately available job opportunities for local workers and should be seen as one part of a proactive response to changing conditions in coal country. Reclamation work will not replace mining employment for all of these workers, but it can mitigate layoffs and provide a bridge to future employment, retirement or retraining for some.

WORC's recent report "Planning for Coal's Decline" outlined the scope of the reclamation yet to be completed in the West and recommended solutions to ensure these lands are fully restored. This report found that, after decades of coal mining in this Western region, 234 square miles or nearly 150,000 acres of coal pits and mine facilities still require reclamation. This area is equivalent to 37% of all land mined for coal in these states since 1977. Although state and federal laws require reclamation of this mined land, reclamation work may be delayed or abandoned during the industry bust⁴.

Job-Years is a term to denote the total number of people working full-time for an entire year to complete the job at hand. Essentially, one job-year is equivalent to one person working full-time for a year (or two people working half-time for a year, etc.) on a project, typically 2,000 hours in a year. But many big construction projects take longer than a year to complete, so to get a more straight-forward idea of how many people (or full-time equivalents) will be employed, it's helpful to know the duration of the project⁷. Dividing job-years by the number of years the project is projected to take provides a snapshot of how many full-time equivalent employees will be needed, on average, for each year of the project⁸.

This report builds on the findings and recommendations in our earlier report, "Planning for Coal's Decline." In addition to estimating the overall job creation potential in the region (Colorado, Montana, Navajo Nation, Hopi Tribe, Arizona, New Mexico, North Dakota, Utah, and Wyoming), this report includes six case studies to illustrate the risks facing communities and the benefits that reclamation jobs could provide. These case studies include the Colowyo Mine (Colorado), Rosebud Mine (Montana), Absaloka Mine (Montana), Kayenta Mine (Navajo Nation), Navajo Mine (New Mexico), Freedom Mine (North Dakota), Eagle Butte Mine (Wyoming), and North Antelope Rochelle Mine (Wyoming).

Communities will benefit most if mining companies complete reclamation work with local workers, but this isn't guaranteed. Decision makers need to act decisively to ensure this occurs. This report's recommendations add to those outlined in "Planning for Coal's Decline" emphasizing measures that would increase the potential of local hire and economic benefits for communities.

FINDINGS

1. RECLAMATION JOBS PROVIDE YEARS OF EMPLOYMENT FOR COAL MINERS AT THE END OF MINE LIFE.

Completing reclamation work at surface coal mines on Colorado, Montana, Navajo Nation, Hopi Tribe, Arizona, New Mexico, North Dakota, Utah, and Wyoming lands will require between approximately 6,000 and 12,000 job-years. The most labor-intensive mine reclamation work can be completed in two to three years. In 2019, surface mine employment in this Western region was 8,540. Thus, as the coal mines slow or stop production altogether, reclamation jobs can be a bridge of employment for numerous workers facing sudden lay-offs.

2. MINE CLEANUP CAN AND SHOULD BE DONE BY THE LOCAL WORKFORCE.

Many current mine employees have the skills and experience to do reclamation work. Reclamation work often utilizes the same heavy equipment as mining activities, and many miners today switch between production and reclamation tasks.

3. DELAYED RECLAMATION MEANS FEWER JOBS FOR LCOAL WORKERS.

The timing of reclamation activities has significant implications for the local community. Delayed reclamation -- especially after a mine's closure -- will reduce the number of local workers hired to complete the work. There are no laws or incentives in place to help the most impacted workers obtain the thousands of jobs that will be required to complete reclamation at mines across the country.

4. RECLAMATION JOB CREATION IS DEPENDENT ON AVAILABILITY OF CLEAN UP FUNDING.

Reclamation job creation is dependent on the **availability** and adequacy of cleanup funding. Although by law, mine operators are financially responsible for reclamation, there are ways for these operators to delay or even abandon their obligations. In this era of coal's decline, it is likely that many will walk away without funding the full cost of cleanup, leaving state and federal regulatory agencies responsible for completing reclamation. If no action is taken, these agencies will be forced to either find funding elsewhere (potentially from taxpayers) or leave mined lands unreclaimed.

METHODOLOGY TO CALCULATE RECLAMATION JOBS

WORC estimated employment figures for full mine cleanup using a simple engineering cost calculation regularly performed by mining engineers to project labor costs for heavy construction activities, such as coal mine reclamation⁵.

Our primary assumption is that the labor cost as a percentage of total direct costs of surface coal mine operations is in the range of 10-20%⁶. WORC collected the amounts of reclamation bonds held by Colorado, Montana, Navajo Nation / Arizona, New Mexico, North Dakota, Utah, and Wyoming for active coal strip mines and prevailing wages for reclamation-type work, and then applied a range of payroll cost assumptions. Our methodological approach and calculations are described in much greater detail in Appendix A of this report.

Using a wage estimate of \$30/hour (typical of heavy construction) and 2,000 hours per full-time employee equivalent per year, we calculated three scenarios: low (payroll = 10% of bond amount), medium (payroll = 15% of bond amount), and high (payroll = 20% of bond amount). The result yields units of job-years. This provided the estimates for the overall surface mine reclamation workforce needed across the geographic analysis area.

The case study analysis takes a similar approach but provides a more detailed review of coal mine reclamation bonds. Utilizing the data available on the direct and indirect costs in the bond cost estimation documents submitted by mining companies to regulators, a specific calculation of labor needs was conducted for selected mines. From the equipment and labor cost calculations, the job types and workforce size could be estimated. WORC conducted these calculations under the advisement of Jim Kuipers, a mining engineer with decades of industry experience. A complete write-up of the methodology can be found in Appendix A of this report.

FINDINGS

RECLAMATION JOBS PROVIDE YEARS OF EMPLOYMENT FOR COAL MINERS AT THE END OF MINE LIFE

If labor accounts for 10% of the bond amount, then 6,081 jobs-years would be created (the low end scenario). If labor accounts for 15% of the bond amount, then 9,121 jobs-years would be created (the medium end scenario). And if labor accounts for 20% of bond amount 12,161 jobs-years would be created (the high end scenario).

Mine reclamation will require hundreds of skilled workers for multiple years.

To provide a sense of the scale of work to be done and the annual full-time workers required for that work, these job-years can be divided by the number of years it typically takes to reclaim a surface coal mine⁹. The vast majority of coal mine reclamation work is completed in two to three years. Thus, we can assess the yearly employment needs associated with these estimates of low, medium, and high reclamation employment in the four-state region within these timeframes. If reclamation takes two to three years, it would provide jobs for 2,027 to 6,081 workers.

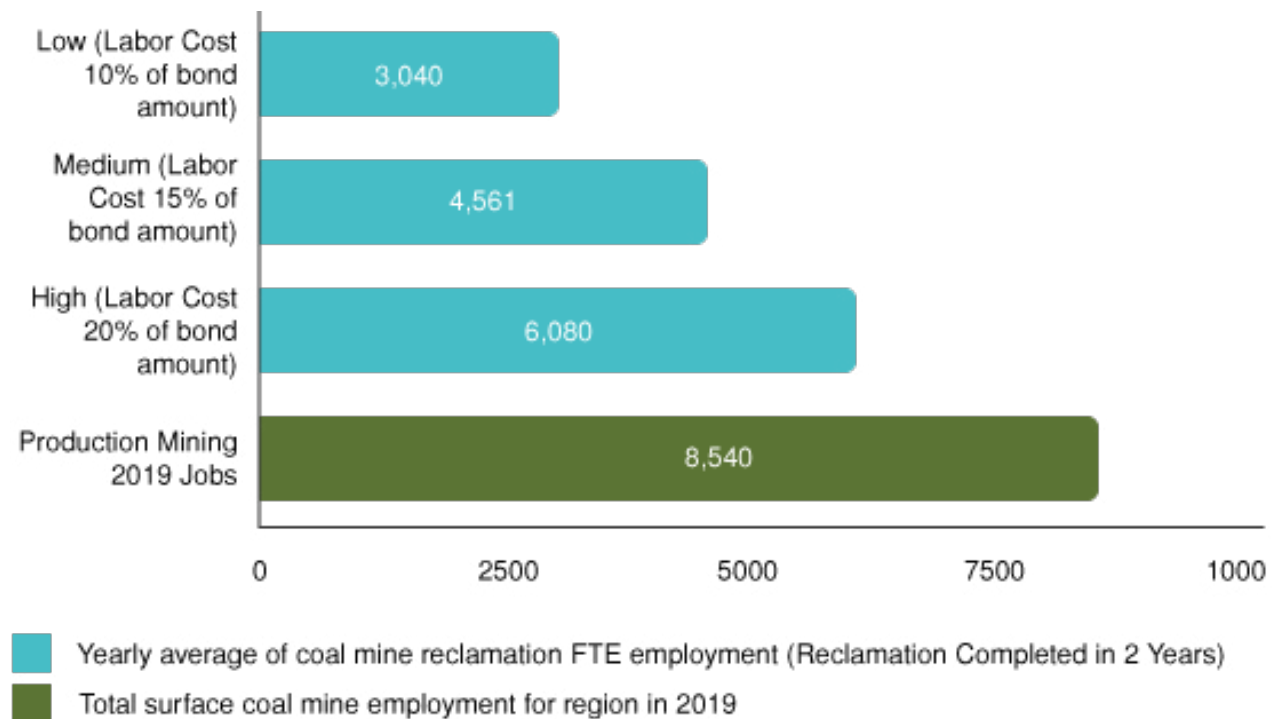
Table 1. Yearly average of coal mine reclamation FTE employment estimates across the Intermountain West (Colorado, Montana, Navajo Nation, Hopi Tribe, Arizona, New Mexico, North Dakota, Utah and Wyoming)

	Low (Labor Cost 10% of bond amount)	Medium (Labor Cost 15% of bond amount)	High (Labor Cost 20% of bond amount)
Reclamation Completed in 2 Years	3,040 jobs	4,561 jobs	6,081 jobs
Reclamation Completed in 3 Years	2,027 jobs	3,040 jobs	4,054 jobs

Note 1: Average FTEs required each year according to overall reclamation timeline

It is important to note that much of this reclamation workforce is needed for the early stages of cleanup and can therefore serve as immediate “bridge” employment for mine workers facing the end of active mine production. Reclamation work broadly requires four stages: earthmoving, topsoil replacement, reseeding, and monitoring. Of these, the first steps, earthmoving and topsoil replacement, are the most labor-intensive. If operators and regulators initiate full mine reclamation immediately after mine shut down, they can keep a significant portion of the current, local workforce employed. The scale of workers needed for cleanup is illustrated in the North Antelope-Rochelle Mine case study in this report, where it is estimated that 748 job-years are needed to complete reclamation (or 249 average jobs per year if reclamation is completed in three years).

Image 2: Potential Reclamation Employment Compared with Active Mining Employment in the Western Region (Colorado, Montana, Navajo Nation, Hopi Tribe, Arizona, New Mexico, North Dakota, Utah and Wyoming)



For reference, the graph below details the most recent federal data available on mine employment in the four selected western states compared with this analysis’ yearly average of coal mine reclamation FTE employment findings¹⁰.

At the eight case study mines, the number of expected job-years for each mine’s reclamation range from 49 to 748.

Table 2. Yearly average of surface coal mine FTE employment estimates across four western states (Colorado, Montana, North Dakota, and Wyoming)

Surface Coal Mine Employment by Area 2019¹¹	
Colorado	346
Montana	937
Navajo Nation / Hopi Tribe / Arizona	367
Navajo Nation / New Mexico	573
North Dakota	1,231
Utah	36
Wyoming	5,050
Total	8,540

Table 3 – Base Case Labor Estimate from Financial Assurance Estimates

Mine	Est. Year	Total Direct Costs	Labor Rate \$/hr	% Direct Cost as Labor	Total Labor Costs	Reclamation Employment¹²
East Decker, MT	2008	\$43,688,404	\$30	15%	\$6,553,261	109
Absaloka, MT	2017	\$19,694,521	\$30	15%	\$2,954,178	49
Rosebud, MT	2007	\$152,757,268	\$30	15%	\$22,913,590	382
Eagle Butte, WY	2017	\$107,421,442	\$30	15%	\$16,113,216	269
North Antelope Rochelle, WY	2018	\$299,069,727	\$30	15%	\$44,860,459	748
Freedom, ND	2014	\$141,302,864	\$30	15%	\$21,195,430	353
Navajo Mine, NN/ NM	2020	\$173,333,360	\$30	15%	\$26,000,004	433
Kayenta, NN/HT/AZ	2017	\$166,218,964	\$30	15%	\$24,932,845	416
Colowyo, CO	2016	\$70,724,252	\$30	15%	\$10,608,638	177
Total		\$1,174,210,802			\$176,131,621	2,936

This report uses 15% of direct bond costs as the Base Case scenario. To reflect an accurate range of potential jobs, a full sensitivity analysis was conducted to understand the low (10%), middle (15%), and high (20%) employment scenarios for each of the case study mines. The results of the full sensitivity analysis can be found in Appendix A.

HOW IS MINE RECLAMATION DONE?

All U.S. surface coal mines are required by law to reclaim the land disturbed by mining, so that the land returns to its pre-mining condition¹³. Operators must first do a lot of earthmoving so that the land surface is similar to its pre-mined state and blends in with the surrounding area. Then, operators must demonstrate successful revegetation. In the arid West, this means the presence of persistent vegetation ten years after planting. There are also various structure demolition and disposal tasks, like removing conveyor belts, maintenance facilities, or storage facilities. Finally, each mine must address other direct reclamation tasks specific to its permit or mine conditions, such as pumping and treating impacted water, sealing underground entries, or replacing wetlands.

Overall, earthmoving comprises the vast majority of reclamation work and cost at any strip mine¹⁴. Of this study's five case study mines that include a detailed breakdown of costs in their bond cost estimates, earthmoving tasks account for 69% to 89% of the direct reclamation costs¹⁵. Common earthmoving activities include backfilling, grading, and topsoil replacement. These are significant tasks because surface mines are quite expansive and deep with features like spoil ridges, cut-and-fill slopes, highwalls, and diversions. This stage requires blasting highwalls, road ripping, and/or scarifying. Next, the land must be backfilled and graded to its approximate original contour. Regrading must complement the drainage pattern of the surrounding landscape, reduce erosion, and replace surface features like streams. Finally, appropriate topsoil must be replaced so that revegetation can be successful¹⁶.

For a typical western surface mine that is no longer actively mining coal, the majority of reclamation work can take between two and three years to complete. Most earthmoving tasks can be done year-round whereas replanting or reseeding takes place at specific times, usually in the Spring or Fall¹⁷.

MINE CLEANUP CAN AND SHOULD BE DONE BY THE LOCAL WORKFORCE

There are several reasons why the existing workforce is the ideal workforce to hire for the labor-intensive first stages of reclamation work.

Firstly, mine workers have several overlapping skills needed for reclamation work. In fact, at least some workers at most mines already switch between active mining tasks and reclamation tasks depending on the season, coal production schedule, and other operational needs¹⁸. Secondly, the local mining workforce also has experience with the specific equipment already at a mining site that would be used for reclamation, like scrapers, dozers, haul trucks, front end loaders, and water trucks.

In practice, it is common for a mining company to cease active mining operations and keep on a smaller workforce just to complete reclamation. For example, in 2016 the Beulah mine in North Dakota retained 40 of 145 mine workers to finish the last bit of active coal mining and then transfer to full-time reclamation work¹⁹. At the New Horizon mine in Nucla, Colorado, 19 of the 26 mine workers transferred to reclamation activities after the mine ceased production²⁰.

It's also worth noting the positive local economic benefits of hiring the local labor force to do cleanup work. **Reclamation is a crucial cornerstone of social and economic recovery for communities dependent on natural resource extraction**²¹. If coal mine reclamation is timely and well-enforced, it can provide a critical bridge of employment and other economic and community benefits. These benefits are multiplied when the cleanup work is done by the local workforce.

DELAYED RECLAMATION MEANS FEWER JOBS FOR LOCAL WORKERS

Local communities are greatly impacted by the timing of reclamation because it affects who gets those reclamation jobs and when those jobs are available. However, hiring the local workforce to do reclamation is not required by law.

If final reclamation work is initiated immediately after mine closure, workers, community members, and unions can exert pressure on mine owners to ensure reclamation jobs go to local miners. In the case of the New Horizon Mine referenced above, workers with the local United Mine Workers of America fought for and eventually entered into an agreement with mine owner Tri-State that would help workers transition after the mine shut-down. In addition to severance payments, medical benefits, and continuing

education, this agreement included the option for mine workers to continue employment with the mine as reclamation workers. Final reclamation work at the New Horizon Mine took 18 months and employed 19 retained mine workers²². Alternatively, if reclamation is deferred, it is less likely that the current workforce will get those reclamation jobs. There's only so long a laid-off miner can or will wait around for reclamation work to materialize.

Finally, it is increasingly more likely in the current context of coal's decline that more mining companies will forfeit their bonds and these Western states and Nations will have to assume additional reclamation duties. The current shaky financial state of some of the region's largest mines and mine owners in Wyoming²³ should serve as a warning to regulators that they must prepare for a potential onslaught of bond forfeitures. Such planning is critical to ensure state administered reclamation can begin quickly and therefore provide more economic benefits -- like local reclamation work hiring -- for the host communities.

Because the timing of reclamation activities has such a direct and significant impact on the employment outlook for the current mine workers, it is imperative that communities advocate for reclamation that begins swiftly -- whether it is a mining company or the state that administers the project.

RECLAMATION JOB CREATION IS DEPENDENT ON AVAILABILITY OF CLEANUP FUNDING

In the last few years, coal mines ownership in the West began turning over quickly and this presents new concerns for cleanup. Older coal basins, like in Appalachia, have seen rapid changes in mine ownership and new owners who have disregarded financial, worker, and environmental obligations²⁴. In 2019, the OSMRE reported that mine health and safety violations have significantly increased in Kentucky²⁵, which corresponds with increased turnover in mine ownership. This should serve as a warning to western communities and regulators as new and unproven operators have recently acquired mines in the West [see the Eagle Butte case study in this report for more details].

Thus, as mine ownership changes, it is up to the regulators to ensure these new operators can post sufficient, liquid financial assurances and are performing contemporaneous reclamation at a satisfactory pace. Additionally, a poor track record of reclamation, safety violations, and financial malfeasance at other mines should preclude an operator from receiving a permit at a new mine.

Regulators can provide more rigorous oversight on undercapitalized companies which have a track record of putting reclamation on the back burner. This may require more frequent mine inspections.

RECCOMENDATIONS

1. END INSUFFICIENT AND INSECURE RECLAMATION BONDS

Secure reclamation bonds will create the most reclamation jobs. Because the coal industry is in a structural decline and unlikely to recover, it is increasingly likely that more companies will walk away from reclamation obligations, leaving reclamation funding and work up to the states. If a state finds itself holding an inadequate reclamation bond that does not produce the money required to complete reclamation, the state will be forced to hire fewer workers. Thus, states must be vigilant about ensuring sufficient and secure bonds are in place. Self-bonding must be eliminated, especially in North Dakota, and the use of collateral bonds and bond pools must be discarded. Where insufficient bonds are already in place, they must be replaced as soon as possible with liquid, secure, and adequate financial assurances from a surety company. Additionally, states should not grant mine permits to companies without secure financial assurances. The increasingly frequent changes in mine ownership mean that state and federal regulators must be diligent about requiring financial assurances associated with new mine permits.

2. REGULATORS MUST ENSURE THAT ALL CLEANUP LIABILITIES ARE ASSUMED BY NEW MINE OWNERS AND THAT NEW MINE OWNERS ARE POISED TO FULFILL THOSE OBLIGATIONS.

Mine permits should be denied to operators who have a track record of insufficient reclamation, financial mismanagement, safety violations, and other workforce violations, and/or cannot provide secure, liquid, and adequate financial assurances for cleanup.

3. STATE REGULATORS NEED TO BE READY TO SEIZE BONDS IMMEDIATELY WHEN A MINING COMPANY ABANDONS ITS MINES IN ORDER TO INITIATE RECLAMATION IMMEDIATELY.

It is very likely that coal companies in the Western region will not pursue final bond release for all mined lands and states will be responsible for administering cleanup on at least some mines. In preparation, regulators should be ready to seize the bonds and initiate cleanup right away. Agencies would also be wise to ensure funds are available immediately to commence reclamation in case bond monies are delayed. Regulators should also remove any policy or administrative barriers that would prevent reclamation from being initiated immediately after mine operation cessation and bond forfeiture.

4. FEDERAL AND STATE AUTHORITIES SHOULD WORK TO ACCELERATE THE PACE OF CONTEMPORANEOUS RECLAMATION AT ACTIVE MINES.

Contemporaneous reclamation is not being done on all disturbed acres where it could be done. For instance, some large Powder River Basin mines have spoil ridges that have been sitting for several years when they could be backfilled and graded. Regulators could address this “backlog” of unreclaimed lands where reclamation has been unnecessarily delayed, by forcing coal companies to fully staff reclamation crews and complete this work ahead of mine closure. With declining employment in the coal industry, completing some of this reclamation before mine closure will ensure local miners get paid for completing the work.

5. FEDERAL, STATE, AND LOCAL POLICYMAKERS SHOULD INSTITUTE POLICIES THAT FACILITATE AND INCENTIVIZE LOCAL HIRING FOR MINE RECLAMATION.

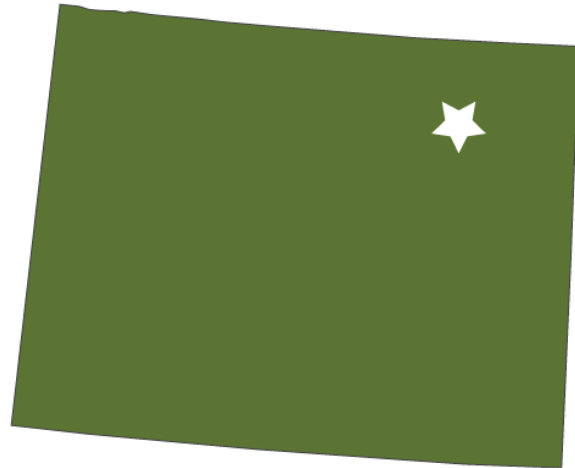
Hiring the local workforce to do reclamation is not required by law. It can be difficult to require private companies to hire local through legislation, but when a state administers reclamation, it is somewhat easier to implement local hiring through ordinance or statute. Options might include a right-of-first refusal for former miners when a state administers reclamation or retraining opportunities for local workers for cleanup jobs. In addition to these measures, tax incentives could be offered to companies that hire displaced workers and/or newly funded retraining programs could prioritize enrolling mine workers and provide them with the necessary additional certifications to do reclamation work. Workers, community members, and other local decision makers can also look for ways to ensure that reclamation jobs are good jobs (i.e. fairly compensated and safe).



CASE STUDY

EAGLE BUTTE MINE: HOLDING NEW MINE OWNERS RESPONSIBLE FOR RECLAMATION

Eagle Butte Mine
Campbell County, Wyoming
Owner: Eagle Specialty Materials
Permittee: Contura Energy, Inc.
Mine Employees: 239²⁶
Potential Reclamation Job-Years: 269



The Eagle Butte Mine near Gillette, Wyoming, exemplifies the complex problems that a local community faces as the coal industry declines and mines change ownership. When a coal mine operator declares bankruptcy in this new era of coal decline, it often leads to less certainty for reclamation work and less security for mine workers.

In 2015, Eagle Butte's former owner, Alpha Natural Resources, declared bankruptcy and split the company, giving Eagle Butte to newly-formed Contura Energy, owned by Alpha's senior creditors. After eighteen months, Contura sold Eagle Butte and its sister mine, Belle Ayr, to Blackjewel LLC. This new owner had a well-documented history of buying up bankrupt mines in Appalachia, then accumulating serious safety and environmental violations²⁷.

In July 2019, Blackjewel abruptly closed the Eagle Butte and Belle Ayr mines without any warning right after filing for Chapter 11 bankruptcy²⁸. Around 580 workers were suddenly out of work, having no idea if or when the mine might reopen and if they could resume work. Shortly thereafter, the company terminated their employment-based health care plan and workers could not access their retirement accounts²⁹. Eagle Specialty Materials, LLC eventually took over the mines during the bankruptcy process and started operating the Eagle Butte and Belle Ayr mines in October 2019³⁰.

In some ways, this mismanagement could have been predicted. Blackjewel's owner, Jeff Hoops, had racked up 42 mine permit violations at other operations in Appalachia^{31,32}. Some of these environmental and safety violations were serious enough to prompt regulators to shut the mines down for periods of time. At the time of their bankruptcy filing, Blackjewel owed \$60 million in unpaid royalties to the federal government and \$37

million in taxes to Campbell County, as well as \$11 million in back taxes to the state of Wyoming³³. Wyoming regulators and courts are beginning to scrutinize the unpaid royalty and tax debts Blackjewel and other coal companies owe to local governments, which is certainly a step in the right direction³⁴.

The Blackjewel example illustrates why it is prudent for regulators and decision makers to keep a close eye on new mine owners' reclamation activities. Ensuring new owners post sufficient bonds and that contemporaneous reclamation is being performed at a sufficient rate need to be top regulatory priorities.

This analysis estimates that approximately 269 job-years will be needed to complete reclamation work at Eagle Butte. If this work is completed in 2 years, around 134 full-time workers will be needed each year. And if the work is done in 3 years, around 89 full-time workers will be needed each year.

The 2019 Eagle Butte shut-down also illustrates how suddenly mine operations can cease, leaving workers stranded. Clearing the bureaucratic and financial barriers to initiating reclamation work during a temporary shut-down or after a closure would help keep local workers employed for at least 2 to 3 years while they figure out their next steps.



CASE STUDY

NORTH ANTELOPE ROCHELLE MINE: RECLAMATION IS A VITAL PART OF THE BRIDGE ECONOMY

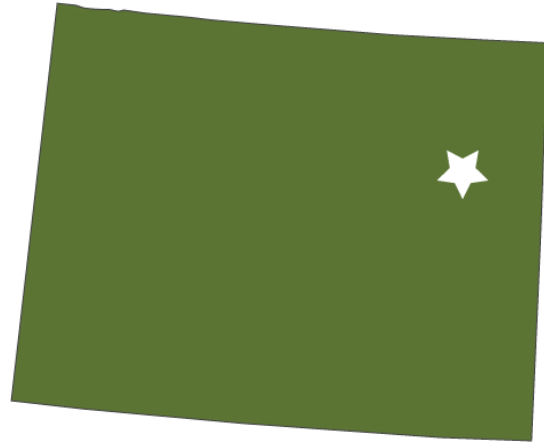
North Antelope Rochelle Mine

Campbell County, Wyoming

Owner: Peabody Energy

Mine Employees: 1,228

Potential Reclamation Job-Years: 748



Covering nearly 25,000 acres and long-producing 100 million tons or more of coal per year, the North Antelope Rochelle Mine (NARM) is the largest coal mine in the US and one of the largest in the world³⁵. Even as production has decreased in recent years, dropping to 85 million tons in 2019, the mine still employs around 1,200 people.

Like most mines in the Powder River Basin, the mine's financial outlook is poor. The market for NARM's thermal coal continues to shrink with no plausible rebound in sight³⁶. Many of the coal-fired power plants that burn NARM coal are scheduled for retirement in the next few years.

Despite this bleak outlook for NARM's active mining future, there is a significant amount of unreclaimed land at the mine which means that there is an equally significant potential for reclamation jobs. This analysis estimates that approximately 748 job-years will be needed to complete reclamation work at NARM. If this work is completed in 2 years, around 374 full-time workers will be needed each year. And if the work is done in 3 years, around 249 full-time workers will be needed each year.

The potential of mine reclamation work at NARM illustrates how the cleanup economy can provide a bridge between a coal community's past and its future. As production slows, hundreds of workers can transfer over to reclamation activities rather than being laid-off. This isn't a long-term or permanent solution, but it affords workers and communities a few years to plan their next steps.

CASE STUDY

ROSEBUD MINE: RECLAMATION HELPS AGRICULTURAL PRODUCERS

Rosebud Mine
Rosebud County, MT
Owner: Westmoreland Mining LLC
Mine Employees: 402
Potential Reclamation Job-Years: 382



The Rosebud Mine in Colstrip, Montana, is a mine-mouth operation, meaning that it supplies coal to one buyer, the local 2100 megawatt

Colstrip power plant. This plant has supplied power to much of the Northwest since 1978, but shut down is within sight. One-third of the generating capacity was retired at the end of 2019 and most analysts predict the remainder will be retired before 2030. This means the corresponding shut-down of the Rosebud mine is within sight.

Without the contracts or infrastructure in place to supply coal to other power plants, a mine mouth operation is dependent on the viability of the associated power plant. And since these facility retirements usually happen in tandem, it results in large reductions of local government revenues and mass lay-offs. In Colstrip, the closure of the mine and power plant will mean the loss of approximately 800 direct jobs and many hundreds of indirect jobs – a significant impact for a rural town of just 2,300 people and 800 households.

The Rosebud Mine still has many acres of reclamation work yet to be done. According to this analysis, between 255 and 509 job-years will be needed to complete this work. If the mid-range of this estimate (402 job-years) are needed for reclamation for the first 3 years, approximately 134 full-time workers will be needed each year. And if the high end of this estimate (509 job-years) are needed for reclamation for the first 3 years, approximately 170 full-time workers will be needed each year. These jobs are well suited for the current workforce. The current miners have the skillset for reclamation and these jobs will be needed before and after shut-down.

There's another substantial economic benefit for timely reclamation in the Colstrip area. Small-scale agriculture was the original industry of the Colstrip area and will be there long

after the coal industry has faded. Local farmers and ranchers depend on water resources which have been significantly degraded by mining activities through groundwater contamination. Mining also often changes surface drainage patterns, lowers the water table, and increases sedimentation in local waterways – all massive impacts for water users and wildlife.

Montana law requires that successful reclamation restores the local hydrologic balance. Restoring this natural resource will have long-term economic benefits. The more quickly this is accomplished, the greater the benefit to local agricultural producers and the county.



CASE STUDY

ABSALOKA MINE: LOCAL AND TRIBAL GOVERNMENTS BENEFIT FROM RECLAMATION

Absaloka Mine
Crow Nation and Big Horn County, Montana
Owner: Westmoreland Absaloka Mining LLC
Employees: 130
Potential Reclamation Job-Years: 49



The Absaloka Mine illustrates the potential of reclamation work for the local communities -- both in terms of government revenues and overall employment rates.

While all coal communities' governments will be impacted by the industry's downturn, Big Horn County and the Crow Tribe will be among the hardest hit. The Crow Reservation makes up almost all of Big Horn County in the remote southeastern corner of Montana. In addition to the Absaloka Mine (located on the Crow Reservation), Big Horn County is home to two other large coal mines, Spring Creek and Decker, both of which neighbor the reservation. Analyses looking at local revenue collection and relative proportion of jobs conclude that Big Horn is one of the most coal dependent counties in the West³⁷. As of 2013, the coal mining industry accounted for 30% of the jobs in the county³⁸. Property taxes from coal mines account for around a quarter of Big Horn County's budget and 50% of the Crow Nation's annual budget³⁹.

As is typical for many natural resource-rich, rural communities, this abundance of coal has not led to widespread, long-term prosperity. The per capita income is approximately half of the US average and 26.2% of people in Big Horn country are living in poverty, whereas the national average is 14.1%⁴⁰.

This is where the potential of mine reclamation jobs is especially meaningful. Reclamation at the Absaloka Mine will require approximately 49 job-years – or 24.5 full time jobs per year if reclamation is completed within 2 years. If reclamation is completed in 3 years, 16 full-time jobs will be created per year. Employed workers help the local economy in many ways, including creating indirect jobs (when they spend wages locally) and revenue from property taxes. Employed workers also rely less on local or state government resources.

Absaloka is the smallest of the mines in Big Horn County. Full reclamation at all mines in the area (including the immense Decker and Spring Creek mines) will require hundreds of workers. Ensuring these jobs will go to the current local workforce will be especially important for the Crow Nation and Big Horn Country.



CASE STUDY

FREEDOM MINE: ENDING SELF-BONDING IS CRITICAL FOR CREATING RECLAMATION JOBS IN NORTH DAKOTA

Freedom Mine
Mercer County, North Dakota
Operator: North American Coal Company
Mine Employees: 457
Potential Reclamation Job-Years: 353



The Freedom Mine is the largest lignite mine in the US but the funds for cleanup are not secure – which should worry both North Dakota taxpayers and potential reclamation workers. North Dakota is one of a few states that still allows self-bonding for cleanup, the least reliable method to fund reclamation. And if reclamation is not fully funded, workers cannot be hired to do the work.

SMCRA requires that all mines provide financial assurance to the state so that if the mine company walks away before all the reclamation is done, the state will have the funds to cover the remaining cleanup. Some states, including North Dakota, still allow a practice called self-bonding wherein the mining company is deemed financially secure enough to cover reclamation costs at any time and therefore is not required to post a substantive bond. This was always a very risky loophole, but it is now blatantly irresponsible considering the severe financial distress of the entire coal industry. The reality is self-bonding allows a company to close up shop and abandon the mine, leaving the state on the hook for cleanup. At that point, the state can find other funds to complete the cleanup (most likely from taxpayers), do minimum reclamation tasks or leave the mine abandoned altogether.

The immense size of the Freedom Mine illustrates the risks of self-bonding for North Dakota. The most recent total estimated reclamation cost is \$143,733,543 -- a massive expense for a state government to cover. Mine shutdowns are already happening in North Dakota and there are significant tracts of unreclaimed land left. North Dakota could be facing a tragic scenario: a massive, abandoned mine needing swift reclamation to protect local natural resources and hundreds of unemployed, skilled workers ready to do the work, but no funds because a company was not held accountable in time.

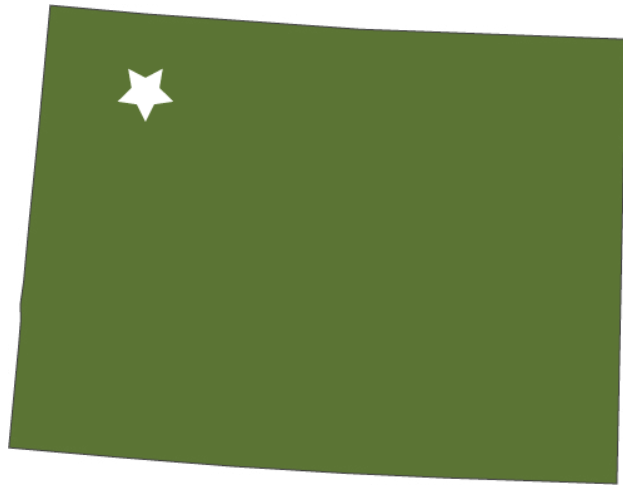
According to this analysis, between 236 and 471 job-years will be needed to complete this work. If the high end of this estimate are needed for reclamation for the first 3 years, approximately 157 full-time workers will be needed each year. If reclamation is done over two years, approximately 235 full-time workers will be needed each year.

North Dakota can choose a different path. States like Wyoming and Colorado have limited self-bonding to ensure mines post more secure, reliable, and liquid bonds such as surety bonds. This kind of funding ensures that if a mine closes up shop before reclamation is complete, the state can quickly hire the workforce needed to complete all reclamation.

CASE STUDY

COLOWYO MINE: COMMUNITIES CAN BENEFIT FROM BOTH RECLAMATION WORK AND NEW STATE POLICIES

Colowyo Mine
Moffat and Rio Blanco Counties, Colorado
Owner: Tri-State G&T Association
Mine Employees: 222
Potential Reclamation Job-Years: 177
Production 2018 (Short Tons): 1,470,896



The Colowyo Mine and associated Craig Station in northwestern Colorado are both facing shut down dates within the next 10 years, which means a loss of 500 jobs in the area. But new state policies coupled with a robust reclamation plan could ease the transition for many workers, and potentially serve as a template for other states looking to plan for a carbon-free future that does not punish coal workers.

The Colowyo Mine is located primarily in Moffat County and spills into Rio Blanco County, both are exceptionally dependent on coal mining for jobs and local revenue. In 2017, coal mining comprised 37% of total private employment in the country – a staggering percentage considering that coal mining accounts for 1% of private employment in Colorado as a whole and 0.5% for the US⁴¹. As of 2016, there were 345 people employed in coal mining in the county¹⁰. And according to a Rio Blanco county commissioner in 2019, 85% of the county’s property taxes come from the coal, oil, and gas industries⁴².

The Colowyo Mine supplies coal to the nearby Craig Station, where Unit 1 is scheduled for retirement in 2025, Units 2 and 3 will close by 2030⁴³. Neighboring Rio Blanco and Moffat Counties will be the hardest hit by these retirements, since they are home to both the Craig station and Colowyo mine workers. Collectively, these two mines and power plant directly employ between 500 and 600 workers^{44,45} – the loss of those jobs and the loss of revenue to the local governments will have a tremendous impact on the communities.

Colorado does have some policies in place that can help ease the transition away from coal. The state recently passed a law to establish an Office of Just Transition that will help impacted coal communities with emergency funding and job retraining. In addition to funding that can help fill revenue gaps and directly help workers, the law also established two important directives:

1. To create a template for establishing an early warning system of impending coal plant and coal mine closures, and
2. Guidelines for formulating plans and programs for addressing the local employment impacts of such closures⁴⁶.

This source of funding and other resources could be tremendously helpful for Moffat and Rio Blanco counties. Additional training and planning through the Office of Just Transition could help mine workers obtain available reclamation jobs at the mine. Other decision makers can work to ensure that reclamation timelines are not dragged out which will help local workers secure reclamation jobs and ease the uncertainty associated with transition.

CASE STUDY

NAVAJO MINE: COAL MINE RECLAMATION COULD PROVIDE UP TO 289 JOBS PER YEAR

Navajo Mine
Navajo Nation, near Farmington, N.M.
Mine Employees: 350, 85% Navajo
Mine Permit Size: 33,600 acres
Disturbed Mining Area: ~17,000 acres
Potential Reclamation Job-Years: 433



Navajo Mine is situated just outside of Farmington, N.M. on land that is leased from the Navajo Nation. The mine has just one customer; it is the sole supplier of fuel for the nearby Four Corners Power Plant, which even after having three of its five units retired in 2013, remains one of the largest coal-burning power plants in the West, at 1,636 MW of nameplate capacity. In 2019, Navajo Mine provided 4.7 million tons of coal to the plant⁴⁷. Original plans for the plant and mine had them both operating into the 2040s, but as a result of the rapidly declining economics of coal, the closure date has been moved forward several times. In its most recent resource plan, Arizona Public Service (APS), which operates and owns 63% of the generating capacity of the plant, now has targeted a 2031 closure⁴⁸ to coincide with the expiration date of the current coal supply contract. The mine, without any other customers, would close at the same time.

Mining began at Navajo Mine in 1963 to feed the Four Corners plant, which started operations the same year. The mine has had several owners and operators, beginning with Utah International, which was then acquired by General Electric. In 1984, GE sold the mine to private mining firm BHP, which operated it for three decades⁴⁹. In 2013, in an agreement negotiated to settle long-standing pollution issues, the owners of Four Corners shut down three of the plant's five units. Facing a proportional decline in production and potential cleanup liabilities, BHP decided to sell the mine.

BHP found its buyers for the mine in the Navajo Nation itself, which authorized the creation of a private tribal enterprise to acquire and operate the mine. Navajo Transitional Energy Co. (NTEC) was created and bought the mine with the backing of the Nation. The mine is now operated under contract with NTEC by Bisti Fuels, a subsidiary of North American Coal Co.

One concern about reclamation at Navajo Mine is the historical practice of disposing of millions of tons a year of coal-ash waste from combustion at the power plant. Early in its life, the mine began using this material, which contains hazardous compounds such as arsenic, mercury, cadmium and selenium, as backfill. Beginning in 1971, approximately 1.9 million tons of toxic coal ash material a year were hauled back to the mine from the power plant and simply dumped into mined-out pits then covered with dirt, rocks and mining spoils as part of the “reclamation” process⁵⁰.

Adequate coal-ash waste disposal requires liner systems with internal monitoring devices that can detect and collect migration of leaching contamination streams. The pits where the coal-ash waste was dumped at Navajo Mine are never lined and lack any sort of leachate collection system. They are located within 50 feet of the Chaco River and less than 1.5 miles from the San Juan River. The material is buried approximately 10 feet below the surface. Until this practice was halted in 2008, an estimated 70 million tons of coal-ash waste ended up being disposed of in the mine (since then, coal-ash waste has been disposed of on site at the power plant). It remains to be seen how any potential contamination issues at the mine may affect or be addressed in future reclamation work. The current \$162 million reclamation bond does not include any contingencies specific to cleaning up potential groundwater or surface water contamination.

The coal supply agreement between NTEC and the owners of Four Corners runs through 2031. While the official retirement date for the mine is not for another decade, however, there are strong economic indicators signaling that the closure of the power plant, and thus the mine, could come far sooner, ramping up the need for a transition plan that would provide a soft landing for the workers. Reclamation work at the mine could provide a significant part of that cushion. A conservative estimate of potential reclamation jobs (15% labor cost assumption) finds that 433 job-years are required to finish reclamation at the Navajo Mine. This translates to between 144 and 217 jobs per year if the work is done within the typical 2 and 3 years cleanup timeframe. At the high end of this analysis (20% labor costs), up to 289 jobs per year could be created to complete reclamation.

Note: Potential reclamation jobs were calculated from the combined Navajo Mine and Pinabete permits, since these are functionally one mine operation.

CASE STUDY

KAYENTA MINE: HUNDREDS OF JOBS DELAYED

Kayenta Mine
Navajo Nation / Hopi Reservation,
Northern Arizona
Mine Employees: ~350, 90% Navajo and Hopi
Mine Permit Size: 44,000 acres
Disturbed Mining Area: 18,239 acres
Potential Reclamation Job-Years: 416



For nearly 50 years, Kayenta Mine served as the sole supplier of fuel for the largest coal-burning power plant in the West, providing around 8 million tons of coal annually to ship to Navajo Generating Station, located 90 miles to the west. In early 2017, as coal was becoming increasingly uneconomic as a source of electricity, the owners of NGS made a decision to close the plant no later than the end of 2019. After several failed efforts to keep the plant running, Kayenta loaded its last trainload of coal to NGS in August 2019 and closed its doors for good several months ahead of NGS's retirement.

In the year since Kayenta ceased operations, its owner, Peabody Western Coal Co., has done almost no reclamation work at the mine. The active mining pits have been left idle, with no significant backfilling or grading taking place. As of September 2020, the ~350 miners who worked at the mine⁵¹ are still out of jobs, with Peabody unable to come to an agreement with the United Mine Workers of America to put them back to work on reclamation activities. Even more egregiously, Peabody has actually submitted an application to the federal Office of Surface Mining, Reclamation and Enforcement (OSM) to delay a significant portion of major reclamation for another two to four years, which would keep the workers idle even longer.

Although federal mining law requires contemporaneous reclamation, as of the date of the mine's closure, no lands at Kayenta had yet been certified by OSM to be fully reclaimed. Peabody applied to the agency in May 2019, requesting for the first time in nearly a half century of mining, a release of bonds for final reclamation on 1,384 acres. That covers just 10 percent of the disturbed land at Kayenta⁵².

At the same time that Peabody has asked for a delay, the company also is accumulating a number of applications to OSM for what it calls "minor" permit revisions. The proposed revisions, in some cases, are not so minor. They would make changes to such things as the criteria used to determine the suitability of soil for successful reclamation, the estimated post-mining hydrology, the expected water quality of permanent ponds, and other changes, including the substantial delay to the reclamation schedule noted above. This piecemeal approach is problematic because it allows Peabody to cumulatively make substantial changes to reclamation without opportunities for public input.

There are growing concerns among residents of Black Mesa that the outcome of cleanup at Kayenta will follow the same sad trajectory as Kayenta's sister mine on Black Mesa, also operated by Peabody. The Black Mesa Mine, which supplied fuel for Mohave Generating Station 250 miles to the west, closed down in 2005 when the power plant was retired. Ten years after the mine's closure, the federal Bureau of Indian Affairs (BIA) wrote a letter to Peabody admonishing the company for the deplorable state of reclamation. The 2015 notice describes the condition of reclamation as "inconsistent and often unacceptable, with considerable acreages remaining as raw ungraded and eroding spoil piles, largely void of vegetation."

Inadequate backfilling, grading and topsoil replacement, the BIA determined, "have minimized the potential for the mined landscape to be left in a manner defined as being 'as good condition as received.' Some of these acreages have been idle for many years, having prominent 'moonscape' surface features and heavily eroding slopes. These acreages are determined not to be in accordance with the lease requirements and are therefore not acceptable⁵³."

Peabody's proposal to delay more than 70 percent of major reclamation activities by two to four years at Kayenta makes Navajo and Hopi concerns all the more concerning for residents of Black Mesa. The company's application to OSMRE requests a postponement of backfilling and/or grading on 1,325 acres of the 1,850 disturbed acres in the most recently active mining areas, or 71.6%, until 2022 or later, and 800 of that total until 2023 or later. For areas requiring top-soiling and seeding, Peabody has proposed delaying reseeding on 1,475 acres of the 1,925 acres that will need it, or 76.6% of the total, until 2022 or later.



Inadequate or delayed reclamation, especially the lack of progress in completing even initial backfilling and grading on recently mined acreage, can have damaging consequences for land and water. Failing to backfill and regrade open pits and spoil piles can lead to erosion, slumping and possible water contamination. Delaying top-soiling and reseeding can lead to impacts on the topsoil piles before they are spread back out, invasion of weeds and undesirable plants, and compaction, all of which effect ultimate land use.

More immediately, though, Peabody's cessation of all reclamation work has resulted in a delay of more than a year in hiring back local workers to complete cleanup operations. Peabody allowed its contract with the United Mine Workers of America to expire over a year ago – on Sept. 16, 2019 – and it has lingered without renewal, which raises questions about whether the company will hire local workers at fair pay and benefits to complete reclamation work or bring in non-union labor/contractors from outside the community when work finally does begin. And finally, the company's continued delays in starting up reclamation work exacerbate the dire economic circumstances being felt by the Navajo Nation and Hopi Tribe in light of the COVID pandemic. Jobs that could and should be available to Navajo and Hopi workers at a critical time remain vacant.

Reclamation work at the mine could provide a significant part of that cushion. A conservative estimate of potential reclamation jobs (15% labor cost assumption) finds that 416 job-years are required to finish reclamation at the Kayenta Mine. This translates to between 139 and 208 jobs per year if the work is done within the typical 2 and 3 years cleanup timeframe. At the high end of this analysis (20% labor costs), between 185 and 277 jobs per year could be created to complete reclamation.

REFERENCES

- 1 Full mine reclamation at the end of mine life usually takes between 2 and 3 years. The pace of contemporaneous reclamation varies considerably between mines, however, this pace could be improved overall. For instance, WORC's analysis finds that many mine operators in the West have delayed reclamation on lands that could be reclaimed (see "Planning for Coal's Decline" at <https://www.worc.org/publication/8193/>)
- 2 The annual job numbers will vary depending on how quickly the work is undertaken. For more information on this, see the "Reclamation Jobs Provide Years of Employment for Coal Miners at the End of Mine Life" section below.
- 3 U.S. Department of Labor, Mine Safety and Health Administration (2020). Mine injury and worktime, quarterly. Retrieved from: <https://arlweb.msha.gov/Stats/Part50/WQ/2019/MIWQ%20Preliminary%20Report%20Jan-Dec%202019.pdf>
- 4 WORC's recent report, "Planning for Coal's Decline," found that many Western strip mines have unnecessarily delayed reclamation on certain parcels. For instance, some spoil ridges have been sitting unreclaimed for so long that vegetation can be seen growing on them.
- 5 See Appendix A for a full write-up of the methodology and for full reclamation labor analyses of all mine case studies presented in this report.
- 6 This range of labor costs applies to reclamation of typical surface mines in the West. Other types of coal mines (such as underground mines), mines in other regions, or particularly complex surface mines might have labor costs between 10% and 30% of total direct costs.
- 7 IMPLAN, one of the most widely used and trusted economic impact analysis platforms, recommends reporting this average annual employment numbers instead of total job-years for multi-year construction projects. IMPLAN's explanation of job-years and average annual employment numbers is a useful resource for understanding how economic impacts are typically measured and modeled: <https://implanhelp.zendesk.com/hc/en-us/articles/360040512733-Construction-Building-Across-Years>
- 8 Another helpful resource for understanding job-years and job creation estimates in context is a 2009 report from the President's Council of Economic Advisor, titled "Estimates of Job Creation from the American Recovery and Reinvestment Act of 2009" (<https://obamawhitehouse.archives.gov/sites/default/files/microsites/Estimate-of-Job-Creation.pdf>)
- 9 It is important to note that the pace and timing of that work vary quite a bit between mines, which will impact how many workers will be needed at any given time and for how long. To get average yearly employment needs though, this analysis assumes reclamation activities are pursued without delays, are fully staffed, and are fully funded.
- 10 U.S. Department of Labor, Mine Safety and Health Administration (2020). Mine injury and worktime, quarterly. Retrieved from: <https://arlweb.msha.gov/Stats/Part50/WQ/2019/MIWQ%20Preliminary%20Report%20Jan-Dec%202019.pdf>
- 11 Note that this report reports preliminary 2019 data. The final 2019 data is slated to be reported in November 2020.
- 12 Job-years is interchangeable with FTE-years, which is the terminology used in the full methodological write-up [see Appendix A].
- 13 SMCRA, 30 U.S.C. §1265, sub§§ (b)-(e). Specifically, the law requires operators to "[R]estore the land affected to a condition capable of supporting the uses which it was capable of supporting prior to any mining, or higher or better uses of which there is reasonable likelihood" (30 C.F.R. §1265, sub§§ (b)(2)).
- 14 More information on the basics of surface coal mine reclamation can be found in Appendix A of this report. Another useful resource for understanding the general process and terminology can be found on

the Montana Department of Environmental Quality's website on mine reclamation: <https://deq.mt.gov/Land/AbandonedMines/bluebook>

15 Although not included in this analysis, indirect costs like engineering and surveying work also create some valuable jobs in the state and local area.

16 Sheoran, V., Sheoran, A. S., & Poonia, P. (2010). Soil reclamation of abandoned mine land by re-vegetation: a review. *International journal of soil, sediment and water*, 3(2), 13.

17 See Appendix A

18 For example, many miners at the Peabody-owned Rawhide mine in Wyoming switched from active mining duties to reclamation duties during a downturn in production. See: Rucinski, T. (2016, July 25). Bankrupt coal giant turns to grass in Wyoming to cut liabilities. Reuters. Retrieved from: <https://www.reuters.com/article/us-peabody-bankruptcy-cleanup/bankrupt-coal-giant-turns-to-grass-in-wyoming-to-cut-liabilities-idUSKCN10517E>

19 Donovan, L. (2016, Jan 22). Miners to lose Beulah coal jobs. *Bismarck Tribune*. Retrieved from: https://bismarcktribune.com/news/state-and-regional/miners-to-lose-beulah-coal-jobs/article_c66f85ded476-5732-bdef-5a92d8a9509c.html

20 N.A. (2018, Dec 5). Reclamation forces Nucla mine cutback. *The Daily Sentinel*. Retrieved from: https://www.gjsentinel.com/news/western_colorado/reclamation-forces-nucla-mine-cutback/article_63f71eca-f85b-11e8-bec8-10604b9f6eda.html

21 Haggerty, J. H., Haggerty, M. N., Roemer, K., & Rose, J. (2018). Planning for the local impacts of coal facility closure: emerging strategies in the US West. *Resources Policy*, 57, 69-80. Retrieved from: <https://par.nsf.gov/servlets/purl/10057131>

22 Ibid.

23 Graham, A. (2020, Jan 27). Report: Shakiest coal companies have most mine cleanup left. *WyoFile*. Retrieved from: https://www.wyomingnews.com/news/local_news/report-shakiest-coal-companies-have-most-mine-cleanup-left/article_00034e12-4007-11ea-abac-47af0ee49c52.html

24 One of the most notorious examples of this is Blackjewel which laid off workers without warning for several months in 2019, withheld or bounced paychecks, and racked up dozens of environmental violations during their bankruptcy proceedings. See the case study below for more details; also, <https://www.wymt.com/content/news/Blackjewel-cited-for-numerous-environmental-problems-across-Appalachia-564767722.html>

and <https://www.wkyufm.org/post/bankrupt-blackjewel-coal-still-racking-environmental-violations-officials-warn-0#stream/0>

25 Estep, B. (2019, July 27). Erosion, landslides and pollution. Coal industry's compliance with federal rules down. *Lexington Herald-Leader*. Retrieved from: <https://www.kentucky.com/news/state/kentucky/article232013522.html>

26 See Appendix B for mine data sources

27 Blackjewel has continued this pattern in Wyoming. As of April 2019, Blackjewel owed Campbell County \$17.2 million in delinquent production and property taxes from 2017 and 2018. It was only due to grassroots community pressure that Blackjewel eventually negotiated a monthly payment schedule with the County.

28 Taft, M. (2019, Sept 21). As coal companies fail, the workers are being left with nothing. *Fast Company*. Retrieved from: <https://www.fastcompany.com/90407109/as-coal-companies-fail-the-workers-are-being-left-with-nothing>

29 McKim, C. (2019, Oct 28). How coal bankruptcies are changing the health insurance conversation. *Woming Public Media*. Retrieved from: <https://www.wyomingpublicmedia.org/post/how-coal-bankruptcies-are-changing-health-insurance-conversation#stream/0>

30 Johnson, G. (2019, Oct 21). Done deal. *Eagle Specialty Materials* is new owner of Belle Ayr, Eagle

- Butte mines. *Gillette News Record*. Retrieved from: https://www.gillettenewsrecord.com/news/article_621f8de5-6a7f-5023-a4f7-481685120b0f.html
- 31 Roberts, D. (2019, July 9). Coal left Appalachia devastated. Now it's doing the same to Wyoming. *Vox*. Retrieved from: <https://www.vox.com/energy-and-environment/2019/7/9/20684815/coal-wyoming-bankruptcy-blackjewel-appalachia>
- 32 McKim, C. (2019, May 17). Dispute over coal permit transfers ends in delay. *Wyoming Public Media*. Retrieved from: <https://www.wyomingpublicmedia.org/post/dispute-over-coal-permit-transfers-ends-delay#stream/0>
- 33 Williams-Derry, C. (2019, Jul 9). Seven bombshells in the Blackjewel bankruptcy. *Sightline Institute*. Retrieved from: <https://www.sightline.org/2019/07/09/blackjewel-bankruptcy-seven-bombshells/>
- 34 Erickson, C. (2020, Jan 23). New Blackjewel owner misses first tax payment. *Casper-Star Tribune*. Retrieved from: <https://www.wyodaily.com/story/2020/01/23/news/new-blackjewel-owner-misses-first-tax-payment/10200.html>
- 35 Goldenberg (2014, Nov 10). The real story of US coal: Inside the world's biggest coal mine. *The Guardian*. Retrieved from: <https://www.theguardian.com/environment/2014/nov/10/-sp-the-real-story-of-us-coal-inside-the-worlds-biggest-coal-mine>
- 36 Richards, H. (2019, Feb 7). Peabody to slow Wyoming coal production in a 'value over volume' pivot. *Casper Star-Tribune*. Retrieved from: https://trib.com/business/energy/peabody-to-slow-wyoming-coal-production-in-a-value-over/article_f6709ddb-7972-5a9a-8f8b-02b2275c1f20.html
- 37 Haggerty, M. (2016, Sept). Economic conditions in communities dependent on federal coal. *Headwaters Economics*. Retrieved from: <https://headwaterseconomics.org/energy/coal/communities-dependent-on-federal-coal/>
- 38 Haggerty, M. (2016, Feb). Planning for Montana's energy transition. *Headwaters Economics*, 22. Retrieved from: <https://headwaterseconomics.org/energy/coal/montanas-energy-transition/>
- 39 Wilson, S. (2017, Oct 3). Crow government's future uncertain as budget woes hit tribe. *Billings Gazette*. Retrieved from: https://billingsgazette.com/news/state-and-regional/montana/crow-government-s-future-uncertain-as-budget-woes-hit-tribe/article_7d859f5b-e8c5-5545-9692-ccd7570e9603.html
- 40 U.S. Department of Commerce (2019). Census Bureau, American Community Survey Office, Washington, D.C. Reported by Headwaters Economics' Economic Profile System: <https://headwaterseconomics.org/tools/economic-profile-system/>
- 41 U.S. Department of Commerce (2019). Census Bureau, County Business Patterns, Washington, D.C. Reported by Headwaters Economics' Economic Profile System: <https://headwaterseconomics.org/tools/economic-profile-system/>
- 42 Kohler, J. (2019, May 7). We don't have a choice: Colorado coal counties try to plan for unsure economic future. *Denver Post*. Retrieved from: <https://www.denverpost.com/2019/05/06/colorado-coal-counties-economic-future/>
- 43 Hood, G. (2020, Jan 10). Craig's coal mine and plant will close early and Colorado is already working to get ahead of it. *Colorado Public Radio*. Retrieved from: <https://www.cpr.org/2020/01/10/craigs-coal-mine-and-plant-will-close-early-and-colorado-is-already-working-to-get-ahead-of-it/>
- 44 Hood, G. (2019, Mar 12). Colorado coal jobs saw a modest uptick in 2018. *Colorado Public Radio*. Retrieved from: <https://www.cpr.org/2019/03/12/colorado-coal-jobs-saw-a-modest-uptick-in-2018/>
- 45 TriState Energy (2016, Sept 1). Proposed revision will enforce stringent emissions limits in 2020 and retire the 427-megawatt Craig Station Unit 1 by Dec. 31, 2025. *TriState Energy*. <https://www.tristategt.org/craig-station-owners-regulators-and-environmental-groups-reach-agreement-proposed-revisions>
- 46 Eaton, P. & Cates, K. (2019, May 9). *IEEFA U.S.: Seeds of a just coal transition policy in Colorado*. Institute for Energy Economics and Financial Analysis. Retrieved from: <https://ieefa.org/ieefa-u-s-seeds-of->

a-just-coal-transition-policy-in-colorado/

47 U.S. Energy Information Administration data, Form 923.

48 APS 2020 Integrated Resource Plan, September 15, 2020, <https://www.aps.com/-/media/APS/APSCOM-PDFs/About/Our-Company/Doing-business-with-us/Resource-Planning-and-Management/2020IRP-StakeholderUpdateSeptember152020.ashx>

49 <https://www.navajo-tec.com/history>

50 Four Corners-Navajo Mine EIS Comments, Western Environmental Law Center, Oct. 31, 2012

51 Institute for Energy Economics and Financial Analysis. <https://ieefa.org/ieefa-u-s-peabody-abandons-longtime-native-american-workforce-before-reclamation-of-kayenta-coal-complex-in-arizona/?fbclid=IwAR1nOoDrGdKwhf-ULnlMf1mhcmk5lYJ18TiXOBp7ZAvEhaVPchZOL9AZeow>. August 2019.

52 Arizona Newspapers Association: Public Notice: Peabody Western Coal Company (PWCC) has filed an application with the Office of Surface Mining Reclamation and Enforcement (OSMRE) for bond release on a portion of the lands in the J21 Coal Resource Area (CRA) within the Kayenta Mine Permit. May 2019.

53 Letter from U.S. Department of the Interior, Bureau of Indian Affairs, Navajo Regional Director to Randolph Lehn, Director, Environmental Services, SW, Peabody Energy Corp. re: Indian Lands Lease Relinquishment Requirements - Mined Land Revegetation Standards, June 9, 2015

October 2020

