



December 27, 2021

Michael Regan, Administrator  
United States Environmental Protection Agency  
Office of the Administrator  
William Jefferson Clinton Federal Building  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460

**RE: Temporary Emergency Suspension – Regional Haze 309(g) SIP for PacifiCorp Jim Bridger Power Plant Unit 2.**

Administrator Regan:

I hereby notify you that because of EPA's failure to act on Wyoming's Regional Haze 309(g) State Implementation Plan (SIP) revision for PacifiCorp's Jim Bridger Power Plant Unit 2 within the time prescribed by law, I must exercise my authority under 42 U.S.C. § 7410(g) to prevent the premature closing of Unit 2 and the dire economic impacts resulting therefrom. I hereby issue a temporary emergency suspension of that portion of Wyoming's existing SIP proposed to be revised and requiring additional controls of NOx emissions at Unit 2 by December 31, 2021. *See* 79 Fed. Reg. 5032 (Jan. 30, 2014). This emergency suspension is effective beginning January 1, 2022, and shall continue for the maximum period provided by law. As more fully explained below, Wyoming's proposed SIP revision meets the applicable requirements of Section 7410 of the Clean Air Act (CAA), and this emergency suspension is necessary to prevent Unit 2 from closing for one year or more and to prevent substantial increases in unemployment which would result from such closure.

Background

In 2014, EPA published a final Regional Haze Rule that approved the NOx portion of Wyoming's SIP requiring controls of NOx emissions from the Jim Bridger Power Plant Units 1-4. 79 Fed. Reg. 5032 (Jan 30, 2014). In particular, EPA approved Wyoming's requirement that PacifiCorp install low NOx burners (LNB) and separated overfire air (SOFA) plus selective catalytic reduction (SCR) at Jim Bridger Units 1-4 with NOx emission limits of 0.07 lb/MMBtu (30-day rolling average) as part of the State's Reasonable Progress Long Term Strategy. PacifiCorp installed these control technologies on Units 3 and 4 in 2015 and 2016. PacifiCorp has also installed LNB and SOFA at Units 1 and 2.

Due to the significant cost of installing SCR at Units 1 and 2, on February 5, 2019, PacifiCorp submitted a Regional Haze Reasonable Progress Reassessment to the State of Wyoming proposing an alternative to installing SCR. This alternative regional haze compliance strategy for the Jim Bridger Power Plant included visibility enhancing emission limits, a four-factor “reasonable progress” analysis, reduced plant-wide month-by-month emissions limits for the two principle haze-causing pollutants, NO<sub>x</sub> and SO<sub>2</sub>, and an annual total emissions cap for both pollutants for all four Units. Before submitting the reassessment to the State, PacifiCorp and the Wyoming Department of Environmental Quality worked cooperatively and directly with EPA to develop the alternative and to address all of EPA’s questions and concerns.

PacifiCorp’s proposed alternative was significantly better than the existing SCR requirement in every possible way. The proposed alternative was far more cost efficient than SCR. In fact, the capital cost of SCR was over \$297 million compared to just over \$16 million for the visibility enhancing emission limits. The visibility enhancing emission limits were also much more cost effective per ton at \$349 per ton removed compared to \$4,744 per ton removed for SCR, resulting in reduced cost to ratepayers during a time of increasing inflation nationally.

Moreover, the visibility enhancing emission limits would actually result in greater visibility improvement than SCR. First, even EPA agreed in 2014 that the visibility benefits from installing SCR in addition to LNB and SOFA at Units 1 and 2 were modest and imperceptible at 0.10 to 0.15 deciviews. Installing SCR would reduce NO<sub>x</sub> emissions from these units by 5,848 tons/year. But even EPA recognizes that it is SO<sub>2</sub>, not NO<sub>x</sub> that is “the predominant cause of regional haze on the Colorado Plateau in the western US.” 79 Fed. Reg. at 5097. By implementing the visibility enhancing emissions limits, the proposed alternative would reduce NO<sub>x</sub> and SO<sub>2</sub> emissions by 6,056 tons/year. Thus the proposed alternative would result in greater visibility improvement than the NO<sub>x</sub> only reductions associated with the installation of SCR. This conclusion was confirmed by updated CALPUFF modeling. Moreover, the plant-wide limit would cap all emissions from the source, including particulate matter, producing additional visibility benefits.

In addition, the proposed alternative had other significant benefits beyond getting better visibility for substantially less money. Implementing the visibility enhancing emission limits would also result in less impacts from mercury, carbon monoxide, carbon dioxide, particulate matter, sulfuric acid, coal consumption, coal combustion residual production and disposal, and raw water consumption. SCR also requires the use and storage of ammonia (a hazardous substance) while the proposed alternative does not. Moreover, SCR uses a significant amount of electricity which could otherwise be put to use elsewhere. The proposed alternative would save 10.4 MW or enough electricity to power approximately 8,761 homes. Finally, because the visibility enhancing emission limits are plant-wide, they provide the entire facility flexibility to “load follow” or accommodate the intermittent influx of renewable energy in the western power grid. Thus, the alternative would make the electricity grid more robust.

Presented with all these advantages, no known disadvantages, and EPA’s buy-in, Wyoming began the SIP revision process. During the public comment period on the revision, EPA submitted minor technical comments, which Wyoming fully addressed. Notably, EPA did not express any

substantive concerns with the revision, the supporting data, the conclusions drawn from that data, or in any way signal that the revision would not meet the legal requirements of the regional haze program. The science was, and remains, clear. The environmental, social, and economic outcomes of the alternative are superior in every way.

Accordingly, Wyoming determined that the revision ensured reasonable progress as required by the CAA and submitted the revisions to EPA for approval on May 12, 2020. EPA acknowledged receipt of the revised SIP submission on May 14, 2020. EPA then began its formal review process. In fact, it appears that EPA actually finished that process last year. Wyoming was notified on November 23, 2020, that the former Region 8 Administrator, Gregory Sopkin, had signed the proposed action on November 20, 2020, and that Wyoming would be informed when the action would be published in the Federal Register. But that did not happen.

The CAA imposes a nondiscretionary duty on the Administrator to approve or disapprove a SIP revision within twelve months of being deemed complete. 42 U.S.C. § 7410(k)(2). On May 14, 2020, EPA acknowledged receipt of Wyoming's SIP revision. EPA did not make a completeness finding within six months as required by 42 U.S.C. § 7410(k)(1)(B). Thus, Wyoming's SIP revision was deemed complete by operation of law on November 14, 2020. 42 U.S.C. § 7410(k)(1)(B). EPA was required to act on Wyoming's SIP revision within twelve months, or by November 14, 2021, in accordance with 42 U.S.C. § 7410(k)(2)-(3), but failed to do so.

As a result of EPA's inaction, the current SIP requires PacifiCorp to install SCR on Unit 2 by December 31, 2021, which it can not do at this late hour. Thus, in several short days, PacifiCorp will be forced to shut down Unit 2, lay off employees, and buy power to make up for the lost generation. That cost will be passed on to consumers in Wyoming and across the west creating a social and economic injustice. All for no good reason.

#### Temporary Emergency Suspension Authority

As you know, when the EPA Administrator has not approved or disapproved a plan revision within twelve months of submission, the CAA vests the governor of each state with the authority to issue a temporary emergency suspension of the part of the applicable implementation plan which is proposed to be revised. 42 U.S.C. § 7410(g)(1). To exercise this authority, the State must determine that the proposed revision meets the requirements of Section 7410 and "is necessary (i) to prevent the closing for one year or more of any source of air pollution, and (ii) to prevent substantial increases in unemployment which would result from such closing[.]" *Id.*

A temporary emergency suspension remains in effect for a maximum of four months unless disapproved by order of the EPA Administrator. *Id.* at (g)(2). However the EPA Administrator may only disapprove "such suspension if he determines that it does not meet the requirements of this subsection." *Id.*

Neither the CAA nor any applicable federal regulation specifies a particular procedure or form for an emergency suspension issued under Section 7410. Accordingly, I assert that this notice to you, copied to the owner of the source at issue, is a proper form for the exercise of my authority. Moreover, any perceived procedural deficiency associated with the issuance of this emergency suspension does not provide cause to disapprove the emergency suspension as your disapproval authority is specifically limited by Section 7410.

This emergency suspension meets the requirements of Section 7410(g).

The first two requirements of Section 7410(g) are easily established and beyond dispute. EPA failed to act on Wyoming's proposed revision within twelve months of submission and the State determined that the proposed revision met the requirements of Section 7410 when it submitted the proposed revision. The remaining two requirements relate to the detrimental effects of compliance with the existing SIP. Those effects are immediate, long-term, significant, and in my view, also beyond reasonable dispute.

First, this emergency suspension is necessary to prevent the closing of Unit 2 for twelve months or more. As you know, PacifiCorp's 2021 Integrated Resource Plan filed with the Wyoming Public Service Commission (PSC) reflects the company's intention to continue operation of Units 1 and 2 until 2023 and to convert them to natural gas fueled peaking units in 2024. In light of this intention, it will never make sense for PacifiCorp to install SCR at Unit 2 for the purpose of restarting the Unit for the limited period of time until conversion. Accordingly, if EPA forces Unit 2 to shutdown, it will remain shut down until it can be restarted as a natural gas unit. Thus, the question becomes whether PacifiCorp can reasonably convert Unit 2 to natural gas within the next twelve months. It cannot.

At my suggestion, the Wyoming Public Service Commission (PSC) initiated an investigation into the effects of shutting down Unit 2 at the end of this year as a result of EPA's failure to act on Wyoming's SIP revision. While that investigation remains ongoing, the PSC has already collected a significant amount of data from PacifiCorp. This data includes information about the anticipated length of time before Unit 2 could convert to natural gas. In order to convert to natural gas, a new lateral pipeline to the Jim Bridger power plant will need to be constructed from nearby existing natural gas pipelines. I understand that even accelerating the construction schedule as much as possible, this pipeline could not be constructed until the last quarter of 2023. Accordingly, this emergency suspension is necessary to prevent the closing of Unit 2 for twelve months or more.

Second, this emergency suspension is necessary to prevent substantial increases in unemployment resulting from the shutdown. The Jim Bridger Power Plant employs 302 highly skilled craftsmen, engineers, professionals and managers in the operation of the four coal-fired units. The power plant is staffed with a combination of both union and non-union employees. The power plant is a mine-mouth operation, meaning a reduction in electric power generation results in a corresponding reduction in coal production. Shutting down Unit 2 imperils many of the jobs

at the plant, at the mines that supply it, with the outside companies that support it, and elsewhere throughout the community.

In light of your stated intention to let the impending compliance deadline come and go without acting on Wyoming's proposed revision, the State of Wyoming asked Professor Timothy J. Considine, Ph.D., Professor of Energy Economics at the University of Wyoming's School of Energy Resources, to study the fiscal and economic impacts resulting from closing Unit 2. A copy of Professor Considine's report is attached hereto for your convenience. As it relates to employment, Professor Considine estimates that shutting down Unit 2 would result in 404 lost jobs state-wide with 327 of those lost jobs occurring in Sweetwater County where the power plant is located. These estimates include direct, indirect, and induced job losses. By any measure within Wyoming and Sweetwater County's small rural economies this represents a substantial increase in unemployment.

The magnitude of the jobs lost resulting from the shutdown of Unit 2 is amply illustrated when translated into lost compensation. Professor Considine estimates that the lost employee compensation for Sweetwater County in 2021 dollars would be in excess of \$30 million plus nearly \$5 million in additional lost employee compensation in the rest of the state annually. This represents a tremendous loss for Wyoming workers and their families.

Of course, a shutdown would also cause other economic losses and adverse effects. Professor Considine estimates that the closure of Unit 2 would result in \$148.6 million annual loss in value added to the State of Wyoming, which is the regional equivalent of gross domestic product. In addition, he estimates a loss in annual tax revenues at the federal, state, and local level of more than \$33 million. Moreover, while the PSC has not yet issued findings related to its ongoing investigation, I understand that the information submitted by PacifiCorp suggests that closure of Unit 2 at the end of the year would result in an increase in both industrial and commercial electricity rates and residential electricity rates. I also fully anticipate that the PSC's investigation will reveal reliability concerns and even the possibility of adverse effects on new renewable generation.

As is readily apparent, this emergency suspension meets all the requirements of Section 7410(g) and it would be irresponsible either for me not to issue it or for you to attempt to disapprove it. The costs are simply too great socially, economically and environmentally to allow Unit 2 to shut down on January 1st.

#### The Status Quo Until May 1, 2022 and Beyond

I want to say a few words about the status quo during the period the emergency suspension is in place. As a precursor to the SIP revision submitted to EPA, PacifiCorp sought and Wyoming granted Permit No. P0025809 attached hereto for your convenience. That permit adopts the substance of the proposed SIP revision and requires PacifiCorp to begin operations in compliance with the proposed SIP revision on January 1, 2022. The Permit establishes:

monthly-block average pound per hour (lb/hr) NO<sub>x</sub> and SO<sub>2</sub> emissions limits for Units 1-4 (EGU001-EGU004) combined and a 12-month rolling total NO<sub>x</sub> and SO<sub>2</sub> emission limit of 17,500 tons per year (tpy) for Units 1-4 (EGU001-EGU004) combined. This combined set of lb/hr and tpy limits will be enforced in lieu of installation of selective catalytic reduction technology (SCR) on Units 1-2 (EGU001-EGU002), and will effectively decrease the operating capacity of the plant, thereby reducing its emission of haze-causing pollutants, NO<sub>x</sub> and SO<sub>2</sub>.

Accordingly, the environmental benefits associated with Wyoming's proposed SIP revision will begin to accrue on the day this emergency suspension becomes effective. While that is a good thing, it does not solve the problem for the long term. And I cannot solve this problem unilaterally, even with the assistance of the courts. EPA must take action on the proposed SIP revision to solve this problem, and I urge you again to approve the SIP revision immediately.

Alternatively, I previously suggested that EPA could avoid the catastrophic shutdown of Unit 2, by issuing a Federal Implementation Plan (FIP) in conjunction with a disapproval of the proposed SIP revision. I understand that your staff has asserted that EPA does not have that authority where an existing SIP has been approved. I am baffled by that assertion. Section 7410(c)(1)(B) of the CAA expressly provides the Administrator with authority to issue a FIP upon the disapproval of a SIP submission in whole or in part. That section makes no distinction between a plan and a plan revision. Instead it clearly applies to submissions of either kind.

### Conclusion

I believe the effect of this emergency suspension is clear, but please contact me if you have any questions or concerns. I must again reiterate that unless you act on the proposed SIP revision within the sixty days following my notice to you of November 14, 2021, the State of Wyoming will file suit and seek all available relief from the court. In the meantime, this emergency suspension gives you an opportunity to approve Wyoming's revised SIP. I remain hopeful you will act on that opportunity. I remain willing to engage with you further on this matter.

Sincerely,



Mark Gordon  
Governor of Wyoming

MG:rl:gf

cc: Attorney General Bridget Hill  
Senator John Barrasso  
Senator Cynthia Lummis  
Representative Liz Cheney  
Governor Brad Little

Dan Dockstader, President, Wyoming Senate  
Eric Barlow, Speaker, Wyoming House of Representatives  
Christopher Petrie, Chairman, Wyoming Public Service Commission  
Michael Robinson, Deputy Chairman, Wyoming Public Service Commission  
Mary Throne, Commissioner, Wyoming Public Service Commission  
Todd Parfitt, Director, Wyoming Department of Environmental Quality  
Robin Cooley, Director, Wyoming Department of Workforce Services  
Brenda Hensen, Director, Wyoming Department of Revenue  
Randy (Doc) Wendling, Chair, Sweetwater County Commissioners  
Tim Kaumo, Mayor, City of Rock Springs  
Pete Rust, Mayor, City of Green River  
Jim Willox, President, Wyoming County Commissioners Association  
Kathleen Becker, EPA Administrator for Region 8  
Gary Hoogeveen, President and CEO, Rocky Mountain Power  
Lisa A. Grow, President and CEO, IDACORP, Inc. and Idaho Power

**“The Fiscal and Economic Impacts  
of Closing Unit 2 at the Jim Bridger Power Plant”**

by

Timothy J. Considine, Ph.D.  
Professor of Energy Economics  
School of Energy Resources  
University of Wyoming

December 26, 2021



### About the Author

Timothy Considine is a Professor of Energy Economics with the School of Energy Resources and the Department of Economics at the University of Wyoming.

### Acknowledgements

This report was completed under a consulting agreement with the Office of the Wyoming Attorney General. The author is grateful to the State of Wyoming for supporting this project.

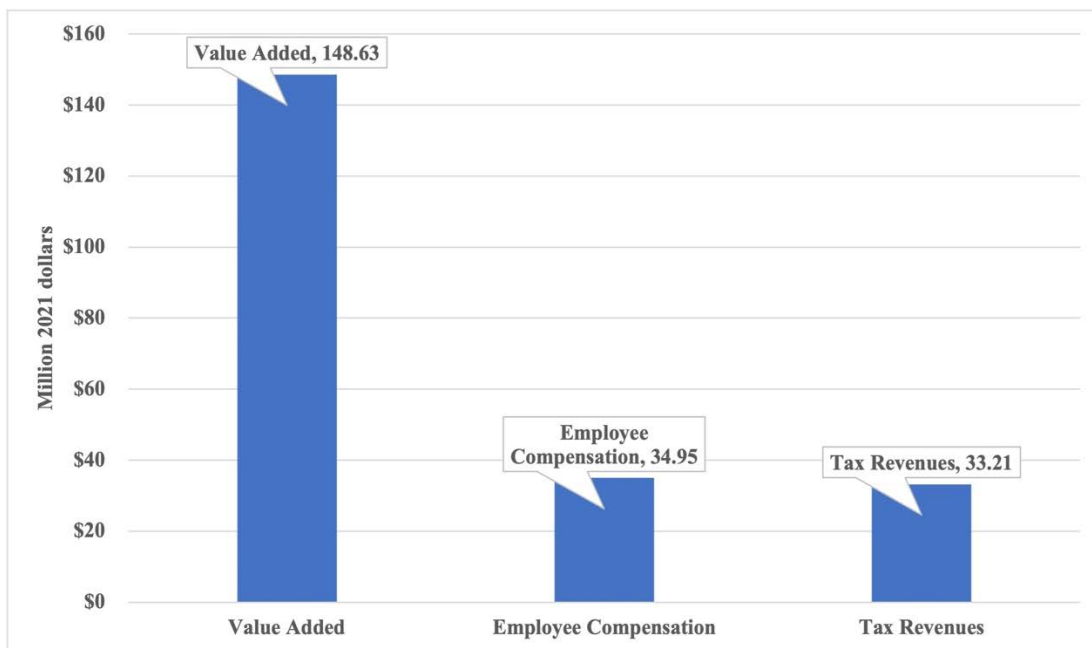
### Disclaimer

The opinions, findings, and conclusions expressed in the report are those of the authors and are not necessarily those of the University of Wyoming, the Office of the Wyoming Attorney General, or the State of Wyoming.

## Executive Summary

This study estimates the economic and fiscal impacts of closing Unit 2 of the Jim Bridger power plant for Sweetwater County, where the plant is located, and for the rest of Wyoming. This study does not estimate the increased costs of electricity to ratepayers, nor the economic costs associated with less electricity reliability that this closure may cause. The impacts estimated in this study include three parts. First, there are the direct economic impacts from lower electric power generation. The second component includes the indirect or supply chain impacts, such as reduced coal production. The third and final economic impact is lower spending on goods and services induced by the lower household and business income from the direct and indirect economic impacts. The total economic impact is the sum of these three components. These economic impacts also affect collections of tax revenues by federal, state, and local governments.

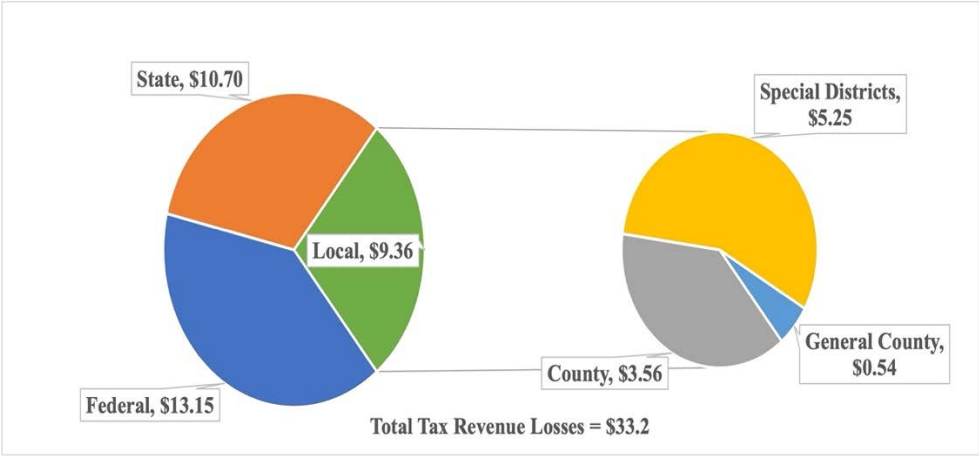
My main findings are as follows. First, closing Unit 2 results in a \$148.6 million loss in value added to the State of Wyoming, which is the regional equivalent of gross domestic product, see Figure ES1. Secondly, closing Unit 2 reduces employee compensation by \$34.9 million, see Figure ES1. Each of these impacts represent annual economic losses. If the plant were to remain open through the end of its expected lifetime in 2028, for example, the opportunity cost of closing Unit 2 increases to \$1.0 billion and \$245 million in cumulative foregone value added and employee compensation respectively.



**Figure ES1: Economic and fiscal losses from closing Unit 2 in million 2021 dollars**

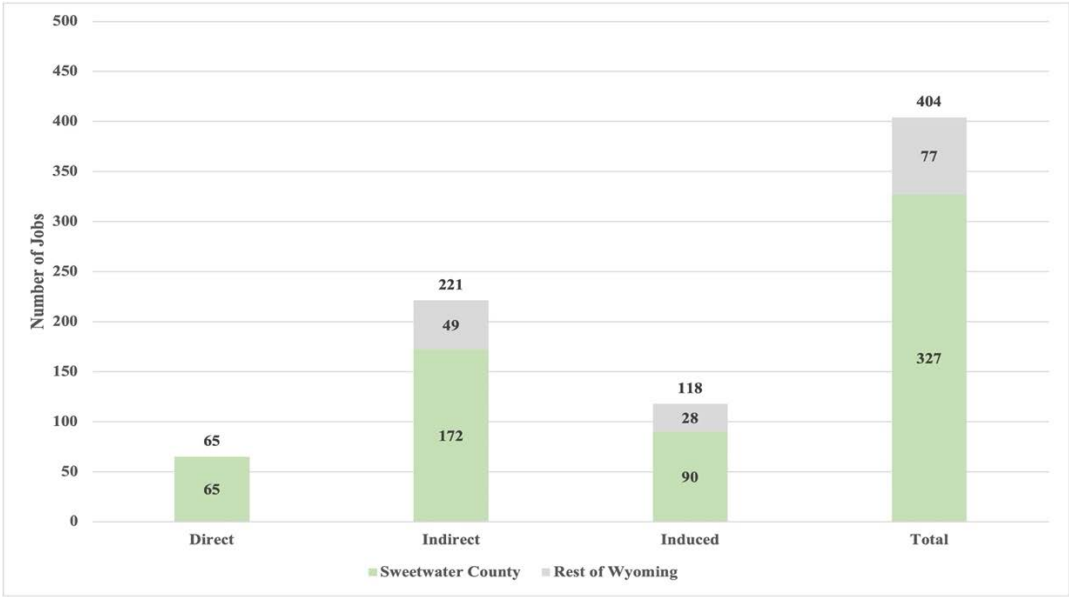
In addition, as Figure ES1 reports, annual tax revenues, which includes payments to federal, state, and local governments, declines \$33.2 million. A breakdown of the tax revenues appears in Figure ES2. Federal tax revenues decline \$13.15 million on an annual basis. Annual tax payments to the State of Wyoming decline \$10.7 million. Tax payments to local governments

decline \$9.36 million with special districts tax revenues declining \$5.25 million, county tax revenues falling \$3.56 million, and general county tax revenues dropping \$540 thousand.



**Figure ES2: Tax revenue losses from closing Unit 2 in million 2021 dollars**

Lower economic output and tax revenues reduce the demand for labor. In Figure ES3, the direct, indirect, and induced employment losses from closing Unit 2 are reported for Sweetwater County and for the rest of Wyoming. Notice that the direct employment impacts include 65 full-time equivalents (FTEs) at the power plant and therefore, only occur in Sweetwater County. The indirect employment losses are 172 FTEs in Sweetwater County, including the loss of 108 coal-mining jobs. Combined with the 90 jobs lost from lower incomes associated with these direct and indirect impacts, closing Unit 2 reduces total employment by 327 in Sweetwater County. Total state employment declines by 404, which includes the losses in Sweetwater, 49 FTEs from indirect impacts and a loss of 28 FTEs from induced impacts in the rest of the state.



**Figure ES3: Employment losses from closing Unit 2**

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## 1. Introduction

The focus of this study, the Unit 2 electric power generator at the Jim Bridger power plant, is one of four units operating at the plant in Point of Rocks, Wyoming, which is 25 miles east of Rock Springs, Wyoming in Sweetwater County. The operator of the plant is PacifiCorp. This study will estimate the economic and fiscal contributions of Unit 2 to the economies of Sweetwater County and the rest of the State of Wyoming. The next section describes the assumptions made and the methods used to estimate these contributions. Section three of this report provides a discussion of these contributions for Sweetwater County, including value added, employee compensation, employment, and tax revenues. The fourth section presents estimates of the spillover contributions to the rest of the state. The fifth section summarizes the impacts for the entire State of Wyoming. The report concludes with a synopsis of the main findings and their implications for regional economic development, environmental policy, and energy security and reliability.

## 2. Definitions and Methodology

This study employs input-output analysis, which is an analytical framework developed by Professor Wassily Leontief in the late 1930s, for which he received the Nobel Prize in Economic Science in 1973. This framework is also known as interindustry analysis, since the fundamental purpose of the input-output framework is to analyze the interdependence of industries in an economy, according to Miller and Blair (2009). This framework is ideal for estimating how purchases by the electric power sector affect supporting industries, such as coal mining, and how these supply-chain relationships determine how events in one industry affect spending by business and households in a regional economy.

This modeling framework has been implemented by IMPLAN (2021) in an online platform that combines extensive databases, economic factors, and multipliers with a refined modeling system that is customizable. IMPLAN provides complete sets of economic accounts for every county and zip code in the United States. These accounts form the backbone for each regional input-output model. This model balances industry inputs with outputs and can be used to determine how these interindustry transactions change in response to an external shock to the regional economy, such as the closure of the Unit 2 electric power generator.

This shock is represented by the change in the value of gross electrical power output. According to the Energy Information Administration (2021), Unit 2 generated 2,956,511 megawatt hours of electricity during 2020, which is the last calendar year with complete data. To estimate gross value, I multiplied the gross value of electricity output for the fossil-fuel electric power sector in Sweetwater County reported by IMPLAN by the share of Unit 2 in total electricity generated by the Jim Bridger plant. Accordingly, the gross value of output from Unit 2 is estimated to be \$151,608,193 for the analysis below. This estimate is conservative and reflects the historic cost-based value of electric power rather than the cost of replacement power, which is substantially greater.<sup>1</sup>

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<sup>1</sup> I originally multiplied Unit 2 generation by the Palo Verde Hub peak price for electricity reported by Bloomberg (2021) from the data collected by the International Commodity Exchange. This approach yields an estimate for gross output from Unit 2 at \$185.1 million.

To avoid double counting of industry impacts, this study conducts an industry contribution analysis (ICA) using the online IMPLAN tools. The ICA provides a more accurate picture of the relative extent and magnitude of the Unit 2 closure event.

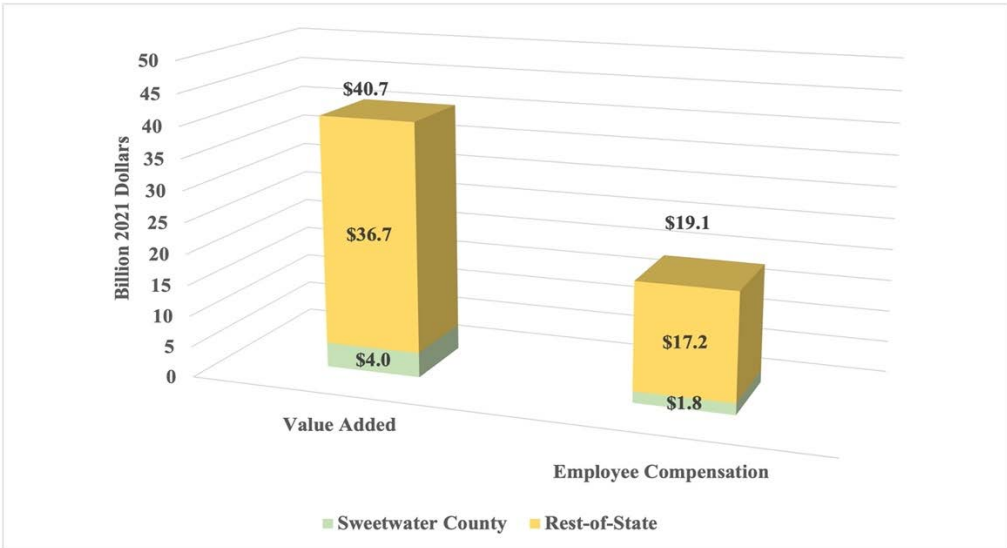
The Jim Bridger power plant is a so-called mine-mouth power plant. For this configuration, coal is transported from the mines to the power generating units via a conveyer belt that is depicted in Figure 1. This somewhat unique arrangement requires a customization of the purchasing coefficients in the default IMPLAN input-output models. Specifically, the regional purchasing parameter is set to 100 percent and the interindustry purchases were rebalanced to reflect the captive nature of the coal mine so that if Unit 2 closes, the coal cannot be sold to another customer. In other words, the reduction in electric power production entails a corresponding reduction in coal production.



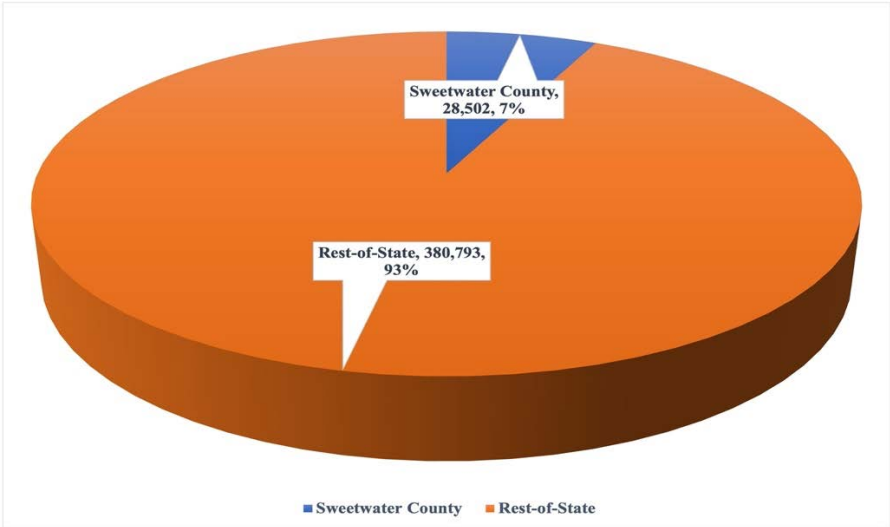
**Figure 1: The Jim Bridger power plant**

With these modifications to the default IMPLAN models for Wyoming, the final decision is to define the scope of the study region, which includes Sweetwater County and the remaining counties in Wyoming. An overview of value added and employee compensation for the study region in 2019 is provided in Figure 2. Total Wyoming value added in 2019 was \$40.7 billion with \$4.0 billion in Sweetwater County and the remaining \$36.7 billion generated in the remaining counties. Employee compensation for the entire State of Wyoming was \$19.1 billion with \$1.8 billion earned in Sweetwater County and the remaining \$17.2 billion earned in the rest of the state. An overview of employment in the study region is presented in Figure 3. Of the 409,295 total state employment, 7% or 28,502 is in Sweetwater County and the remaining 93% or 380,793 is in the rest of the state.

This study conducts a multi-regional input-output analysis that models how the Unit 2 closure would affect the purchases and sales of goods and services within Sweetwater County and between Sweetwater County and the rest of the state. Accordingly, the next three sections present and discuss the economic impacts for Sweetwater County, the rest of the state, and the entire State of Wyoming. These impacts include the direct, indirect, and induced impacts of the plant closure on value added, employee compensation, employment, and tax revenues in each of the three regions. Indirect impacts are essentially supply-chain impacts, such as coal purchases by the power plant and contractor services acquired by the power plant and the coal mine. Induced impacts arise from the spending of income earned from direct and indirect impacts on local goods and services, for example, workers throughout the supply-chain spending their wage and proprietor income to dine at local restaurants.



**Figure 2: Value added in the study region in billion 2021 dollars**



**Figure 3: Employment in the study region**

### 3. Economic and Fiscal Impacts on Sweetwater County

This section reports the estimated losses in value added, employee compensation, employment, and tax revenues for Sweetwater County. The total economic impacts are the sum of the direct, indirect, and induced impacts. For this study, the direct impacts stem from the reduced electricity output from closing Unit 2. The indirect impacts include the reduced purchases of coal and other intermediate inputs purchased by the power plant. Finally, the induced impacts capture the reduced spending on local goods and services that results from lower household and business income. This analysis assumes that prices for local goods and services are unaffected by the closure of Unit 2.

Gross output is equivalent to gross sales and includes purchases of intermediate inputs. Adding changes in gross output across industries due to an industry event, therefore, would double count economic inputs. Instead, economic impact analysis uses changes in value added to estimate total economic impacts. Value added for a particular industry is the difference between gross output and the cost of intermediate inputs, which are purchases from other industries or imports. Value added includes employee compensation, proprietor income, taxes on production and imports, and other property income. In short, value added for an industry is its net contribution to gross domestic product.

IMPLAN reports industry impacts for 546 sectors of the economy. This study aggregates these sectors into the two-digit aggregate industries defined by the North American Industry Classification System (NAICS) in the first column in Table 1. Notice that the value under the direct column in Table 1 for the utilities row is \$47,787,405, which is the change in value added from the utilities sector due to the closure of Unit 2 at the Jim Bridger power plant. Notice that this is lower than the \$151,608,193 of gross value of electricity output from closing Unit 2.

The indirect or supply-chain impacts are reported in column three in Table 1. The largest impact is \$67,859,530 in the mining sector, which includes coal production. This means that the net contribution of coal mining falls by over \$67 million due to the closure of Unit 2. Once again, we are assuming that the captive coal mine cannot sell the coal that would have gone to Unit 2 to another buyer. This is a reasonable assumption because to do so would require capital investments for coal handling and transportation to ship coal to buyers outside of Point of Rocks.

The next largest indirect impacts occur in transportation and warehousing, \$4,105,515, utilities, \$2,282,231, which is primarily electric transmission, wholesale trade, \$1,324,684, and waste management, \$657,841. Real estate and rentals, professional scientific and technical services, government enterprises as well as many other sectors also would be adversely affected by closing Unit 2.

Also reported in Table 1 in column 4 are the induced losses in value added by sector. Unlike the indirect or supply-chain impacts, the sectors hit hardest by the shutdown include real estate, \$3,053,939, retail trade, \$1,024,676, and health care and social assistance, \$810,563, within Sweetwater County. The sectoral allocation of these impacts represents how the local economy would be affected as households and business reduce their spending due to lower incomes in the county after closure of Unit 2.



**Table 1: Lost value added for Sweetwater County in 2021 dollars**

<b>NAICS Aggregated Industries</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
Ag, Forestry, Fish & Hunting	\$0	\$1,652	\$2,967	\$4,619
Mining	\$0	\$67,859,530	\$31,984	\$67,891,514
Utilities	\$47,787,405	\$2,282,231	\$95,355	\$50,164,992
Construction	\$0	\$216,698	\$87,543	\$304,241
Manufacturing	\$0	\$59,437	\$1,203	\$60,640
Wholesale Trade	\$0	\$1,324,684	\$283,601	\$1,608,285
Retail trade	\$0	\$169,532	\$1,024,676	\$1,194,208
Transportation & Warehousing	\$0	\$4,105,515	\$205,274	\$4,310,789
Information	\$0	\$71,007	\$94,541	\$165,549
Finance & insurance	\$0	\$218,116	\$323,053	\$541,169
Real estate & rental	\$0	\$719,950	\$3,053,939	\$3,773,889
Professional- scientific & tech	\$0	\$421,081	\$132,901	\$553,982
Management of companies	\$0	\$221,453	\$35,464	\$256,916
Waste Management	\$0	\$657,841	\$107,704	\$765,545
Educational Services	\$0	\$3,092	\$55,934	\$59,025
Health Care and Social Assistance	\$0	\$4	\$810,563	\$810,567
Arts, entertainment & recreation	\$0	\$3,928	\$89,962	\$93,890
Accommodation & food services	\$0	\$90,857	\$670,777	\$761,634
Other services	\$0	\$100,865	\$459,823	\$560,688
Government Enterprises	\$0	\$152,534	\$83,366	\$235,900
<b>Total</b>	<b>\$47,787,405</b>	<b>\$78,680,007</b>	<b>\$7,650,630</b>	<b>\$134,118,042</b>

The total losses of value added by sector in Sweetwater County from closing Unit 2 are reported the last column of Table 1. Notice that the loss of value added in utilities and the mining sector are \$50,164,992 and \$67,891,514 respectively. These two sectors alone account for 88% of the total loss in value added of \$134,118,942. The loss of value added in the transportation and warehousing sector is the next largest at \$4,310,789. The real estate sector loses \$3,773,889 in value added. Losses in value added exceed \$1 million in the wholesale and retail trade, while losses in waste management, health care and social assistance, and accommodation and food services are between \$761 and \$810 thousand.

The changes in employee compensation are reported in Table 2. Employee compensation is fully loaded payroll or the total payroll cost of wage and salary employees to the employer, including wages and salaries, all benefits such as health and retirement, and payroll taxes. The direct payroll loss in the utility sector from closing Unit 2 is \$10,114,444. Employee compensation in mining declines by \$13,499,151. Induced impacts are reported in column three of Table 2. Total employee compensation in Sweetwater County declines \$30,483,345 with 80 percent of this decline occurring in the utility and mining sectors.

The impacts on employment are reported in Table 3. Total employment losses in the utility sector are 65 full-time equivalent jobs, see column 1 in Table 3. The loss in mining employment is estimated to be 108 FTEs. Total indirect job losses are 172 FTEs and induced job losses are 90. Hence, the total loss in employment in Sweetwater County is 327 FTEs. Dividing the loss of 327 in total employment by the direct loss of 65 jobs in the utility sector plus the closely related 108 lost coal-mining jobs implies a multiplier of 1.89, which means that for every job lost from shutting down Unit 2, almost 2 total jobs are lost, which is conservative.

**Table 2: Lost employee compensation for Sweetwater County in 2021 dollars**

<b>NAICS Aggregated Industries</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
Ag, Forestry, Fish & Hunting	\$0	\$965	\$1,711	\$2,676
Mining	\$0	\$13,499,151	\$9,444	\$13,508,594
Utilities	\$10,114,444	\$766,408	\$34,351	\$10,915,203
Construction	\$0	\$108,747	\$45,657	\$154,404
Manufacturing	\$0	\$36,523	\$651	\$37,174
Wholesale Trade	\$0	\$484,780	\$131,011	\$615,791
Retail trade	\$0	\$72,197	\$572,030	\$644,227
Transportation & Warehousing	\$0	\$1,110,332	\$143,513	\$1,253,845
Information	\$0	\$23,945	\$30,652	\$54,597
Finance & insurance	\$0	\$124,777	\$175,580	\$300,357
Real estate & rental	\$0	\$222,766	\$54,998	\$277,764
Professional- scientific & tech	\$0	\$274,006	\$88,516	\$362,521
Management of companies	\$0	\$164,848	\$26,399	\$191,246
Waste Management	\$0	\$412,428	\$73,032	\$485,459
Educational Services	\$0	\$2,101	\$39,334	\$41,434
Health Care and Social Assistance	\$0	\$3	\$641,717	\$641,720
Arts, entertainment & recreation	\$0	\$1,302	\$34,340	\$35,642
Accommodation & food services	\$0	\$61,892	\$430,995	\$492,887
Other services	\$0	\$65,477	\$250,071	\$315,548
Government Enterprises	\$0	\$93,832	\$58,421	\$152,254
<b>Total</b>	<b>\$10,114,444</b>	<b>\$17,526,478</b>	<b>\$2,842,423</b>	<b>\$30,483,345</b>

**Table 3: Lost employment for Sweetwater County in 2021 dollars**

<b>NAICS Aggregated Industries</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
Ag, Forestry, Fish & Hunting	0	0	0	0
Mining	0	108	0	108
Utilities	65	5	0	71
Construction	0	2	1	3
Manufacturing	0	0	0	0
Wholesale Trade	0	8	2	10
Retail trade	0	3	20	23
Transportation & Warehousing	0	12	3	15
Information	0	0	1	1
Finance & insurance	0	3	5	7
Real estate & rental	0	5	5	10
Professional- scientific & tech	0	5	2	7
Management of companies	0	1	0	2
Waste Management	0	12	2	14
Educational Services	0	0	1	1
Health Care and Social Assistance	0	0	16	16
Arts, entertainment & recreation	0	0	2	3
Accommodation & food services	0	3	21	24
Other services	0	1	8	9
Government Enterprises	0	1	1	2
<b>Total</b>	<b>65</b>	<b>172</b>	<b>90</b>	<b>327</b>

With lower economic output and employment from closing Unit 2, tax revenues decline. Table 4 presents the IMPLAN model estimates of these losses in tax revenues. Federal tax revenues decline \$11,623,589, see the top panel of Table 4. Federal personal tax revenues decline \$3,441,724 and employee and employer contributions for social security are \$2,513,520 and \$1,815,681 lower respectively. State tax revenue losses are nearly \$9.5 million with most of these losses coming from lower sales and severance tax revenues of \$4,107,204 and \$3,238,258 respectively. Tax revenues for Sweetwater County and its special districts decline \$8.7 million with 86.6 percent of this loss coming from reduced property taxes, which include ad valorem taxes on mineral and industrial properties.

**Table 4: Lost tax revenue for Sweetwater County in 2021 dollars**

<b>Federal</b>	<i>Employees &amp; Proprietors</i>	<i>Production &amp; Imports</i>	<i>Households &amp; Business</i>	<i>Total</i>
Social Ins. Tax- Employee	\$2,513,520			\$2,513,520
Social Ins. Tax- Employer	\$1,815,681			\$1,815,681
Excise Taxes		\$944,044		\$944,044
Custom Duty		\$765,179		\$765,179
Corporate Profits Tax			\$2,143,441	\$2,143,441
Personal Tax: Income Tax			\$3,441,724	\$3,441,724
<b>Sub-total</b>	<b>\$4,329,201</b>	<b>\$1,709,224</b>	<b>\$5,585,165</b>	<b>\$11,623,589</b>
<b>State</b>				
Social Ins. Tax- Employee	\$138,594			\$138,594
Social Ins. Tax- Employer	\$212,010			\$212,010
Sales Tax		\$4,107,204		\$4,107,204
Property Tax		\$1,105,460		\$1,105,460
Motor Vehicle License		\$158,919		\$158,919
Severance Tax		\$3,238,258		\$3,238,258
Other Taxes		\$300,693	\$209,388	\$510,081
<b>Sub-total</b>	<b>\$350,604</b>	<b>\$8,910,534</b>	<b>\$209,388</b>	<b>\$9,470,526</b>
<b>County</b>				
Sales Tax		\$752,484		\$752,484
Property Tax		\$2,506,320		\$2,506,320
Motor Vehicle License		\$40,451		\$40,451
Other Taxes			\$27,445	\$27,445
<b>Sub-total</b>		<b>\$3,299,255</b>	<b>\$27,445</b>	<b>\$3,326,700</b>
<b>Special Districts</b>				
Sales Tax				
Property Tax		\$4,749,607		\$4,749,607
Other Taxes		\$89,624	\$31,672	\$121,296
<b>Sub-total</b>		<b>\$4,839,231</b>	<b>\$31,672</b>	<b>\$4,870,903</b>
<b>General County</b>				
Sales Tax		\$77,144		\$77,144
Property Tax		\$278,444		\$278,444
Other Taxes		\$144,844	\$1,857	\$146,701
<b>Sub-total</b>		<b>\$500,432</b>	<b>\$1,857</b>	<b>\$502,289</b>
<b>Government Totals</b>	<b>\$4,679,805</b>	<b>\$19,258,676</b>	<b>\$5,855,527</b>	<b>\$29,794,008</b>

**4. Economic and Fiscal Impacts on the Rest of the State**

The economic impacts on the rest of the state only include indirect and induced effects from trade between Sweetwater County and other counties in Wyoming. These impacts are reported in the next four tables. The total impact of closing Unit 2 on value added for the rest of the state is \$14.5 million with \$12.2 of this arising from indirect or supply-chain impacts and the remaining \$2.3 induced by changes in household and business income, see Table 5. The largest impacts occur in the mining, utility, transportation and warehousing, real estate and rentals, and government enterprises. These impacts are much smaller than those estimated for Sweetwater County.

**Table 5: Value added losses for rest of state in 2021 dollars**

<b>NAICS Aggregated Industries</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
Ag, Forestry, Fish & Hunting	\$31,615	\$4,023	\$35,638
Mining	\$5,724,283	\$16,014	\$5,740,297
Utilities	\$1,071,662	\$39,564	\$1,111,226
Construction	\$158,299	\$25,033	\$183,332
Manufacturing	\$644,291	\$24,088	\$668,379
Wholesale Trade	\$326,590	\$69,959	\$396,550
Retail trade	\$42,687	\$247,794	\$290,481
Transportation & Warehousing	\$1,612,329	\$69,229	\$1,681,558
Information	\$81,148	\$55,961	\$137,110
Finance & insurance	\$165,351	\$163,418	\$328,769
Real estate & rental	\$218,411	\$720,567	\$938,978
Professional- scientific & tech	\$624,568	\$76,594	\$701,161
Management of companies	\$41,156	\$7,132	\$48,288
Waste Management	\$166,067	\$48,732	\$214,799
Educational Services	\$604	\$15,988	\$16,592
Health Care and Social Assistance	\$21	\$322,595	\$322,615
Arts, entertainment & recreation	\$7,695	\$37,778	\$45,473
Accommodation & food services	\$27,925	\$146,962	\$174,887
Other services	\$44,400	\$132,744	\$177,144
Government Enterprises	\$1,247,722	\$54,037	\$1,301,759
<b>Total</b>	<b>\$12,236,825</b>	<b>\$2,278,213</b>	<b>\$14,515,038</b>

Employee compensation in the rest of the state follows the same pattern across sectors as the decline in value added, see Table 6. Total employee compensation declines \$4.5 million, see Table 6. The largest losses occur in mining, government enterprises, utilities, and professional scientific and technical services.

Employment in the rest of the state declines by 77 FTEs with 49 arising from supply chain impacts and the remaining 28 lost FTEs induced by lower income, see Table 7. The largest, although modest in absolute terms, employment losses are in the mining, utilities, transportation and warehousing, scientific and professional services, and government enterprises.

Lost tax revenues in the rest of the state are reported in Table 8. The IMPLAN model estimates total lost tax revenues in the rest of the state are \$3.4 million, much smaller than the \$29.8 million in Sweetwater County.

**Table 6: Losses of employee compensation for rest of state in 2021 dollars**

<b>NAICS Aggregated Industries</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
Ag, Forestry, Fish & Hunting	\$6,135	\$1,513	\$7,647
Mining	\$1,252,045	\$3,672	\$1,255,717
Utilities	\$355,921	\$13,248	\$369,169
Construction	\$75,796	\$12,268	\$88,064
Manufacturing	\$198,064	\$8,592	\$206,656
Wholesale Trade	\$96,452	\$31,313	\$127,765
Retail trade	\$17,397	\$132,037	\$149,434
Transportation & Warehousing	\$253,766	\$37,516	\$291,282
Information	\$28,337	\$19,122	\$47,458
Finance & insurance	\$88,929	\$89,635	\$178,564
Real estate & rental	\$44,904	\$19,083	\$63,987
Professional- scientific & tech	\$291,116	\$41,795	\$332,911
Management of companies	\$35,905	\$6,222	\$42,126
Waste Management	\$107,981	\$32,318	\$140,299
Educational Services	\$436	\$12,620	\$13,055
Health Care and Social Assistance	\$15	\$256,211	\$256,227
Arts, entertainment & recreation	\$2,243	\$15,965	\$18,208
Accommodation & food services	\$18,671	\$95,482	\$114,153
Other services	\$28,135	\$80,700	\$108,835
Government Enterprises	\$627,509	\$32,431	\$659,941
<b>Total</b>	<b>\$3,529,755</b>	<b>\$941,744</b>	<b>\$4,471,498</b>

**Table 7: Lost employment for rest of state in 2021 dollars**

<b>NAICS Aggregated Industries</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
Ag, Forestry, Fish & Hunting	0	0	0
Mining	14	0	14
Utilities	3	0	3
Construction	2	0	2
Manufacturing	1	0	1
Wholesale Trade	1	0	2
Retail trade	1	5	6
Transportation & Warehousing	4	1	4
Information	1	0	1
Finance & insurance	2	3	5
Real estate & rental	2	2	4
Professional- scientific & tech	6	1	7
Management of companies	1	0	1
Waste Management	3	1	4
Educational Services	0	0	1
Health Care and Social Assistance	0	5	5
Arts, entertainment & recreation	0	1	1
Accommodation & food services	1	4	5
Other services	1	3	3
Government Enterprises	7	0	7
<b>Total</b>	<b>49</b>	<b>28</b>	<b>77</b>

**Table 8: Lost tax revenues for rest of state in 2021 dollars**

<b>Federal</b>	<i>Employees &amp; Proprietors</i>	<i>Production &amp; Imports</i>	<i>Households &amp; Business</i>	<b>Total</b>
Social Ins. Tax- Employee	\$390,309			\$390,309
Social Ins. Tax- Employer	\$292,864			\$292,864
Excise Taxes		\$78,048		\$78,048
Custom Duty		\$63,261		\$63,261
Corporate Profits Tax			\$184,091	\$184,091
Personal Tax: Income Tax			\$522,259	\$522,259
<b>Sub-total</b>	<b>\$683,173</b>	<b>\$141,309</b>	<b>\$706,350</b>	<b>\$1,530,832</b>
<b>State</b>				
Social Ins. Tax- Employee	\$20,443			\$20,443
Social Ins. Tax- Employer	\$31,272			\$31,272
Sales Tax		\$525,659		\$525,659
Property Tax		\$141,532		\$141,532
Motor Vehicle License		\$20,346		\$20,346
Severance Tax		\$414,593		\$414,593
Other Taxes		\$38,498	\$32,935	\$71,432
<b>Sub-total</b>	<b>\$51,716</b>	<b>\$1,140,628</b>	<b>\$32,935</b>	<b>\$1,225,278</b>
<b>County</b>				
Sales Tax		\$50,488		\$50,488
Property Tax		\$175,199		\$175,199
Motor Vehicle License		\$2,726		\$2,726
Other Taxes		\$5,031	\$2,929	\$7,960
<b>Sub-total</b>		<b>\$233,444</b>	<b>\$2,929</b>	<b>\$236,373</b>
<b>Special Districts</b>				
Sales Tax		\$783		\$783
Property Tax		\$363,763		\$363,763
Other Taxes		\$13,706	\$2,690	\$16,396
<b>Sub-total</b>		<b>\$378,252</b>	<b>\$2,690</b>	<b>\$380,942</b>
<b>General County</b>				
Sales Tax		\$13,521		\$13,521
Property Tax		\$20,822		\$20,822
Other Taxes		\$7,096	\$153	\$7,248
<b>Sub-total</b>		<b>\$41,439</b>	<b>\$153</b>	<b>\$41,591</b>
<b>Government Totals</b>	<b>\$734,889</b>	<b>\$1,935,071</b>	<b>\$745,057</b>	<b>\$3,415,016</b>

**5. Total State Economic and Fiscal Impacts**

This section simply provides summary tables for the economic and fiscal impacts for the entire State of Wyoming. The closure of Unit 2 reduces state-wide value added by \$148.6 million with \$51.3 and \$73.6 million from the utility and mining sectors respectively, see Table 9. Value added declines \$6 million in transportation and warehousing and \$4.7 million in the real estate and rental sector. The next largest losses occur in wholesale trade with \$2 million, government enterprises at \$1.5 million, retail trade at \$1.5 million, professional scientific and professional services at \$1.3 million, and \$1 million from the waste management sector.

**Table 9: State-wide lost value added in 2021 dollars**

<b>NAICS Aggregated Industries</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
Ag, Forestry, Fish & Hunting	\$0	\$33,267	\$6,990	\$40,257
Mining	\$0	\$73,583,813	\$47,998	\$73,631,811
Utilities	\$47,787,405	\$3,353,893	\$134,919	\$51,276,218
Construction	\$0	\$374,997	\$112,576	\$487,573
Manufacturing	\$0	\$703,728	\$25,291	\$729,019
Wholesale Trade	\$0	\$1,651,274	\$353,560	\$2,004,835
Retail trade	\$0	\$212,219	\$1,272,470	\$1,484,689
Transportation & Warehousing	\$0	\$5,717,844	\$274,504	\$5,992,348
Information	\$0	\$152,156	\$150,502	\$302,658
Finance & insurance	\$0	\$383,467	\$486,470	\$869,937
Real estate & rental	\$0	\$938,361	\$3,774,507	\$4,712,868
Professional- scientific & tech	\$0	\$1,045,648	\$209,495	\$1,255,143
Management of companies	\$0	\$262,609	\$42,596	\$305,204
Waste Management	\$0	\$823,909	\$156,436	\$980,344
Educational Services	\$0	\$3,696	\$71,922	\$75,617
Health Care and Social Assistance	\$0	\$25	\$1,133,158	\$1,133,183
Arts, entertainment & recreation	\$0	\$11,623	\$127,741	\$139,363
Accommodation & food services	\$0	\$118,782	\$817,740	\$936,521
Other services	\$0	\$145,265	\$592,567	\$737,832
Government Enterprises	\$0	\$1,400,256	\$137,403	\$1,537,660
<b>Total</b>	<b>\$47,787,405</b>	<b>\$90,916,832</b>	<b>\$9,928,843</b>	<b>\$148,633,080</b>

Employee compensation in the State of Wyoming declines \$34.9 million with \$10.1 million coming directly from the utility sector, another \$21 million from reduced business activity in the supply chain, and the remaining \$3.8 million induced by lower spending in the economy from lower wage, salary, and proprietor income, see Table 10.

Nearly 75 percent of the losses in employee compensation are from losses in the utility and mining sectors. The corresponding losses in employment are 74 and 122 FTEs respectively in these two sectors. Dividing the loss in employee compensation by the loss the employment indicates that the lost average employee compensation per FTE for these two sectors are \$121,019 and \$152,492 for the mining and utility sectors respectively. Total employment losses are 404 with 65 from direct impacts, 221 from indirect effects, and 118 from induced impacts, see Table 11.

**Table 10: State-wide lost employee compensation in 2021 dollars**

<b>NAICS Aggregated Industries</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
Ag, Forestry, Fish & Hunting	\$0	\$7,099	\$3,224	\$10,323
Mining	\$0	\$14,751,196	\$13,116	\$14,764,312
Utilities	\$10,114,444	\$1,122,328	\$47,599	\$11,284,372
Construction	\$0	\$184,543	\$57,925	\$242,468
Manufacturing	\$0	\$234,587	\$9,243	\$243,830
Wholesale Trade	\$0	\$581,231	\$162,324	\$743,555
Retail trade	\$0	\$89,594	\$704,067	\$793,661
Transportation & Warehousing	\$0	\$1,364,098	\$181,029	\$1,545,127
Information	\$0	\$52,282	\$49,774	\$102,056
Finance & insurance	\$0	\$213,706	\$265,216	\$478,921
Real estate & rental	\$0	\$267,669	\$74,082	\$341,751
Professional- scientific & tech	\$0	\$565,121	\$130,311	\$695,432
Management of companies	\$0	\$200,752	\$32,621	\$233,373
Waste Management	\$0	\$520,409	\$105,350	\$625,758
Educational Services	\$0	\$2,536	\$51,954	\$54,490
Health Care and Social Assistance	\$0	\$18	\$897,929	\$897,947
Arts, entertainment & recreation	\$0	\$3,545	\$50,305	\$53,850
Accommodation & food services	\$0	\$80,564	\$526,477	\$607,040
Other services	\$0	\$93,611	\$330,771	\$424,382
Government Enterprises	\$0	\$721,342	\$90,853	\$812,194
<b>Total</b>	<b>\$10,114,444</b>	<b>\$21,056,233</b>	<b>\$3,784,167</b>	<b>\$34,954,844</b>

**Table 11: State-wide lost employment in number of jobs**

<b>NAICS Aggregated Industries</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
Ag, Forestry, Fish & Hunting	0	0	0	1
Mining	0	122	0	122
Utilities	65	8	0	74
Construction	0	4	1	5
Manufacturing	0	2	0	2
Wholesale Trade	0	9	3	11
Retail trade	0	3	25	29
Transportation & Warehousing	0	16	4	20
Information	0	1	1	2
Finance & insurance	0	5	7	12
Real estate & rental	0	8	7	15
Professional- scientific & tech	0	11	3	14
Management of companies	0	2	0	2
Waste Management	0	16	3	19
Educational Services	0	0	2	2
Health Care and Social Assistance	0	0	21	21
Arts, entertainment & recreation	0	1	3	4
Accommodation & food services	0	4	25	29
Other services	0	2	10	12
Government Enterprises	0	8	1	9
<b>Total</b>	<b>65</b>	<b>221</b>	<b>118</b>	<b>404</b>



Total tax revenues generated in Wyoming decline by \$33.2 million from the closure of Jim Bridger’s power generation Unit 2. Federal tax revenues decline \$13.1 million. State tax revenues decline \$10.7 million primarily from a \$4.6 million reduction in sales tax revenues and \$3.7 million in lost severance tax revenues. County tax revenues decline \$9.4 million with 86 percent of this decline coming from lower property tax revenues due to lower mineral ad valorem tax revenues.

**Table 12: State-wide lost tax revenue in 2021 dollars**

<b>Federal</b>	<i>Employees &amp; Proprietors</i>	<i>Production &amp; Imports</i>	<i>Households &amp; Business</i>	<i>Total</i>
Social Ins. Tax- Employee	\$2,903,829			\$2,903,829
Social Ins. Tax- Employer	\$2,108,545			\$2,108,545
Excise Taxes		\$1,022,093		\$1,022,093
Custom Duty		\$828,440		\$828,440
Corporate Profits Tax			\$2,327,532	\$2,327,532
Personal Tax: Income Tax			\$3,963,983	\$3,963,983
<b>Sub-total</b>	<b>\$5,012,374</b>	<b>\$1,850,532</b>	<b>\$6,291,515</b>	<b>\$13,154,422</b>
<b>State</b>				
Social Ins. Tax- Employee	\$159,037			\$159,037
Social Ins. Tax- Employer	\$243,283			\$243,283
Sales Tax		\$4,632,863		\$4,632,863
Property Tax		\$1,246,992		\$1,246,992
Motor Vehicle License		\$179,265		\$179,265
Severance Tax		\$3,652,851		\$3,652,851
Other Taxes		\$339,191	\$242,322	\$581,513
<b>Sub-total</b>	<b>\$402,320</b>	<b>\$10,051,162</b>	<b>\$242,322</b>	<b>\$10,695,804</b>
<b>County</b>				
Sales Tax		\$802,972		\$802,972
Property Tax		\$2,681,519		\$2,681,519
Motor Vehicle License		\$43,177		\$43,177
Other Taxes		\$5,031	\$30,374	\$35,405
<b>Sub-total</b>		<b>\$3,532,699</b>	<b>\$30,374</b>	<b>\$3,563,073</b>
<b>Special Districts</b>				
Sales Tax		\$783		\$783
Property Tax		\$5,113,370		\$5,113,370
Other Taxes		\$103,329	\$34,363	\$137,692
<b>Sub-total</b>		<b>\$5,217,483</b>	<b>\$34,363</b>	<b>\$5,251,846</b>
<b>General County</b>				
Sales Tax		\$90,665		\$90,665
Property Tax		\$299,266		\$299,266
Other Taxes		\$151,940	\$2,009	\$153,949
<b>Sub-total</b>		<b>\$541,871</b>	<b>\$2,009</b>	<b>\$543,880</b>
<b>Government Totals</b>	<b>\$5,414,694</b>	<b>\$21,193,747</b>	<b>\$6,600,583</b>	<b>\$33,209,024</b>

## 6. Conclusions

Closing Unit 2 at the Jim Bridger reduces value added, or gross state product, in the State of Wyoming by \$148.6 million per annum. Annual total federal, state, and local tax revenues decline \$33.2 million. Closing Unit 2 also reduces employment, and our estimates indicate a loss of 404 full-time equivalent positions.

Most of these losses occur in Sweetwater County where Unit 2 is located. Value added or gross county product is reduced by \$134.1 million and 327 jobs are lost. Sweetwater County tax revenues are reduced by nearly \$8.7 million.

These are annual losses from closing the Unit 2. If the Unit 2 were to operate through the then end of its expected life, these losses, except the employment losses, would accumulate for seven years. From this perspective, the economic and fiscal impacts would be 7-fold larger, or \$1 billion in lost value added and \$245 million in foregone tax revenues.

A complete cost-benefit analysis of the air quality benefits from closing Unit 2 is beyond the scope of this study. Nevertheless, the cost of closing Jim Bridger Unit 2 in terms of lost value added per ton of avoided carbon dioxide and particulate pollution are \$73 and over \$35,000 per ton respectively, which both seem rather high.

Finally, closing Unit 2 may have significant impacts on maintaining the reliability of electricity service to the thousands of customers consuming electric power generated at the Jim Bridger plant. While estimating the impact of closing Unit 2 on the reliability of the electric grid is also beyond the scope of this study, readers should keep in mind that the social costs of unreliable electricity service are significant.

## References

Bloomberg (2021) “Bloomberg Terminal: Bloomberg Professional Services,  
<https://bba.bloomberg.net>.

Energy Information Administration (2021) “EIA-923 Monthly Generating Unit Net Generation Time Series File,” 202 Revision, <https://www.eia.gov/electricity/data/eia923/>.

IMPLAN (2021) “Economic Impact Analysis for Planning,” <https://implan.com>.

Miller, R.E. and P.D. Blair (2009) Input-Output Analysis: Foundations and Extensions, Cambridge University Press, 750 pages.



Mark Gordon, Governor

# Department of Environmental Quality

*To protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations.*



Todd Parfitt, Director

Date: May 5, 2020

Mr. James Owen  
Director, Environmental Services  
PacifiCorp  
1407 W North Temple, Ste 210  
Salt Lake City, UT 84116

Permit No. **P0025809**

Dear Mr. Owen:

The Division of Air Quality of the Wyoming Department of Environmental Quality has completed final review of PacifiCorp's (CMP000574) application to modify operations at the Jim Bridger Plant (F000645) by establishing monthly-block average pound per hour (lb/hr) NO<sub>x</sub> and SO<sub>2</sub> emissions limits for Units 1-4 (EGU001-EGU004) combined and a 12-month rolling total NO<sub>x</sub> and SO<sub>2</sub> emission limit of 17,500 tons per year (tpy) for Units 1-4 (EGU001-EGU004) combined. This combined set of lb/hr and tpy limits will be enforced in lieu of installation of selective catalytic reduction technology (SCR) on Units 1-2 (EGU001-EGU002), and will effectively decrease the operating capacity of the plant, thereby reducing its emission of haze-causing pollutants, NO<sub>x</sub> and SO<sub>2</sub>. The Jim Bridger Plant is located in Section 3, T20N, R101W, approximately four (4) miles north of Point of Rocks, in Sweetwater County, Wyoming.

Following this agency's proposed approval of the request as published July 20, 2019 and in accordance with Chapter 6, Section 2(m) of the Wyoming Air Quality Standards and Regulations, the public was afforded a 30-day period in which to submit comments concerning the proposed modification, and an opportunity for a public hearing. A public hearing was conducted on August 23, 2019, in the Pilot Butte Conference Room of the Rock Springs BLM Field Office, located at 280 Highway 191 North, Rock Springs, in Sweetwater County, Wyoming. Comments received were considered in the final permit. Therefore, on the basis of the information provided to us, approval to modify the Jim Bridger Plant as described in the application is hereby granted pursuant to Chapter 6, Section 2 of the regulations with the following conditions:

1. That authorized representatives of the Division of Air Quality be given permission to enter and inspect any property, premise or place on or at which an air pollution source is located or is being constructed or installed for the purpose of investigating actual or potential sources of air pollution and for determining compliance or non-compliance with any rules, standards, permits or orders.
2. That all substantive commitments and descriptions set forth in the application for this permit, unless superseded by a specific condition of this permit, are incorporated herein by this reference and are enforceable as conditions of this permit.
3. That PacifiCorp shall file a complete application to modify their Operating Permit within twelve (12) months of commencing operation, in accordance with Chapter 6, Section 3(c)(i)(B) of the WAQSR. Where an existing operating permit would prohibit such construction or change in operation, the owner or operator must obtain a permit revision before commencing operation.

4. That all notifications, reports, and correspondence required by this permit shall be submitted to the Stationary Source Compliance Program Manager. Submissions may be done electronically through <https://airimpact.wyo.gov> to satisfy requirements of this permit.
5. That written notification of the anticipated date of initial startup of the Reasonable Progress Reassessment Project, in accordance with Chapter 6, Section 2(i) of the WAQSR, is required not more than sixty (60) days or less than thirty (30) days prior to such date. Notification of the actual date of startup is required within fifteen (15) days after startup.
6. That the date of commencement of construction of the Reasonable Progress Reassessment Project shall be reported to the Administrator within thirty (30) days of commencement. In accordance with Chapter 6, Section 2(h) of the WAQSR, approval to construct or modify shall become invalid if construction is not commenced within twenty-four (24) months after receipt of such approval or if construction is discontinued for a period of twenty-four (24) months or more. The Administrator may extend the period based on satisfactory justification of the requested extension.
7. Units 1-4 shall be limited to the following monthly-block average pound per hour (lb/hr) NO<sub>x</sub> and SO<sub>2</sub> emissions limits. Compliance with the limits shall be determined using continuous emissions monitoring systems (CEMS) certified in accordance with 40 CFR part 75. The NO<sub>x</sub> and SO<sub>2</sub> limits will be effective on January 1, 2022 and initial compliance shall be determined on February 1, 2022.

<b>Month</b>	<b>NO<sub>x</sub></b>	<b>SO<sub>2</sub></b>
January	2,050	2,100
February	2,050	2,100
March	2,050	2,100
April	2,050	2,100
May	2,200	2,100
June	2,500	2,100
July	2,500	2,100
August	2,500	2,100
September	2,500	2,100
October	2,300	2,100
November	2,030	2,100
December	2,050	2,100

8. Compliance with the monthly-block average lb/hr NO<sub>x</sub> and SO<sub>2</sub> emissions limits set forth in Condition 7 of this permit shall be determined with data from certified CEMS as follows:
- i. Exceedance of the limit shall be defined as follows:
1. Any monthly-block average which exceeds the lb/hr NO<sub>x</sub> and SO<sub>2</sub> limits as calculated using the following formula:

$$E_{avg} = E_{U1} + E_{U2} + E_{U3} + E_{U4}$$

Where:

$E_{avg}$  = Monthly-block average emission rate (lb/hr)

$E_{U1}$  = Monthly-block average Unit 1 emission rate (lb/hr)

$E_{U2}$  = Monthly-block average Unit 2 emission rate (lb/hr)

$E_{U3}$  = Monthly-block average Unit 3 emission rate (lb/hr)

$E_{U4}$  = Monthly-block average Unit 4 emission rate (lb/hr)

$$E_{U1} = \frac{\sum_{h=1}^n (C_1)h}{n}$$

$$E_{U2} = \frac{\sum_{h=1}^n (C_2)h}{n}$$

$$E_{U3} = \frac{\sum_{h=1}^n (C_3)h}{n}$$

$$E_{U4} = \frac{\sum_{h=1}^n (C_4)h}{n}$$

$C1$  = Unit 1 1-hour average emission rate (lb/hr) for hour “h” calculated using valid data (output concentration and average hourly volumetric flowrate) from the CEM equipment certified and operated in accordance with Part 75. Valid data shall meet the requirements of WAQSR, Chapter 5, Section 2(j). Valid data shall not include data substituted using the missing data procedure in subpart D of Part 75, nor shall the data have been bias adjusted according to the procedure of Part 75.  $C1$  shall be determined for each calendar month used to demonstrate compliance with the emission limits set forth in Condition 7.

$C2$  = Unit 2 1-hour average emission rate (lb/hr) for hour “h” calculated using valid data (output concentration and average hourly volumetric flowrate) from the CEM equipment certified and operated in accordance with Part 75. Valid data shall meet the requirements of WAQSR, Chapter 5, Section 2(j). Valid data shall not include data substituted using the missing data procedure in subpart D of Part 75, nor shall the data have been bias adjusted according to the procedure of Part 75.  $C2$  shall be determined for each calendar month used to demonstrate compliance with the emission limits set forth in Condition 7.

$C3$  = Unit 3 1-hour average emission rate (lb/hr) for hour “h” calculated using valid data (output concentration and average hourly volumetric flowrate) from the CEM equipment certified and operated in accordance with Part 75. Valid data shall meet the requirements of WAQSR, Chapter 5, Section 2(j). Valid data shall not include data substituted using the missing data procedure in subpart D of Part 75, nor shall the data have been bias adjusted according to the procedure of Part 75.  $C3$  shall be determined for each calendar month used to demonstrate compliance with the emission limits set forth in Condition 7.

$C4$  = Unit 4 1-hour average emission rate (lb/hr) for hour “h” calculated using valid data (output concentration and average hourly volumetric flowrate) from the CEM equipment certified and operated in accordance with Part 75. Valid data shall meet the requirements of WAQSR, Chapter 5, Section 2(j). Valid data shall not include data substituted using the missing data procedure in subpart D of Part 75, nor shall the data have been bias adjusted according to the procedure of Part 75.  $C4$  shall be determined for each calendar month used to demonstrate compliance with the emission limits set forth in Condition 7.

$n$  = The number of unit operating hours monitored during the monthly-block period with valid emissions data meeting the requirements of WAQSR, Chapter 5, Section 2(j).

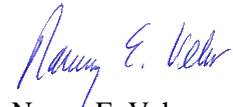
- ii PacifiCorp will comply with all monitoring, recordkeeping, and reporting requirements in Section 8.3.3 of Wyoming’s 309(g) Regional Haze SIP in addition to the reporting and recordkeeping requirements as specified in WAQSR, Chapter 5, Section 2(g).
9. Units 1-4 shall be limited to a combined limit for  $\text{NO}_x$  plus  $\text{SO}_2$  of 17,500 tons per year based on a 12-month rolling total. Compliance with the limit shall be determined using a CEMS certified in accordance with 40 CFR part 75. Valid data shall not include data substituted using the missing data procedure in subpart D of Part 75, nor shall the data have been bias adjusted according to the procedures of Part 75. The  $\text{NO}_x$  plus  $\text{SO}_2$  limit will be effective on January 1, 2022 and initial compliance shall be determined on January 1, 2023.
  10. PacifiCorp shall retain a copy of all records necessary to determine compliance with the limits established in Conditions 7 and 9 for five (5) years from the date of such record.
  11. All conditions from previously issued permits and authorization letters/waivers for the Jim Bridger Plant shall remain in effect unless specifically superseded by a condition of this permit.

It must be noted that this approval does not relieve you of your obligation to comply with all applicable county, state, and federal standards, regulations or ordinances. Special attention must be given to Chapter 6, Section 2 of the Wyoming Air Quality Standards and Regulations, which details the requirements for compliance with Conditions 3, 5 and 6. Any appeal of this permit as a final action of the Department must be made to the Environmental Quality Council within thirty (30) days of permit issuance per Section 8, Chapter 1, General Rules of Practice and Procedure, Department of Environmental Quality.

**PacifiCorp**  
**Air Quality Permit P0025809**  
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If we may be of further assistance to you, please feel free to contact this office.

Sincerely,



Nancy E. Vehr  
Administrator  
Air Quality Division



Todd Parfitt  
Director  
Dept. of Environmental Quality