STATE OF WYOMING

Public Service Commission

IN THE MATTER OF THE APPLICATION OF ROCKY MOUNTAIN POWER FOR AUTHORITY TO INCREASE ITS RETAIL ELECTRIC UTILITY RATES IN WYOMING APPROXIMATELY $97.9 MILLION PER YEAR OR AN AVERAGE OVERALL INCREASE OF 17.3 PERCENT	DOCKET NO. 20000-384-ER-10

Direct Testimony of Jeremy Fisher, Ph.D.

On Behalf of Powder River Basin Resource Council

April 11, 2011

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1. INTRODUCTION AND QUALIFICATIONS

Q Please state your name, business address and position.

A My name is Jeremy Fisher, and I am a scientist with Synapse Energy Economics (Synapse). My business address is 485 Massachusetts Avenue, Suite 2, Cambridge Massachusetts 02139.

Q Please describe Synapse Energy Economics.

A Synapse Energy Economics is a research and consulting firm specializing in energy and environmental issues, including electric generation, transmission and distribution system reliability, ratemaking and rate design, electric industry restructuring and market power, electricity market prices, stranded costs, efficiency, renewable energy, environmental quality, and nuclear power.

Q Please summarize your work experience and educational background?

A I have ten years of applied experience as a geological scientist, and four years of working within the energy planning sector, including work on integrated resource plans, long-term planning for states and municipalities, electrical system dispatch, emissions modeling, the economics of regulatory compliance, and evaluating social and environmental externalities. I have provided consulting services for various clients, including the U.S. EPA, the National Association of Regulatory Utility Commissioners (NARUC), the California Energy Commission (CEC), the California Division of Ratepayer Advocates, the State of Utah Energy Office, the National Association of State Utility Consumer Advocates (NASUCA), the National Rural Electric Cooperative Association (NRECA), the State of Alaska, the Western Grid Group, the Union of Concerned Scientists (UCS), the Sierra Club, the National Resources Defense Council (NRDC), the Environmental Defense Fund (EDF), the Stockholm Environment Institute (SEI), and the Civil Society Institute.

Prior to joining Synapse, I held a post doctorate research position at the University of New Hampshire and Tulane University examining the impacts of Hurricane Katrina.

I hold a B.S. in Geology and a B.S. in Geography from the University of Maryland, and an Sc.M. and Ph.D. in Geological Sciences from Brown University.

Q On whose behalf are you testifying in this case?

A I am testifying on behalf of the Powder River Basin Resource Council.

Q Have you testified previously before the Wyoming Public Service Commission?

A No, I have not.

What is the purpose of your testimony?

A The purpose of my testimony is to detail the current and likely upcoming federal environmental regulations that are likely to affect the operations and economics of PacifiCorp's fleet of coal plants. I also comment on PacifiCorp's (dba as Rocky Mountain Power in Wyoming) treatment of these regulations in the last relevant Integrated Resource Plan (IRP) and in the current rate case, as well as the company's stated expectations for these regulations and how they will affect the fleet.

In this testimony, I will focus on the units for which PacifiCorp/Rocky Mountain Power (the "company") is requesting rate base increases in the current case. These units are Dave Johnson 3 & 4, Jim Bridger 1-4, Naughton 1-3, Wyodak 1, Hunter 1 & 2, and Huntington 1 & 2.

Q On what PacifiCorp documents and filings do you base your opinion regarding the company's expectations for and treatment of environmental compliance costs affecting its fleet of coal plants?

A In addition to company witness testimony in this case, I have reviewed the following publicly available documents prepared by PacifiCorp (the company):

- 2008 Integrated Resource Plan (IRP) ("2008 IRP"), dated May 28, 2009;
- 2008 Update Integrated Resource Plan ("2008 IRP Update"), dated March 31, 2010;
- PacifiCorp's Emission Reduction Plan, filed as Appendix A to Chapter 6 of the Wyoming 309(g) [Regional Haze] State Implementation Plan, Technical Support Document ("Emissions Reduction Plan"), filed November 2, 2010 with the Wyoming Department of Environmental Quality (WY DEQ);
- PacifiCorp's Quarterly Statement (Form 10-Q) to the Securities and Exchange Commission (SEC), filed on September 30, 2010;
- PacifiCorp's Best Available Retrofit Technology (BART) Analysis for Dave Johnson, Jim Bridger, Naughton, and Wyodak units, filed December 2007 and March 2008 with the WY DEQ;
- PacifiCorp's response to the US Environmental Protection Agency (US EPA) Request for Information Under Section 104(e) of the Comprehensive Environmental Response, request for information requested on coal ash impoundments at Dave Johnston, Jim Bridger, Naughton, and Wyodak units;
- 2004 Integrated Resource Plan (IRP) ("2004 IRP")

Q Are you filing any exhibits with this testimony?

A I have attached the following exhibits to this testimony:

- **Exhibit PRBRC___(JIF-1)** Curriculum vitae
- **Exhibit PRBRC___(JIF-2)** PacifiCorp's Emissions Reduction Plan, filed with the WY Department of Environmental Quality (DEQ) in November 2010

- **Exhibit PRBRC___(JIF-3)** "Fact Sheet" prepared by the World Resource Institute (WRI), entitled "Response to EEI's Timeline of Environmental Regulations.", November 2010.
- **Exhibit PRBRC___(JIF-4)** Figure 2.1 from the PacifiCorp 2008 IRP Update, entitled "Environmental Regulatory Timeline at the Federal Level"
- **Exhibit PRBRC___(JIF-5)** Chart showing requested and additional expected capital investments at PacifiCorp coal plants discussed in this testimony.

Q How is your testimony organized?

A My testimony is organized as follows:

- Introduction and Qualifications
- Summary of Conclusions and Recommendations
- Environmental Regulations
- Clean Air Act Visibility Rule
- Clean Air Act Toxics Rule For Utility Steam Generating Units
- Clean Air Act National Ambient Air Quality Standards (NAAQS)
- Clean Water Act Cooling Water Intake Rule
- Clean Water Act Effluent Limitation Guidelines
- Resource Conservation and Recovery Act Coal Combustion Residuals Disposal Rule
- Summary of Expected Capital Expenditures
- Closing

2. SUMMARY OF CONCLUSIONS AND RECCOMENDATIONS

Q In your opinion and according to the documents you have reviewed, has PacifiCorp adequately considered and accounted for all current and reasonably expected environmental costs in its planning process?

A No. As I will detail below, the company's planning for environmental compliance costs has been quite limited, even with respect to existing emissions regulations. I have found no evidence that the company has adequately planned for compliance costs associated with upcoming federal regulations and expected strengthening of existing regulations.

Q What is your recommendation to the Commission?

A I recommend that, to determine if the capital expenditures and operating expenses requested in this rate case are cost-effective, the Commission should require the company to provide a full analysis and accounting for the impact of existing and upcoming environmental regulations affecting its fleet of coal plants, as well as the full range of options for addressing those regulations, including both supply- and demand-side resources. The costs facing the existing fleet should include not only the costs requested for meeting environmental compliance criteria today, but also the capital and operating expenses associated with reasonably anticipated environmental retrofits and other environmental mitigation requirements, as well as a price on carbon dioxide (CO_2) representative of likely regional and federal policies on greenhouse gas emissions.

Without such an analysis, it is impossible for the Commission or any intervener to fully assess whether the company's plans for the maintenance, upgrades, and operations of its fleet of plants is in keeping with least-cost principles.

Q What impact does the company's decision to build environmental retrofits have on ratepayers?

A I estimate that in this rate case, approximately 24% of the requested rate base increase is from new retrofits to meet existing environmental regulations at old

coal plants in the PacifiCorp fleet (the Current Case Retrofits).[1] I estimate that across the company, PacifiCorp is requesting rate base increases for about $600 million in environmental retrofits this year [Wyoming General Rate Case, December 2011. Dickman, Exhibit RMP___(BSD-2) p. 8.6.5.], in addition to at nearly $600 million for environmental retrofits in the last rate case [Wyoming General Rate Case, December 2010. Dickman, Exhibit RMP___(BSD-2) p. 8.10.4]. In PacifiCorp's Emissions Reduction Plan ("Emissions Reduction Plan") filed as Exhibit PRBRC___(JIF-2), the company has indicated that to implement an emissions reduction plan, "from 2005 through 2010 PacifiCorp has spent more than **$1.2 billion** in capital dollars." [Emissions Reduction Plan, p.1 (emphasis added)]

Q Has the company indicated an expectation of additional environmental compliance costs above and beyond those discussed in this rate case in publicly available documents?

A Yes. The company's requested recovery of environmental compliance costs, both in the last rate case and in this one, are insufficient to bring the PacifiCorp fleet into compliance with current or emerging regulations. In the Emissions Reduction Plan, the company acknowledges that:

> It is anticipated that the total costs for all projects that have been committed to will exceed **$2.7 billion** by the end of 2022. The total costs (which include capital, O&M and other costs) that will have been incurred by customers to pay for these pollution control projects during the period 2005 through 2023, are expected to exceed **$4.2 billion**, and by 2003 the annual costs to customers for these projects will have reached **$360 million per year**. [Emissions Reduction Plan, p. 1 (emphasis added)]

[1] Using values presented in Witness Dickman Exhibit RMP___(BSD-2), I have added up all of the pollution control projects, plus the turbine upgrade at Huntington U1 (page 8.6.5). The sum total for the July 2010 to December 2011 steam plant additions was $588 million. The sum total of all plant additions (pages 8.6.5 through 8.6.15) amounts to $2,413 million over the same time period. I estimate the pollution upgrades are 24% of the total additions presented in this rate case (588/2413 * 100 = 24.4).

I surmise that the Company is aware of additional environmental compliance costs that are required to meet existing regulations.

I will refer to the upgrades set out in the Emissions Reduction Plan as Company Projected Retrofits. These costs are not restricted to single capital investments. Each environmental retrofit entails new, persistent operational costs. According to company witness Mr. Teply, "Operation of new pollution control equipment will result in increased operation and maintenance costs associated with reagent, waste disposal, and equipment maintenance." [Direct Testimony Chad Teply, p. 11.] In addition, many of these retrofits impose parasitic loads, reducing the output of the affected units. Both types of additional costs for the Company Projected Retrofits will further reduce the cost effectiveness of those upgrades, as will similar costs entailed in the Current Case Retrofits.

Q Are additional environmental compliance costs beyond those mentioned in the Emissions Reduction Plan likely?

A Yes. The costs projected in the Emissions Reduction Plan for Company Projected Retrofits are the costs the company anticipated for compliance with only one EPA regulation, the Regional Haze Rule, also known as BART, for Best Available Retrofit Technology [to reduce visibility-impairing emissions].

The Emissions Reduction Plan ignores a number of additional environmental regulations designed to protect public health and the environment, which can reasonably be expected to adversely affect the economic condition of the PacifiCorp coal fleet, and yet have not been reflected by the company in its justification for the cost of the Current Case Retrofits, and have not been presented to this Commission for consideration.

In the Emissions Reduction Plan, the company states:

> … the rate increases for PacifiCorp customers associated with PacifiCorp's emissions reduction strategy alone will be significant. [Emissions Reduction Plan, p. 7]

but

> …the projected costs reflect only the installation of the noted emission reduction equipment. These cost increases do not include other costs expected to be incurred in the future to meet further emission reduction measures or address other environmental initiatives… [Emissions Reduction Plan, p. 7]

The company notes that additional compliance costs will be required to meet Utah regional haze requirements, mercury emissions limitations, mitigating CO_2 (carbon dioxide) under federal and regional initiatives, and mitigating coal combustion residuals (CCR). I refer to these and other expected additional compliance costs as Emerging Retrofits.

Q Please summarize your conclusions.

In general, I conclude that the company has:

- Failed to account for Company Projected Retrofits in forward-planning;
- Failed to explicitly inform the Commission about the expectation of additional compliance costs facing the company fleet beyond the Current Case Retrofits;
- Failed to account for Emerging Retrofits in any meaningful way;
- Failed to present any of these additional expected costs to the Commission as part of this rate case; and,
- Failed to show that the Current Case Retrofits are in keeping with least cost principles.

The company's own documents clearly demonstrate awareness of and expectation that the company's generating units will have to comply with numerous regulations and face mounting compliance costs.

Q Will you provide the details of the environmental compliance costs likely to be faced by PacifiCorp's fleet, and how they have been treated in the IRP and rate case?

The following sections describe environmental regulations which can reasonably be expected to impact the PacifiCorp coal fleet. Due to the number of regulatory regimes and the evolving nature of the rules, and the fact that these rules can be and have been interpreted differently for different regions and resources depending on ambient conditions, plant type, fuels, economic viability, and other factors, this analysis can be quite intricate. However, a certain level of detail is required to present the whole picture of compliance costs that will ultimately be faced by ratepayers for the continued operation of PacifiCorp's coal fleet.

In my opinion, no reasonable decision can be made on the future viability of these plants without explicitly addressing each of the regulations or likely regulations in turn: .

3. ENVIRONMENTAL REGULATIONS

Q Is PacifiCorp's coal fleet subject to federal laws protecting human health and the environment?

A Yes. The company's coal units are subject to EPA regulations under the Clean Air Act (CAA), the Clean Water Act (CWA), and the Resource Conservation and Recovery Act (RCRA), among other statutes.

Q Which Clean Air Act rules directly affect the PacifiCorp coal fleet?

A There are three regulatory areas under the CAA that directly affect the company's coal fleet, including:

- The existing Regional Haze rule ("BART"), designed to improve visibility in National Parks and other Class 1 public lands;
- The proposed Air Toxics rule for utility steam generating units, designed to protect human health and wellbeing by reducing emissions of hazardous air pollutants (HAPs) and mercury (Hg) from oil and coal-burning units; and

- The proposed strengthening of National Ambient Air Quality Standards (NAAQS) on ozone (O_3) sulfur dioxide (SO_2), and particulates ($PM_{2.5}$), designed to protect human health, reduce premature mortality, and reduce environmental harms from emissions.

Q Which Clean Water Act rules directly affect the PacifiCorp coal fleet?

A There are two CWA regulations, currently being finalized by the EPA, that would reasonably be expected to affect the PacifiCorp coal fleet:

- the proposed Cooling Water Intake Structures rule, designed to protect fisheries and aquatic organisms from being trapped by cooling water screens, or uptake into cooling systems,
- and the expected Effluent Limitation guidelines, restricting toxic releases into waterways from steam power plant structures and effluent ponds

Q Which Resource Conservation and Recovery Act rules directly affect the PacifiCorp coal fleet?

A The EPA is expected to release a rule regulating the disposal and storage of coal ash to prevent toxic releases into ground and surface waters.

Q In your opinion, when should PacifiCorp have known that these regulations could have a material financial impact upon its coal fleet operations and costs?

A The company knew or should have known of these regulations well in advance of making its investments in the Current Case Retrofits, and knew or should have known that proposed regulations would result in a need for additional costly environmental upgrades (Emerging Retrofits). While the specific form of likely regulations is still evolving, the likelihood that a suite of regulations would affect coal-fired power plants has been well known for a number of years. The full suite of regulations discussed in this testimony have been generally expected by the industry since 2007, with some in the works since 1972.

A "Fact Sheet" prepared by the World Resource Institute (WRI) indicates that steam plant operators were, or should have been, well aware that additional environmental compliance obligations would be imposed on their fleets. See Exhibit PRBRC___(JIF-3). For all of the above mentioned rules, WRI calculated that, prior to November 2010, utilities had anywhere from three (3) to thirty-eight (38) years to anticipate and plan for more stringent regulatory regimes, depending on the regulation. This document includes a figure prepared by the Edison Electric Institute (EEI), the primary electric industry trade group, detailing EEI's expectations for environmental regulations that will affect the electric industry.

Further, and as discussed below, PacifiCorp's own documents show its knowledge of these regulations and their likely impact. Given all of this, PacifiCorp's management and its planning staff certainly knew, or should have known as of 2007, that costs of such Emerging Retrofits would be a vital consideration in evaluating the future costs associated with the company's coal fleet.

Q Did the company demonstrate awareness of these recent and emerging regulations in its 2008 Integrated Resource Plan?

A Yes. In the 2008 IRP Update, the company wrote:

> There are currently a multitude of environmental regulations which are in various stages of being promulgated, as outlined on the timeline below. Each of these regulations will have an impact on the utility industry and could affect environmental control requirements, limit operations, change dispatch, and could ultimately determine the economic viability of PacifiCorp's generation assets. The US Environmental Protection Agency as undertaken a multi-pronged approach to minimize air, land, and water-based environmental impacts. Aside from potential greenhouse gas regulation, no single regulation is likely to materially impact the industry; however, in concert they are expected to have a significant impact –especially on the coal fueled generating units that supply approximately 50% of the nation's electricity. [IRP Update, p. 17].

Specifically, the company indicated in its IRP that it was aware that there were a series of rules emerging to regulate ozone, ambient air quality standards for sulfur

dioxide (SO_2), nitrous oxide (NO_2), fine particulate matter ($PM_{2.5}$), the interstate transport of criteria pollutants under the then-applicable Clean Air Interstate Rule (CAIR), direct emissions of HAPS and mercury, the disposal of coal ash wastes, the use and/or consumption of water, toxic effluent, and greenhouse gas emissions. In the 2008 IRP Update, the company included a figure showing the "Environmental Regulatory Timeline at the Federal Level." The figure is attached as Exhibit PRBRC___(JIF-4), and is nearly identical to the final figure in the Emissions Reduction Plan**.** To my understanding, the figure lays out the expected timeline of compliance dates for the regulations listed above.

As far back as the 2004 IRP, the company acknowledged that "the cost of meeting present, pending and future SO_2, NO_X, and Hg regulations will be substantial." [2004 IRP, p. 35]

4. CLEAN AIR ACT REGIONAL HAZE RULE

Q Please describe the Clean Air Act's Regional Haze Rule

A The Clean Air Act defines as a national goal the remedying of existing visibility impairment that results from manmade air pollution in all "Class I" areas (e.g., most national parks and wilderness areas). *See* 42 U.S.C. § 7491(a)(1). EPA's implementing rules require states to create plans to achieve natural visibility conditions by 2064 with enforceable reductions in haze-causing pollution from individual sources and and other measures to meet "reasonable further progress" milestones. *See* generally 40 C.F.R. §51.308-309.

The Clean Air Regional Haze Rule was issued in 1999, and revised in 2005. A key component of this program is the imposition of air pollution controls on existing facilities that impact visibility in Class I areas. Specifically, the rules stipulate that "best available retrofit technology" (BART) limits be developed for such facilities on a case-by-case basis which would then guide emissions controls choices. EPA requires BART to be evaluated for the air pollutants that impact visibility in our national parks and wilderness areas – namely sulfur dioxide (SO_2), nitrogen oxides (NO_x) and particulate matter (PM). Under the Clean Air

Act, States have the primary responsibility for developing these requirements, but EPA must approve those plans if the plans comply with EPA's regulations; if EPA finds the plans do not fully meet its regulations, EPA must adopt a federal plan and BART requirements that comply with its regulations. Affected facilities must comply with the BART determinations as expeditiously as practicable but no later than five years from the date EPA approves the state plan or adopts a federal plan.

Q Which PacifiCorp plants are subject to BART compliance under the Regional Haze Rule?

A According to the Wyoming DEQ, in Wyoming, Dave Johnson 3 & 4, Jim Bridger 1-4, Naughton 1-3, Wyodak 1; in Utah, Hunter 1 & 2, and Huntington 1 & 2.

Q When is the compliance deadline for the BART requirements?

A BART must be met as expeditiously as practicable and no later than five years after EPA approves the state's regional haze plan or adopts a federal plan. Wyoming submitted final, revised BART SIP to the US EPA on January 12, 2011. Therefore, we would expect a compliance deadline on or before 2016. Utah's public comment period ended in March 2011 for its regional haze plan. It is expected to be adopted and submitted to EPA within the next few months, and again we would expect a compliance deadline on or before 2016.

Q What are the BART determinations for PacifiCorp plants in the Wyoming regional haze plan?

A The Wyoming BART determinations vary by plant and unit and include required installations of low NO_X burners, baghouses, flue gas desulfuration (FGD) systems and upgrades, and selective catalytic reduction (SCR) systems at selected units. These BART determinations are reflected in Table 1 of the Emissions Reduction Plan in Exhibit PRBRC___(JIF-2). It is notable that in most cases, the Wyoming DEQ did not require SCR to meet BART for NO_X compliance in 2016. However, in the final Wyoming State Implementation Plan for Regional Haze, the Wyoming DEQ did select SCR for a long term control strategy at all Jim Bridger

units, including some installations which would post-date the BART compliance deadline of 2016.

Q Has the US EPA approved the Wyoming BART requirements?

A The EPA has not yet approved the Wyoming Regional Haze plan or the BART requirements.

Q What are the BART requirements for PacifiCorp plants in the proposed Utah regional haze plan?

A In Utah's proposed regional haze plan, Utah found that the planned installations and upgrades of controls at PacifiCorp's Hunter and Huntington units satisfied BART requirements. Specifically, Utah cites to the planned conversion of existing electrostatic precipitators to fabric filter baghouses and the installment of new low NO_x burners and overfire air systems at Hunter Units 1 and 2 and Huntington Units 1 and 2, as well as the upgrades to existing SO_2 scrubbers at Hunter Units 1 and 2 and Huntington Unit 1 and the addition of a new SO_2 scrubber at Huntington Unit 2.

Q Has the US EPA approved the Utah BART requirements?

A No EPA has not yet approved the BART requirements, as Utah is in the final stages of adopting its plan.

Q What compliance actions has PacifiCorp taken to date regarding the Regional Haze Rule and BART requirements?

A PacifiCorp has invested in numerous capital projects over the last two years in advance of the EPA's approval of the Wyoming and Utah plans, following investments laid out in the Emissions Reduction Plan. According to the Plan, the utility began "implementing its emission reduction commitments in 2005…well ahead of the emission reduction timelines under the regional haze rules" [Emission Reduction Plan, p4].

As I noted previously, the Wyoming plan also requires additional SCR retrofits, which are discussed in the Emissions Reduction Plan, but are not presented in the current case.

Q Are PacifiCorp's compliance actions sufficient to meet the Regional Haze Rule?

A The National Park Service plays an important role in the development of the regional haze plans, as the Clean Air Act grants the National Park Service and other federal land managers an "affirmative responsibility" to protect the air quality related values including visibility from the effects of manmade air pollution. Comments from the US Department of Interior National Park Service on the Jim Bridger, Naughton, Dave Johnston, Wyodak, Hunter, and Huntington BART applications all provide evidence that SCR technology is reasonable, cost effective and more protective of air quality for all of these BART-eligible units. Specifically, according to the National Park Service comments in August 2009, "we conclude that SCR controls are reasonable BART controls for the WY EGUs." While the final EPA BART requirements are still pending for Wyoming, we can surmise, based on the National Park comments, that the EPA could well require SCR to be the BART requirement for coal units in Wyoming and Utah.

If EPA requires SCR to meet BART for units currently not planning on building SCR or delaying implementation of SCR controls, the company will have inadequately planned for future capital expenditures.

5. CAA TOXICS RULE FOR UTILITY STEAM GENERATING UNITS

Q Please describe the proposed Clean Air Act Toxics Rule (Utility MACT)

A After a lengthy study, in 2000, EPA found it was necessary to regulate toxic air emissions (or hazardous air pollutants, HAPs) from utility steam electric generating units. As a result of that finding, EPA must adopt strict emission limitations for hazardous air pollutants that are based on the emissions of the cleanest existing sources. [Clean Air Act §112(d)] These emission limitations are known as Maximum Achievable Control Technology (MACT). Although EPA

was required to adopt MACT standards within two years after issuing its finding in 2000, the rules have been tied up in litigation. Nevertheless, utility companies have or should have known about forthcoming air toxics rules for more than ten years.

On March 16, 2011, EPA proposed MACT emission limits for electric generating units The final utility MACT rule will establish emission limits for various toxic pollutants including mercury, acids gases and non-mercury metals. As required under the Clean Air Act, the EPA's proposed emissions limitations for existing units are based on emissions achieved at the lowest emitting 12% of thermal power units in the nation. The best-controlled units in the country use wet scrubbers (i.e., wet FGD systems), selective catalytic reduction (SCR) systems, and baghouses to control HAPs, and thus, these controls may likely be required to meet the emission limitations of the final rule. Activated carbon injection (ACI) will also likely required to control mercury.

A In the proposed rule, EPA describes controls that will comply with a MACT rule, finding that combinations of existing control technologies, such as FGD scrubbers and SCR are useful in conjunction with fabric filters and ACI for reducing mercury emissions:

> EPA projects that for acid, companies will likely use dry scrubbing and sorbent injection technologies rather than wet scrubbing. For non-Hg metal HAP controls, EPA has assumed that companies with ESPs [electrostatic precipitators] will likely upgrade them to FFs [fabric filter baghouses]. As a number of units that in the MACT floor for non-Hg HAP metals only had ESPs installed, this is likely a conservative assumption. For Hg, EPA projects that companies will comply either through the collateral reductions created by other controls (e.g. scrubber/SCR combination) or ACI. [proposed rule, p442]

Q Which PacifiCorp units in Wyoming and Utah are eligible for compliance with Utility MACT?

A All of the company's coal units, including the uncontrolled Carbon 1 & 2 and Dave Johnson 1 & 2 units that are exempt from BART, will be required to comply with the utility MACT rule.

Q When is the compliance deadline for the Utility MACT rule?

A The MACT emission limits must be met within three years of EPA's issuance of a final MACT rule. Pursuant to an April 15, 2010 consent decree, EPA is required to issue a final utility MACT rule by November 16, 2011. Therefore, utility units will be required to comply with the MACT emission limits no later than the beginning of 2015.

Q What actions has PacifiCorp taken to date to demonstrate compliance with the Utility MACT rule?

A I find no public records that the company has adequately begun planning for the utility MACT rule. The utility describes proposed mercury regulation in the 2008 IRP, and notes that "PacifiCorp and MEHC anticipate spending $1.2 billion over a ten-year period to install necessary equipment under future emissions control scenarios to the extent that it's cost effective." [2008 IRP, p. 37] This description does not detail the type of investments required, or if this spending is different than the investments required for regional haze compliance.

Within the Emissions Reduction Plan, the company acknowledges the MACT provisions, only to state that they are not part of the utility plan:

> …these cost increases do not include other costs expected to be incurred in the future to meet further emission reduction measures or address other environmental initiatives, including, but not limited to: …2. The addition of mercury control equipment under the requirements of the upcoming mercury MACT provisions. PacifiCorp estimates that $68 million in capital will be incurred by 2015 and annual operating expenses will increase by $21 million per year to comply with mercury reduction requirements. In addition, anticipated regulation to address non-mercury hazardous air pollutant (HAPs) emissions may require significant addition reduction of SO2, as a precursor to sulfuric acid mist, from non-BART units that currently do not have specific controls to reduce SO2 emissions. [Emissions Reduction Plan, p7]

In the current rate case, the company has asked for recovery for continuous emissions monitoring equipment for mercury and mercury "emissions testing," suggesting that it is well aware that mercury limits may be exceeded at its units.

6. CLEAN AIR ACT NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

Q Please describe the proposed CAA NAAQS

A EPA promulgates "National Ambient Air Quality Standards" (NAAQS) pursuant to the authority granted by Clean Air Act § 109 (42 U.S.C. §7409). Primary NAAQS are set to protect public health and secondary NAAQS protect public welfare. The NAAQS are supposed to be evaluated and revised if necessary to protect public health and welfare at five year intervals. EPA is currently working to improve NAAQS for sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone, and fine particulate matter known as $PM_{2.5}$.

New standards for these pollutants will trigger the process for designating areas as either in "attainment" or "nonattainment" with the new standards. In nonattainment areas, sources must automatically comply with emission reduction requirements known as "Reasonably Available Control Technology" (RACT), and new sources, including major modifications at existing sources, must comply with very strict emissions reductions consistent with "lowest achievable emissions reductions" (LAER) as well as obtain emission offsets.

For areas that are designated nonattainment, Wyoming, Utah, and other states where PacifiCorp has facilities must develop a plan to bring the air quality into compliance with the applicable NAAQS. Those plans may contain additional emissions reduction requirements at specific plants.

Compliance with the NAAQS is typically required within five years after EPA designates areas as nonattainment.

Q When are the new NAAQS expected, and what are the expected compliance deadlines?

- **SO_2**: EPA adopted a new one hour average NAAQS for SO_2 in 2010. [75 Fed. Reg. 35520 (June 22, 2010)]. States have until June 3, 2011 to designate nonattainment areas. Given the time it will take for EPA to approve those designations, we expect a compliance deadline in 2017.

- **NO_2**: EPA adopted a new one hour average NAAQS for NO_2 in 2011. [75 Fed.Reg. 6474 (February 9, 2010)]. EPA expects to do initial nonattainment designations by January 2012 with additional areas designated based on the implementation of a new air monitoring network in 2016 or 2017. Compliance will be required within five years of these designations.

- **Ozone**: The EPA has proposed a new standard, and a final rule is expected by July 29, 2011. [75 Fed. Reg. 2938 (Jan. 19, 2010)]. Assuming it will take two years after this for EPA to adopt nonattainment area designations, a compliance deadline is expected in 2018.

- **$PM_{2.5}$**: the proposed rule is expected from EPA by mid-2011. States have one year from the time the standard is final to designate nonattainment areas, with one more year for EPA to finalize those areas. A compliance deadline could reasonably be expected in 2019.

Q Are areas in Wyoming and Utah expected to be in nonattainment in light of the new NAAQS?

A The new nonattainment designations are not yet available, however, the EPA has done preliminary mapping estimating ozone nonattainment status.

The new one-hour standard for ozone is expected to be between 0.060 to 0.070 parts per million, lower than the 0.075 parts per million standard set in 2008. With this lower standard, using air quality data from 2006 to 2008, EPA expects that four counties in Wyoming and nine counties in Utah could be in nonattainment. [*Proposed Revisions to National Standards for Ground-Level Ozone, Maps.* January 6, 2010. EPA].

Depending on how the State of Wyoming chooses to implement a SIP in these counties, both the Naughton and Jim Bridger plants may be compelled to reduce ozone emissions. These plants could feasibly require SCR to help bring counties into ozone attainment status by 2016.

Coal units in Utah are less likely to be targeted for ozone compliance purposes due to the geography of the nonattainment areas and the coal units.

Q Could the revised NAAQS affect PacifiCorp facilities in other ways?

A Yes. PacifiCorp has acknowledged in its filings, that it needs to obtain air permits to undertake the pollution control actions and other actions planned at its facilities. One key requirement of a state permitting program is to ensure that the NAAQS are complied with by facilities undergoing construction or modification. [42 U.S.C. §7410(a)(2)(C)]. Even if the units are not in formally designated nonattainment areas, the facilities could be causing violations of the NAAQS that may not be detected simply because there is no ambient air monitoring system in the area. Computer air dispersion modeling analyses would need to be done in order to assess the facilities' compliance with these new NAAQS before permits could be obtained. If any of the facilities cause or contribute to air quality in excess of the NAAQS, the facilities will need to reduce emissions accordingly.

Q What actions has PacifiCorp taken to date to demonstrate compliance with the *existing* NAAQS?

A In the 2008 IRP, the company describes the existing standards for ozone and particulate matter and states that "currently, with the exception of the Gadsby [gas] power plant, all of PacifiCorp Energy's operating fossil-fueled facilities are located in areas that are in attainment with the ozone National Ambient Air Quality Standards." [2008 IRP, p. 35.] The same is said for the fine particulate standard. [2008 IRP, p. 36] These statements suggest that the company understands itself to be currently in compliance with existing NAAQS.

Q What actions has PacifiCorp taken to date to demonstrate compliance with the *proposed* NAAQS?

A I find no public records indicating that the company has incorporated costs associated with the emerging NAAQS into their planning process.

7. CLEAN WATER ACT COOLING WATER INTAKE RULE

Q Please describe the proposed CWA Cooling Water Intake Structure rule

A On March 28, 2011, the EPA proposed a long-expected rule implementing the requirements of Section 316(b) of the Clean Water Act at existing power plants. [33 U.S.C. § 1326.] Section 316(b) requires "that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." Under this new rule, EPA set new standards reducing the impingement and entrainment of aquatic organisms from cooling water intake structures at new and existing electric generating facilities.

The rule provides that:

- Existing facilities that withdraw more than two million gallons per day (MGD) would be subject to an upper limit on fish mortality from impingement, and must implement technology to either reduce impingement or slow water intake velocities.

- Existing facilities that withdraw at least 125 million gallons per day would be required to conduct an entrainment characterization study for submission to the Director to establish a "best technology available" for the specific site.

Q Will plants in the PacifiCorp fleet need to comply with the cooling water rule?

A Yes. According to 2008 data submitted to the Energy Information Administration (EIA) by PacifiCorp and other operators, I expect that every coal unit in the PacifiCorp fleet, with the possible exception of the Carbon units, exceeds the 2 MGD threshold.[2] The company would therefore be required to submit a plan, and potentially install new technology, to reduce water withdrawals.

[2] I have calculated withdrawals from data reported to the EIA in Form 860 (2008) on cooling water intake structures, as well as generation data reported to the EIA in Form 923 (2008).

The Dave Johnson 1-3 units report a total facility water withdrawal in 2008 well in excess of the 125 MGD threshold (estimated at 334 MGD), and would therefore need to comply with the second provision of this rule.

The cooling water intake rule is designed to reduce impacts associated with once-through cooling, used for example at the Dave Johnson 1-3 units. It is likely that the compliance mechanism for such high withdrawal units will require retrofits to cooling towers where feasible.

Q When are the compliance deadlines for the new rule?

A The new rule is expected to be finalized in 2012, and the regulations would become effective within 60 days thereafter. EPA stipulates that "as proposed, facilities would have to comply with the impingement mortality requirements as soon as possible." [*NPDES—Proposed Regulations to Establish Requirements for Cooling Water Intake Structures at Existing Facilities.* EPA. p. 262 (March 28, 2011)] However, facilities would have five years and up to eight years on appeal to comply with the impingement mortality requirements; and up to eight years at the discretion of the Director to comply with the entrainment provisions. Therefore, I would expect a compliance deadline, at the latest, in 2017 for impingement, and 2020 for entrainment.

Q What actions has PacifiCorp taken to date to demonstrate compliance with the proposed water use standards?

A I find no public records indicating that the company has acknowledged or planned for the proposed water use standards.

8. CLEAN WATER ACT EFFLUENT LIMITATION GUIDELINES

Q Please describe the emerging effluent limitation guidelines under the Clean Water Act

A The Clean Water Act requires EPA to develop "effluent limitation guidelines" – clear rules for what large industrial sources of water pollution can discharge into nearby waters. [*See* 33 U.S.C. § 1311; 40 C.F.R. 423.] These rules must consider

what is “economically achievable” and must be updated at least once every five years to keep up with improving treatment technology. Although EPA is supposed to update its rules regularly, the power plant rules were last updated in 1982, and so are almost thirty years out of date.

On September 15, 2009, EPA announced an intent proceed with a rulemaking on effluent guidelines for wastewater discharges from steam electric plants, including nuclear and fossil-fired plants.

In May of 2010, the EPA distributed a survey to 733 steam electric facilities, including units owned by PacifiCorp, to request information about onsite waste storage and disposal (i.e. ash ponds), management of storage facilities, and leachate sampling.

The EPA has identified wastewaters from flue gas mercury control systems, regeneration of the catalysts used for SCR, wastes from FGD units, and coal combustion residual storage ponds as waste streams that warrant attention. I therefore expect that the new effluent limitation guidelines will address toxic releases from point sources or coal ash ponds.

Q When are the compliance deadlines for the new rule?

A A final rule is not expected until 2013, and requirements are expected on a permit-by-permit basis, which could take up to five years. Therefore, I would expect effluent limitations for steam electric plants to be in place between 2015 and 2018.

Q What actions has PacifiCorp taken to date to demonstrate compliance with the emerging effluent guidelines?

A I find no public records that the company has acknowledged or planned for the emerging effluent guidelines.

9. RESOURCE CONVSERVATION AND RECOVERY ACT COAL COMBUSTION RESIDUALS DISPOSAL RULE

Q Please describe the emerging coal combustion residuals (CCR) disposal rule under the Resource Conservation and Recovery Act (RCRA)

A Coal-fired power plants generate a tremendous amount of ash and other residual wastes, which are commonly placed in dry landfills or slurry impoundments; regulations governing the structural integrity and leakage from these installations vary. However, the risk associated with these installations was dramatically revealed in the catastrophic failure of the ash slurry containment at the Kingston coal plant in Roane County, Tennessee in December 2008, releasing over a billion gallons of slurry and sending toxic sludge into tributaries of the Tennessee River.

On June 21, 2010, EPA proposed regulation of ash and FGD wastes, or "coal combustion residuals" (CCR) as either a Subtitle C "hazardous waste" or Subtitle D "solid waste" under the Resource Conservation and Recovery Act (RCRA). [75 Fed. Reg. 35127.(June 21, 2010)].

The coal combustion rulemaking was forced by a combination of missed statutory deadlines and court orders. The current rulemaking is 30 years overdue.

If the EPA classifies CCR as hazardous waste, a cradle-to-grave regulatory system applies to CCR, requiring regulation of the entities that create, transport, and dispose of the waste. Under a Subtitle C designation, the EPA would regulate siting, liners, run-on and run-off controls, groundwater monitoring, fugitive dust controls, and any corrective actions required; in addition, the EPA would also implement minimum requirements for dam safety at impoundments.

Under a "solid waste" Subtitle D designation, the EPA would require minimum siting and construction standards for new coal ash ponds, compel existing unlined impoundments to install liners, and require standards for long-term stability and closure care.

The EPA is currently evaluating which regulatory pathway will be most effective in protecting human health and the environment without resulting in unintended

consequences or resulting in unnecessarily burdensome requirements. In 1999, the EPA released a series of technical papers to Congress documenting cases in which damages are known to have occurred from leakages and spills from coal ash impoundments. [*Technical Background Document for the Report to Congress on Remaining Wastes from Fossil Fuel Combustion: Potential Damage Cases*. March 15, 1999. EPA]. In the current proposed rule, the EPA recognizes a substantial increase in the types of potentially toxic CCR from air pollution control equipment, including FGD, SCR, and ACI.

> Use of more advanced air pollution control technology reduces air emissions of metals and other pollutants in the flue gas of a coal-fired power plant by capturing and transferring the pollutants to the fly ash and other air pollution control residues. The impact of changes in air pollution control on the characteristics of CCRs and the leaching potential of metals is the focus of ongoing research by EPA's Office of Research and Development (ORD). [75 Fed. Reg. 35139 (June 21, 2010).]

In my opinion, the weight of evidence presented by the EPA over three decades of study, and increasing concern about the toxicity of CCR will likely lead to a Subtitle C "hazardous waste" designation by the EPA for CCR.

Q Do CCR impoundments at PacifiCorp plants currently present a hazard to either public safety or the environment?

A Yes. To inform the rulemaking process, in 2009, EPA requested information from specific facilities and impoundments at coal-fired power plants. PacifiCorp provided information on fifteen of the company's impoundments at the Jim Bridger, Naughton, Dave Johnson, and Wyodak units. Within the survey, the EPA requested information about the hazard rating of coal impoundments if a state or federal agency regulates the pond. Of the 15, two were given ratings of "low" hazard; three were given ratings of "significant" hazard, and the remaining ten were not given a rating because they are not regulated or inspected by either state or federal officials, so I have no basis for estimating their hazard level. A "significant" hazard rating is defined by a failure which would cause economic loss, environmental damage, or cause other major damage.

Q Will plants in the PacifiCorp fleet need to comply with coal ash disposal rules?

A Yes. If the EPA designates CCR as hazardous waste (Subtitle C), all of the coal units in PacifiCorp's coal fleet or the facilities which process wastes from the unit, could be subject to significant new oversight and regulation at all stages of waste creation, transportation, and disposal. If the EPA designates CCR as solid waste (Subtitle D), units which dispose waste into unlined impoundments would be required to renovate disposal ponds to prevent leakage.

According to the proposed rulemaking, "EPA has estimated that in 2004, 31% of the CCR landfills and 62% of the CCR surface impoundments lacked liners, and 10% of the CCR landfills and 58% of the CCR surface impoundments lacked groundwater monitoring." [75 Fed. Reg. 35151 (June 21, 2010).]

Q Has the company demonstrated that it is aware of the proposed regulation on surface impoundments and landfills?

A Yes. In 2009, the company responded to the EPA survey request for information regarding CCR impoundments and landfills.

In 2010, the company gave oral comments at a public hearing on EPA's proposed rule, asserting that "the company's surface impoundments and landfills are assessed through an extensive groundwater monitoring program" and that "PacifiCorp's surface impoundments [are] routinely inspected and actively managed to ensure integrity with oversight by the appropriate state agency." [Public Hearing on EPA's Proposed Rule on Hazardous and Solid Waste Management System. Denver, CO. September, 2010.]

Q Has PacifiCorp demonstrated that it is aware that the company may face additional compliance costs under the proposed regulation?

A PacifiCorp has acknowledged that this rule may significantly impact the company's coal fleet. According to the company's September 2010 filing to the US Securities and Exchange Commission:

> Under both [EPA regulatory] options, surface impoundments utilized for coal combustion byproducts would have to be cleaned and closed unless they could meet more stringent regulatory requirements; in addition, more stringent requirements would be implemented for new ash landfills and expansions of existing ash landfills. PacifiCorp operates 16 surface impoundments and six landfills that contain coal combustion byproducts. These ash impoundments and landfills may be impacted by the newly proposed regulation, particularly if the materials are regulated as hazardous or special waste under RCRA Subtitle C, and could pose significant additional costs associated with ash management and disposal activities at PacifiCorp's coal-fired generating facilities. [US SEC, Quarterly Report Form 10-Q. PacifiCorp, September 30, 2010]

Further, according to the Emissions Reduction Plan:

> projected costs [in Emissions Reduction Plan…] do not include other costs expected to be incurred in the future…including, but not limited to: 5. Regulations associated with coal combustion byproducts. […] It is anticipated that the requirements under the final rule will impose significant costs on PacifiCorp's coal-fueled facilities within the next eight to ten years.

Q What actions has PacifiCorp taken to date to demonstrate compliance with the proposed CCR rule?

A I have found no public records that indicate the company has planned compliance actions for either version of the proposed CCR rule.

10. SUMMARY OF EXPECTED CAPITAL EXPENDITURES

Q Please summarize the range of costs which may be faced by the company's plants over the next decade, according existing rules and proposed regulations described above.

A Based on the existing regulations and my understanding of the emerging regulations, the company will be required to install a range of retrofits to meet environmental compliance obligations at various coal plants discussed in this rate case. These retrofits include flue gas desulfurization (FGD), FGD upgrades, low NO_X burners (LNB), selective catalytic reduction (SCR), fabric filter baghouses, flue gas conditioning (FGC), activated carbon injection (ACI), coal ash

remediation for coal combustion residuals (CCR), cooling towers, new water intake structures, and potentially liquid effluent controls.

In Exhibit PRBRC___(JIF-5), I show expected capital investments at the PacifiCorp coal plants discussed in this testimony. These capital investments include expenditures recovered in the last rate case (2010 Case Retrofits), Current Case Retrofits, Projected Retrofits, and Emerging Retrofits. Retrofits are organized by facility and pollution or environmental requirement. For each current, projected or emerging retrofit, a bracket follows indicating the rule or regulation that will require the expenditure.

Costs for Company Projected and Emerging Retrofits are derived from cost estimate algorithms used by the US EPA in evaluating the costs of the proposed Transport Rule [*Documentation for EPA Base Case v.4.10*, Appendices 5-1A Wet FGD and 5-2 SCR, (August 2010)] and the proposed Toxics Rule (*Documentation: Updates to EPA Base Case v4.10_PTox*, Chapter 5, Appendices 5-3 ACI and 5-5 Fabric Filters (March 2011)], as well as assumptions from the North American Electric Reliability Corporation (NERC) study of emerging EPA rules and regulations [*2010 Special Reliability Assessment Scenario*, NERC (November 29, 2010)] for wet cooling tower costs. In this assessment, I have excluded the costs of coal ash remediation (contingent on company information as well as additional regulatory guidance), effluent remediation (same), and cooling water intake structure impingement remediation (same).

The assessment shows that Current Case Retrofits are only the start of capital investments which ratepayers will bear over the next decade.

Q Please summarize the Current Rate Retrofits that should have been assessed for cost effectiveness in light of proposed regulations.

A To the best of my understanding, the company has requested rate base treatment for the following environmental retrofits and turbine upgrades which should be assessed for cost effectiveness:

- Dave Johnson 3: flue gas desulfurization unit (FGD) and baghouse, low NO_X burner (LNB), and upgraded turbine controls
- Dave Johnson 4: turbine upgrade
- Naughton 1: LNB, flue gas conditioning (FGC)
- Naughton 2: FGD, LNB, FGC
- Wyodak 1: LNB, Baghouse, replacement of air cooled condenser (ACC)
- Jim Bridger 1: FGD upgrades, LNB
- Jim Bridger 3: FGD upgrade
- Hunter 2: FGD upgrade, LNB, baghouse, turbine upgrade
- Huntington 1: LNB, baghouse, turbine upgrade

Q Please summarize the Company Projected Retrofits that should have been considered in assessing the cost effectiveness of the Current Case Retrofits.

A From the Emissions Reduction Plan, I understand the company to be anticipating the following additional capital expenditures, not presented in this docket by the company:

- Dave Johnson 4: FGD, baghouse
- Naughton 1: FGD, LNB
- Naughton 3: FGD, LNB, SCR, baghouse
- Jim Bridger 1: SCR
- Jim Bridger 2: SCR
- Jim Bridger 3: SCR
- Jim Bridger 4: SCR
- Hunter 1: FGD upgrade, LNB, baghouse

Q Please summarize the Emerging Retrofits identified above that should have been considered in assessing the cost effectiveness of the Current Case Retrofits.

A I estimate that the company may reasonably need to install the following environmental retrofits and execute compliance actions to meet proposed and emerging environmental regulations:

- Dave Johnson 3: SCR, ACI, new cooling tower, coal ash remediation, effluent remediation
- Dave Johnson 4: SCR, ACI, coal ash remediation, effluent remediation, impingement remediation
- Naughton 1: SCR, baghouse, ACI, coal ash remediation, effluent remediation, impingement remediation
- Naughton 2: SCR, baghouse, ACI, coal ash remediation, effluent remediation, impingement remediation
- Naughton 3: ACI, coal ash remediation, effluent remediation, impingement remediation
- Wyodak 1: SCR, ACI, coal ash remediation, effluent remediation, impingement remediation
- Jim Bridger 1: SCR, baghouse, ACI, coal ash remediation, effluent remediation, impingement remediation
- Jim Bridger 2: SCR, baghouse, ACI, coal ash remediation, effluent remediation, impingement remediation
- Jim Bridger 3: baghouse, ACI, coal ash remediation, effluent remediation, impingement remediation
- Jim Bridger 4: baghouse, ACI, coal ash remediation, effluent remediation, impingement remediation
- Hunter 1: ACI, coal ash remediation, effluent remediation, impingement remediation
- Hunter 2: : SCR, ACI, coal ash remediation, effluent remediation, impingement remediation
- Hunter 3: : SCR, ACI, coal ash remediation, effluent remediation, impingement remediation
- Huntington 1: SCR, ACI, effluent remediation, impingement remediation
- Huntington 2: SCR, ACI, effluent remediation, impingement remediation

11. CLOSING

Q What do you conclude about PacifiCorp's treatment of expected costs of compliance with current and proposed environmental regulations in its IRP and in the current rate case?

A Based on the documents to which I have had access, I conclude that the company has failed to present any analysis of the cost implications of current regulations including costs for Company Projected Retrofit, and has presented almost no analysis of the cost implications of upcoming regulations or the Emerging Retrofits it would require. As a result, I conclude that the company has:

- Failed to account for Company Projected Retrofits in forward-planning;
- Failed to explicitly inform the Commission about the expectation of additional compliance costs facing the company fleet beyond the Current Case Retrofits;
- Failed to account for Emerging Retrofits in any meaningful way;
- Failed to present any of these additional expected costs to the Commission as part of this rate case; and,
- Failed to show that the Current Case Retrofits are in keeping with least cost principles.

Q Does this conclude your testimony?

A Yes, it does.