STATE OF UTAH

Public Service Commission

In the Matter of the Application of Rocky Mountain Power for Authority to Increase its Retail Electric Utility Service Rates in Utah and for Approval of its Proposed Electric Service Schedules and Electric Service Regulations	Docket No. 10-035-124

Direct Testimony of
Jeremy Fisher, Ph.D.

On Behalf of
Sierra Club

Redacted

May 26, 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 Sierra Club.

Q **Have you testified previously before the Utah Public Service Commission?**

A No, I have not.

Q **What is the purpose of your testimony?**

A The purpose of my testimony is to describe the current and upcoming federal environmental regulations that will likely affect the operations and economics of PacifiCorp's fleet of coal plants. I also comment on PacifiCorp's (dba as Rocky Mountain Power in Utah) 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 **Please identify the PacifiCorp documents and filings on which 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):

- Integrated Resource Plan (IRP) ("2011 IRP"), dated March 31, 2011
- 2008 Integrated Resource Plan (IRP) ("2008 IRP"), dated May 28, 2009;
- 2008 Update Integrated Resource Plan ("2008 IRP Update"), dated March 31, 2010;
- 2004 Integrated Resource Plan (IRP) ("2004 IRP")
- 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 Annual Statements (Form 10-K) to the Securities and Exchange Commission (SEC), filed between 2004 and 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;
- Air Permits issued for the Jim Bridger, Dave Johnson, Naughton, Huntington, and Wyodak plants for emissions controls for which recovery is requested in this case;
- 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;
- CONFIDENTIAL Responses to Discovery

Q Are you filing any exhibits with this testimony?

A I have attached the following exhibits to this testimony:

- **Exhibit SC-1 (JIF-1)** Curriculum vitae
- **Exhibit SC-2 (JIF-2)** PacifiCorp's Emissions Reduction Plan, filed with the WY Department of Environmental Quality (DEQ) in November 2010 and with the Wyoming PSC as Exhibit RMP___(CAT-3R) in the concurrent rate case docket (20000-384-ER-10)
- Confidential **Exhibit SC-3 (JIF-3)**.
- **Exhibit SC-4 (JIF- 4)** "Fact Sheet" prepared by the World Resource Institute (WRI), entitled "Response to EEI's Timeline of Environmental Regulations." November 2010.
- **Exhibit SC-5 (JIF-5)** Chart showing EPA regulatory development for relevant air and water quality regulations.
- **Exhibit SC-6 (JIF-6)** Pages 34-37 from the PacifiCorp 2008 IRP discussing "currently regulated emissions". May 28, 2009.
- **Exhibit SC-7 (JIF-7)** Figure 2.1 from the PacifiCorp 2008 IRP Update, entitled "Environmental Regulatory Timeline at the Federal Level" March 31, 2010.
- **Exhibit SC-8 (JIF-8)** Discovery response to DPU Request 24.13. "Present Value Revenue Requirement Summaries" study. May 2011
- **Exhibit SC-9 (JIF-9)** 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 That Affect PacifiCorp
- Reasonable Planning Practice

- Clean Air Act Regional Haze 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
- Summary of Conclusions and Recommendations

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. Although, in general ways, the company's planning and decision processes demonstrate efforts to consider a range of technical compliance options at different plants, as well as new resource options for meeting customer requirements. However, the company's planning processes fall short in a very significant manner: notably it has based all planning on an apparent assumption that existing units *must* continue to operate regardless of cost-effectiveness; an assumption which saddles ratepayers with both the significant cost of environmental compliance with existing regulations, and the risk of yet additional costs with impending regulations.

The company has failed to use appropriate venues, such as Integrated Resource Planning (IRP), to allow the Commission to consider in a comprehensive fashion whether ratepayers should fund the continued operation of existing coal-fired units in light of existing and likely regulatory obligations.

Indeed, the company's willingness to install costly environmental upgrades significantly in advance of regulatory requirements, or even finalized rules, appears to represent an incremental approach wherein the company, by examining only one regulation at a time, can justify individual projects without the burden of examining overall cost effectiveness.

Q Will the company's decision to build environmental retrofits impact ratepayers?

A Yes. I estimate that in this rate case, approximately 26% 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] In addition, I estimate that across the company, PacifiCorp is requesting rate base increases for about $900 million in environmental retrofits this year [McDougal, Exhibit RMP___(SRM-3) p. 8.8.22-23.], in addition to $293 million for environmental retrofits in the last Major Plant Addition case [Utah Docket No. 10-035-13,Witness Teply p3]. In PacifiCorp's Emissions Reduction Plan filed as Exhibit SC-2 (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 in publicly available documents of additional environmental compliance costs above and beyond those discussed in this rate?

A It has. The company's requested recovery of environmental compliance costs, both in the last rate case and in this one, are technically 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

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[1] Using values presented in Witness McDougal Exhibit RMP___(SRM-3), I have added up all of the pollution control projects of which I am aware. The sum total for the July 2010 to June 2012 steam plant additions was $911 million. The sum total of all plant additions (pages 8.8.22 through 8.8.33) amounts to $3,573 million over the same time period. I estimate the pollution upgrades are 26% of the total additions presented in this rate case (911/3573 * 100 = 25.8).

> 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)]

Based on my experience with the Company's most recent IRP process and my knowledge of the electric industry generally, I conclude that the Company knows or should have known of additional environmental compliance costs associated with meeting 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 will entail 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. These types of additional costs were not quantified or disclosed in the company's direct testimony.

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 forthcoming Regional Haze Rule which will require the company to install Best Available Retrofit Technology (BART) to reduce visibility-impairing emissions.

The company's Emissions Reduction Plan ignored a number of additional environmental regulations designed to protect public health and the environment that will require additional investment in the PacifiCorp coal fleet. Further, the company failed to analyze these impending requirements as costs for the Current Case Retrofits, and did not disclose these costs to the Commission for consideration.

According to the Emissions Reduction Plan:

> … [T]he rate increases for PacifiCorp customers associated with PacifiCorp's emissions reduction strategy alone will be significant. [Emissions Reduction Plan, p. 7]

but

> …[T]he 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 it will bear additional compliance costs to meet Utah regional haze requirements, to comply with mercury emissions limitations, to mitigate CO_2 (carbon dioxide) under federal and regional initiatives, and to mitigate contamination from coal combustion residuals (CCR). I refer to these and other reasonably expected additional compliance costs from proposed or emerging regulations as **Emerging Retrofits.**

Q Has the company acted reasonably in planning for and implementing the environmental upgrades requested in this docket?

A No. Despite knowledge of these requirements, the company has repeatedly failed to account for reasonably anticipated future regulations governing air emissions, water use, and solid waste disposal. The company has sufficient expertise to both follow the development of these regulations and anticipate how these regulations, even if not fully finalized, might impact the economic condition of the company's generation fleet. In other words, the company has not factored proposed or impending regulations when planning for and ultimately implementing the Current Case Retrofits; instead it has simply decided which upgrades would meet the most imminent regulations to avoid litigation, rather than acting in the best interests of ratepayers by evaluating whether continued operation of the existing coal plants is the best option in light of anticipated costs.

Q **Please provide examples that show the company chose its environmental upgrade path in a less than optimal manner from the perspective of least cost service to customers.**

A There are several.

Confidential material removed.

Q **Should the company have planned for existing, proposed, and reasonably anticipated environmental regulations?**

A Yes. During forward planning, such as in the IRP process, prior to submitting applications for state air permits, and prior to contracting for the Current Case Retrofits, the company should have: (1) factored in the likelihood and magnitude of additional compliance costs beyond the Current Case Retrofits: and, (2) considered the risk that, after these large capital expenditures, individual coal units might not be cost effective relative to alternatives. Importantly, the IRP process is an essential venue for company vet the cost effectiveness of proposed upgrades, rather than retrospectively in a rate case. The company failed to use the IRP process to vet the major investments entailed in the Current Case Retrofits.

Q **Please summarize your conclusions.**

A My testimony demonstrates the following:

- Despite increasing certainty of stricter environmental requirements , the company has failed to consider the full costs of complying with current, impending, and likely regulations. Therefore, it cannot show the commission that ratepayers should continue to fund investments in the existing coal units over alternative resources;

- The company has selectively chosen to accelerate compliance for certain environmental regulations without examining the overall cost effectiveness of continuing unit operation despite other expected environmental regulations;
- In its most recent IRP, the company omitted critical information regarding substantial environmental cost obligations that it will request are passed on to ratepayers, nor has it shown in a comprehensive way that absorbing those costs is the least cost solution for meeting the needs of ratepayers;
- The company has consistently ignored potentially cost-effective compliance mechanisms for meeting existing and impending environmental regulations, such as unit repowering or retirement;
- As a consequence, ratepayers have borne, and may continue to bear, the burden of potentially non-cost effective decisions made by the company.

In support of these conclusions, I:

- Briefly outline the environmental regulations that should be under consideration;
- Review how a reasonable planning mechanism could have been used by the company to account for the impact of these regulations;
- Review my understanding of the company's process to justify and support the Current Case Retrofits, and show why the company's process is not reasonable; and, finally,
- Detail how the environmental regulations might impact company assets, and how these regulations have been taken into account by the company.

2. ENVIRONMENTAL REGULATIONS THAT AFFECT PACIFICORP

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 ("MACT"), designed to protect human health 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), particulates ($PM_{2.5}$), and nitrogen dioxide (NO_2) 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 combustion residuals (CCR) including ash and other wastes to prevent toxic releases into ground and surface waters.

I will detail these rules and their expected impact on the company coal fleet later in my testimony.

3. Reasonable Planning Practice

Q Do the rules you have described have a financial impact on the company's generating assets?

A Yes. Based on the existing regulations and information on the emerging regulations, the company will be required to install a range of retrofits to meet environmental compliance obligations. If the plants continue operating, I believe that most of the units will require, in the near future, not only the Current Case Retrofits, but operating flue gas desulfurization (FGD), low NO_X burners (LNB), selective catalytic reduction (SCR), fabric filter baghouses, activated carbon injection (ACI), and where required, coal ash remediation for coal combustion residuals (CCR), operating cooling towers and/or new water intake structures, and potentially liquid effluent controls.

The net impact of these costs could be very high. As stated above, the company has noted in documentation to the Wyoming DEQ that it expects to spend over four billion dollars in capital projects to comply with environmental regulations imposed on the coal fleet. It is my understanding that even that estimate may not fully account for costs expected under existing regulations, much less take into account proposed and impending regulations that will affect the PacifiCorp fleet.

Later in my testimony I will detail existing and impending regulations, how these regulations may impact the company's coal units, and which additional retrofits could reasonably be expected above and beyond those in the Current Case Retrofits or the Company Projected Retrofits.

Q Should PacifiCorp have known that these regulations would have a material financial impact upon its coal fleet operations and costs?

A Yes. The company knew or should have known of these regulations well in advance of making its investments in the Current Case Retrofits. It also knew or should have known at that time that proposed regulations would result in a need for additional costly environmental upgrades (Emerging Retrofits). While the final regulations are still evolving, the likelihood that a suite of regulations would affect coal-fired power plants has been well known for a number of years. Since approximately 2007, industry has expected the regulations discussed in this testimony, with some rules in development 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 SC-4 (JIF-4).[2] 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 would affect the electric industry.

I have compiled a timeline of considered, proposed, and final regulatory actions by the EPA for each of the major classes of air pollutants and non-air pollutants from 1995 through the present day in Exhibit SC-5 (JIF-5). The timelines clearly indicate that the company should have had knowledge of impending regulations and tightening standards well before the Current Case Retrofits.

Further, and as discussed below, PacifiCorp's own documents, both internal and public, show its knowledge of these regulations and indicate that the company was aware that those emerging regulations would likely adversely affect company

[2] I offer the WRI Fact Sheet as an exhibit solely for the purpose of showing when certain impending regulations were well known in the U.S. electric industry and not for the truth of any other statements or the validity of any policy positions made or taken therein.

assets. 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 In your opinion, how should the company have planned for existing, proposed, and emerging environmental regulations?

A In Utah and other PacifiCorp states, the integrated resource planing (IRP) process is the established venue in which the Commission and interveners may evaluate how the company plans to meet its customer needs, including through new capacity additions and major company investments. In rebuttal testimony filed in the concurrent Wyoming rate case ("Wyoming Rate Case") [Wyoming docket 20000-384-ER-10], witness Mr. Chad Teply cites the IRP process as the correct venue to evaluate the cost effectiveness of major investments at the company.

Q Do you agree that the IRP process is the appropriate venue for evaluating major investment decisions facing the company?

A Yes. Prior to committing to the substantial investments at issue in the current rate case, the company should have evaluated the cost effectiveness of those investments as it should for any other major capital investment, such as new generation, demand-side management, or transmission. The company's 2008 IRP, for example, should have explicitly discussed the company's expected compliance obligations under both existing and emerging regulations and should have explored all cost effective mechanisms of meeting these regulations, including repowering or retiring non-cost effective assets.

Q Did the 2008 IRP address the company's impending costs of complying with criteria pollutant regulations, or propose how the company would meet its compliance obligations?

A No. The 2008 IRP devoted four pages [p. 34-37] to discussing "currently regulated emissions", including NAAQS for ozone and PM, regional haze, and mercury. For both ozone and PM, the IRP acknowledges that there is a significant risk of increasingly stringent regulations. I have attached these pages as Exhibit SC-6 (JIF-6).

Regarding regional haze, according to the May 2008 IRP, the Wyoming and Utah state environmental regulators were drafting regional haze rules. The IRP omitted the fact that by the time the company submitted the IRP, it had already requested or received air emissions permits from the states for a majority of Current Case Retrofits.

Finally, the IRP noted that a lengthy legal battle had left the EPA with the obligation to regulate mercury emissions at coal-fired units, but "it is not known the extent to which future mercury rules may impact PacifiCorp's current plans to reduce mercury emissions at their coal-fired facilities." [2008 IRP, page 37] There is no additional discussion of these "current plans."

In the 2008 IRP Update, the company acknowledged that the impending regulations may have a significant impact on its fleet:

> 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. Emphasis added].

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), nitrogen dioxide (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 SC-7 (JIF-7), and is nearly identical to the final figure in the Emissions Reduction Plan**.** To my understanding, the figure describes the company's 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]

Despite all of these precursors, there is no indication in the 2004 or 2008 IRP of the expected compliance burden faced by any coal fired plant, the significant expected costs of compliance, or any indication that these Current Case Retrofits could either be expected or avoided by ratepayers. The 2008 IRP did not evaluate the regulations "in concert" though it anticipated that those regulations would have a significant impact on coal-fired power plants.

Q Did the 2008 IRP discuss the company's costs to comply with the existing regulations or any alternatives to reach a least-cost compliance solution?

A No. Neither the compliance obligations for the fleet, nor costs for each power plant are discussed. In addition, the company omitted costs of maintaining compliance with either existing or impending regulations, and omitted compliance alternatives. Indeed, at the time, the company indicated that it intended to spend significant capital to maintain its coal-fired fleet.

> 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, page 37]

The IRP did not disclose that many of these investments had already been committed at the time the company finalized its IRP.

Q Has the 2011 IRP addressed any of the impending environmental costs facing the company?

A No. I was a stakeholder in the 2011 IRP, representing the Sierra Club from December 2010 through March 2011. Through that time, according to company documentation and presentations, the company was still in the process of finalizing "portfolio development cases" – i.e. developing scenarios which would represent the structure of the fleet over the next two decades. This process is a key event in evaluating the cost efficacy of both incremental capacity additions as well as investments in the current fleet.

During the stakeholder process, the company refused to divulge any information about the performance of the existing fleet in the model outputs. Further, despite my requests and those from other stakeholders, the company withheld information about its consideration of current and impending environmental regulations impacting the coal fleet, and its expected costs to meet those regulatory hurdles. Indeed, under questioning, the company informed the stakeholders that these costs and plans, currently the subject of this rate case, were confidential.

In the 2011 IRP, the company developed several "coal plant utilization" scenarios, evaluating how likely the coal fleet was to maintain current operations under various CO_2 and natural gas prices. The company again refused to divulge any detail about the assumptions behind these "sensitivities" until after all modeling was complete and the company was one month away from finalizing the IRP (February 23, 2011). Shortly before the company submitted the final draft to this Commission, the stakeholders confirmed through a phone call with the company that the substantial environmental costs faced by the coal units were ***not considered avoidable in any scenario***.

In other words, even if the high cost of continuing to retrofit existing coal units was ultimately not cost effective, i.e., even if those units should be retired as a form of environmental compliance, the company had knowingly biased its model results through an *a priori* assumption. The company had unilaterally rejected a solution that could feasibly protect ratepayers from having to pay billions of dollars for unnecessary environmental upgrades.

Q Has the company indicated that decisions such as retirement alternatives are appropriate to consider within an IRP?

A Yes. Witness Mr. Chad Teply, in the concurrent rate case in Wyoming, explained that:

> The company's integrated resource planning proceeding conducted in all six of the states served by the Company provides the process to address ongoing investment in the Company's coal units versus alternatives including accelerated retirement and replacement and repowering. [Mr. Chad Teply, Rebuttal Testimony. Wyoming Docket 20000-384-ER-10. Page 3 at 22]

Q Did the 2011 IRP provide any venue "to address ongoing investment in the Company's coal units versus alternatives including accelerated retirement and replacement and repowering?"

No. While the assumptions in the IRP description of the "coal plant utilization" study indicate that "incremental comprehensive air initiative capital recovery" is included as an avoidable cost for the coal units, the model is only "allowed to select the gas plant betterment option for any year after 2016." [2011 IRP, pages 181-182]. According to the Emissions Reductions Plan, the only two Company Proposed Retrofits which occur after the 2016 horizon are two SCR upgrades at Jim Bridger 1 & 2. By design, the IRP modeling process prohibits plants from retiring to meet expensive environmental compliance obligations.

Q **Is the IRP the last opportunity for the company to evaluate the cost effectiveness of environmental retrofits or other major investments?**

A No. The IRP provides an opportunity for the Commission and public to evaluate and vet plans and proposals put forth by the company. However, the IRP is not the last opportunity to evaluate the cost efficacy of the plants under existing and impending regulations. Prior to committing to a major upgrade, the company should evaluate the cost efficacy of investing in aging infrastructure in the face of known and likely costs, versus other reasonable alternatives.

Q **Is there evidence that the company has considered the long-range costs of complying with increasingly stringent criteria air pollutant regulations?**

A Yes. To my best understanding, the company has engaged in numerous internal evaluations of costs and potential regulation and litigation risks associated with operating the coal-fired fleet.

A Confidential material removed.

This analysis pre-dates the air permit applications and contracts associated with the Current Case Retrofits.

Q **Has the company considered long-range costs of future regulatory compliance obligations in evaluating the cost effectiveness of any given Current Case Retrofits?**

A Yes. In response to a discovery request by the Utah DPU [Attachment DPU 24.13], and in rebuttal testimony in the concurrent Wyoming Rate Case the company provided two studies: a "Present Value Revenue Requirement Summary" for the 2009 10-Year Business Plan and a 2011 10-Year Business Plan, both encompassing a CAI ("Comprehensive Air Initiative") Capital Projects Study ("CAI PVRR Study"). These studies purport to "address, on a macro basis, whether continued unit operations of the company's coal plants through the regulatory depreciation life, produces enough net value to pay for the proposed CAI capital." The studies are attached herein as Exhibit SC-8 (JIF-8).

The studies appear to estimate the differential present value revenue requirement ("PVRR(d)") of maintaining each coal unit until a certain future year, up to the depreciation life of the unit, relative to the value of the unit's generation. Due to the sparse study description and assumptions, I am unable to evaluate whether the study presents a fair or meaningful representation of the cost-effectiveness of each of the coal-fired units in light of the slate of Company Projected Retrofits.

Nonetheless, this study appears to be the type of evaluation which should have been conducted by the company prior to investing in the Current Case Retrofits, in the 2008-2009 timeframe.

Q **When was the CAI PVRR Study conducted?**

A The study is dated May 2011.

Q **What does the CAI PVRR Study conclude?**

A In the introduction, the study finds:

> The results of the analysis indicate that at the $8 per ton CO_2 price level assumption basis for PacifiCorp's 2009 10-year business plan, all the coal units will be above breakeven in terms of present value revenue requirement differential (PVRR(d)).

However, on page 9, a graph representing the expected benefit of maintaining the Naughton units, the lines representing Naughton Units 1 & 2 indicate that the units are unable to "produce enough net value to pay for the proposed CAI capital" until well into 2023 or 2024. Thus, the company performed and presented this analysis for consideration to this Commission prior to committing to the Naughton investments, the Commission would have had the opportunity to review whether the upgrades should actually be considered cost-effective.

Q **Are you aware of any other similar studies conducted by the company?**

A No. Sierra Club requested all such studies during the discovery period and received nothing similar.

The company did provide internal appropriation requests (APR) for each of the Current Case Retrofits, most of which appeared to include an evaluation of the financial benefit of each individual project, where benefits were compared to the next best end-of-pipe control technology. For example, in the Naughton Unit 1 FGD implementation APR (April 22, 2009), the net financial benefit is measured by the cost of a "waste sodium carbonate mine water FGD" against a "wet lime FGD system with forced oxidation" which may be a reasonable comparison of two technical solutions, but does not constitute a test of cost-effectiveness for the plant with respect to the FGD costs.

Further, the provided APRs do not constitute reasonable cost-effectiveness studies for the units with respect to the Current Case Retrofits or the Company Projected Retrofits. The APRs likewise fail to provide sufficient justification that the units will remain cost effective through the series of environmental compliance obligations, including, but not limited to, the Current Case Retrofits.

Q Can you provide details on the company's environmental compliance costs and how the company has treated such costs in internal company documents, in IRPs and in this rate case?

A I will. The following sections describe environmental regulations that can reasonably be expected to affect the PacifiCorp coal fleet. My testimony is not a formal analysis of the requirements at each of PacifiCorp's coal units under existing, proposed, or impending regulations, nor does it stipulate a plan or proposal. My testimony simply illustrates the types of costs that the company could reasonably expect to face and to demonstrate that the company has failed to take these costs into account in a comprehensive manner.

4. CLEAN AIR ACT REGIONAL HAZE RULE

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

A One of the Clean Air Act's national goals is to reduce existing visibility impairment from manmade air pollution in all "Class I" areas (e.g., most national parks and wilderness areas). [42 U.S.C. § 7491(a)(1)] EPA's implementing rules require states to create plans to improve natural visibility conditions by 2064 with enforceable reductions in haze-causing pollution from individual sources 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 develop these requirements, but EPA must approve those plans to comply with the CAA. If EPA finds the plans are not consistent with the CAA,, it adopts a federal plan and BART requirements. 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 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, but no later than five years after EPA approves the state's regional haze plan or adopts a federal plan. Wyoming submitted a final, revised BART SIP to the EPA on January 12, 2011. EPA is expected to act on Wyoming's rules in 2012. Therefore, we expect a compliance deadline in the 2016/17 timeframe. Utah is following roughly the same timeline as Wyoming.

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 SC-2 (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 EPA approved Wyoming's BART requirements?

A No. .

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

A In Utah's proposed regional haze plan, the Utah DEQ found that the planned installations and upgrades of controls at PacifiCorp's Hunter and Huntington units satisfied BART requirements.

Q Has EPA approved the Utah BART requirements?

A No.

Q Has PacifiCorp commenced retrofits to comply with regional haze requirements?

A Yes. PacifiCorp has invested in numerous capital projects over the last two years in advance of final, EPA-approved rules for Wyoming and Utah, and even in advance of state BART findings.

For example, at the Naughton Units in Wyoming:

- The company submitted state-requested BART application materials to the Wyoming DEQ in December 2007, and revised application materials in March 2008.
- While the DEQ was still analyzing company data, the company appears to have submitted an application to begin construction of the Naughton Current Case Retrofits.
- The company received a permit to begin construction on May 20, 2009 and began construction at the site. [WY DEQ MD-5156] [3]
- One week later, the Air Quality Division (AQD) of the Wyoming DEQ published an analysis based on the 2007/2008 BART applications. This analysis found that the controls permitted the previous week were BART-compliant. [WY DEQ AQD BART Analysis AP-6042, May 28, 2009].
- On January 7, 2011,Wyoming submitted its Regional Haze rule to EPA for SIP approval. As noted, EPA has not yet approved Wyoming's rule.

The Emissions Reduction Plan confirms this general scheme of pre-compliance with an emerging regulation; 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].

Indeed, data from the Hunter 2 arbitration dispute confirms the company's plan to install emissions controls outside of a finalized regulatory framework:

> In this process, it gets back to our reference case scenario in moving forward. These permits are submitted at the same time that the State is developing their State Implementation Plan and the Regional Haze Rules are not in effect at this point in time when we

[3] Attachment to discovery request UIEC 15.6 1a and 2a are timelines of construction activities at the Naughton Units. The activity of "Contract Award and Notice to Proceed" is dated 05-May-09. I assume that the company was notified its permit had been granted prior to the formal release of the construction permit.

submitted these applications. [Deposition of William Lawson, January 6, 2011. Page 115 at 5]

Q **Do air permits provide sufficient economic justification to install the Current Case Retrofits?**

A No. The company requested the air permits in Wyoming and Utah via a "Notice of Intent." Then the company began significant construction well before any EPA-approved final regional haze rules.

Q **Will PacifiCorp's compliance actions be sufficient to meet final Regional Haze Rules?**

A Probably not. 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 in national parks and wilderness areas. Comments from the National Park Service on the Jim Bridger, Naughton, Dave Johnston, Wyodak, Hunter, and Huntington BART applications 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, "SCR controls are reasonable BART controls for the WY EGUs." Based on these and other Park Service comments, EPA could well require SCR for coal units in Wyoming and Utah.

As 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.

If EPA requires SCR to meet BART, the company will have acted prematurely by inadequately planning for future capital expenditures.

5. CLEAN AIR ACT TOXICS RULE FOR UTILITY STEAM GENERATING UNITS

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

A In 2000, after a lengthy study, EPA determined it was appropriate and necessary to regulate toxic air emissions (or hazardous air pollutants, HAPs) from utility steam electric generating units. As a result, 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 the CAA required EPA to adopt MACT standards within two years after issuing its finding in 2000, the rules were 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. EPA's proposed emissions limits 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. Therefore, these controls may likely be required to meet the emission limitations of the final rule. Activated carbon injection (ACI) will also likely be required to control mercury.

In the proposed rule, EPA described 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 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.

Sierra Club requested documents prepared by or for the company examining compliance requirements for the Utility MACT Rule [Sierra Club Data Request 2.9a], and received only an objection and stipulation of attorney-client privilege. Therefore, this Commission has no information prepared by the company to demonstrate compliance or intended compliance with the Utility MACT rule.

In a response to discovery from the Utah Division of Public Utilities (DPU) the company stated that

> based on the Company's evaluation of the proposed non-mercury metallic HAP's MACT rules at the facilities identified, the Company expects to be able to comply with the surrogate particulate matter emissions compliance limit at each facility with existing equipment…

but

based on recently completed control technology demonstration testing, the Company also expects to be able to comply with mercury HAPs MACT rules via activated carbon injection ("ACI") and supplemental reagent injection, as may be required. [Company Response to DPU Data Request 24.13]

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," indicating 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, states must develop plans that comply with the applicable NAAQS. Those plans may contain additional emissions reduction requirements for 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 under the new NAAQS?

A Most likely. 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. The standard will likely be tested against 2008-2010 data; however, using air quality data from 2007 to 2009, EPA expects that six counties in Wyoming and nine counties in Utah could be in nonattainment of the lower standard. [Air Quality Program Update. October 5, 2010. US EPA.].[4]

[44] The number of counties in Wyoming (six) differs from similar testimony filed in the concurrent Wyoming rate case, in which I testified that four counties were in potential violation. The difference between these two stipulations arises from access to updated data showing violations based on 2007-2009 air quality data, as opposed to 2006-2008 air quality data as given by the EPA in the older Proposed Revisions to National Standards for Ground-Level Ozone, Maps. January 6, 2010. EPA. New data is dated October 5, 2010.

Depending on how Wyoming chooses to meet new NAAQS 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.

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. This would require computer air dispersion modeling analyses in order to assess the facilities' compliance with these new NAAQS before the company could receive permits. 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 indicate 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.

Sierra Club requested documents prepared by or for the company examining compliance requirements for the various NAAQS [Sierra Club Data Requests 2.8b&c, 2.9d, and 2.10b]. Inexplicably the company objected to Sierra Club's request on grounds of attorney-client privilege. Therefore, this Commission has no company information demonstrating compliance or intended compliance with the various proposed or emerging NAAQS.

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 PacifiCorp and other utilities submitted to the Energy Information Administration (EIA), I expect that every coal unit in the PacifiCorp fleet, with the possible exception of the Carbon units, exceeds the 2 MGD threshold.[5] The company would therefore be required to submit a plan, and potentially install new technology, to reduce water withdrawals.

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 EPA is expected to finalize the rule in 2012, then the regulations would become effective within 60 days thereafter. According to EPA, " 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, if PacifiCorp objects to the rule, I would expect a compliance deadline, at the latest, in 2017 for impingement, and 2020 for entrainment.

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[5] 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).

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

A I find no public records indicating that the company has acknowledged or planned for the proposed water intake standards or considered the costs of compliance in concert with costs of compliance for other regulations.

Sierra Club requested documents prepared by or for the company examining compliance requirements for the CWA Cooling Water Intake Rule [Sierra Club Data Request 2.9b]. In response, the company verified that it was likely to be subject to the rule at all of the Dave Johnston, Jim Bridger, Naughton, Carbon, Hunter, and Huntington coal units, as well as the Gadsby gas plant. The company also confirmed that "it is expected that additional modifications will be required at the Dave Johnston plant's cooling water intake structure to provide compliance with the proposed entrainment mortality standards." In addition, the company verified that it had conducted a "Comprehensive Demonstration Study" in 2007 which may have been responsive to this impending rule. However, at the time of this writing, the company had not sent the study as provided in the response to the request.

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 expected in 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 or considered the costs of compliance in concert with costs of compliance for other regulations.

Sierra Club requested documents prepared by or for the company examining compliance requirements for the CWA Cooling Water Intake Rule [Sierra Club Data Request 2.10a]. In response, the company indicated that "the Dave Johnston and Naughton facilities have significant outflows and may have additional requirements placed on them as a result of this rule."

9. RESOURCE CONSERVATION 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).]

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

A Yes. 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 rule, "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 Is the company 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 Is PacifiCorp aware that the company may face additional compliance costs under the proposed regulation?

A Yes. 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 Has PacifiCorp taken any actions to demonstrate compliance with the proposed CCR rule?

A No. MidAmerican Energy Holdings Company (MEHC), the parent company of PacifiCorp, filed comments with the EPA expressing significant concern with the potential designation of CCR as a hazardous waste. While the comments do not indicate that the company has evaluated the costs of compliance with the CCR rule, the company does note that, should the EPA require a Subtitle C or D designation which both require the renovation of unlined impoundments, the company could be significantly impacted.

> To comply with these surface impoundment closure requirements, the majority of MidAmerican's facilities will be required to convert from wet handling (sluicing) to dry handling systems which could have major impacts on system reliability, and cost each facility tens of millions of dollars. [*Comments of MEHC on Hazardous and Solid Waste Management System [etc]*. November, 2010].

I have found no other records that indicate the company has planned compliance actions for either version of the proposed CCR rule, or considered the costs of compliance in concert with costs of compliance for other regulations.

10. SUMMARY OF EXPECTED CAPITAL EXPENDITURES

Q Please summarize the range of costs the company may face over the next decade, according to 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 SC-9 (JIF-9), I show expected capital investments at the PacifiCorp coal plants discussed in this testimony. These capital investments include expenditures from the Major Plant Addition case in 2010 (Docket 10-035-13), 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 the company should have 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 it should have assessed for cost effectiveness:

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

- Hunter 1: FGD upgrade
- Hunter 2: FGD upgrade, LNB, baghouse, turbine upgrade
- Hunter 3: Conversion to a wet stack and turbine upgrade
- Huntington 1: LNB, baghouse, FGD upgrade, and 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: baghouse
- Naughton 3: FGD, LNB, SCR, baghouse
- Jim Bridger 1: SCR
- Jim Bridger 2: SCR
- Jim Bridger 3: SCR
- Jim Bridger 4: SCR
- Hunter 1: LNB, baghouse

Q Please summarize the Emerging Retrofits identified above that the company should have 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, based on all available data, it is my opinion that the company has:

- Failed to justify the Current Case Retrofits in forward-planning, such as in an IRP;
- Failed to account for the Company Projected Retrofits in concert with the Current Case Retrofits in any forward-planning, such as IRP;
- Failed to 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 in IRP, or other available documentation;
- 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 cost-effective in light of either Company Projected Retrofits or Emerging Retrofits.

Q Does this conclude your testimony?

A Yes, it does.

CERTIFICATE OF SERVICE

I hereby certify that on this 26th of May, 2011, a redacted original version, an unredacted original version, and fifteen unredacted copies of the foregoing document, with Exhibits provided on CD, were sent via U.S. Mail to the following:

Attn: Julie Orchard
Herber M. Wells Building, 4th Floor
160 East 300 South
Salt Lake City, UT 84111

Additionally, I hereby certify that on this 26th day of May, 2011, a redacted version of the foregoing document was sent via email to the following:

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___*Original signed by:*_______________
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