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**2013**

**Integrated**

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**Special Update**

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Rocky Mountain Power  
Pacific Power  
PacifiCorp Energy

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*Let's turn the answers on.*

# CONFIDENTIAL SPECIAL 2013 IRP UPDATE: CHOLLA UNIT 4

## Executive Summary

The coal-fired Cholla power plant located in Joseph City, Arizona, includes four units. PacifiCorp owns Cholla Unit 4, which contributes 387 MW of capacity to the PacifiCorp system. Arizona Public Service (APS), the operator of the plant, owns Units 1, 2, and 3.<sup>1</sup> PacifiCorp acquired Cholla Unit 4, which was commissioned in 1981, from APS in 1991. Under the Regional Haze program, a visibility improvement program that was enacted in 1999 and revised in 2005, installation of select catalytic reduction (SCR) emission control equipment is required at Cholla Unit 4 by January 4, 2018.<sup>2</sup>

PacifiCorp has analyzed compliance alternatives to installation of SCR including early retirement of Cholla Unit 4 by the end of 2017 and conversion of the unit to natural gas with an online date in the second quarter of 2018. PacifiCorp has also analyzed technology and inter-temporal trade-off compliance alternatives in which it is assumed the installation or SCR required by January 4, 2018, can be avoided in exchange for a firm commitment to cease coal-fired operation at a later date.<sup>3</sup> The inter-temporal trade-off scenarios analyzed include a case in which coal fired operations cease by the end of 2024, with either an early retirement or with a natural gas conversion coming online in the second quarter of 2025. The technology trade-off analysis applies the cost of selective non-catalytic reduction (SNCR) technology in 2017 (to achieve an assumed January 4, 2018 compliance deadline) to the inter-temporal tradeoff cases. Table 1 summarizes the present value revenue requirement differential (PVRR(d)) of each compliance alternative as compared to installation of SCR by January 4, 2018.

**Table 1. Summary of Cholla Unit 4 PVRR(d) Results**

Compliance Alternative to SCR	NO <sub>x</sub> Control	2018 – 2032 Nominal Levelized Henry Hub Natural Gas Price (\$/MMBtu)	PVRR(d) Benefit/(Cost) of SCR as Compared to Each Compliance Alternative (\$m)
2017 Early Retirement	None	\$6.65	
2018 Gas Conversion	Gas Conversion	\$6.65	
2017 Early Retirement	None	\$6.07	
2018 Gas Conversion	Gas Conversion	\$6.07	
2024 Early Retirement	SNCR	\$6.07	
2025 Gas Conversion	SNCR/Gas Conversion	\$6.07	
2024 Early Retirement	None	\$6.07	
2025 Gas Conversion	Gas Conversion	\$6.07	

<sup>1</sup> PacifiCorp owns 37 percent of the common facilities at the Cholla plant.

<sup>2</sup> The requirement for SCR is being litigated; however, with denial of requests for administrative stay and judicial stay as discussed further below, the January 4, 2018 compliance deadline for installing SCR at Cholla Unit 4 remains in place.

<sup>3</sup> The technology and inter-temporal alternate compliance scenarios would require review and approval of the EPA, the state of Arizona, APS as operator of the unit, and potentially other parties to the on-going Regional Haze litigation in Arizona.

Based upon PacifiCorp's assessment of Cholla Unit 4 Regional Haze compliance alternatives, the least-cost alternative for customers is to pursue a compliance alternative that eliminates the compliance obligation to install SCR and maximizes customer benefits. This decision is supported by PacifiCorp's financial analysis of Cholla Unit 4 compliance alternatives, as well as the U.S. Environmental Protection Agency's (EPA) recent history of being willing to consider such approaches when they also provide significant environmental benefits. Furthermore, eliminating the SCR installation requirement is expected to help maintain compliance flexibility, as well as mitigating the risk of incremental stranded investment associated with EPA's proposed rule under §111(d) of the Clean Air Act (the "111(d)" rule). Consistent with its inter-temporal tradeoff analysis, PacifiCorp will pursue a compliance strategy that avoids installation of SCR with a firm commitment to cease operating Cholla Unit 4 as a coal-fired unit in early 2025.<sup>4</sup> In parallel, PacifiCorp will continue to evaluate least cost compliance alternatives at Cholla Unit 4 as EPA's proposed 111(d) rule is finalized and the state of Arizona begins to formulate its 111(d) compliance plan.

## Regional Haze Program

### Overview

The Regional Haze program is a visibility improvement program that was enacted in 1999 and revised in 2005. Although its long-term goal is to return Class I areas in the U.S. to natural visibility conditions by 2064, the Regional Haze program also contains stringent requirements at the front end. The states, through development of state implementation plans (SIPs), and EPA are tasked with administering the Regional Haze program under two primary compliance timeframes:

- (1) The initial Best Available Retrofit Technology (BART) planning and compliance period originally required BART controls to be in place by 2013<sup>5</sup>; and
- (2) Long-term planning periods that require resubmittal of updated SIPs, including long-term strategy controls on BART and other units to meet reasonable progress goals, every ten years beginning in 2018.

Because the Regional Haze program affects all emissions sources within a region and is implemented over many years, there will continue to be emerging compliance obligations established by state and federal agencies responsible for administering the rules for several decades to come. Projects and visibility improvements deployed and achieved in the initial BART phase of the program are intended to be operated over time to support continued compliance with the program's visibility goals.

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<sup>4</sup> It is important to note that PacifiCorp's assessment of alternate compliance options for Cholla Unit 4 all assume that remaining book value for the asset at the end of the various operating schedules is recovered from customers.

<sup>5</sup> The Final Amendments to the Regional Haze Rule and Guidelines for Best Available Retrofit Technology (BART) Determinations (70 Fed. Reg. 128; July 6, 2005) contemplated that states would complete SIPs and the EPA would issue final approval during 2008, which in turn would require BART controls to be installed at eligible units within five years (2013). Because EPA has not yet finalized its approval of the states' SIPs, the five-year clock continues to get pushed out in time from a federal compliance perspective.

## Regional Haze Compliance Requirements at Cholla Unit 4

In March 2011, the state of Arizona submitted its Regional Haze SIP to EPA for review. The SIP requires currently installed low NO<sub>x</sub> burners (LNB) as BART for NO<sub>x</sub> emissions at Cholla Unit 4. By final rule dated December 5, 2012, EPA disapproved portions of the Arizona Regional Haze SIP and issued a federal implementation plan (FIP). The FIP requires, among other things, installation of SCR on Cholla Unit 4 by January 4, 2018. The FIP also institutes an averaged NO<sub>x</sub> emission rate of 0.055 lb/MMBtu for Cholla Units 2, 3, and 4. In January and February 2013, PacifiCorp, the state of Arizona, and other Arizona utilities filed separate appeals of EPA's FIP with the Ninth Circuit Court of Appeals. In February 2013, PacifiCorp and other Arizona utilities filed petitions for reconsideration at the EPA and filed requests for administrative stay of the FIP until judicial appeals are completed. In March 2013, PacifiCorp and other Arizona utilities filed motions for judicial stay of the FIP with the Ninth Circuit Court of Appeals until the appeals are complete.

On April 3, 2013, the court consolidated the various appeals into a single docket before a single judicial panel. On April 9, 2013, EPA granted various petitions for reconsideration for the NO<sub>x</sub> rate only, but has taken no further action to date. Although EPA may propose a new NO<sub>x</sub> rate at some time in the future, which will undergo public comment, it is not under any timing requirement to do so. EPA did not address the various requests for administrative stay in its April 9, 2013 action.

On April 23, 2013, the court set the following case schedule:

- June 2013—Briefing on motions for judicial stay (completed)
- January 2014—Briefing on the merits of appeals (completed)

On September 9, 2013, the court denied the motions for stay. The court is now expected to issue a final decision on the appeals in 2015. However, there are no mandatory dates by which the court must issue decisions.

With the denial of requests for administrative stay and judicial stay, the January 4, 2018 compliance deadline for installing SCR at Cholla Unit 4 remains in place. PacifiCorp continues to coordinate with the state of Arizona and other Arizona utilities in connection with the now consolidated appeals. Various environmental groups have intervened in the appeals in support of EPA's FIP.

## Compliance Timeline

PacifiCorp has considered compliance alternatives to the Cholla Unit 4 SCR requirement in EPA's FIP for Arizona, which include: (1) early retirement; (2) cease coal-fueled operations by converting the unit to operate on natural gas; and (3) technology and inter-temporal tradeoffs. An acceptable alternate compliance solution would require that the state of Arizona incorporate the alternative as a recommended amendment to its SIP for EPA review and approval. The SIP amendment and EPA review and approvals would include the appropriate public notice and comment processes.

The timeline for installing SCR by January 4, 2018, is outlined in Appendix A. To evaluate key decision points associated with the natural gas conversion and early retirement alternatives in relation to SCR installation, the timelines for those alternatives are also provided. In evaluating a technology tradeoff alternative, PacifiCorp considered a case that might require installation of SNCR by January 4, 2018. The timeline for installing SNCR equipment is also provided in Appendix A. To facilitate direct comparison, each timeline is built around the current January 4, 2018 compliance deadline. The timeline for compliance alternatives other than installing SCR could shift out in time under an alternate compliance outcome that allows for implementation of natural gas conversion, early retirement, or installing SNCR beyond the January 4, 2018 deadline for SCR installation.

### **Installation of SCR**

A schedule to install SCR on Cholla Unit 4 by an assumed January 4, 2018 compliance date is presented in Appendix A, Figure A.1. The SCR project entails installing the reactor module(s) on the unit in the boiler flue gas exit path between the economizer exit and the air preheater inlet. Other work that may be required includes:

- Installing an ammonia receiving and delivery system.
- Installing a SCR reactor cleaning system.
- An economizer modification to limit SCR reactor inlet temperatures to avoid catalyst damage.
- Adding an economizer exit gas temperature control system to extend the operating load range of the unit, if economically justified.
- To provide NFPA 85 Code compliance, structurally reinforcing the boiler; forced draft equipment and ductwork; and flue gas path equipment and ductwork. Alternatively and/or in addition, control system mitigations may be implemented.
- Potential modifications to the boiler induced draft equipment.
- Potential modifications to the unit auxiliary power system.

### **Installation of SNCR**

A schedule to install SNCR on Cholla Unit 4 by an assumed compliance date January 4, 2018, is presented in Appendix A, Figure A.2. If an SNCR is needed, the project would entail installation of several levels of urea solution injection equipment in the boiler at critical temperature zones. Other work that may be required includes:

- Installing a urea solution receiving and transport system.
- Boiler modifications to accommodate urea solution injection locations.

### **Natural Gas Conversion**

A schedule to convert Cholla Unit 4 to 100 percent natural gas fueling is presented in Appendix A, Figure A.3. The implementation schedule assumes the unit would be converted to natural gas fueling in 2018 after coal fueling is discontinued on December 31, 2017. Thereafter, a six-month tie-in outage is planned. The schedule would shift out in time under potential compliance scenarios that allow for continued coal operation beyond December 31, 2017. The following scope of work is anticipated to be required:



- Installing new low oxides of nitrogen natural gas burner system;
- Main windbox modifications;
- Modifying the boiler flame scanner system;
- Installing new boiler burner front natural gas piping;
- Installing a flue gas recirculation system, provided to reduce oxides of nitrogen and carbon monoxide emissions;
- Potential air preheater basket modifications;
- Flue gas ductwork and equipment modifications;
- Potential boiler structural reinforcement;
- Electrical and control system modifications; and
- Installing a natural gas delivery system.

## Early Retirement

A schedule for an early retirement scenario of Cholla Unit 4 is presented in Appendix A, Figure A.4. The implementation schedule assumes the unit would cease coal-fired operation by December 31, 2017. The schedule would shift out in time under potential compliance scenarios that allow for continued coal operation beyond December 31, 2017.

## Initial Analysis: August 2013

### Overview: Initial Analysis

PVRR(d) analyses are used to quantify the benefit or cost of installing emission control equipment in relation to other compliance alternatives. The PVRR(d) for any given emission control installation is calculated as the difference in system costs between two System Optimizer model simulations. The base System Optimizer simulation includes costs for near-term and prospective future environmental compliance costs required for the unit to continue operating as a coal-fueled unit. In the case of Cholla Unit 4, this simulation includes the cost of SCR and other environmental compliance costs related to the Mercury and Air Toxics Standard (MATS), coal combustion by-products (CCB), and effluent limit guidelines (ELG). In the alternative Regional Haze compliance cases, SCR costs are removed and other environmental compliance costs and run-rate operating costs are adjusted consistent with the scenario being analyzed. In each System Optimizer simulation, resource portfolio impacts, including up-front capital and run-rate operating costs for new generating units, and system dispatch impacts of the specific compliance alternative being studied are captured.<sup>6</sup>

An initial PVRR(d) analysis of the 2017 early retirement and 2018 natural gas conversion alternatives to installation of SCR was performed in August 2013. In this analysis, it was assumed that the compliance schedule for Cholla Unit 4 as outlined in EPA's FIP for Arizona is met, requiring coal-fueled operations to cease by January 4, 2018, under either a natural gas conversion or early retirement scenario.<sup>7</sup> The PVRR(d) analysis reflects the difference in the

<sup>6</sup> The study period used to analyze Cholla Unit 4 Regional Haze compliance alternatives is aligned with the 2013 IRP planning horizon and covers the period 2013–2032.

<sup>7</sup> For modeling purposes, coal-fueled operations were assumed to cease by December 31, 2017. The currently approved depreciable life for Cholla 4 is 2042 for all states but Oregon. For Oregon, the currently approved depreciable life of Cholla 4 is 2028.