Regional Haze
and the San Juan Generating Station

A case study of PNM's San Juan Generating Station's compliance with EPA's Regional Haze Rule.

By Pat Vincent-Collawn and Maureen Gannon

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A win-win is a desirable but often elusive outcome to a dispute. And when even greater benefits are realized beyond what either party has anticipated, the result can only be termed a true success. A recent agreement among the U.S. Environmental Protection Agency (EPA), the state of New Mexico, and PNM, New Mexico's largest electric utility, to meet EPA's Regional Haze Rule provided an effective and comprehensive pathway to achieve regulatory compliance and deliver environmental benefits beyond what the regulations require while minimizing the cost impact to electricity customers.

EPA's regional haze regulations require visibility improvements at many of the nation's national parks and wilderness areas, known as Class I areas. The goal is to restore these areas to natural visibility conditions by the year 2064.

States are to take the lead in developing plans to meet the goals of the regulations. Part of the Regional Haze Program includes looking at large stationary sources that emit emissions of nitrogen oxides (NOx), sulfur dioxide (SO2), and particulate matter (PM) and were constructed between 1962 and 1977. In 2006, the New Mexico Environment Department (NMED) identified PNM's San Juan Generating Station (SJGS) as the only stationary source under the jurisdiction of the NMED subject to this rule due to its emissions and proximity to 16 Class I areas.

Located in Northwest New Mexico, the 1,683-MW SJGS sits 15 miles west of the city of Farmington. SJGS is comprised of four coal-fired electric generating units built between 1973 and 1982. The plant is owned by nine companies, including PNM, and serves approximately 2 million customers throughout the West, including Arizona, Utah, California, and New Mexico. The plant employs approximately 350 people of which 22% are Native American. Figure 1 shows the location of SJGS with respect to the 16 Class I areas it impacts.
PNM hired Black and Veatch, an engineering, consulting, and construction company, to perform an analysis for SJGS. The review was required to identify the Best Available Retrofit Technology (BART) for reduction of NO\textsubscript{X} and PM at SJGS. A BART analysis for SO\textsubscript{2} was not required because New Mexico is participating in a regional trading program under Section 309 of the U.S. Clean Air Act. PNM submitted the San Juan BART analysis to the NMED in June of 2007.

Between 2006 and 2009, PNM and the other owners of SJGS completed a major upgrade of the environmental controls at SJGS. The plant was already equipped with wet flue gas desulfurization scrubbers for SO\textsubscript{2} control. During the upgrade, owners installed baghouses, eliminated a scrubber bypass system, and installed combustion control equipment that resulted in significant reductions in NO\textsubscript{X}, SO\textsubscript{2} and PM, all pollutants that can impair visibility. An activated carbon injection system for mercury control was also added. The upgrade resulted in emissions reductions in NO\textsubscript{X} by 41%, SO\textsubscript{2} by 60%, PM by 69%, and mercury by 99%. PNM believed that the upgrades would satisfy the regional haze requirements, but soon found that while this was true for PM, the NMED and EPA had other perspectives regarding NO\textsubscript{X} emissions.

In June 2011, the NMED filed a State Implementation Plan (SIP) to address compliance with the Regional Haze Rule that included a BART determination for SJGS. The plan proposed the installation of additional technology called selective non-catalytic reduction (SNCR) technology on all four SJGS units to further reduce NO\textsubscript{X} emissions. The estimated price tag was $77 million. In August of that same year, EPA filed its own Regional Haze Federal Implementation Plan (FIP) for SJGS calling for the installation of a technology called selective catalytic reduction (SCR) for NO\textsubscript{X} reduction on all four units by September of 2016. The estimated cost of that proposal was close to $1 billion, more than 10 times the cost of the state plan.

Both PNM and the state of New Mexico filed appeals in the 10th Circuit Court of Appeals in late 2011 to repeal the federal plan and leave the state plan in place. However, the lawsuits against EPA were not progressing quickly enough to keep pace of the enormous investments PNM would have to begin making to comply with the plan it was appealing.

In April 2012, New Mexico’s Governor Susana Martinez sent a letter to then-EPA Administrator Lisa Jackson urging EPA to work with PNM and the NMED to find an alternative to the federal and state plans. Both the Governor and PNM asked for a stay of the federal rule to delay the implementation since significant dollars were at stake.

In July 2012, EPA issued an administrative 90-day stay. PNM agreed to work with the parties to find an alternative with three primary goals:

- To achieve significant environmental benefits;
- To minimize the cost impact of compliance for its customers—a particular concern given the large percentage of New Mexicans who are at or below poverty level; and
- To minimize the economic impact on the Four Corners region that depends heavily on the jobs and tax revenue from SJGS.

The NMED convened a series of stakeholder meetings in August 2012 that included representatives from several environmental groups, the Navajo Nation, the New Mexico Public Regulatory Board, Black and Veatch, and the PNM Board. PNM’s negotiations with the state and EPA resulted in a new alternative plan for SJGS that addresses the Regional Haze Rule and provides significant additional environmental benefits at a lower cost than the federal plan.

![Figure 1. Map of SJGS in relationship to the closest 16 Class 1 areas.](image)
The company’s jurisdictional resource portfolio); • 40 MW of solar energy; and • 150–200 MW of natural gas.

Of significance is that PNM’s economic modeling showed that retiring the two units at SJGS and replacing the retired capacity with zero-carbon-emitting nuclear and solar resources plus natural gas peaking capacity is a lower cost option over time for PNM’s customers than installing SCR at SJGS. The new alternative also results in significant reductions in overall emissions from SJGS. With regard to NOx emissions, the installation of SNCR and the emissions limit of 0.23 lb/mmBtu will decrease potential NOx emissions from Units 1 and 4 by 23%. Coupled with the retirement of Units 2 and 3, overall plant emissions of NOx will be reduced by 62%. The revised SIP calls for a reduction in permitted SO2 emissions from Units 1 and 4 to 0.10 lb/mmBtu from the existing limit of 0.15 lb/mmBtu. This represents a 33% reduction of potential SO2 emissions.

The plan will create additional environmental benefits, including the reduction of greenhouse gas emissions (carbon dioxide), water consumption, and coal ash generation. Further, the truck traffic associated with raw material deliveries and hauling coal ash for disposition back to the adjacent mine will be reduced and two of the four visible plumes from the facility stacks will be eliminated once Units 2 and 3 are retired. Table 1 provides a summary comparison of the reduction of overall air emissions, water consumption and coal combustion residuals generated during plant operations between current operations and the revised SIP and the FIP.

The significant reductions in NOx and SO2 translate into visibility improvements comparable to Commission staff and local county and city officials, and PNM. The NMED also conducted public meetings in the city of Farmington and solicited input on potential alternatives to the FIP. Similar public meetings were conducted on the Navajo Nation. Governor Martinez was instrumental in getting the parties and stakeholders to the table to explore various alternatives to the FIP. President Ben Shelly of the Navajo Nation was also personally involved.

PNM’s negotiations with the state and EPA resulted in a new alternative plan for SJGS that addresses the Regional Haze Rule and provides significant additional environmental benefits at a lower cost than the federal plan. A formal agreement was announced on February 15, 2013. If approved by EPA through the normal regulatory process, PNM will retire SJGS Units 2 and 3 and will install the much less costly SNCR technology on SJGS Units 1 and 4. PNM proposes to replace a portion of the retired capacity with the following:

• 134 MW from Palo Verde Nuclear Generating Station (which PNM owns, but is currently not in

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<th>Revised SIP</th>
<th>EPA FIP</th>
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<tr>
<td>Nitrogen Oxides (NOx)</td>
<td>62%</td>
<td>83%</td>
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<tr>
<td>Sulfur Dioxide (SO2)</td>
<td>67%</td>
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<tr>
<td>Particulate Matter (PM)</td>
<td>50%</td>
<td>0</td>
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<tr>
<td>Carbon Monoxide (CO)</td>
<td>44%</td>
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<tr>
<td>Volatile Organic Compounds (VOCs)</td>
<td>51%</td>
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</tr>
<tr>
<td>Carbon Dioxide (CO2)</td>
<td>50%</td>
<td>0</td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td>50%</td>
<td>0</td>
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<tr>
<td>Water Consumption</td>
<td>53%</td>
<td>0</td>
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<tr>
<td>Coal Ash</td>
<td>48%</td>
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Table 1. A comparison of emissions reductions.

Figure 2. SJGS impact on visibility (in deciviews) on 16 Class 1 areas (based upon EPA-approved CALPUFF dispersion modeling (Version 5.8)).
Curry, EPA Regional Administrator for Region 6, called the agreement a model for other states in a March 2013 interview with the Albuquerque Journal. EPA Administrator Gina McCarthy cited the plan as an example of “collaboration with state and local governments…” during her confirmation hearings in 2013.

The revised SIP plan for SJGS has lower expected capital costs and will lessen customer rate impacts as compared to the FIP. Of equal importance, the plan ensures expansive environmental benefits. It achieves strong visibility improvements and reduces multiple emissions, coal ash and water usage. Finally, the agreement will lead to a more balanced, diversified fuel mix for PNM, which will help offset the impact of future EPA regulations. The SJGS regional haze plan is a culmination of many years of difficult technical work, extensive and open communication among the parties and affected stakeholders, and recognition that the ultimate solution provided a far better outcome than anyone could have imagined.

The New Mexico Environmental Improvement Board unanimously approved the revised SIP in September 2013, and it has now been submitted to EPA for review. The New Mexico Public Regulatory Commission must also approve certain portions of the SIP. While the revised SIP is not yet final, it is a major milestone and achievement in itself. EPA is expected to issue a draft decision regarding the revised SIP by May 1, 2014, and finalize their decision by the end of September 2013.

The new state plan has been lauded as a successful example of federal and state cooperation. Ron Curry, EPA Regional Administrator for Region 6, called the agreement a model for other states in a March 2013 interview with the Albuquerque Journal. EPA Administrator Gina McCarthy cited the plan as an example of “collaboration with state and local governments…” during her confirmation hearings in 2013.

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