

WEST ASSOCIATES



Arizona

Arizona Electric Power
Cooperative
Arizona Public Service
Salt River Project
Tucson Electric Power
Tri-State G&T Association

June 30, 2009

WRAP Implementation Working Group Co-Chairs

Tina Anderson
Division of Air Quality
Department of Environmental Quality
State of Wyoming
122 W. 25th Street
Cheyenne, WY 82002

Mike Edwards
SIP Coordinator
DEQ - Air Quality Division
State of Idaho
1410 North Hilton
Boise, ID 83706

California

PacifiCorp/Pacific Power
Southern California Edison

Colorado

Colorado Springs Utilities
Xcel Energy
Platte River Power
Authority
Tri-State G&T Association

WRAP Technical Oversight Committee Co-Chairs

Steve Arnold
Dept. of Public Health and Environment
CDPHE-APCD-ADM-B1
State of Colorado
4300 Cherry Creek Dr. South
Denver, CO 80246-1530

David Jones
Cortina Indian Rancheria
P.O. Box 1630
Williams, CA 95987

Idaho

PacifiCorp/Rocky
Mountain Power

Nevada

NV Energy

New Mexico

Public Service Co. of New
Mexico
Xcel Energy
Tri-State G&T Association

WRAP Air Quality Program Project Manager

Lee Gribovicz
3218 Locust Drive
Cheyenne, Wyoming 82001

North Dakota

Basin Electric Power
Cooperative

Dear Ms. Anderson, Mssrs. Edwards, Arnold, Jones, and Gribovicz

Oregon

PacifiCorp/Pacific Power
Portland General Electric

RE: WRAP's Reasonable Progress Four Factor Evaluation Project

This letter provides WEST Associates' comments on the Western Regional Air Partnership's (WRAP) reports entitled "Supplementary Information for Four-Factor Analyses for Selected Individual Facilities..." (Four Factor Reports) that were recently prepared by EC/R Incorporated. WEST Associates (WEST) members consist of fifteen utilities operating in the western states with a number of electric generating plants subject to BART and potentially affected by the states' Regional Haze – Reasonable Progress Goal (RH-RPG) assessments.

Utah

PacifiCorp/Rocky
Mountain Power

Washington

PacifiCorp/Pacific Power

Wyoming

Basin Electric Power
Cooperative
PacifiCorp/Rocky
Mountain Power
Xcel Energy
Tri-State G&T Association

WRAP's Reasonable Progress Four Factor Evaluation Project

June 30, 2009

Page 2

WEST Associates members reviewed the Four Factor Reports for the following states for selected electric generating plants, as follows:

- Colorado -- 11 Electric Generating Plants
- North Dakota -- 2 Electric Generating Plants
- South Dakota -- 2 Electric Generating Plants
- Wyoming -- 1 Electric Generating Plant

WEST Associates focused its review of the Four Factor Reports on information affecting electric generating units (EGUs) at these plants.

The Four Factor Reports are Inadequate and Should Be Withdrawn

After reviewing the reports, WEST concludes that each of them are wholly inadequate, especially taking into account EPA's *Guidance for Setting Reasonable Progress Goals Under the Regional Haze Program (June 2007 Revision)*¹ ("RP Guidance"). **Therefore, WEST Associates requests that the Four Factor Reports covering Electric Generating Plants be withdrawn from the decision-making and regulatory processes related to regional haze.** In the comments below, WEST provides examples of approaches employed by EC/R in the reports that support this conclusion and request.

WEST is concerned that these Four Factor Reports, as currently constituted, will set a pattern, both in substance and in analytical procedure, that will be followed in response to other states' requests for Four Factor evaluations of other selected EGUs. To perpetuate Four Factor analyses based on the methods used by EC/R in preparation of these reports as currently constituted would not be adequate or helpful to any state in preparing the RPG portions of their RH-SIPs.

Programmatic Consideration of Visibility Improvement Benefit to Achieving the Reasonable Progress Goal is Absent

While the Four Factors do not list visibility improvement as one of the factors, per se, the 40 CFR Part 51.308 regulation governing the development of states' reasonable progress goals, does require consideration of visibility improvement as the results of the Four Factor Reports are used in each state's RPG design and formulation, as follows:

- *First*, the state must not only complete the Four Factor analyses relating to cost effectiveness of control measures on specific sources, the state must also demonstrate *how those factors were taken into account in selecting the goal*. This clearly requires the state to consider cost effective measures in the context of what they will achieve in visibility improvement that is aligned with the desired RPG goal in the RH-SIP. See the following Sec. 308 citations:

¹ <http://www.wrapair.org/forums/amc/documents/RPguidance.pdf>

40 CFR 51.308(d)(1)(i) -- "In establishing a reasonable progress goal for any mandatory Class I Federal area within the State, the State must:

(A) Consider the costs of compliance, the time necessary for compliance, the energy and non-air quality environmental impacts of compliance, and the remaining useful life of any potentially affected sources, *and include a demonstration showing how these factors were taken into consideration in **selecting the goal.***"

(B) ... In establishing the reasonable progress goal, the *State must consider the uniform rate of improvement in visibility and **the emission reduction measures needed to achieve it*** for the period covered by the implementation plan."

40 CFR 51.308(d)(3)(v) -- "The State must consider, at a minimum, the following factors in developing its long-term strategy:

"... (A) Emission reductions due to ongoing air pollution control programs, including measures to address reasonably attributable visibility impairment;

(G) The ***anticipated net effect on visibility due to projected changes in point, area, and mobile source emissions*** over the period addressed by the long-term strategy."

- Second, the RP Guidelines state that for assessing individual, large scale sources such as EGUs simple cost effectiveness estimates may not be as meaningful as consideration of the value of emission reductions on visibility improvement, as follows:

"In considering the cost of compliance factor, you should keep in mind that different pollutants differently impact visibility impairment. For example, on a ton basis, sulfur dioxide related particles have a greater impact on visibility impairment than crustal material. Therefore, in assessing additional emissions reduction strategies for source categories or individual, large scale sources, ***simple cost effectiveness estimates based on a dollar-per-ton calculation may not be as meaningful as a dollar-per-deciview calculation***, especially if the strategies reduce different groups of pollutants." [RP Guidance, pg. 5-2].

"Another approach you could take, consistent with the "back out" approach discussed in section 2.3, would involve *identifying the set of emissions control measures that achieves the target percentage reductions in visibility-impairing pollutants associated with progress* at or beyond the uniform rate of progress. The *selection of control measures to*

include in this set would be guided by your consideration of the statutory factors and any other factors you have determined are relevant." . "

"Note that for some sources determined to be subject to BART, the State will already have completed a BART analysis. *Since the BART analysis is based, in part, on an assessment of many of the same factors that must be addressed in establishing the RPG, it is reasonable to conclude that any control requirements imposed in the BART determination also satisfy the RPG-related requirements for source review in the first RPG planning period.* Hence, you may conclude that no additional emissions controls are necessary for these sources in the first planning period." [RP Guidance, pg. 4-2].

The Four Factor Reports need to include a clear discussion of how their Four Factor cost effectiveness findings are to be integrated within each state's obligation under the EPA's Regional Haze Rule and the RP Guidelines to assess the benefit of and contribution to visibility improvement for achieving the state's RPG.

Nevertheless, WEST is providing the following detailed analysis and comments on the cost effectiveness analyses contained in the above referenced EC/R developed Four Factor Reports, as follows:

Incomplete and Cursory Application of the Four Factors

The "Four Factors"² required to be evaluated pursuant to the Clean Air Act and the Regional Haze Rule are acknowledged by the WRAP and EC/R to be necessary review elements for evaluating and setting reasonable progress goals as states develop their Regional Haze SIPs (RH-SIPs). Yet, the essential ingredients for thoroughly and accurately evaluating "cost of compliance" and "remaining useful life of any existing source subject to such requirements" are fundamentally ignored in the EC/R reports.

For example, EPA's RP Guidance includes knowledge and evaluation of site-specific factors, and specific design parameters unique to the evaluated electric generating unit (EGU), cited as follows:

"To assess compliance costs *for individual sources* or source categories potentially subject to emission limitations, we suggest that you *use established control cost analysis techniques*. For stationary sources, generally this involves the following:

- a) Identify *the emissions units* to be controlled;

² Cost of compliance; Time necessary for compliance; Energy and non-air quality environmental impacts of compliance; and, Remaining useful life of any existing source subject to such requirements.

b) Identify *the design parameters for emissions controls*; and

c) Develop cost estimates *based upon those design parameters*.

[States] should evaluate both average *and incremental costs*...."³ (Emphasis added).

Clearly, EPA's RP Guidance points to a four-factor evaluation process that selects individual EGUs and evaluates "design parameters for emissions controls" unique to each EGU evaluated. Furthermore, "cost estimates based upon those design parameters" must be applied to the "emissions units to be controlled" – once those units are identified. The RP Guidance provides no latitude for the apparent "boiler plate" approach taken in these reports by EC/R.

Inadequate Evaluation of Cost of Compliance

"Established control cost evaluation techniques" include, but are not limited to, the following *essential* evaluative factors:⁴

- Control Options Feasibility for specific EGUs
- Control Option percent Reduction Achievable for specific EGUs
- Control Costs Based on EGU Site-Specific and Operational Factors
- Baseline Emissions Adjusted for Regulatory Required and Committed Control Retrofits to the EGU Prior to RPG Evaluation
- Control Cost Amortization Adjusted for EGU Remaining Useful Life

The Four Factor Reports fail on most of the above "established control cost evaluative techniques." From its review of these reports, WEST supplies examples below to support this conclusion. For purposes of simplicity, WEST is referencing the "2009-05-22 Individual Facility Analyses -- Colorado." The same issues appear in each of the Four Factor Reports.

Control Options Feasibility for the specific EGU

EC/R performed a partial evaluation of control options feasibility for reviewed Colorado EGUs. WEST notes for example, in Table 3-2, that EC/R varies the control technology options between each EGU, based on some knowledge of existing or committed controls. However, there is no discussion in the report to verify EC/R's technical reasons for the

³ "Guidance for Setting Reasonable Progress Goals Under the Regional Haze Program (June 2007 Revision)"; Pg. 18; <http://www.wrapair.org/forums/amc/documents/RPguidance.pdf>

⁴ These evaluative factors are a combination of the steps required pursuant to the RP Guidance document for evaluation of control measure options, and practical engineering analysis steps commonly used by power plant engineers when EGUs prepared BART Assessments required by EPA's BART Guidance document (2005).

WRAP's Reasonable Progress Four Factor Evaluation Project

June 30, 2009

Page 6

options listed. As it relates to NO_x, each of the reports contain a common listing of low-NO_x burners (LNB), LNB with over-fired air (OFA), selective non catalytic reduction (SNCR), and selective catalytic reduction (SCR) (with the lower level controls not listed if currently installed).

This approach has the following two flaws.

First, there is no discussion about whether EGU boiler specific operational and existing design factors would accommodate the listed control option and whether the specific control option would yield NO_x reduction capabilities within the percent reduction ranges stated. For example, installation of NO_x, PM, and SO₂ controls required to meet recently-adopted BART emission limits (unique to the specific EGU design parameters), will directly affect the volume and grid size of SCR catalyst beds required to resolve back pressure issues that can impact the NO_x percent removal achievable with SCR. Under some conditions, this will result in infeasibility of SCR.

Also, some EGUs have specific design parameters and operational characteristics that can make installation of SNCR either not feasible or ineffective in achievable NO_x percent removal. SNCR involves injection of urea or ammonia within the ductwork flow of combustion flue gas at a carefully designed and tested location of optimum flue gas temperature and residence time. Retrofit installation of SCR or SNCR controls, along with BART-required SO₂ scrubbers and PM control devices, require sufficient space. In some cases, limited space is inadequate or unavailable to accommodate the footprint of retrofit equipment. There is no discussion of these specific factors in the reports.

Second, Table 3-2 does not "winnow" the list of control options based on a "baseline" that takes into account BART emission limits for SO₂, NO_x and PM that most states have promulgated or are in the process of promulgating. There cannot be an accurate Four Factor cost assessment unless baselines are updated with states' adopted BART limits and other EGU committed controls to establish an accurate foundation for Four Factor analyses that may be needed for RPG planning. Nevertheless, achievement of reasonable progress goals may require no further changes in emissions controls after BART is taken into account, and the Four Factor Reports should be revised to reflect this and other possibilities.

Control Option Percent Reduction Achievable for Specific EGUs

Table 3-2 lists Estimated Control Efficiency for each control option in most cases as a range (e.g., SNCR, 30-75%; SCR, 40-90%). It appears that EC/R selected a single percent reduction range for each control technology. This error is repeated across all reports, even though specific EGU analyses will yield unique percent reduction capabilities when taking into account individual EGU parameters.

For example, SNCR and SCR list an average control efficiency of 40% and 80%, without respect to whether these efficiencies are achievable. Given the direct effect this percent

WRAP's Reasonable Progress Four Factor Evaluation Project

June 30, 2009

Page 7

reduction assumption has on the outcome of the \$/ton cost effectiveness, it is critical that any useful evaluation of control technology options take into account situational and operational factors and characteristics. The generic and unjustified information provided in Table 3-3 is a disservice to both the states that requested these analyses and the EGU sources.

Clearly, there is no attempt by EC/R to identify what achievable percent reduction is appropriate for each specific EGU, given site specific and operational design parameters and performance. Both the minimum achievable percent reduction and the range of expected control performance could differ substantially due to individual EGU site specific and operational/design factors.

Further, no discussion indicates that variability in fuel sulfur content, ash content, and nitrogen content was evaluated. It is well known that these fuel constituents vary, with significant effects on emission control performance. Even in cases where EGU fuel sources are relatively constant (e.g., mine-mouth plants, use of western low sulfur coal), fuel constituent variability exists. A change in coal seam can be accompanied by a shift in ash content, nitrogen content, and sulfur content of coal. Fuel factors such as these need to be evaluated specific to each EGU.

Control Costs Based on EGU Site Specific and Operational Factors

None of the Four Factor Reports indicate that control costs were adjusted or tailored to address individual EGU design parameters and site-specific factors. It appears that EC/R used "look up" tables provided by EPA and other sources to make basic nominal adjustments to capital costs of controls based on capacity, combustion configuration, and other commonly known EGU factors. The purpose of these Four Factor Reports is to inform decisions about reasonableness of control measures to achieve reasonable progress goals. Capital and annual operating costs for controls may vary according to the following:

- Space limitations (after BART controls are installed)
- Requirements to replace, add, or reroute flue gas ducting
- Requirements to add induced draft fans to overcome back pressure accrued by addition of more controls
- Moving and reinstallation of major power plant components to provide space for added controls, such as moving the power plant stack.
- Variability in ammonia or urea use required to achieve minimum required percent control for NO_x
- Catalyst replacement schedules.
- Secondary increases in other pollutants resulting from installation of SCR, that further need to be controlled.

An example of how major EGU site and operational specific parameters can significantly affect control costs and, therefore, the need to adjusted control costs to address individual

WRAP's Reasonable Progress Four Factor Evaluation Project

June 30, 2009

Page 8

EGU design and site-specific factors is the retrofit of SCR on coal-fired EGUs operating in the west. Costs associated with SCR may require inclusion of sorbent injection for sulfuric acid mist control, and then potentially a polishing bag house for those EGUs that have ESPs and a scrubber. From at least one WEST utility's experience, SCR will result in a significant increase in sulfuric acid mist that requires the installation of BACT technology. Thus use of sorbent injection to mitigate sulfuric acid mist can in turn result in a significant increase in PM10, which triggers the need for a polishing bag house. Again, this practical example reinforces our comment that there is no generic NOX template that can be applied to western EGUs.

The variability in capital and operating costs can be enough to significantly affect the outcome of the cost effectiveness. Again, there is no evidence in the report to indicate that EC/R considered these practical issues.

Finally, the cost of installing controls (evaluated as \$/ton cost effectiveness) has significant variability due to two additional factors not considered by EC/R. First, EC/R used a capital amortization period of 30 years at 7 percent. WEST takes a position that use of a "one size fits all" amortization period is inappropriate and ignores consideration of the remaining useful life of a plant.

With respect to the 7% cost of capital, this is overly simplistic since the actual cost of capital by individual electric generating plants varies substantially in the case of Investor Owned Utilities (IOUs). Depending on the regulatory decision made by the public utilities commission with jurisdiction, and the individual IOU's financial condition, the cost of capital ranges more typically from 8% or 9% up to 13% or higher. At a minimum, EC/R could have surveyed the range of costs of capital that exist among western IOUs and picked a median % cost of capital to use more appropriately in these analyses.

Baseline Emissions Adjusted for Regulatory Required and Committed Control Retrofits to the EGU Prior to RPG Control Measure Evaluation

Table 3-3 cost effectiveness calculations provide only an annual average \$/ton result. As cited above, it is *a major omission to not also include incremental \$/ton cost effectiveness calculations and results for each EGU*, pursuant to EPA's RP Guidance. The baseline emissions listed for each EGU in Table 3-1 are used for calculating emission reductions, and thereby calculating cost effectiveness results for control options in Tables 3-2 and 3-3. However, the listed NOx and SO2 historical annual emissions in Table 3-1 do not reflect adjustments for the states' recently adopted BART emission limits. Unless, these baseline emissions are adjusted to reflect adopted BART and other EGU committed controls, any Four Factor analysis to be used by states for their 2018 RPG Planning will be inaccurate.

Calculations of cost effectiveness and incremental costs are driven directly by the baseline emissions that will occur after installation and operation of pre-existing

regulatory requirements and committed emission controls. Such changes will result in fewer annual tons of emissions by the time the first reasonable progress goal milestone arrives in 2018. As a result, additional reductions to achieve reasonable progress goals will be less or unnecessary, and the \$/ton cost effectiveness and incremental costs will be significantly higher (less cost effective) than posed by EC/R in Table 3-3.

Control Cost Amortization Adjusted for EGU Remaining Useful Life

As discussed above, EC/R applied a constant, universal capital cost amortization method based on a 30-year amortization period at 7% cost of capital. EC/R could have surveyed the BART Assessments required by EPA's BART Guidelines (2005) that have been submitted by each EGU owner to each state's air quality regulatory agency. Those BART Assessments (in their cost effectiveness calculations) make statements and assumptions about the remaining useful life of each affected EGU.

EC/R should have used EGU specific information and calculated the cost effectiveness of each control option accordingly.

Conclusion:

WEST Associates strongly urges the WRAP and its states to reject the severely flawed Four Factor Reports. The Four Factor Reports produced by EC/R Incorporated comprise an inadequate and incomplete foundation on which to base discussions regarding the creation of reasonable progress goals and consideration of control measures in developing Regional Haze SIPs.

If you have any questions, or need further information regarding these comments, please contact Lyle Nelson, at lylen@simginc.com.

Sincerely,



Kevin Wanttaja
President of the Board
WEST Associates

//lrn