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Draft Guidance for Setting Reasonable Progress Goals Under the Regional Haze Program

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Abbreviations and Acronyms

BACT - Best Available Control Technology

BART - Best Available Retrofit Technology

Btu - British thermal unit

CAA - Clean Air Act

dv - Deciview

EPA - Environmental Protection Agency

FR - Federal Register

GCVTC - Grand Canyon Visibility Transport Commission

IMPROVE – Interagency Monitoring of Protected Visual Environments

kWh - Kilowatt-hour

LAER - Lowest Achievable Emission Rate

LTS - Long Term Strategy **RPG**s - Reasonable Progress Goals

NOx - A mixture of NO_2 (nitrogen dioxide), nitric oxide (NO), and other nitrogen oxide gases

NSPS - New Source Performance Standards

RHR - Regional Haze Rule

RPO - Regional Planning Organization

SIP - State Implementation Plan

SCR - Selective Catalytic Reduction

1.0 INTRODUCTION

The purpose of this guidance is to provide States (and Tribes who so choose) with direction for complying with the requirement to set and meet Reasonable Progress Goals (RPGs) as part of their regional haze State Implementation Plans (SIPs) under 40 CFR 51.308(d)(1). This document provides additional guidance for certain key steps in the process that have not been directly addressed in existing guidance. A significant part of this guidance is devoted to interpreting the "statutory factors," listed in section 169A(g)(1) of the Clean Air Act (CAA), and 40 CFR 51.308(d)(1)(i)(A). This fulfills EPA's obligation to provide such guidance, as promised in the Regional Haze Rule (RHR) (64 FR 35732).

1.1 Legislative and Regulatory History

The CAA was amended in August 1977, and a new section 169A was added for the protection of visibility in areas of great scenic importance, such as national parks and wilderness areas. In section 169A(a)(1), Congress established the national goal for visibility protection as:

> "the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution."

Section 169A(4), in part, required EPA to "promulgate regulations to assure reasonable progress toward meeting the national goal ...." States were also required to submit SIPs containing such emission limits, schedules of compliance, and other measures as may be necessary to make reasonable progress toward meeting the goal.

In the CAA Amendments of 1990, Congress established a new section 169B, which strengthened and reaffirmed the national goal and, under section 169B(e), called for EPA to carry out the Administrator's regulatory responsibilities under section 169A, including criteria for measuring "reasonable progress" toward the national goal.

In response to these mandates, EPA promulgated the RHR on July 1, 1999 (64 FR 35714-35774). Under Section 308(d)(1) of this rule, States must "establish goals (expressed in deciviews) that provide for reasonable progress towards achieving natural visibility conditions." RPGs must be established for each Class I area within the State, and "must provide for an improvement in visibility for the most impaired days over the period of the implementation plan and ensure no degradation in visibility for the least impaired days over the same period." Section 169A(g)(1) of the CAA and Section 51.308(d)(1)(i)(A) of the RHR provide that States consider the following four statutory factors:

a) The costs of compliance,
b) The time necessary for compliance,
c) The energy and non-air quality environmental impacts of compliance, and
d) The remaining useful life of existing sources that contribute to visibility impairment.

States must consider these four "statutory factors" in consultation with other affected States, Federal Land Managers, and all stakeholders, in determining their RPGs.

The 1990 CAA Amendments, Section 301(d), provides Tribes the authority to seek treatment in the same manner as a State (see 40 CFR Part 49). Since no Tribe has jurisdiction of a mandatory Class I area, Tribes, similarly to States without Class I areas, will be limited to participation in consultation with surrounding States as the State develops its RPGs. This guidance should provide Tribes, as well as States without Class I areas, with a basic understanding of how RPGs will be established and assist them in the consultation process.

1.2 Meaning of the Term, "Reasonable Progress Goals"

The national visibility goal, "the prevention of any future, and the remedying of any existing, impairment of visibility ...." at Class I areas, is expected to be satisfied by 2064, with a return to natural visibility conditions. The linear rate of improvement sufficient to attain natural conditions by 2064 is referred to as the "uniform rate of progress." RPGs should define future visibility conditions that are equal to, or better, than visibility conditions expected by the uniform rate of progress at any future year until natural conditions are achieved. RPGs are established for the final year in each planning period. In the case of the first SIP, which covers 2008 to 2018, the RPG for this SIP should be calculated for 2018.

RPGs should be initially developed considering available control measures as evaluated using the statutory factors. Based on emission reductions anticipated from the resulting control strategy for all visibility impairing pollutants, the State should ensure that the RPGs define visibility conditions at, or better than, conditions based on the uniform rate of progress. If a State finds that its initial RPG will not result in visibility improvement equal to or better than the uniform rate of progress, then the State should reconsider available control measures, and additional measures should be evaluated as appropriate. The RPGs should then be revised based upon a more stringent suite of controls[1]. These issues are discussed further in sections 2.2 and 5

[1] If a State shows, under section 308(d)(1)(ii), that a more stringent suite of controls is not possible based on the four factors, then a lower RPG may be justified. We expect, however, that only under unusual circumstances would it be necessary for a State to justify a lower RPG.

below.

1.3 Relationship of Reasonable Progress to BART and the Long Term Strategy

The RPGs, Best Available Retrofit Technology (BART), and the Long Term Strategy (LTS) are the three main elements of the regional haze SIPs required by 40 CFR 51.308. Although evaluated separately, these SIP elements are inherently related.

The LTS is the compilation of all control measures, and is the principal vehicle through which the State will meet the RPGs. The LTS must include "enforceable emissions limitations, compliance schedules, and other measures as necessary to achieve the reasonable progress goals ...." Section 51.308(d)(3)(iv) requires that the State "identify all anthropogenic sources of visibility impairment considered by the State in developing its LTS." Section 51.308(e) addresses a special subset of stationary anthropogenic sources, BART eligible sources, through the application of BART. RPGs are the visibility conditions expected to be achieved at the required milestone dates, 2018 being the first such milestone date. The first RPG (2018) is the visibility condition expected to be achieved when the first LTS (BART plus all the other reasonable control measures) is fully implemented. (The final RPG (2064) should represent natural conditions, which are the visibility conditions expected to be achieved when the final LTS is fully implemented.)

2.0 OVERVIEW OF THE PROCESS FOR DEVELOPING THE RPG

Development of the RPG for each Class I area should be a collaborative process among State, local, and Tribal authorities, Regional Planning Organizations (RPOs), and Federal Land Managers (FLM)[2]. The steps in the development of the RPGs will be briefly outlined in this section of the guidance, along with references to other guidance and rules where additional detail can be found. The remaining sections of this guidance are devoted to expanding particular aspects of these steps. In addition, as this is guidance for States , the use of "you" through the rest of the document refers to States developing RPGs.

2.1 Establish the Baseline

The baseline represents the starting point from which reasonable progress will be measured. There are two baseline values for each Class I area. Using 2000 - 2004 IMPROVE monitoring data, the deciview values for the 20% best days in each year are averaged together, producing a single average deciview value for the best days. Similarly, the deciview values for the 20% worst days in each year are averaged together, producing a single average deciview value for the worst days. Previous guidance and rulemaking[3] adequately cover this topic; therefore it is not discussed further in this guidance. While this guidance addresses calculation of baseline conditions, it may be important to determine which chemical species contribute to these two conditions as the sources and distribution of chemical species may differ between the 'best days' and 'worst days'. The control strategies necessary to achieve the RPGs for the 'best' and 'worst' days may be different.

2.2 Develop Control Measures Using the Statutory Factors

The second step in setting an RPG is to use the statutory factors to develop control measurers, discussed in section 1.1 above. The following are basic steps in this process:

a) Identify the sources and source categories that contribute significantly to the most

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[2] See CAA sections 169A(d) Consultations with appropriate Federal land managers, 169B(c) Establishment of visibility transport regions and commissions, and 169B(d) Duties of visibility transport commissions.

[3] For more detail, see 64 FR 35728 – 29, 51.308(d)(1), 51.308(d)(2), and EPA's *Guidance for Tracking Progress Under the Regional Haze Rule*, EPA-454/B-03-004, September 2003, , available at: www.epa.gov/ttn/oarpg/t1/memoranda/rh_tpurhr_gd.pdf

impaired days at each Class I area. This is covered in more detail in Section 3.0. Also identify source categories that contribute significantly to the least impaired days.

b) Determine the key pollutant species which are contributing to regional haze at each Class I area on both the 'worst' and 'best' days. This is covered in more detail in Section 3.1.

c) Identify the control measures and associated emission reductions that are:

   i) Expected to be achieved from existing rules and promulgated rules with future effective dates. These rules may include State, local and federal rules, and

   ii) Available measures for the sources and source categories that contribute significantly to visibility impairment at each Class I area, beyond current and expected controls.

   This is covered in more detail in Section 4.

d) Apply the four statutory factors to sources and control measures in each source category. Include control measures for sources in the source categories you have identified per Section 3 below. Applying the statutory factors is covered in more detail in Section 5 below.

2.3 Determine the Uniform Rate of Progress for Each Class I Area

The third step in setting an RPG is to identify the uniform rate of progress to natural conditions by 2064 for each Class I area, by determining the linear rate of improvement from baseline to natural conditions (using EPA default values for natural conditions[4]). You should also identify the visibility improvement that uniform rate of progress would provide over the planning period for the first LTS (i.e. by 2018). Section 6 discusses this process in more detail.

[4] Again, see 64 FR 35728 – 29, 51.308(d)(1), 51.308(d)(2), and EPA's *Guidance for Tracking Progress Under the Regional Haze Rule*, EPA-454/B-03-004, September 2003, available at: www.epa.gov/ttn/oarpg/t1/memoranda/rh_tpurhr_gd.pdf

2.4 Select the Reasonable Progress Goal and Measures to Achieve the Goal

The fourth step in setting an RPG is to select the most appropriate control strategy, which can be done in the following manner:

(a) Combine the control measures from "existing controls", additional controls, and BART for an overall control strategy.

(b) Compare visibility condition resulting from the control strategy to conditions determined from the uniform rate of progress for each Class I area.

(c) Select a RPG based upon a control strategy scenario that results in visibility improvement at or beyond the uniform rate of progress for the first LTS.

In sum, you would identify all available control measures for sources that contribute to impairment on both the 'best' and 'worst' days. Each control measure would be evaluated in light of the four statutory factors. A control strategy would be developed and emission reductions determined. Visibility conditions resulting from the strategy would be determined and compared to conditions based in the uniform rate of progress. If the projected conditions are equal to, or better than those from the uniform rate of progress, the goals can be accepted. Should conditions not be equal to those based on the uniform rate of progress, you should consider additional measures for inclusion in the strategy. If no additional measures can be identified that are reasonable, you will need to justify why the SIP cannot meet visibility goals that are equal to or better than conditions based on the uniform rate of progress.

Some states or RPOs are developing or using variations on this approach which are acceptable under this guidance. For example, one similar approach is to assume specific percentage reductions in visibility impairing pollutants, and determine (through dispersion modeling) what visibility conditions would result from such reduction. These conditions are then compared to conditions calculated from the uniform rate of progress. A percentage emission reduction could be determined that would provide progress at or beyond the uniform rate of progress. In a separate step, the State would consider the four statutory factors to select appropriate measures. Then a suite of control strategies would be selected in light of both overall emission reductions needed and the statutory factors. In modeling the resulting suite of controls you would need to ensure that they would result in an RPG at or beyond the uniform rate of progress.

The RP process is expected to be iterative since it is anticipated to require states to identify potential sources, evaluate potential control measures against the statutory factors, assess

the potential impacts of these control measures on visibility and then repeat the process to more finely hone exactly which control measures will be implemented. More details about how this iterative process might work are outlined in the sections below.

3.0 IDENTIFYING KEY POLLUTANTS AND SOURCE CATEGORIES FOR THE FIRST PLANNING PERIOD

Use the statutory factors to select appropriate control measures. This process begins with the identification of key pollutants and source categories – i.e., analysis of visibility impairment attributable to specific pollutant species on the 20 percent best and worst days. Such analysis has been the subject of considerable study over the past decade, including studies by the Grand Canyon Visibility Transport Commission (GCTVC) and others; and ongoing work by RPOs. For the purpose of this document, it is assumed that such analyses have been conducted for each Class I area.

3.1 Identification of source categories from which these pollutants and their precursors are emitted

Once the key pollutants contributing to visibility impairment at each Class I area have been identified, the sources or source categories responsible for emitting these pollutants or pollutant precursors can also be determined. There are several tools and techniques being employed by the RPOs to do so, including analysis of emission inventories, source apportionment, trajectory analysis, atmospheric modeling, and others. Technical guidance on these techniques is beyond the scope of this document. Instead, this document focuses on policy considerations relevant to the identification of which source categories should be considered and the level of control in establishing reasonable progress goals.

3.2 Identification of possible control measures for these pollutants (and their precursors) and source categories

There are numerous possible conceptual approaches that can be used to identify control measures for the long-term strategy. We suggest beginning by concentrating on possible emissions reductions of several pollutant species from a few selected source sectors, focusing on those source categories with the highest emissions.[5]

One benefit of this approach is that there may be significant industrial sources in BART source categories that are not subject to BART (because, for example, they were not constructed during the BART time period), and from which reductions will be eventually be needed to get to natural conditions. The benefits of controls on these sources should be considered in planning the

[5] Note that this step in the process is independent of the glide path analysis, insofar as emissions from sources in a given source category may affect numerous Class I areas.

first long-term strategy, as it may be more efficient to get these reductions at the same time as BART, rather than regulating the source category in piecemeal fashion over a longer time period. In addition, there may be additional non-BART source categories (e.g., road dust, wildfires, prescribed burns, and agricultural burning) from which significant reductions may be available.

Under this approach, the question arises whether to consider the statutory factors, discussed in the next section, in order to initially select the source categories on which to concentrate. This in turn may point to the need for some type of multi-step approach, employing the factors twice – once to identify promising sources from which to obtain needed reductions, and a second time to ensure that the measures required are in fact reasonable, in light of the analysis of the factors across different source categories.

This is just one example of a conceptual approach; there could be many others, each requiring different iterations of air quality modeling, economic analyses, sensitivity analyses, etc. The RPOs have been established to address, and are addressing, the need to structure such policy and technical analyses in the most cost effective manner, involving the least duplicative efforts among States. Therefore, this guidance seeks to provide some principles which will ensure general consistency among RPOs, and more importantly, ensure that all appropriate factors are considered in setting the reasonable progress goals.

4.0 IDENTIFY CONTROL MEASURES FOR CONTRIBUTING SOURCE CATEGORIES FOR THE FIRST PLANNING PERIOD

A key factor to consider when identifying contributing source categories is the relation of the LTS requirements to reasonable progress. Section 308(d)(3) of the RHR governs the required contents of the LTS. Section 308(d)(3)(iv) provides that States should consider all anthropogenic sources of visibility impairment, including major and minor stationary sources, as well as mobile and area sources, within the LTS. Section 308(d)(3)(v) further delineates seven factors to consider when developing a LTS:

a) Ongoing emission reduction programs, including measures to address reasonably attributable visibility impairment, as well as those to address NAAQS attainment and other CAA requirements.
b) Measures to mitigate the impact of construction activities.
c) [Additional] emission limits and compliance schedules needed to achieve the RPG.[6]
d) Source retirement and replacement schedules.
e) Agricultural and forestry smoke management techniques.[7]
f) Enforceablity of emissions limitations and controls.
g) Anticipated visibility effects from changes in point, area, and mobile source emissions.

The preamble clarifies that these LTS requirements are based on the requirement in the CAA section 169A(b)(2)(B) that SIPs include "long term (ten to fifteen year) strategies for making reasonable progress toward meeting the national goal." The preamble discussion of each of these factors indicates that they are integrally related to the reasonable progress goals.[8]

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[6] The word "Additional" does not appear in the regulatory text at 51.308(d)(3)(v)(C), but the preamble clarifies that this item refers to measures in addition to ongoing programs. See 64 FR 35737.

[7] Where smoke impacts from fire are identified as an important contributor to regional haze, smoke management programs should be a key component of regional and State regional haze planning efforts and long-term strategies. There are a number of sources of information on mitigation approaches for fire emissions, including: (1) The EPA Interim Air Quality Policy on Wildland and Prescribed Burning, which can be found at www.epa.gov/ttn/oarpg/t1/memoranda/firefnl.pdf, and (2) Prescribed Burning Background Document and Technical Information Document for Best Available Control Measures (EPA-450/2-92-003), which can be found at www.epa.gov/ttn/catc/products.html

[8] Of course these control measures should be included in SIPs in a manner consistent with applicable EPA policy and memoranda, such that the measures are enforceable in the SIP. For example, monitoring, recordkeeping, and reporting requirements must be consistent with title V requirements and the compliance

Given that all of these factors – and the source categories they entail – should be addressed in the LTS, States should identify the broadest possible universe of minor and major stationary sources, and area and mobile sources contributing to visibility impairment, when determining the emission measures needed to make reasonable progress.

In other words, source categories should not be eliminated at this stage of the analysis. For example, even if emissions reductions from one source category are projected to be enough to achieve the uniform rate of progress towards natural background in 60 years, you should not forego an analysis of what degradation is being caused by pollutants from other source categories, or what improvements could be made by controlling them. The statutory factors must be applied before determining whether given emission reduction measures are reasonable. **In particular, the State should adopt a rate of progress greater than the uniform rate of progress if this in found to be reasonable according to the statutory factors**. See in particular the directive in the preamble to the RHR at 64 FR 35732:

> "If the State determines that the amount of progress identified through the analysis is reasonable based upon the statutory factors, the State should identify this amount of progress as its reasonable progress goal for the first long-term strategy, unless it determines that additional progress beyond this amount is also reasonable. If the State determines that additional progress is reasonable based on the statutory factors, the State should adopt that amount of progress as its goal for the first long-term strategy."

4.1 Determination of emission reductions expected from State, federal, and local control measures affecting those sources which will be in place within the first LTS period

The next step in this segment of the analysis is to determine the amount of emission reductions that can be expected from the identified sources or source categories as a result of currently existing and firmly anticipated requirements at the local, State, and federal levels, during the period of the LTS.

The baseline year for emission inventories on which long term strategies are based is 2002[9]. You may take credit in your LTS for emission reductions achieved after 2002, including

requirements at 40 CFR Part 75.

[9] 40 CFR 308(d)(3)(iii) provides that the baseline emission inventory year is presumed to be the most recent year of the consolidated emissions inventory for the SIP. A memorandum from OAQPS dated November 18, 2002, entitled *2002 Base Year Emission Inventory SIP Planning: 8-hr Ozone, PM 2.5, and Regional Haze*

reductions from measures under ozone and PM2.5 programs[10]. Additionally, Section 308(d)(1)(vi) of the RHR also provides that reasonable progress goals may not represent less visibility improvement than is expected to result from implementation of other CAA requirements during the planning period. Therefore, it is necessary to estimate the emission reductions expected from other CAA programs during the 2002-2018 period.

It should also be noted that in the case where you choose to implement an alternative strategy in lieu of source-specific BART, you must demonstrate that emission reductions resulting from the alternative program "will be surplus to those reductions resulting from measures adopted to meet requirements of the CAA as of the baseline date of the SIP."[11] Some measures adopted as of the baseline date of the SIP (2002) might not be fully reflected in the 2002 EI (for example, if the measures were adopted late in the year); therefore, if you are contemplating the use of a BART-alternative program, you should ensure that it is able to identify emissions reductions occurring after 2002 as a result of programs adopted as of 2002.

4.2 Identification of additional emission control strategies for the source categories identified

After determining the amount of emissions reductions of visibility impairing pollutants that may be expected from implementation of other CAA programs, you will be in the position to identify suites of strategies to obtain further reductions from these sources, as well as reductions from sources which are not subject to existing CAA requirements. There are many ways that a strategy to identify emission reductions to meet reasonable progress goals could be developed. We encourage you to proceed with the approach that, on balance, achieves the greatest air quality improvements while remaining sensitive to statutory requirements and specific considerations in your State. All sensitivity analyses used to develop specific control strategies should be developed and documented in the SIP.

You should identify suites of control strategies of different levels of stringency. One way might be to develop a maximum control scenario, a medium control scenario, and a minimum additional controls scenario. A minimum strategy could simply address controls expected from

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Programs ("2002 EI Memo") established 2002 (which is a consolidated EI year) as the baseline emission inventory year for regional haze as well as the other programs cited. See http://www.epa.gov/ttn/oarpg/t1/memoranda/2002bye_gm.pdf

[10] See 2002 EI Memo at page 4.

[11] 40 CFR 308(e)(2)(iv).

already promulgated or soon to be promulgated State and federal rules. Strategies of greater stringency could apply specific control levels across the board to all sources, or to specific source categories. Specific control levels for specific source categories could be chosen with reference to control levels documented in the BACT/LAER clearinghouse, or on EPA's AIRControlNet database[12]. A maximum control scenario could include expanding non-attainment area control measures to attainment areas within your State as well as requiring additional or more stringent controls within non-attainment areas. Correspondingly, a medium stringency strategy could expand non-attainment type control measures to attainment areas, without requiring any additional reductions within ozone and $PM_{2.5}$ non-attainment areas.

[12] Information on AirControlNET can be found at www.epa.gov/ttn/ecas/AirControlNET.htm

5.0 APPLYING STATUTORY FACTORS TO POTENTIALLY AFFECTED SOURCES

The reasonable progress factors are easily applied to stationary sources. CAA section 169A(g)(1) provides reasonable progress factors which are nearly identical to the CAA section 169A(g)(2) factors applicable to major stationary sources subject to BART, the major difference being that the reasonable progress factors do not include consideration of visibility improvement.[13] However, a broader analytical framework exists for application of the factors in the reasonable progress context.

In the case of BART, Congress identified a specific class of sources that may have been grandfathered from review, and for which an appropriate retrofit emission limitation must be determined. It is in the determination of a source specific technology that the factors are considered. In contrast, in the context of reasonable progress, Congress simply required that the factors be considered in determining what progress is reasonable, without prescribing which source categories, or activities must be considered in the analysis.

Given this less prescriptive approach, the CAA provides a good deal of flexibility as to how the factors are taken into consideration – for example, they could be used to select which sources or activities should be regulated, or they could be used to determine the level or stringency of control for selected sources or activities, or some combination of both.

Neither the legislative history for the 1977 nor 1990 amendments provide further illumination regarding the intended applicability of these factors. In section 169B(e), Congress required us to develop criteria for measuring "reasonable progress," which we did in the 1999 RHR by establishing the "60 year glide path".

We believe that the reasonable progress factors may be applied to sources other than stationary sources where appropriate, but that the meaning of the factors should not be unduly strained to in order to fit non-point sources. In other words, if common sense dictates that a particular statutory factor does not apply to a particular source category, then your analysis may of course reflect that fact, and emission reductions from such sources may still be included in the SIP.

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[13] This is not surprising, as it is self evident that visibility improvement must be considered in determining what progress is reasonable in remedying existing visibility impairment. In contrast, absent Congress making it so, consideration of visibility improvement would not be inherently necessary in order to determine the appropriate retrofit control technology at a particular source.

5.1. Overview of Process of applying statutory factors

In light of the above considerations, we recommend the following overall process for applying the statutory reasonable progress factors:

(a) Begin with a suite of control strategies (identified as described in section 4) which achieve a rate of progress equal to or greater than the uniform glide path to natural conditions. Then, apply statutory factors to each control measure for each source category by describing the amount and level of control that each of these statutory factors could warrant. There may be several possible levels of control that a single statutory factor might warrant, depending on interpretation. A good description of the rationale used to conclude the reasonable level of control for each statutory factor is expected. Based on the level of control or stringency, you may need to adjust the expected emissions reductions to a level consistent with what is determined to be "reasonable".

(b) Sum the net expected emission reductions, after the application of the factors, from all control measures.

(c) Determine the visibility improvement that would result from the strategy.

(d) If the projected rate of visibility improvement remains greater than or equal to the uniform glide path, it represents the RPG (for all such Class I areas).

(e) If the rate of visibility improvement is less than the uniform glide path for any Class I area, you should consider a more stringent suite of measures.

(f) If the rate of visibility improvement is still less than the uniform glide path, you may adopt these RPGs provided that you explain in the SIP how achieving the uniform glide path is not reasonable based on the application of the factors. Demonstrate why the slower rate is reasonable, and state the projected date for achieving natural background under this alternative rate of progress.

5.2 Application of Factors on Category-Wide Basis

We do not believe that the CAA requires that the reasonable progress factors necessarily be applied on a source-by-source basis. Therefore you may apply the factors on a broader basis, such as to a source category using simplifying assumptions. As discussed in section 5.1, the analytical framework provided by the CAA for applying the reasonable progress factors is

different than that for a BART determinations. Nonetheless, it is helpful to consider the interpretation of the BART provisions by the DC Circuit in the *American Corn Growers* decision in order to shed light on how the reasonable progress factors should be applied.

In *American Corn Growers ,* the DC Circuit remanded the provisions for applying BART on a source specific basis contained in the 1999 RHR. The court was motivated by two basic concerns. The first was that we had improperly constrained the discretion Congress had conferred to you in making a BART determination. The court said that we had done so by *requiring* that you to consider the visibility improvement factor on a cumulative, rather than source-specific basis. The second concern was that under the process prescribed by us, a source might be required to spend millions of dollars for controls that resulted in no perceptible visibility benefits, with no provision to safeguard against this possibility by considering the visibility benefits of the controls at that particular source.

Neither of those concerns necessarily preclude the application of the reasonable progress factors on a cumulative (e.g., source category-wide) basis. With respect to the first concern, we are not requiring you to apply the factors on a cumulative basis, but simply suggesting that such an approach would be permissible.[14]

With respect to the second concern, the fact that the reasonableness of the measures is evaluated on a cumulative basis does not necessarily imply that control requirements are being imposed at particular sources without the possibility of variations. You should be mindful, however, of the possible need for an exemption process in order to ensure that source-specific factors may be considered where appropriate.

5.3 Relationship to BART Analyses

As stated in Section 1.3, above, part of the LTS is the implementation of BART to BART eligible sources (or an alternative program that provides for emission reductions greater than source specific BART). BART determinations are made separately from, and prior to, the uniform rate of progress analysis. Emission reductions resulting from BART are to be included in the LTS and used, in conjunction with all other control measures, to meet the RPGs. You may find that in order to achieve reasonable progress, controls more stringent than BART are

[14] The purpose of this document is to give States, Tribes and FLMs guidance in assessing reasonable progress under the RHR. This guidance does not substitute for the CAA or EPA regulations, nor is it a regulation itself. Thus, it does not impose binding, enforceable requirements on any party. EPA retains the discretion to approve SIPs on a case-by-case basis that may differ from this guidance but still comply with the statute and regulations. This guidance is a living document and may still be revised periodically without public notice.

warranted for particular sources or source categories for which BART determinations have been made. In addition, of course, sources not subject to BART (or not BART-eligible) could be called upon to make reductions for reasonable progress.

5.4 Reasonable Progress Statutory Factor (a): Cost of Compliance

The cost of compliance factor is used to determine whether compliance costs for sources are reasonable compared to the emission reductions and visibility improvement they will achieve. Note that visibility improvement is not only related to tons of pollutant removed, but also involves how the pollutant or chemical compound affects the extinction coefficient in each Class I area. For example, on a pound to pound comparison, sulfate particulate impairs visibility greater than coarse particulate.

Costs should be determined for one-time capital costs and ongoing annual operation, maintenance, and upkeep costs.

To apply the cost of compliance statutory factor, established control cost analysis techniques should be applied to the sources or source categories that have been identified as potentially subject to emission limitations. Generally, this involves the following:

a) Identify the emission units being controlled,

b) Identify the design parameters for emission controls, and

c) Develop cost estimates based upon those design parameters.

Step a), the identification of units being controlled, is the product of the analysis discussed in section 4 above. Steps b) and c) are discussed below.

5.4.1 Identification of Design Parameters

The goal of the regional haze SIP is to achieve emission reductions from sources which will achieve reasonable progress towards the national visibility goal. In order to develop cost estimates for a specific source or source category, the design parameters for proposed controls need to be determined. Therefore, unless the particular emission reduction standard for the source has been identified, you should use design values based on the typical operation of specific control devices.

Examples of design values include parameters such as; type of sorbent and pressure drop

in a wet scrubber, or ammonia to NOx molar ratio in SCR. The selection of design parameter values may be complicated by the fact that there is no source specific quantitative standard (e.g., pounds per million BTU) to use in selecting a design value needed for compliance. Potential sources of design parameters include equipment vendors, background information documents used to support NSPS development, control technique guidelines documents, cost manuals developed by EPA, control data in trade publications, and engineering and performance test data.

The analysis must include documentation of assumptions regarding design parameters. Examples of supporting references would include EPA's *OAQPS Control Cost Manual*[15] and background information documents used for NSPS and hazardous pollutant emission standards. If the design parameters specified differ from typical designs, document the difference by supplying performance test data for the control technology in question applied to the same source or a similar source.

5.4.2 Development of Cost Estimates

Once the control technology alternatives and achievable emissions performance levels have been identified, you should develop estimates of capital and annual costs (capital costs can be annualized in a manner consistent with EPA guidance). The basis for equipment cost estimates should also be documented, either with data supplied by an equipment vendor (i.e., budget estimates or bids) or by a referenced source (such as the *OAQPS Control Cost Manual*). In order to maintain and improve consistency, cost estimates should be based on the EPA/OAQPS *Control Cost Manual*, where possible.[16]

5.4.3 Level of Cost Estimation

As explained in the *OAQPS Control Cost Manual,* cost analysis may be divided into five levels of detail: order of magnitude, "study," scope, project control, and detailed. The *OAQPS Control Cost Manual* provides guidance for conducting analysis at the "study" level, which normally provide results that are plus or minus 30 percent. This level of precision is sufficient for

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[15] The *Control Cost Manual* is updated periodically. The most current version that is available at the time of the impact analysis should be used. For more information, see EPA's OAQPS Control Cost Manual, available at: www.epa.gov/ttn/catc/products.html

[16] Documentation for any additional information used for the cost calculations, including any information supplied by vendors that affects your assumptions regarding purchased equipment costs, equipment life, replacement of major components, and any other element of the calculation that differs from the *Control Cost Manual* must be documented.

the reasonable progress analysis. In some cases, where costs are considered on a source-category basis, it may be appropriate to use sensitivity analysis to determine whether an order-of-magnitude level of analysis is sufficient (e.g., if cost considerations are not expected to have any appreciable effect on the amount of emission reductions achieved).

5.4.4 Cost Considerations for Measures other than End-of-Pipe Controls

In the case of strategies other than installation of pollution control devices, such as pollution prevention efforts or increased enforcement efficiency through updated monitoring technology, different cost considerations will apply. To the extent the cost of such measures fall upon regulated entities (rather than local agency administrative cost), you should quantify the costs using a comparable level of rigor as needed for pollution control devices. Factors to consider may include the cost of installing and operating updated monitoring devices, administrative cost of increased recordkeeping, or costs of altering production techniques to eliminate air pollution. For pollution prevention measures, costs should be calculated on a net basis, subtracting out benefits to the source such as recovery of useful product or elimination of existing end-of-pipe control costs.

5.5 Reasonable Progress Statutory Factor (b): Time Necessary for Compliance

The "time necessary for compliance" factor may be used to adjust the RPG to reflect the degree of improvement achievable within the LTS period, as opposed to the improvement expected at full implementation of a control measure, if the time needed for full compliance exceeds the length of the LTS period (for example, diesel retrofits for non-road vehicles may take many years for full fleet turn over). For example, if construction labor availability constraints preclude the installation of controls at all sources of a particular category within the LTS period, the RPG should reflect the visibility improvement anticipated from installation of controls at the percentage of sources that *could* be controlled within the strategy period. (The SIP could still include control strategies that extend beyond the 2018 milestone; in the above example, the visibility improvement anticipated from installation of controls at the percentage of sources that *could not* be controlled within the first strategy period would have to be counted in a later SIP).

Another example might be the implementation of smoke management plans. Due to well-documented problems caused by overly aggressive fire suppression over the past century, emissions from various forms of wild land fires may increase for years or decades before it is possible to reduce burning and establish a new equilibrium. In that sense, the time necessary for compliance with the requirement to remediate existing impairment and prevent additional degradation may be delayed for this source type. In such cases, RPGs should reflect compliance with smoke management plans designed to minimize increases in emissions.

5.6 Reasonable Progress Statutory Factor (c): Energy and Non-Air Impacts

The "energy and non-air impacts" factor is meant to consider whether the energy requirements (both the amount, type, and availability of energy) of the control technology result in energy penalties or benefits. For example, controls on diesel engines may decrease the overall efficiency and require a significant increase in diesel fuel consumption. Or, a particular control may require a fuel unavailable in the area. The State should also consider any significant or unusual non-air environmental impacts. The State should consider the waste stream that may be generated by a particular control technology. The State should also consider other resource consumption rates such as water, water supply, and waste water disposal. This section divides discussion of this reasonable progress factor into a discussion first of energy impacts, and then a discussion of other non-air impacts.

5.6.1 Energy Impacts

The energy requirements of the control technology should be examined to determine whether the use of that technology results in any significant or unusual energy penalties or benefits. A source owner may, for example, benefit from the combustion of a concentrated gas stream rich in volatile organic compounds; on the other hand, more often extra fuel or electricity is required to power a control device or incinerate a dilute gas stream. If such benefits or penalties exist, they should be quantified and included in the cost analysis. Because energy penalties or benefits can usually be quantified in terms of additional cost or income to the source, the energy impacts analysis can, in most cases, simply be factored into the cost impacts analysis. However, certain types of control technologies have inherent energy penalties associated with their use. The penalties should be quantified so long as they are within the normal range for the technology in question.

In general, your energy impact analysis is expected to consider direct energy consumption and not indirect energy impacts. For example, you should estimate the direct energy impacts of the control alternative in units of energy consumption at the source (e.g., BTU, kWh, barrels of oil, tons of coal). The energy requirements of the control options should be shown in terms of total (and in certain cases, also incremental) energy costs per ton of pollutant removed.

Generally, you should not consider indirect energy impacts (such as energy to produce raw materials for construction of control equipment). However, if it can be determined, either independently or based on a showing by the source owner, that the indirect energy impact is unusual or significant and that the impact can be well quantified, these indirect impacts may be considered.

The energy impact analysis may also address concerns over the use of locally scarce fuels. The designation of a scarce fuel may vary from region to region. However, in general, a scarce fuel is one which is in short supply locally and can be better used for alternative purposes, or one which may not be reasonably available to the source either at the present time or in the near future.

Finally, the energy impacts analysis may consider whether there are relative differences between alternatives regarding the use of locally or regionally available coal, and whether a given alternative would result in significant economic disruption or unemployment. For example, where two options are equally cost effective and achieve equivalent or similar emissions reductions, one option may be preferred if the other alternative results in significant disruption or unemployment.

5.6.2 Non-Air Impacts

In the non-air quality related environmental impacts portion of the reasonable progress analysis, you should address environmental impacts other than air quality due to emissions of the pollutant in question, and due to the side-affects of controlling such pollutants. Such environmental impacts may include, but are not limited to, solid or hazardous waste generation and discharges of polluted water from a control device, and atmospheric deposition of pollutants to create or exacerbate impacts on land or in water.

Any significant or unusual environmental impacts associated with a control alternative that have the potential to affect the selection or elimination of a control alternative should be identified. Some control technologies may have potentially significant secondary environmental impacts. Scrubber effluent, for example, may affect water quality and land use. Alternatively, water availability may affect the feasibility and costs of wet scrubbers. Other examples of secondary environmental impacts could include hazardous waste discharges, such as spent catalysts or contaminated carbon. Generally, these types of environmental concerns become important when sensitive site-specific receptors exist or when the incremental emissions reductions potential of the more stringent control is only marginally greater than the next most-effective option. However, the fact that a control device creates liquid and solid waste that must be disposed of does not necessarily argue against selection of that technology, particularly if the control device has been applied to similar facilities elsewhere and the solid or liquid waste is similar to those other applications. On the other hand, where you or the source owner can show that unusual circumstances at the proposed facility create greater problems than experienced elsewhere, this may provide a basis for the elimination of that control alternative.

The procedure for conducting an analysis of non- air quality environmental impacts should be made based on a consideration of site-specific circumstances. It is not necessary to perform

this analysis of environmental impacts for the entire list of technologies or measures identified (see section 4 above) if you propose to adopt the most stringent alternative. In general, the analysis need only address those control alternatives with any significant or unusual environmental impacts that have the potential to affect the selection of a control alternative, or elimination of a more stringent control alternative. Thus, any important relative environmental impacts (both positive and negative) of alternatives can be compared with each other.

In general, the analysis of impacts starts with the identification and quantification of the solid, liquid, and gaseous discharges from the control device or devices under review. Initially, a qualitative or semi-quantitative screening to narrow the analysis to discharges with potential for causing adverse environmental effect should be performed. Next, the mass and composition of any such discharges should be assessed and quantified to the extent possible, based on readily-available information. Pertinent information about the public or environmental consequences of releasing these materials should also be assembled. The following are examples of how to conduct non-air quality environmental impacts:

5.6.2.1 Water Impact

The relative quantities of water used, and water pollutants produced and discharged, should be identified as a result of the use of each alternative emission control system relative to the most stringent alternative. Where possible, the effect on ground water and such local surface water quality parameters as pH, turbidity, dissolved oxygen, salinity, toxic chemical levels, temperature, and any other important considerations, particularly those pertaining to human or ecological resources, should be assessed. The analysis should consider whether applicable water quality standards will be met and the availability and effectiveness of various techniques to reduce potential adverse effects.

5.6.2.2 Solid Waste Disposal Impact

The quality and quantity of solid waste (e.g., sludges, solids) that must be stored and disposed of or recycled, as a result of the application of each alternative emission control system, should be compared with the quality and quantity of wastes created with the most stringent emission control system. You should also consider the composition and various other characteristics of the solid waste (such as permeability, water retention, rewatering of dried material, compression strength, leachability of dissolved ions, bulk density, ability to support vegetation growth and hazardous characteristics), which are significant with regard to potential surface water pollution or transport into and contamination of subsurface waters or aquifers.

5.6.2.3 Irreversible or Irretrievable Commitment of Resources

You should consider the extent to which the alternative emission control systems may involve a trade-off between short-term environmental gains at the expense of long-term environmental losses, and the extent to which the alternative systems may result in irreversible or irretrievable commitment of resources (for example, use of scarce water resources). These considerations may weigh against a control system that requires irreversible or irretrievable commitment of resources.

5.6.2.4 Other Adverse Environmental Impacts

Significant differences in noise levels, radiant heat, or dissipated static electrical energy may be considered. Other examples of non-air quality environmental impacts would include hazardous waste discharges such as spent catalysts or contaminated carbon. Generally, these types of environmental concerns become important when the plant is located in an area that is particularly sensitive to environmental degradation and when the incremental emissions reductions potential of the most stringent control option is only marginally greater than the next most-effective option, but the environmental impact is of greater concern.

5.6.2.5 Benefits to the Environment

You may find it important to consider differing beneficial impacts to non-air quality-related environmental media among control options. For example, a given control option may result in less deposition of pollutants, in particular nitrogen compounds, to nearby sensitive water bodies. Also, there may be effects unique to high elevation ecosystems. In some eastern Class I areas with elevations above 1,000 meters, there may be direct deposition of acid and nitrogen compounds on vegetation and soil from cloud impacts. Growth rates and competition between alien and native species may be affected by pollution loadings as well. As part of the consultation requirement between States and the FLMs under 40 CFR 51.308(i)(2), we expect the FLMs to provide information on non-air quality indicators to be considered. The States should also consider such information available from other sources, such as public comments.

5.7 Reasonable Progress Statutory Factor (d): The Remaining Useful Life of the Source

The statutory factor of the remaining useful life of the source is applicable only to those measures which would require retrofitting of control devices (or possibly production changes) at *existing* sources. In such cases, this factor should be treated as one element of the overall cost analysis. The "remaining useful life" of a source, if it represents a relatively short time period, may affect the annualized costs of retrofit controls. For example, the methods for calculating annualized costs in EPA's *OAQPS Control Cost Manual* require the use of a specified time period for amortization that varies based upon the type of control. If the remaining useful life will clearly

exceed this time period, the remaining useful life has essentially no effect on control costs and on the reasonable progress determination process. Where the remaining useful life is less than the time period for amortizing costs, this shorter time period should be used in your cost calculations.

For purposes of this analysis, the remaining useful life is the difference between the year of the reasonable progress analysis and the date the facility permanently stops operations. In cases where emission reduction measures are being considered on a source category basis, simplifying assumptions, such as average retirement rates in order to assess the affect of remaining useful life factor on the category as a whole, should be used.

If achieving the uniform rate for progress is dependent upon the assumed shut-down of a particular source or number of sources within a source category by the end of the first long term planning period, then such a shut down must be assured by a federally enforceable agreement to do so, or to install control devices by the agreed upon shut down date. Where the source chooses not to accept a federally enforceable condition requiring the source to shut down by a given date, it is necessary to determine whether a reduced time period for the remaining useful life changes the level of controls that would have been required. If the reduced time period does change the level of controls, you should identify, and include as part of the emission limitation, the more stringent level of control that would be required if there were no assumption that reduced the remaining useful life. This would serve as a contingency should the source continue operating after the assumed shut-down date.

The remaining useful life factor is not applicable to measures affecting new sources, or to "sources" of emissions which by nature have an indefinite life span – for example, agricultural or biomass burning practices.

6.0 DETERMINING UNIFORM RATE OF PROGRESS TO NATURAL BACKGROUND CONDITIONS

As mentioned in Section 2.3, the third step in setting a RPG is to identify, for each Class I area, the uniform rate of progress to natural conditions in 2064[17]. From the uniform rate of progress, you can then calculate the minimum amount of visibility improvement that should be achieved in the period of the first planning period. Figure 1, below, illustrates the basic steps in the process.

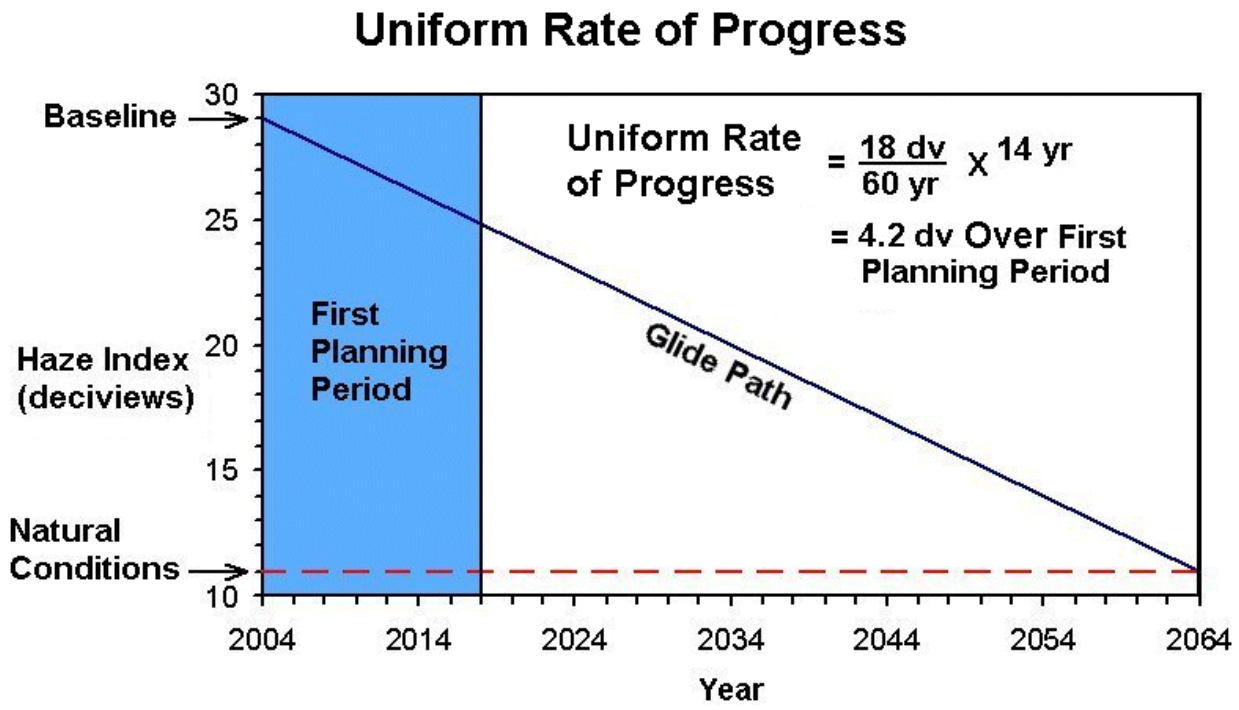

Figure 1 Example of a Uniform Rate of Progress

To determine the uniform rate of progress to natural background conditions, the following steps should be followed for each Class I area:

[17] Also see *Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Program*, EPA-454/B-03-005, September 2003, available at: http://www.epa.gov/ttn/oarpg/t1/memoranda/rh_envcurhr_gd.pdf

a) Compare the baseline visibility conditions in the years 2000 – 2004 (in deciviews) for both the most impaired days and the least impaired days, with the natural background conditions. In this example, the baseline value is 29 deciviews (dv), and the natural background conditions are 11 dv.

b) The difference between the baseline and natural background values represents to the amount of progress needed to reach natural background conditions in 60 years, that is, by the year 2064. In this example, this value is 18 dv.

c) Calculate the average yearly improvement needed by dividing the total amount of improvement needed by 60 years (the period between 2004 and 2064). In this example, this value is 0.3 dv/yr.

d) Multiply the average yearly improvement needed by 14 years, representing the number of years in the first planning period (the period from 2004 until 2018). In this example, this value is 4.2 dv.

The result represents the *minimum* amount of improvement needed in the period of the first long-term strategy.

7.0 ASSESS VISIBILITY IMPROVEMENT RESULTING FROM VARIOUS COMBINATIONS OF STRATEGIES, AND SELECT RPGS

The next step in the process of determining what emission reductions are needed in order to achieve the uniform rate of progress towards natural background conditions is to estimate the degree of visibility improvement expected from the strategies identified in the previous step. This should be performed according to procedures detailed in EPA's *Guidance for Tracking Progress Under the Regional Haze Rule*. Because a large number of potential strategies (involving different source categories at varying levels of control) have been consolidated into a smaller number of suites of controls, as described in section 4.2 above, the complexity of the modeling task is lessened.

Based on modeling the results of applying controls that are reasonable according to the four factors for each source category, set an RPG for each Class I area at the uniform rate of progress or a greater rate.

You may determine that it is not reasonable to achieve the uniform rate of progress or a greater rate; but if so, you must demonstrate this according to the four factor analysis in section 5 above, and you must also demonstrate why the slower rate that you choose is reasonable according to the four factor analysis. In this case, you must also provide information on number of years needed to reach background conditions at this rate.