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Preventing Significant Deterioration Under the Clean Air Act: Baselines, Increments, and Ceilings—Part II

by John-Mark Stensvaag

Editors' Summary: The CAA's PSD program is extraordinarily complex. This Article, written in two parts, focuses on the root of the PSD implementation process—baselines, increments, and ceilings. After exploring the essential features of baselines, increments, and ceilings, Prof. John-Mark Stensvaag delves into to the complications that clutter up the theoretical simplicity of these features—complications flowing from statutory drafting, regulatory drafting, and interpretative choices made during the first 30 years of the program. Part I of this Article, which appeared in the December 2005 issue of News & Analysis, focused on baseline dates and baseline areas. In Part II, the author examines baseline concentrations, ceilings, and increment consumption. His analysis reveals two overarching themes about the program: (1) the PSD increment program is implemented to maximize industrial growth; and (2) implementation is tailored to avoid the establishment of baseline ambient air concentration values, to avoid the specification of ambient air quality ceilings, and to avoid the use of ambient air quality monitoring to determine compliance with the increment system.

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V. Baseline Concentrations: Getting the Numbers Right . . . or Not . . . or Not at All

A. What the Baseline Is Supposed to Represent

There is universal agreement about what the prevention of significant deterioration (PSD) baseline is supposed to represent: the existing ambient air concentration of the relevant increment pollutant (particulate matter with a diameter of 10 microns or less (PM_{10}), sulfur dioxide (SO_2), or nitrogen dioxide (NO_2)) in the baseline area as of the date of the first completed PSD permit application submitted by a facility seeking to emit that pollutant in a significant amount.[1] To be sure, there are some curlicues in the concept, designed to take into account pending facilities—facilities so close to coming on line with emissions of the relevant pollutant at the time when the PSD program was enacted that their future contributions to ambient air concentrations should also be treated as if already "existing"[2]—but the baseline notion plays the same role here that it plays throughout environmental law: it specifies the background or benchmark from which permissible levels of degradation will ultimately be measured.[3]

Given this function, one would assume that the baseline concentration value—the ambient air concentration existing at the time of the first PSD permit applicant—is actually measured and written down somewhere as the starting point for all that is to follow in the baseline-increment-ceiling dance. As we shall see, however, that is rarely the case.

B. What the Statute Says About Establishing the Baseline Concentration Value

The Clean Air Act (CAA) gives the strong impression that the baseline concentration is, indeed, actually measured and memorialized. Section 169(4) provides:

> The term "baseline concentration" means, with respect to a pollutant, the ambient concentration levels which exist at the time of the first application for a permit in an area subject to this part, *based on air quality data* available in the Environmental Protection Agency or a State air pollution control agency *and on such monitoring data as the permit applicant is required to submit*.[4]

According to this language, baseline concentration values are to be determined based on two—and only two—things: (1) air quality data already available to the U.S. Environmental Protection Agency (EPA) or a state agency; and (2) monitoring data required to be submitted by the permit applicant.

Air quality data might be already available to EPA or to a state agency for a wide variety of reasons, but what does the statute mean when it refers to "such monitoring data as the permit applicant is required to submit?"[5] This reference leads to CAA §165(a) and (e). Section 165(a) sets forth a series of eight conditions that must be met before a PSD permit may be issued,[6] including a review and analysis of the proposed permit and a public hearing thereon.[7] Section 165(e) provides:

1. *See* CAA §169(4), 42 U.S.C. §7479(4); 40 C.F.R. §§51.166(b)(13)(i), 52.21(b)(13)(i) (2005). *See also* 45 Fed. Reg. 52676, 52676 (Aug. 7, 1980) ("The reference point for determining air quality deterioration in an area is the baseline concentration, which is essentially the ambient concentration existing at the time of the first PSD permit application submittal affecting that area.").
2. *See* CAA §169(4), 42 U.S.C. §7479(4); 40 C.F.R. §§51.166(b)(13)(i)(b), 52.21(b)(13)(i)(b).
3. *See* N. William Hines, *A Decade of Nondegradation Policy in Congress and the Courts: The Erratic Pursuit of Clean Air and Clean Water*, 62 Iowa L. Rev. 643, 645 (1977):

   > [E]xisting ambient quality is treated as a baseline that cannot be transgressed to a significant degree unless it can be shown clearly that the social value of the activity that will cause the deterioration in an existing high quality resource exceeds the value associated with maintenance of the status quo.

   Bradley I. Raffle, *Prevention of Significant Deterioration and Nonattainment Under the Clean Air Act—A Comprehensive Review*, 27 Env't Rep. (BNA) 58 (May 4, 1979) ("The concept of air quality deterioration must . . . be related to an ambient status quo . . . [which] is obviously not zero . . . [but reflects] air quality at a fixed point in time.").
4. CAA §169(4), 42 U.S.C. §7479(4) (emphasis added).
5. *Id.*
6. *See id.* §165(a)(1)-(8), 42 U.S.C. §7475(a)(1)-(8).
7. *See id.* §165(a)(2), 42 U.S.C. §7475(a)(2).

> (1) The review provided for in subsection (a) . . . shall be preceded by an analysis in accordance with regulations of the Administrator . . . which may be conducted by the State (or any general purpose unit of local government) or by the major emitting facility applying for such permit, of the ambient air quality at the proposed site and in areas which may be affected by emissions from such facility for each pollutant subject to regulation under this chapter which will be emitted from such facility.
>
> (2) Effective one year after August 7, 1977, the analysis required by this subsection shall include continuous air quality monitoring data gathered for purposes of determining whether emissions from such facility will exceed the maximum allowable increases or the maximum allowable concentration permitted under this part. Such data shall be gathered over a period of one calendar year preceding the date of application for a permit under this part unless the State, in accordance with regulations promulgated by the Administrator, determines that a complete and adequate analysis for such purposes may be accomplished in a shorter period. The results of such analysis shall be available at the time of the public hearing on the application for such permit.
>
> (3) The Administrator shall within six months after August 7, 1977, promulgate regulations respecting the analysis required under this subsection . . . .[8]

We start, therefore, with the assumption that, in the usual case, the permit-issuing authority will have before it one continuous calendar year of air quality monitoring data submitted by the applicant[9]—data vital to establishing the baseline concentration. The court in *Alabama Power Co. v. Costle*[10] was so impressed by the role of this monitoring data that it relied on this PSD program feature to reject EPA's initial attempt to establish a single nationwide baseline date. In doing so, the court stressed the U.S. Senate's desire "to use actual air quality data to establish the baseline,"[11] and further noted that "the task of monitoring existing ambient pollution levels in attainment areas is assigned to the first permit applicant, who will provide the information essential to calculation of the baseline."[12]

C. EPA's Ambivalence Toward Pre-Application Ambient Air Monitoring

Long before *Alabama Power*—indeed, when EPA first struggled to create the PSD program out of thin air—the Agency expressed ambivalence about relying on ambient air quality monitoring data to establish baseline concentration values. In a 1973 *Federal Register* notice explaining its intention to set up a PSD mechanism, EPA suggested that baseline concentration values might be measured by air quality *monitoring* or—in the alternative—might be projected by the use of computer *modeling*:

> [T]he proposed regulations require that, unless the State determines that there is already an adequate air quality monitoring network in the vicinity, the source install a minimum of two continuous air quality monitoring instruments and one meteorological instrument in the areas of expected maximum concentration. This feature would assist in developing adequate air quality information for monitoring of the source's impact, and for analysis of the potential impact of proposed future sources to insure that the deterioration ceiling is not exceeded.
>
> Unfortunately, the type of air quality data needed to accurately establish the baseline air quality is not currently available in many clean areas of the country. It would therefore become necessary to initially estimate this information by use of diffusion modeling and other appropriate techniques.[13]

Even though air quality monitoring was one of two suggested modes for ascertaining baseline concentrations, PSD permit applicants balked at this method and found a sympathetic ear at EPA. As the Agency later explained:

> The prospect of having to operate their own monitoring networks and collect ambient data for 1 year prior to the submittal of a complete PSD application has long been a concern of industry, particularly in cases where there is no practical need for the data in the air quality analysis. This monitoring responsibility obligates a considerable amount of an applicant's resources and often interposes significant time prior to permit application submittal. Permitting authorities frequently have agreed that the monitoring requirement imposes an unnecessary burden on industry where the data is not needed for the air quality analysis . . . .[14]

EPA's 1978 PSD regulations failed to require air quality monitoring to determine whether a permit applicant would cause or contribute to violation of an increment.[15] When this omission was challenged in the *Alabama Power* litigation, the Agency argued that "monitoring air quality concentrations was technologically infeasible for all but a small number of pollutants and that the available monitoring tech-

8. *Id.* §165(e), 42 U.S.C. §7475(e).

9. EPA refers to this type of air quality monitoring data as "pre-application monitoring data," *see, e.g.*, U.S. EPA, New Source Review Workshop Manual: Prevention of Significant Deterioration and Nonattainment Area Permitting C16 (Draft Oct. 1990), *available at* http://www.epa.gov/region07/programs/artd/air/nsr/nsrmemos/1990wman.pdf (last visited Oct. 31, 2005) [hereinafter Workshop Manual]; 60 Fed. Reg. 12492, 12505 (Mar. 7, 1995), or "pre-construction monitoring data." *See, e.g.*, 45 Fed. Reg. at 52723. For consistency, we will use the former term.

10. 636 F.2d 323, 375, 10 ELR 20001 (D.C. Cir. 1979). *See also* John-Mark Stensvaag, *Preventing Significant Deterioration Under the Clean Air Act: Baselines, Increments, and Ceilings—Part I*, 35 ELR 10807, at text accompanying note 56 (Dec. 2005) [hereinafter *Part I*].

11. *Alabama Power*, 636 F.2d at 375 (quoting S. Rep. No. 127, 95th Cong., 98 (1977)).

12. *Id*. at 376. *See also* Steven A. Goldberg, *Source Planning Under the New PSD Regulations*, 29 Env't Rep. (BNA) 6 (Nov. 21, 1980) ("The first applicant will thus have the burden of gathering the baseline data and demonstrating the baseline concentration.").

13. 38 Fed. Reg. 18986, 18990 (July 16, 1973).

14. 61 Fed. Reg. 38250, 38295-96 (July 23, 1996).

15. *See id.* at 38296. EPA declared:

> [I]f preliminary modeling or other data indicate that the new source would not pose a threat to a [national ambient air quality standard (NAAQS)], EPA will exempt the source from the preconstruction monitoring requirements altogether. For example, if an SO_2 source plans to construct in an area with no other SO_2 sources, no preconstruction monitoring for SO_2 would be required.

43 Fed. Reg. 26388, 26399 (June 19, 1978).

niques were at best of questionable accuracy."[16] The *Alabama Power* court refused to accept this argument, concluding that §165(e)(2) establishes "a plain requirement for inclusion of monitoring data, for purposes of the determination whether emissions will exceed allowable increments."[17] The court continued:

> We discern from the statute a technology-forcing objective. [The U.S.] Congress intended that monitoring would impose a certain discipline on the use of modeling techniques . . . . Of course even a congressional mandate, such as a technology-forcing requirement based on a congressional projection of emergence of technology for the future, is subject to a justified excuse from compliance where good-faith effort to comply has not been fruitful of results. That is far different from the exemption created by EPA on the basis of current technological infeasibility. Though EPA has authority to require methods other than monitoring in its effort to ensure that allowable increments . . . are not violated, and though it may choose to invoke that authority because of its perception that monitoring alone is inadequate to the task, it does not have authority to dispense with monitoring—as at least one element of the overall enforcement effort—where Congress has mandated the use of that technique.[18]

When EPA revised its PSD regulations in 1980 following the *Alabama Power* remand, it amended the provisions having to do with pre-application ambient air quality monitoring.[19] The Agency emphasized the vital role of such monitoring in establishing baseline concentrations:

> In holding that monitoring data is required under section 165(e)(2), the court confirmed that actual air quality data should be used to determine baseline concentrations. . . . Since monitoring data provide information on actual air quality concentrations from existing sources and since section 169(4) explicitly states that required monitoring data should be used in establishing baseline concentrations, the court's decision supports EPA's requirement that baseline concentrations reflect actual air quality.[20]

Despite capitulation to the court order, EPA has continued to insist that air quality monitoring for purposes of establishing baseline concentrations is often unnecessary and should be scrapped. Thus, in a 1996 notice of proposed rulemaking, the Agency asserted—using the language of the *Alabama Power* court—that 15 years of good-faith efforts to comply with the pre-application monitoring command had "not been fruitful of results."[21] EPA explained:

> In the years since the court's decision, questions have continued concerning the provisions requiring the submittal of air quality monitoring data in cases where such data is not deemed necessary or useful as part of the air quality analysis. Modeled estimates of air quality are often sufficient to make the required demonstrations of source compliance with . . . PSD increments. Yet some sources still are confronted with the requirement to provide air quality monitoring data as part of a complete application. . . .
>
> The EPA believes that it is appropriate to reassess the regulatory requirement for preconstruction monitoring data for proposed PSD construction to address situations where the collection of such air quality data serves no practical purpose in the required air quality analysis. A more reasonable approach is to give the permitting authority discretion not to require the submittal of air quality monitoring data—including the installation and operation of monitoring stations by the applicant—where the permitting authority determines such data to be unnecessary to assess the air quality in the area affected by the proposed source.[22]

The 1996 proposal to eliminate pre-application monitoring apparently did not go beyond the proposed rulemaking stage.[23]

D. The Regulatory Baseline Concentration Definition

EPA's regulations say four things about how baseline concentration values are established: (1) they define baseline concentration[24]; (2) they specify that certain emissions must be included in,[25] and other emissions must be excluded from,[26] baseline concentrations; (3) they set forth pre-application air quality monitoring requirements[27]; and (4) they articulate conditions and criteria for exempting PSD permit applicants from those monitoring requirements.[28]

The core of the regulatory baseline concentration definition is straightforward:

> Baseline concentration means that ambient concentration level that exists in the baseline area at the time of the applicable minor source baseline date.[29]

This language is faithful to the statutory definition because the "minor source baseline date" for any given increment pollutant is a synonym for the date of the first PSD permit application in the area involving more than de minimis emissions of that pollutant.

E. Pre-Application Air Quality Monitoring Requirements

The statute says that the baseline concentration must be "based on [available] air quality data . . . and on such monitoring data as the permit applicant is required to submit."[30] What monitoring data *is* the permit applicant required to submit with respect to the three increment pollutants? The default answer provided by the regulations is as follows:

16. 61 Fed. Reg. at 38296.
17. *Alabama Power*, 636 F.2d at 372.
18. *Id*.
19. *See* 45 Fed. Reg. at 52734 (promulgating 40 C.F.R. §51.24(m)(1) (1980)) (pre-application air quality monitoring requirements); 45 Fed. Reg. at 52713-14 (promulgating 40 C.F.R. §51.24(i)(8) (1980)) (exemptions from monitoring requirements).
20. 45 Fed. Reg. at 52713-14.
21. *See* 61 Fed. Reg. at 38296.
22. *Id*.
23. *See* [Current Developments] 28 Env't Rep. (BNA) 1791 (1998) (reporting that an industry attorney found it "depressing" that the July 1996 proposal had "gone nowhere," and urged EPA to "simply get rid of preconstruction monitoring requirements altogether").
24. *See* 40 C.F.R. §§51.166(b)(13)(i), 52.21(b)(13)(i) (2005).
25. *See id.* §§51.166(b)(13)(i)(a)-(b), 52.21(b)(13)(i)(a)-(b).
26. *See id.* §§51.166(b)(13)(ii), 52.21(b)(13)(ii).
27. *See id.* §§51.166(m), 52.21(m).
28. *See id.* §§51.166(i)(5), 52.21(i)(5).
29. *Id.* §§51.166(b)(13)(i), 52.21(b)(13)(i). The regulations further provide: "A baseline concentration is determined for each pollutant for which a minor source baseline date is established . . . ." *Id.*
30. CAA §169(4), 42 U.S.C. §7479(4) (2005).

(i) Any application for a [PSD] permit . . . shall contain an analysis of ambient air quality in the area that the [permit applicant] . . . would affect for each [pollutant to be emitted in significant amounts] . . .

(iii) [T]he analysis shall contain continuous air quality monitoring data gathered for purposes of determining whether emissions of that pollutant would cause or contribute to a violation of the standard or any maximum allowable increase.

(iv) In general, the continuous air quality monitoring data that is required shall have been gathered over a period of at least one year and shall represent at least the year preceding receipt of the application, except that, if the Administrator determines that a complete and adequate analysis can be accomplished with monitoring data gathered over a period shorter than one year (but not to be less than four months), the data that is required shall have been gathered over at least that shorter period.[31]

These provisions seem consistent with the statutory requirements.

F. De Minimis Exemption From Pre-Application Air Quality Monitoring Requirements

The regulations provide that permit applicants may be exempt from the pre-application monitoring requirements under certain circumstances:

> [T]he reviewing authority may exempt a [PSD permit applicant] from the requirements of paragraph (m) . . . with respect to monitoring for a particular pollutant, if:
>
> (i) The emissions increase of the pollutant from a new stationary source or the net emissions increase of the pollutant from a modification would cause, in any area, air quality impacts less than the following amounts: . . .
>
> Nitrogen dioxide—14 [micrograms per cubic meter ($\mu g/m^3$)], annual average;
>
> Particulate matter—10 $\mu g/m^3$ of [PM_{10}], 24-hour average;
>
> Sulfur dioxide—13 $\mu g/m^3$, 24-hour average . . . or
>
> (ii) The concentrations of the pollutant in the area that the source or modification would affect are less than the concentrations listed [above] . . . .[32]

The foregoing significant ambient concentration thresholds[33] (and their relationship to the Class II increments and the national ambient air quality standards (NAAQS)), are depicted in Table 3.

Table 3
Pre-Application Monitoring Requirements:
Significant Ambient Concentration Thresholds
(micrograms per cubic meter [$\mu g/m^3$])
Source: CAA § 163(b) & 40 C.F.R. §§ 50.4-.12, 52.21(c), 52.21(i)(5), 51.166(i)(5) (2005)

	PM_{10}	SO_2	NO_2
	24-hr Max (or Average)	24-hr Max (or Average)	Annual Arithmetic Mean (or Average)
Class II Increment	30	91	25
Significant Ambient Concentration Threshold for Pre-Application Monitoring	10 (Average)	13 (Average)	14 (Average)
Primary NAAQS	150	365	100
Secondary NAAQS	150		100

EPA has explained the logic behind the Table 3 numbers as follows:

> [T]he . . . values are based on the current capability to provide a meaningful measurement of the pollutants. The values promulgated represent five times the lowest detectable concentration in ambient air that can be measured by the instruments available for monitoring each pollutant. The factor of five was chosen after reviewing test data for the various methods considered reasonably available. The decision was based in part on considerations of instrument sensitivity, potential for sampling error, problems with instrument variability (e.g., zero drift) and the capability to read recorded data.[34]

The Agency further explained:

> [T]he regulation allows a source to be exempted from the preapplication monitoring requirement if it shows either that existing air pollution in the source impact area or its projected impact in the affected area is de minimis. In most cases, little is to be gained from preconstruction monitoring in situations where either condition applies . . . .
>
> [B]ecause there will be situations where monitoring will be necessary even if modeling predicts de minimis conditions, the exemption is not automatic but rather must be with the approval of the reviewing authority.[35]

A careful reading of the regulations demonstrates that a PSD permit applicant must establish one of two things before the permit-issuing authority may waive pre-application monitoring for a given increment pollutant: (1) the applicant will not increase the ambient air concentrations of the pollutant by more than the specified amount; *or* (2) the existing ambient air concentration of that pollutant in the area does not already exceed the specified value.[36]

31. 40 C.F.R. §52.21(m); *see also id.* §51.166(m).

32. *Id.* §51.166(i)(5). *See also id.* §52.21(i)(5); WORKSHOP MANUAL, *supra* note 9, at C16-C17. Technically, the paraphrased language in subparagraph (ii) refers to "the concentrations listed in paragraph (i)(8)(i) of this section," but this seems to be a typographical error, lingering from a time when paragraphs (i) and (ii) were codified in §§51.166(i)(8) and 52.21(i)(8). When the provisions were renumbered to §§51.166(i)(5) and 52.21(i)(5), the cross-reference was mistakenly left unchanged.

33. EPA does not seem to have a consistent terminology for these cutoff numbers. *See* 58 Fed. Reg. 31622, 31634 (June 3, 1993) (calling them "specific ambient concentration thresholds"); 55 Fed. Reg. 22332, 22333 (June 1, 1990) ("significant ambient concentrations"); 54 Fed. Reg. 41218, 41228 (Oct. 5, 1989) ("significant ambient concentration"); In re AES Puerto Rico, PSD Appeal Nos. 98-29 et al., 1999 WL 345288, 8 E.A.D. 324, ELR ADMIN. MAT. 41132 (EPA EAB May 27, 1999) ("monitoring de minimis levels"); WORKSHOP MANUAL, *supra* note 9, at C16 ("significant monitoring value").

34. 45 Fed. Reg. at 52709-10.

35. *Id.* at 52710.

36. *See* 60 Fed. Reg. at 12505 ("the reviewing authority may exempt a proposed . . . source from the PSD pre-application monitoring requirements . . . if either the air quality impacts resulting from the source, or the existing ambient concentrations of the particular pollutant in the area of the source, are less than the prescribed significance level for that pollutant").

How does the applicant make such a demonstration? With respect to the first item—the extent to which the applicant's facility will increase the ambient air concentration of the particular pollutant—it makes sense to model the proposed emissions. After all, the emissions do not yet exist, so ambient air quality monitoring is not possible. Quite sensibly, EPA's draft *New Source Review Workshop Manual* (*Workshop Manual*)[37] provides: "The determination of the proposed project's effects on air quality (for comparison with the significant monitoring value) is based on the results of the dispersion modeling used for establishing the [1 μg/m3] impact area."[38] If such modeling demonstrates that none of the values in Table 3 will be exceeded by the applicant's proposed emissions, the permit-issuing authority has authority to waive the normal pre-application monitoring requirement.

Even where the applicant's proposed emissions will exceed one or more of the Table 3 values, a pre-application monitoring exemption is still possible, if the applicant demonstrates that the existing ambient air quality for the relevant pollutant falls below the Table 3 value. How may such a showing be made? Is it possible to demonstrate existing ambient air quality without engaging in monitoring (or without consulting air quality data obtained through preexisting monitoring data from the vicinity of the proposed facility)? Indeed, it is. The draft *Workshop Manual* explains:

> Modeling by itself or in conjunction with available monitoring data should be used to determine whether the existing ambient concentrations are equal to or greater than the [Table 3] significant monitoring value . . . . Ambient impacts from existing sources are estimated using the same model input data as are used for the . . . analysis . . . described in section IV.D.4 of this chapter.[39]

The referenced section IV.D.4 of the *Workshop Manual* contains a gloriously detailed explanation of how permit applicants may "*estimate* the ambient concentrations resulting from . . . existing sources contributing to background pollutant concentrations . . . ."[40] We discuss this in the next section.

G. The Modeling Preference

We are currently examining the manner in which a PSD permit applicant may avoid the normal pre-application air quality monitoring requirements by demonstrating that existing ambient air quality in the vicinity of the proposed facility falls below the concentration values set forth in Table 3. EPA invites applicants to make this demonstration by using modeling techniques described in its draft *Workshop Manual*. If those techniques were used only to calculate de minimis values, they might not be worthy of our detailed attention. As we will see, however, these techniques may dominate the establishment of baseline concentration values and the tracking of increment consumption.

The complete methodology set forth in the *Workshop Manual* is addressed later in this Article.[41] For now, it is enough to know that, to avoid actually *measuring* existing ambient air concentrations, EPA recommends the use of models to *estimate* those concentrations based on the pollutant inputs from three categories of sources: point sources; area sources; and line sources.[42]

Air quality modeling is a legitimate and much needed component of any effective air pollution control scheme. Models are essential to predict what will happen if future emissions are added to an existing atmospheric brew or to determine how ambient air concentrations will respond to various decreases in existing emissions. But the mind boggles at the recognition that the techniques set forth in the *Workshop Manual* are designed to estimate in an intricate, convoluted, and backhanded manner something that could actually be measured—existing ambient air quality—and, indeed, that these computations are undertaken for the express purpose of avoiding such actual measurement.

It is true that the measurement of ambient air quality requires time and effort. It is also true that monitored values may be erroneous in various ways due to sampling error, the lack of representative time periods, and so forth. But the whole point of the endeavor is to establish existing ambient air quality so that bona fide baseline concentrations may be calculated. The complex input source data and meteorological data used by the *Workshop Manual* models also entail acquisition costs and pose numerous possibilities for error. Most importantly, the models seem unlikely to produce more accurate baseline values than would ambient air quality monitoring, no matter how imperfect.

EPA's affection for modeling is apparently so great that pre-application monitoring may be waived even if one or more of the Table 3 values is exceeded:

> In addition to the exemptions given in the de minimis section of this *Federal Register* publication, EPA may not always require a source owner to establish a monitoring network when the data would not validate or improve the estimates made by the mathematical models. When the existing air pollution levels are conservatively estimated to be quite small and a monitoring network could not reliably measure the predicted background concentrations, EPA will generally not require the source owner to generate preconstruction monitoring data.[43]

37. The Agency explains the purpose of the draft *Workshop Manual* as follows:

> This document was developed . . . to guide permitting officials . . . . It is not intended to be an official statement of policy and standards and does not establish binding regulatory requirements; such requirements are contained in the regulations and approved state implementation plans.

WORKSHOP MANUAL, *supra* note 9, at 1.

38. *Id.* at C18.

39. *Id*.

40. *Id.* at C44 (emphasis added).

41. *See* text accompanying *infra* notes 148-79.

42. *See* WORKSHOP MANUAL, *supra* note 9, at C44. EPA seems to use the term "point source" as a synonym for "stationary source." The only line sources mentioned in the *Workshop Manual* are roadways. "Area sources are often collections of numerous small emissions sources that are impractical to consider as separate point or line sources." *Id.*

43. 45 Fed. Reg. at 52724. EPA has also authorized use of something called an "accommodative SIP" to avoid pre-application ambient air monitoring. States have occasionally agreed to impose reasonably available control technology (RACT)—ordinarily required only in nonattainment areas—on stationary sources located in attainment areas; in exchange for this accommodation, EPA has agreed that the normal pre-application ambient air monitoring for PSD permit applicants will be waived. *See, e.g.*, 57 Fed. Reg. 10140, 10141 (Mar. 24, 1992). In the late 1980s and early 1990s, a number of states sought state implementation plan (SIP) revisions designed to remove one or more RACT requirements, undoing the accommodation and thereby losing the pre-application monitoring exemption. *See, e.g.*, *id*.; 52 Fed. Reg. 6007 (Feb. 27, 1987).

This expression of EPA's attitude crops up so often that we refer to it as the "modeling preference."

H. Submission of Less Than One Year of Air Quality Monitoring Data

The de minimis provisions allow for a complete exemption from pre-application air quality monitoring by the PSD permit applicant. Even an applicant who fails to qualify for the de minimis exemption may succeed in shortening the time period for any required modeling.

The statute provides that the air quality monitoring data submitted by the first PSD permit applicant in an area "shall be gathered over a period of one calendar year preceding the date of application for a permit under this part unless the State, in accordance with regulations promulgated by the Administrator, determines that a complete and adequate analysis for such purposes may be accomplished in a shorter period."[44] The *Alabama Power* court concluded that EPA had not provided adequate guidance concerning when a shorter period of monitoring might be deemed sufficient.[45] Responding to this ruling, EPA declared in its 1980 PSD program revisions:

> Less than one year of monitoring data will be permitted [if it has been] demonstrated through historical data or dispersion models that the data for such shorter periods of time, but not less than four months, will be obtained during a time period when maximum air quality levels can be expected.[46]

Although PSD implementation has been documented in thousands of pages of *Federal Register* materials, these pages are silent about the exercise of discretion to allow less than one year of monitoring data.

I. Using Existing Data to Avoid Pre-Application Ambient Air Monitoring

We have seen that the permit-issuing authority may waive the normal requirement that the PSD permit applicant obtain and submit one year's worth of pre-application air quality monitoring data if the applicant's emissions (or existing ambient air quality) do not exceed certain de minimis thresholds. EPA has also declared that the applicant may submit "existing representative air quality data . . . in lieu of monitoring"[47] under certain circumstances. The data must have been "collected in the three-year period preceding the permit application . . . in accordance with acceptable quality assurance procedures."[48] In its draft *Workshop Manual*, EPA indicates that measured concentrations from representative "regional" sites may be appropriate.[49]

Language in the draft *Workshop Manual* suggests that site-specific monitoring by the applicant is the *least* appropriate—rather than the preferred—method for establishing the baseline:

> Once a determination is made by the permitting agency that ambient monitoring data must be submitted as part of the PSD application, the requirement can be satisfied in one of two ways. First, under certain conditions, the applicant may use existing ambient data. To be acceptable, such data must be judged by the permitting agency to be representative of the air quality for the area in which the proposed project would construct and operate. . . .
>
> If existing data are not available, or they are judged not to be representative, then the applicant must proceed to establish a site-specific monitoring network. . . .[50]

Even though the statutory language suggests a norm in which one year of ambient air quality monitoring is to be obtained and submitted by the PSD permit applicant, EPA has spoken as if the accumulation of such data by the applicant is the exception to the norm: "Where adequate ambient data are not available, the permitting authority may require the PSD applicant to collect 1 year of ambient monitoring data."[51]

John Quarles, former acting EPA Administrator, recognized this anomaly more than 25 years ago:

> One can question why Congress required that PSD applications should be accompanied with one year of continuous monitoring data if that data was not to be used in the ambient air quality analysis to determine whether the source could fit within the available increment. The fact that actual implementation of the program is somewhat inconsistent with the statutory requirements is reflected by indications from EPA that it may soft-pedal the requirements for one-year of continuous monitoring data.[52]

J. Baseline Inclusions and Exclusions for Certain Stationary Source Emissions: The Statute

Both the statutory and regulatory definitions of "baseline concentration" contain provisions designed to take into account pending facilities—facilities so close to coming on line with emissions of the relevant pollutant at the time when the PSD program was enacted that their future contributions to ambient air concentrations should be treated as if already "existing."[53] The statute provides:

> [The baseline] shall take into account all projected emissions in, or which may affect, such area from any major emitting facility on which construction commenced prior to January 6, 1975, but which has not begun operation by the date of the baseline air quality concentration determination. Emissions of sulfur oxides and particulate matter from any major emitting facility on which

44. CAA §165(e)(2), 42 U.S.C. §7475(e)(2).

45. *See Alabama Power*, 636 F.2d at 372-73.

46. 45 Fed. Reg. at 52727. *See also* Workshop Manual, *supra* note 9, at C19.

47. 45 Fed. Reg. at 52724.

48. *Id.* For a discussion of when existing air quality data is "representative," *see* In re Hawaii Electric Light Co., PSD Appeal Nos. 1-24 et al., 2001 WL 1637222 (EPA EAB Nov. 27, 2001); In re Encogen Cogeneration Facility, PSD Appeal Nos. 98-22 et al., 1999 WL 198914, 8 E.A.D. 244, ELR Admin. Mat. 41088 (EPA EAB Mar. 26, 1999); In re Knauf Fiber Glass, PSD Appeal Nos. 98-3 et al., 1999 WL 64235, 8 E.A.D. 121, ELR Admin. Mat. 41053 (EPA EAB Feb. 4, 1999) (accepting, as representative, existing ambient air quality data from a site approximately nine miles from the proposed facility location).

49. Workshop Manual, *supra* note 9, at C18.

50. *Id.* at C18-C19.

51. 61 Fed. Reg. 65764, 65776 (Dec. 13, 1996).

52. John Quarles, *Federal Regulation of New Industrial Plants*, 28 Env't Rep. (BNA) 14-15 (May 4, 1979).

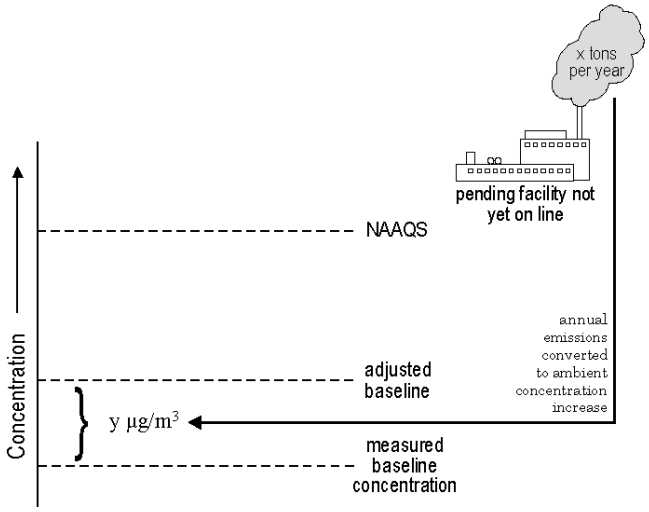
53. *See* CAA §169(4), 42 U.S.C. §7479(4); 40 C.F.R. §§51.166(b)(13)(i)(b), 52.21(b)(13)(i)(b).

> construction commenced after January 6, 1975, shall not be included in the baseline and shall be counted against the maximum allowable increases in pollutant concentrations established under this part.[54]

At first glance, this language seems to have only historical importance—it had a role to play in the few years immediately following January 6, 1975, but has no current application. Technically, that is true. However, the attempt by Congress in the 1977 CAA Amendments to grandfather the pending emissions of certain stationary sources by placing those emissions in the baseline destroyed the purity of the baseline concentration definition in ways that haunt us to the present day.

Although the language of the statutory provision seems relatively straightforward, its operation is actually complex, requiring the permit-issuing authority to convert information about projected *emissions* (for example, the prediction that a facility currently under construction will emit 110 tons per year (tpy) of SO_2) into projected increases in ambient air *concentrations* of that pollutant. We depict this phenomenon in Figure 24.

Figure 24: Baseline Adjustment for Pending Emissions



To paraphrase the statute, the *measured* ambient air concentrations for particulates and SO_2 (the baseline concentration) in a triggered baseline area must be adjusted upward by an amount reflecting the projected *emissions* of those pollutants from facilities for which construction had commenced prior to January 6, 1975,[55] but which had not begun operation by the minor source baseline date. (The statute goes on to say that no such adjustment to the baseline will be undertaken for facilities whose construction commenced after January 6, 1975.)

This adjustment requirement—for grandfathered, pending facilities—destroys the purity of the baseline concentration definition because we can no longer say that the baseline always consists of the existing ambient air concentration of an increment pollutant; baseline values affected by this language will be a mathematical construct rather than a true reflection of existing ambient air quality.[56]

K. Baseline Inclusions and Exclusions for Certain Stationary Source Emissions: The Regulations

As shown above, the statutory baseline concentration definition deviates from the purity of measured ambient air concentrations to take into account certain pending emissions. The regulatory baseline concentration definition further complicates things. The regulations provide:

> (i) A baseline concentration . . . shall include:
>
> (a) The actual emissions, as defined in paragraph (b)(21) of this section, representative of sources in existence on the applicable minor source baseline date, except as provided in paragraph (b)(13)(ii) of this section;
>
> (b) The allowable emissions of major stationary sources that commenced construction before the major source baseline date, but were not in operation by the applicable minor source baseline date.
>
> (ii) The following will not be included in the baseline concentration and will affect the applicable maximum allowable increase(s):
>
> (a) Actual emissions, as defined in paragraph (b)(21) of this section, from any major stationary source on which construction commenced after the major source baseline date; and
>
> (b) Actual emissions increases and decreases, as defined in paragraph (b)(21) of this section, at any stationary source occurring after the minor source baseline date.[57]

Clauses (i)(b) and (ii)(a) of the foregoing regulations seem to be faithful recodifications of the statutory language. They do little more than grandfather the emissions of the same facilities alluded to in CAA §169(4). Clauses (i)(a) and (ii)(b), however, go beyond the statutory language; they seem designed to redefine baseline concentration in a radically different way. They suggest that baseline concentrations are to be ascertained not by ambient air quality *monitoring*, but by emissions *modeling*. This alternative approach—called the modeled baseline—is depicted in Figure 25.

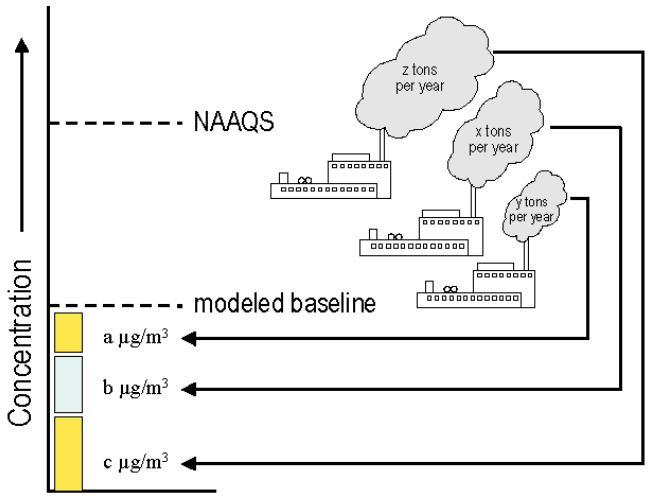
54. CAA §169(4), 42 U.S.C. §7479(4).

55. It is for precisely this reason that January 6, 1975, is called the major source baseline date for PM_{10} and SO_2. *See Part I*, *supra* note 10, at text accompanying notes 58-59 and fig. 11 (illustrating major source baselines and trigger dates).

56. *See* 53 Fed. Reg. 3698, 3705 (Feb. 8, 1988) ("All ambient concentrations resulting from: (1) Actual emissions from existing sources, and (2) allowable emissions for certain sources permitted, but not yet in operation on that date, are part of the baseline concentration for those pollutants.").

57. 40 C.F.R. §§51.166(b)(13), 52.21(b)(13).

Figure 25: Baseline Concentration Established Through Modeling



The draft *Workshop Manual* places relatively little emphasis on the development of ambient air quality monitoring data and very heavy emphasis on what it calls "emissions inventories."[58] "[E]missions inventories contain . . . source data used as input to an applicable air quality dispersion model to estimate existing ambient pollutant concentrations."[59] Figure 25 is a simplistic depiction of one way in which emissions inventories may be used to derive ambient concentration values.

In a sense, the statutory approach to grandfathering (depicted in Figure 24) foreshadowed and invited the modeling approach of Figure 25. The statute abandoned (in the grandfathering language) the purity of using ambient air quality monitoring alone to ascertain the baseline concentration value; nevertheless, the statute can be read to insist that the starting place for baseline analysis is measured ambient air quality values. By going beyond the statutory provisions, however, the regulatory baseline concentration definition suggests that the baseline values may be set without the use of any ambient air quality monitoring data at all. As discussed in the following section, EPA has on several occasions expressed just that notion: measured ambient air concentrations are not needed to establish the baseline.

L. "Baseline? We Don't Need No Stinkin' Baseline!"

There is universal agreement that the "baseline" is an ambient air *concentration*—the concentration existing at the time of the first PSD permit applicant in an area.[60] The statute unambiguously provides that the "maximum allowable increases over baseline *concentrations*" shall not exceed the increments.[61] The regime—depicted in Figure 3 of Part I of this Article[62]—could scarcely be more straightforward.

Nevertheless, EPA has struggled against the baseline concentration parameter from the beginning. In 1973, long before Congress got in on the Act, the Agency suggested that ambient air quality measurements might not be the way to go:

> Unfortunately, the type of air quality data needed to accurately establish the baseline air quality is not currently available in many clean areas of the country. It would therefore become necessary to initially estimate this information by use of diffusion modeling and other appropriate techniques.[63]

This statement was not hostile to the use of ambient air concentrations as baselines, but it did suggest that such concentrations might not be directly measurable.

In 1974—still before statutory codification of the PSD program—EPA continued to express misgivings:

> [T]he availability of actual baseline data in relatively clean areas is of secondary importance in these regulations. As discussed previously, current air quality measurements taken in clean areas show large random variations, and it is unclear how a measured baseline could be meaningful in view of these large random variations in background concentrations.
>
> In actual practice, although the regulations do not specifically preclude the use of measured air quality as a method for assessing the available increment, it is anticipated that assessment of the available increment will normally be accomplished through an accounting procedure whereby modeling results for individual sources will be used to keep track of the available (or "unused") increment as sources and emissions are increased or decreased. Therefore, *an accurately measured baseline is not an essential consideration in implementing these regulations* although the concept is retained for use in those few situations where it may be desired. . . .
>
> In the originally proposed plan, all new major sources were required to conduct air quality monitoring in their vicinity. This was an essential feature because the proposed plan required that accurate air quality information be available in order to assess the "significance" of subsequent sources.
>
> Under the regulations proposed herein, there is no similar need for such precise air quality information, because the air quality assessment is based primarily upon pre-construction modeling results. Although additional air quality data are nearly always of value, there is no justification for requiring sources to conduct monitoring under these proposed regulations. Therefore, the monitoring requirement has been deleted.[64]

At this point in its thinking, EPA had abandoned pre-application monitoring because "an accurately measured baseline" had become unimportant.

Later that same year, the Agency expanded on its view that the existing ambient air concentration, i.e., the baseline, could not be an essential feature of the PSD program:

> [A]ir quality monitoring is presently concentrated in heavily polluted areas, with only scattered monitoring in relatively clean areas. Vast numbers of additional monitors will be necessary to precisely define existing air

58. *See* Workshop Manual, *supra* note 9, at C31-C36.

59. *Id.*

60. *See* text accompanying *supra* note 1.

61. CAA §163, 42 U.S.C. §7473 (emphasis added).

62. *See Part I*, *supra* note 10, fig. 3. This figure depicts the process for establishing baselines, increments, and ceilings.

63. 38 Fed. Reg. at 18990.

64. 39 Fed. Reg. 31000, 31005 (Aug. 27, 1974) (emphasis added).

> quality, making a plan that is dependent on a knowledge of existing air quality virtually unworkable.[65]

By the 1978 version of the regulations, EPA had more fully fleshed out its decision to abandon the ambient air concentration approach to defining the baseline; by this time, however, Congress had enacted the statutory language placing baseline concentrations at the heart of the PSD increment program. It is almost as if the EPA and congressional approaches had diverged, with the Agency continuing on in a pre-determined trajectory:

> The regulations promulgated today . . . place primary emphasis on tracking emission changes *rather than on establishing a baseline concentration*, and provide additional guidance as to what emission levels contribute to the baseline concentration.[66]

Stressing what it now called the "actual emissions concept," EPA explained:

> The November 3, 1977, proposal . . . contained guidance for establishing a baseline concentration through the use of existing air quality data. That proposal also suggested an alternative means to construct a baseline concentration using air quality dispersion modeling when appropriate air quality data did not exist. *The regulations promulgated today no longer suggest that the baseline concentration be formally established.* The Administrator feels that increment consumption can be best tracked by tallying changes in the emission levels of sources contributing to the baseline concentration and increases in emissions due to new sources. *Data to establish baseline air quality in an absolute sense would be needed only if increment consumption were to be tracked using ambient measurements.* Thus, to implement the air quality increment approach set forth in the Act, the reviewing authority needs to verify that all changes from baseline emission rates (decreases or increases as appropriate) in conjunction with the increased emissions associated with approved new source construction will not violate an applicable increment or NAAQS. However, before this concept can be carried out, some additional guidance must be given regarding the type of emission changes that must be tracked.
>
> EPA generally intends to use an actual emissions concept in implementing the above baseline approach. The concept of an actual emissions baseline has been used in implementing EPA's previous PSD regulations, and the Administrator believes that the Act intends for this concept to be continued. Section 169(4) defines baseline concentration in terms of existing air quality. In carrying out an actual emissions baseline, EPA will use reasonable assumptions for various factors affecting the level of source operation. 1977 values will generally be used for hours of operation, capacity utilization, and the types of materials combusted, processed and/or stored, unless another previous year would be more representative or such use would not be allowed under established permit conditions. Actual emissions also includes into the baseline any future increases in hours of operation or capacity utilization as they occur if such are allowed to the source as of August 7, 1977, and if the source could have been reasonably expected to make these increases on this date. This policy is consistent with the intent of the Act to base increment consumption on all emission increases from new and modified sources, but to allow consumption of the increment to occur from only certain non-modification activities (e.g., some fuel-switches) of existing sources. Thus, with the exceptions mentioned below, the Administrator will implement *an actual emissions baseline* in the regulations promulgated today.[67]

Bradley I. Raffle explained EPA's "actual emissions concept" skillfully:

> The final regulations abandon any attempt to establish a specific baseline value through the use of ambient air quality data. . . . Emphasis will . . . be placed on tracking changes in *emission* levels as opposed to *ambient pollution* levels. . . .
>
> The most important aspect of the new EPA baseline concept is its focus on changes in baseline *emissions* as opposed to baseline *air quality concentrations*. The agency does not intend to establish specific numerical baseline concentration levels for PSD areas. Consumption of the increments will be measured in terms of increases in new emissions over the baseline *emission* level.
>
> As an example, assume that an area's baseline emissions of SO_2 are 100 tons per year. Assume further that air quality modeling shows that the area will only be able to assimilate an additional 100 tons SO_2 emissions without violating the SO_2 increments. Under EPA's new emission tracking approach, the agency will simply monitor changes in baseline emissions and the authorization of new SO_2 emission levels (as opposed to changes in actual or estimated ambient SO_2 concentrations) in order to determine increment consumption.[68]

Stated another way, there is no need to know the baseline *concentration*, as long as EPA (or the relevant state agency) knows the baseline date and keeps track of whose (and which) *emissions* should be allocated to each of two different baskets: the baseline category and the increment category. The Agency subsequently suggested that it was calculating an actual baseline concentration, but its use of the term is not convincing and shows that it is really speaking of an emissions inventory:

> In order to use EPA's method, one must fix the baseline concentration in time by describing which emissions contribute to the baseline. Without this fixing of the baseline concentration, EPA's method could not be used.[69]

Notwithstanding the statute's emphasis on the baseline (ambient air) *concentration* value, EPA has persisted in using its actual emissions concept approach. For example, the Agency struggled in 1983 with Florida's approach to tracking increment consumption—an approach involving establishment of a genuine ambient air concentration baseline:

> The August 1980 PSD regulations mention no changes to this [actual emissions concept] procedure. The EPA *PSD Workshop Manual*, which was issued in October 1981 to assist in implementing the 1980 rules, confirms that the baseline concentration need not be established. Thus Florida's method of calculating in-

65. 39 Fed. Reg. 42510, 42510 (Dec. 5, 1974).

66. 43 Fed. Reg. at 26400 (emphasis added).

67. *Id.* (emphasis added).

68. Raffle, *supra* note 3, at 58 (emphasis in original). *See also* 49 Fed. Reg. 49457, 49459 (Dec. 20, 1984) ("EPA has determined, based on the Agency's and Maryland's engineering judgment, the 24-hour baseline to be 58 tons per day at the time of the first permit application.").

69. 48 Fed. Reg. 52713, 52714 (Nov. 22, 1983).

> crement consumption is not in accordance with present EPA policy. . . .
>
> Since it is impossible to use Florida's procedure without knowing the baseline concentration, Florida's procedure is at variance with the guidance. Further, in the example described in the Workbook, it is clear that EPA's method is used.
>
> With respect to the Guideline on Air Quality Models, the commenter describes how the Guideline would be followed if Florida's method of calculating baseline is used. However, *since EPA's method does not calculate the baseline*, this discussion does not demonstrate whether Florida's method is correct.
>
> Lastly, the commenter asserts that Florida's method more closely resembles measuring increment consumption through *monitoring*, which the commenter states is the ideal situation as intended by the Act. EPA's method is equally consistent with this ideal as Florida's method.[70]

EPA's behavior represents a calculated effort over almost 30 years to studiously avoid establishing baseline concentration values by the method assumed by the statute: actual measurement of ambient air concentrations. EPA's rejection of the statutory baseline concentration requirement is now so pervasive that the Agency's *Workshop Manual* declares bluntly: "[T]o determine the amount of PSD increment consumed (or the amount of available increment), no determination of the baseline concentration needs to be made."[71]

M. Complexity of the Actual Emissions Approach to Defining the Baseline

As discussed above, EPA's practice is to sort emissions into two categories: baseline emissions and increment-consuming emissions. This exercise would be complicated enough, even if the emissions of separate facilities could be allocated entirely to one category or the other.[72] It turns out, however, that the permit-issuing authority may find it necessary to sort the emissions from a single source into the two categories.

Consider, for example, emissions from sources in operation prior to the baseline date. Emissions from such existing sources may change (and have historically changed) over time for a great variety of reasons, including changes in operations. Once one decides to define the baseline not by measured concentrations, but by compiling an inventory of emissions, how does one decide which emissions to count? The highest emissions ever generated by existing sources in the area? Emissions representing "typical" operations of such facilities? Something else? The "actual emissions concept" presents issues that would never arise if baseline concentrations were defined through ambient air quality monitoring. The following *Federal Register* passage suggests the complexity of the actual emissions approach:

> [B]aseline concentration will no longer routinely include those emissions increases after the baseline date from sources contributing to the baseline concentration, which are due to increased hours of operation or capacity utilization. Existing policy permitted this grandfathering, provided such increases were allowed under the [state implementation plan (SIP)] and reasonably anticipated to occur as of the baseline date. Today's policy which normally excludes such increases is consistent with using actual source emissions to calculate baseline concentrations. An actual emissions policy, however, does allow air quality impacts due to production rate increases to sometimes be considered as part of the baseline concentration. If a source can demonstrate that its operation after the baseline date is more representative of normal source operation than its operation preceding the baseline date, the definition of actual emissions allows the reviewing authority to use the more representative period to calculate the source's actual emissions contribution to the baseline concentration. EPA thus believes that sufficient flexibility exists within the definition of actual emissions to allow any reasonably anticipated increases or decreases genuinely reflecting normal source operation to be included in the baseline concentration.[73]

Other complications, which will not be addressed here, involve such things as fuel switching[74] and SIP relaxations,[75] each of which may result in higher emissions than those previously generated by an existing facility. In each instance, the Agency is faced with the task of deciding whether altered emissions at existing facilities become part of the baseline or part of the increment. EPA's approach to these riddles is so complicated that Figure 25 ends up being misleadingly simplistic: *some* contributions from each of the facility's plumes may be allocated to the baseline, and *other* portions of the plumes may be allocated to increment consumption—the latter would be depicted as falling above the "modeled baseline" line, thus increasing the ambient concentration in the area above the baseline value.

N. Calculating the Baseline Retroactively When a Baseline Area Redesignation Creates New Baseline Areas With Preexisting PSD Permit Applicants

Before leaving the topic of how the baseline value is calculated, it is interesting to point out one additional twist caused by the widespread practice of resizing existing attainment (and unclassifiable) areas through the baseline redesignation mechanism.[76] Figure 17 from Part I of this Article provides a suitable illustration.[77] Assume that Source #1 in

70. *Id.* at 52714-15 (emphasis added).

71. Workshop Manual, *supra* note 9, at C10.

72. *See* 48 Fed. Reg. at 52714 (referring to "increment-consuming sources" and "baseline sources").

73. 45 Fed. Reg. at 52714.

74. *See, e.g.*, 46 Fed. Reg. 39861, 39861 (Aug. 5, 1981); 45 Fed. Reg. at 52714.

75. *See, e.g.*, 49 Fed. Reg. at 49458; 43 Fed. Reg. at 26400; 49 Fed. Reg. 27177, 27178 (July 2, 1984) (struggling with whether increased emissions resulting from a SIP relaxation—approval of which was pending before EPA prior to the baseline date—should be included in the baseline or the increment consumption calculation).

76. See discussion at *Part I*, *supra* note 10, at text accompanying notes 123-80.

77. *See Part I*, *supra* note 10, fig. 17. Figure 17 depicts the situation in which a state seeks redesignation after a single baseline date and a single baseline concentration have been established for a large attainment or unclassifiable area, and subsequent PSD permit applicants have located in that area without being required to establish the baseline. Because the baseline date is triggered—and the baseline concentration is established—only by the *first* completed PSD permit application in an area, subsequent PSD permittees in the same area do not trigger new baseline dates or establish new baseline concentrations.

Figure 17 submitted a complete PSD permit application on January 1, 1995, triggering the baseline date for the entire state of Tennessee because the state was at that time classified as a single attainment area. The appropriate baseline value was established in the permit hearing. Assume further that Source #2 completed a permit application on January 1, 1999, but triggered no new baseline date because the single baseline date (and baseline) for the state had already been established by Source #1. Finally, assume that Tennessee successfully seeks to have its attainment areas redesignated in 2004 on a county-by-county basis.

As shown earlier, the areas depicted in Figure 17 would thus become two separate attainment areas: (1) one area embracing Williamson County, for which the baseline date and baseline value had already been computed as of 1995; and (2) one area embracing Cameron and Rutherford counties, for which the baseline date would now be triggered retroactively to be January 1, 1999.[78] How do the responsible public officials compute the baseline value for the newly discovered Cameron-Rutherford baseline area? The task of computing this value in 2004 is a daunting one. Moreover, it is a difficult challenge no matter which approach one may take to the problem of determining the baseline value: the air quality monitoring approach suggested by the statute or the actual emissions inventory approach adopted by EPA. Either approach will require a considerable amount of fudging.

VI. Increment Consumption Analysis: The Case of the Missing Ceiling

Thus far this Article has shown how the baseline date, baseline area, and baseline value are determined. Presumably, the only remaining task is to add the appropriate increment to the baseline value, compute the resulting ceiling—sometimes referred to as the "tertiary standard" or local ambient air quality standard (LAAQS)—and enforce that ambient concentration standard. One would think that measuring and enforcing compliance with the LAAQS would be a simple matter of mimicking what is done all the time throughout the nation in connection with the NAAQS. This, however, is not how the program has been implemented.

As discussed earlier, EPA has abandoned the pretext of calculating ambient air concentration baseline values. This development has led inevitably to abandonment of ambient air concentration ceilings based on the baseline-plus-increment computation envisioned by the CAA.

A. What the Statute Says

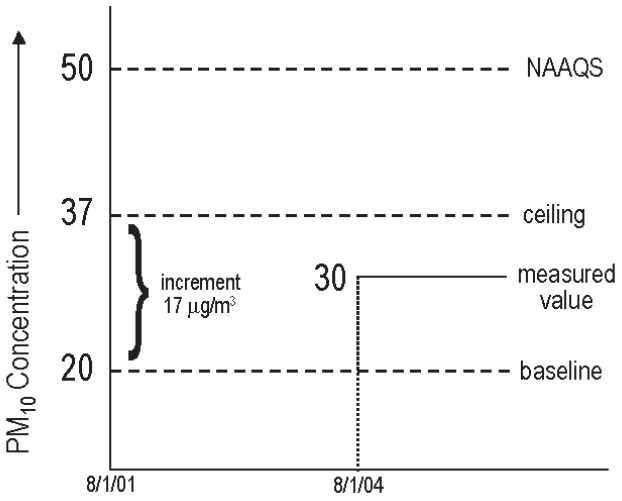
The CAA primarily addresses the consumption of increments in three places, establishing a prohibition and two mandatory enforcement mechanisms. The first two provisions are set forth in §163, captioned "increments and ceilings;" the third provision, set forth in §165, is captioned "preconstruction requirements."

First, the statute declares that "the maximum allowable increase in concentrations of [increment pollutants] over the baseline concentration of such pollutants shall not exceed" specified amounts.[79] This is the prohibition. The current values for those amounts—the "increments"—are set forth in Table 2 of Part I of this Article.[80] Second, the CAA mandates the first of two enforcement mechanisms: SIPs must "contain measures assuring that maximum allowable increases over baseline concentrations of . . . such pollutant shall not be exceeded."[81] Third, the statute mandates an additional enforcement mechanism by prohibiting construction of any major emitting facility in an attainment or unclassifiable area unless the facility owner or operator "demonstrates . . . that emissions from construction or operation of the facility will not cause, or contribute to, air pollution in excess of any maximum allowable increase . . . more than one time per year."[82]

B. Tracking Increment Consumption by Periodic Ambient Air Quality Monitoring

The most straightforward method to "track" increment consumption would be to: (1) establish an iron-clad baseline concentration value as of a specific date; (2) periodically monitor ambient air concentrations after that date; (3) subtract the unchanging baseline value from each measured ambient concentration value; and (4) label the mathematical difference on each occasion as the then-existing extent of increment consumption. To see how this could be done, consider Figure 26.

Figure 26: Increment Consumption Analysis—The Monitoring Approach



If a baseline value for PM_{10} were set at 20 $\mu g/m^3$ on August 1, 2001, and the measured concentration of PM_{10} in the ambient air on August 1, 2004, was 30 $\mu g/m^3$, the baseline area will have "consumed" 10 $\mu g/m^3$ of the 17 $\mu g/m^3$ increment specified for Class II areas. Stated another way, 7 $\mu g/m^3$ of the increment—a figure derived by subtracting the measured value from the ceiling—would remain unconsumed and available for future growth. Similar measurements and calculations could be made on a periodic basis, tracking increment consumption in the style of time-lapse photography. Compliance (and noncompliance) with the

78. See discussion at *Part I, supra* note 10, at note 162 and accompanying text.

79. CAA §163(b), 42 U.S.C. §7473(b).

80. *See Part I*, *supra* note 10, tbl. 2. Table 2 sets forth the increment values established by Congress and EPA.

81. CAA §163(a), 42 U.S.C. §7473(a).

82. *Id.* §§165(a)(3)(A), 7475(a)(3)(A).

NAAQS is essentially done in this manner. Such an approach focuses on assuring that maximum allowable ambient air concentrations are not exceeded.

C. Why EPA Rejected Tracking by Ambient Air Quality Monitoring

From the beginning, EPA has rejected the increment consumption monitoring approach of Figure 26. Instead, the Agency has chosen to track increment consumption by establishing pollutant emission inventories and modeling the ambient air dispersion of those emissions. EPA has articulated two reasons for this decision.[83]

First, because ambient air quality monitoring cannot be used to measure the impacts of emissions that have not yet commenced, the increment consumption impacts of a PSD permit applicant's proposed future emissions must be modeled.[84] This proposition is irrefutable. In declaring that a PSD permit applicant must be denied a permit unless it demonstrates "that emissions from . . . the facility will not cause, or contribute to, air pollution in excess of any maximum allowable increase,"[85] Congress had to know that such a showing could only be made by means of modeling.

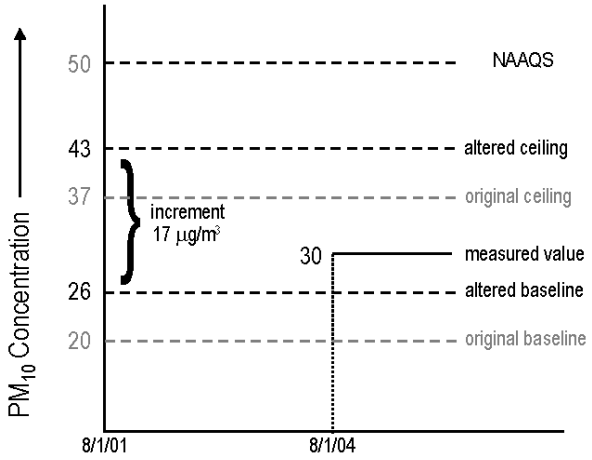
This first argument does not, however, justify EPA's refusal to track increment consumption through air quality monitoring once a PSD permit has been granted and the facility's new emissions commence. Many thousands of emission limitations in SIPs have been established on the basis of air quality models; compliance with NAAQS is nevertheless assessed not by relying on the projections of the models but by periodically measuring ambient air quality. The same could be done for the LAAQS ceilings established through the PSD permit issuing process. Accordingly, the first argument, standing alone, is insufficient to justify EPA's rejection of the ambient air quality monitoring approach to tracking increment consumption.

Second, the Agency has concluded that air quality monitoring cannot be used to track increment consumption because the contributions of continually changing emissions to "baseline" and to "increment" have been defined in complicated ways that air quality monitoring cannot decipher:

> [S]everal actual emission changes that would be detected by an ambient monitor are not considered to consume increment. For example, emissions from any source commencing construction prior to January 6, 1975, but completed at some later date, do not count against increments . . . A state may exempt certain emission changes which otherwise would be counted against increment. Potential exemptions include federally ordered fuel switches, temporary emissions, and new sources outside the United States. Finally, with limited exceptions, section 123 prohibits a source from receiving credit for the dispersive effects of a stack height which exceeds good engineering practice. Consequently, if a source's emissions are counted against increment and its stack height exceeds good engineering practice, its emissions must be calculated as though emitted from a good engineering practice height. A monitor will reflect air quality impacts based on actual stack height.[86]

This second argument also contains a great deal of truth. Consider, once more, Figure 26. When monitoring devices show an ambient air quality of 30 $\mu g/m^3$ (annual arithmetic mean) of PM_{10} on August 1, 2004, does that really mean that a 10 $\mu g/m^3$ chunk of the 17 $\mu g/m^3$ increment has been consumed? What if a portion of that 10 $\mu g/m^3$ increase over the baseline value was contributed by a facility at which some or all particulate emissions have been excluded from increment consumption under one of the four mechanisms of CAA §163(c)?[87] Consider, in this respect, Figure 27.

Figure 27: Increment Consumption Analysis—Effect of §163(c) Exclusions



If 6 $\mu g/m^3$ of the 10 $\mu g/m^3$ increase over baseline falls within such a §163(c) exclusion, the true increment consumption has been only 4 $\mu g/m^3$ and the remaining available increment is actually 13 $\mu g/m^3$ rather than 7 $\mu g/m^3$. It follows that the ceiling is no longer the 37 $\mu g/m^3$ initially calculated by reference to the original baseline, but 43 $\mu g/m^3$. Stated another way, the 6 $\mu g/m^3$ ambient air concentration increase attributable to the excluded emissions must be allocated to the baseline; because it cannot be included in the increment consumption calculation, there is nowhere else to

83. Professor Craig Oren has suggested a third reason:

> In the world in which people breathe, air quality changes continually because atmospheric conditions vary and because sources may not emit at a constant level. Attempting to use actual air quality measurements to judge increment consumption would therefore raise difficult questions about determining which day's or year's monitoring data should be used to judge increment consumption.

Craig N. Oren, *Prevention of Significant Deterioration: Control-Compelling Versus Site-Shifting*, 74 IOWA L. REV. 1, 41-42 (1988). This point is well taken, but these difficulties have not precluded extensive use of ambient air quality monitoring to measure compliance with NAAQS.

84. *See* 44 Fed. Reg. 51924, 51944 (Sept. 5, 1979) ("air quality impacts of a proposed source must necessarily be based on modeling, not monitoring").

85. CAA §165(a)(3)(A), 42 U.S.C. §7475(a)(3)(A).

86. 44 Fed. Reg. at 51944. *See also* Raffle, *supra* note 3, at 61 ("monitors cannot distinguish increment-consuming emissions from exempted or grandfathered emissions").

87. *See* CAA §163(c), 42 U.S.C. §7473(c). This subsection authorizes four exclusions from increment consumption, upon the request of a governor, for such things as federally ordered fuel switches, fuel switches due to certain natural gas curtailment plans, temporary emissions of particulate matter due to construction and related activities, and new sources constructing outside the United States. *See also* 45 Fed. Reg. at 52719 (discussing exclusion requests by governors); 43 Fed. Reg. at 26401-02 (same); 45 Fed. Reg. at 52719 (discussing temporary exclusions).

allocate it. Examples like this demonstrate that ambient air monitoring data, standing alone, cannot provide a true picture of how much increment has been consumed and how much remains available for future growth.

For the foregoing reasons, EPA's policy is now unambiguous: "Increment consumption is based exclusively on predictions from air quality dispersion models."[88] In the words of John Quarles:

> [T]he extent to which an increment has been used up in any specific locality must be determined by reference to a set of books, not by reference to current data of air quality. It is a process of tracking the changes in emissions recorded on the PSD account ledgers.[89]

D. Tracking Increment Consumption by Emissions Inventory Calculations

EPA has chosen to track increment consumption by focusing on *emissions*—and how they change through time—rather than ambient air quality. Such an approach poses three basic issues. First, an emissions tracking scheme requires a clear articulation of which source emissions consume increment.[90] Second, such a scheme must specify how to calculate the *quantities* of increment-consuming pollutants, e.g., in tpy or pounds per hour, that will be discharged by each increment-consuming source. Third, an emissions tracking scheme must specify how to calculate the amount of ambient air *concentration* increment (in $\mu g/m^3$) consumed by the increment-affecting emissions.[91]

E. Which Source Emissions Consume Increment?

Four categories of source emissions affect the increment, either by consuming or expanding it: (1) emissions resulting from major emitting facility construction (including modification) commencing after January 6, 1975, irrespective of whether all facilities have applied for the necessary PSD permits; (2) emission changes occurring after the baseline date at sources whose previous emissions on the baseline date are included in the baseline concentration; (3) emission changes due to SIP revisions approved after the baseline date; and (4) minor and area source growth occurring after the baseline date.[92] All emissions falling within these four categories belong in the inventory of increment-consuming emissions.[93] Thus, for example, EPA may conclude that in a given baseline area, increment-consuming emissions are being discharged by Source A, Source B, and various "area" sources.[94]

F. How Does EPA Calculate the Quantities of Emissions in the Increment-Consumption Inventory?

But how does EPA calculate the *quantities* of increment-consuming pollutants, e.g., in tpy or pounds per hour, emanating from each of the increment-consuming sources? For example, suppose that operations at Source A long preceded establishment of the baseline date, so that its PM_{10} emissions are included in the baseline concentration; if a state revises its SIP to permit greater PM_{10} emissions by such a grandfathered facility, how does EPA calculate the quantity of PM_{10} emissions that will now be said to consume increment? To determine that value, EPA must articulate the quantity of "baseline" PM_{10} emissions contributed by Source A prior to the SIP revision. Is that baseline PM_{10} emission value the "actual" PM_{10} emissions discharged to the atmosphere by Source A in the past? If so, over what time period? Alternatively, is that baseline PM_{10} emission value the quantity of emissions that Source A *could* have lawfully emitted under the SIP prior to its revision—so-called allowed emissions? The latter figure might be quite different (and considerably higher) than the actual emissions.

EPA struggled with such issues when promulgating the regulatory amendments following the *Alabama Power* decision:

> EPA's current regulations provide that the first and third category of sources affect increment on the basis of emissions *allowed* under the permit and emissions allowed under the SIP as revised, respectively. The second and fourth categories affect increment on the basis of *actual* emissions changes from the emissions included in the baseline concentration.
>
> Since its proposal, EPA has reevaluated its current policy . . . [and] has concluded that increment consumption and expansion should be based primarily on *actual* emissions increases and decreases . . . .
>
> Increment consumption or expansion is directly related to baseline concentration. Any emissions not included in the baseline are counted against the increment. The complementary relationship between the concepts supports using the same approach for calculating emissions contributions to each. . . . Since the *Alabama Power* decision and the statute both provide that actual air quality be used to determine baseline concentrations, but provide no guidance on increment consumption calculations, EPA has concluded that the most reasonable approach, consistent with the statute, is to use actual source emissions, to the extent possible, to calculate increment consumption or expansion.
>
> [S]ource emissions allowed under permits and SIP provisions in many cases are higher than actual source emissions. Sources could therefore increase their emissions without being subject to PSD review or the SIP revision process. However, if increment calculations were based on *allowable* emissions, EPA believes increment violations would be inappropriately predicted and proposed source construction would be delayed or halted. . . .
>
> EPA believes it is unwise to restrict source growth based only on emissions a source is permitted to emit but which, in many instances, have not been and are not likely to ever be emitted. Increment calculations based on the best prediction of *actual* emissions links PSD permitting more closely to actual air quality deterioration than calculations based on allowable "paper" emissions. In addition, used [sic] of actual emissions for increment consumption is consistent with using an actual emissions baseline for defining a major modification and for calculating emissions offset baselines.[95]

88. 58 Fed. Reg. at 31631.

89. Quarles, *supra* note 52, at 14.

90. *See* 45 Fed. Reg. at 52717.

91. *See id.*

92. *See id.*

93. EPA uses the phrase "inventory of increment-consuming emissions" in 53 Fed. Reg. at 3708-09.

94. For a definition of "area sources," see *supra* note 42.

95. 45 Fed. Reg. at 52717-18 (emphasis added).

EPA has provided a detailed explanation of how it intends to use the actual emissions approach. The relevant passage is quoted below at great length because it begins to suggest the amazing complexity of the Agency's efforts to replace ambient air quality monitoring with a jerry-rigged Rube Goldberg[96] increment consumption calculation machine:

> Increment calculations will generally be based on actual emissions as reflected by normal source operation for a period of two years. . . . In EPA's judgment, two years represents a reasonable period for assessing actual source operation. . . .
>
> The two-year period of concern should generally be the two years preceding the date as of which increment consumption is being calculated, provided that the two-year period is representative of normal source operation. The reviewing authority has discretion to use another two-year period, if the authority determines that some other period of time is more typical of normal source operation than the two years immediately preceding the date of concern. In general, actual emissions estimates will be derived from source records. Actual emissions may also be determined by source tests or other methods approved by the reviewing authority. Best engineering judgments may be used in the absence of acceptable test data.
>
> EPA believes that, in calculating actual emissions, emissions allowed under federally enforceable source-specific requirements should be presumed to represent actual emission levels. Source-specific requirements include permits that specify operating conditions for an individual source, such as PSD permits, state . . . permits . . . and SIP emissions limitations established for individual sources. The presumption that federally enforceable source-specific requirements correctly reflect actual operating conditions should be rejected by EPA or a state, if reliable evidence is available which shows that actual emissions differ from the level established in the SIP or the permit.
>
> EPA believes two factors support the presumption that source-specific requirements represent actual source emissions. First, since the requirements are tailored to the design and operation of the source which are agreed on by the source and the reviewing authority, EPA believes it is generally appropriate to presume the source will operate and emit at the allowed levels. Second, the presumption maintains the integrity of the PSD and [new source review (NSR)] systems and the SIP process. When EPA or a state devotes the resources necessary to develop source-specific emissions limitations, EPA believes it is reasonable to presume those limitations closely reflect actual source operation. EPA, states, and sources should then be able to rely on those emissions limitations when modeling increment consumption. In addition, the reviewing authority must at least initially rely on the allowed levels contained in source-specific permits for new or modified units, since these units are not yet operational at a normal level of operation. EPA, a state, or source remains free to rebut the presumption by demonstrating that the source-specific requirement is not representative of actual emissions. If this occurs, however, EPA would encourage states to revise the permits or the SIP to reflect actual source emissions. Such revisions will reduce uncertainty and complexity in the increment tracking system, since it will allow reviewing authorities and sources to rely on permits and SIP emissions limitations to model increment consumption.
>
> Review of increment usage due to SIP relaxations will also be based initially on emissions allowed under the SIP as revised (provided this allowed level is higher than the source emissions contributing to the baseline concentration). Calculations will generally be made on the difference between the source emissions included in the baseline concentration and the emissions allowed under the revised SIP. Initial use of allowable emissions is necessary because the increment calculation generally occurs before the source has actually increased its emissions. Therefore, at the time the revision is reviewed, increment consumption must be based on the predicated source operation under the revision. In addition, since SIP revisions are commonly based on source requests, it is reasonable to assume such sources will actually emit at levels permitted by the relaxation.
>
> Subsequent to the initial review process, increment calculations for SIP relaxations may depart from allowable emissions under the SIP, if the source has not actually increased its emissions. For example, three years after approval of a SIP relaxation, if it is found that the source has not increased its emissions to levels allowed in the SIP, estimates of increment usage should be revised to reflect actual source emissions. If this occurs, EPA would also encourage states to revise the emissions levels allowed in the SIP to represent the source's actual emissions.
>
> Finally, the required increment consumption analysis can be amended by the applicant after the PSD review process has begun. For example, an applicant would normally revise its analysis to reflect increment made available by the withdrawal of PSD applications previously considered in the applicant's calculation of increment consumption. In no event, however, will the source be required to take account of emissions changes or changes due to pending PSD applications or SIP relaxations that could increase the amount of increment consumed by other sources.[97]

One's eyes definitely glaze over when attempting to follow these curlicues, but the point is that EPA faces a very daunting challenge in trying to establish an accurate inven-

96. The American Heritage Talking Dictionary (1997) explains:

> Reuben ("Rube") Lucius Goldberg (1883-1970) was an American cartoonist who delighted his readers with drawings of contrivances that used complicated means to perform what otherwise could be accomplished quite simply. For example, a device to shell an egg is tripped when one picks up the morning paper from the kitchen table. In doing so, one pulls a string that opens the door of a birdcage, releasing a bird that follows a trail of birdseed up a platform. The bird falling off the platform into a pitcher of water splashes water onto a flower that grows, pushing up a rod that causes a pistol to fire. A monkey scared by the shot hits his head against a bumper attached to a razor that cuts into the egg, loosening the shell, which falls into a saucer.

97. 45 Fed. Reg. at 52718-19. EPA also set forth a very lengthy discussion of how to handle what it calls the "Gulf Coast Problem"—circumstances in which gas-fired boilers had received approval to burn oil in the event of a future natural gas shortage; if all such sources made the switch, SO_2 increment consumption violations would occur. *See id*. at 52720-21. *See also id*. at 52722 (potential increment violations due to the double counting of emissions decreases); 48 Fed. Reg. 48665, 48668 (Oct. 20, 1983) ("if in the future it can be shown that actual emissions were significantly less than allowable emissions at the time the baseline was triggered, the actual emission levels will be used in calculating PSD increment consumption").

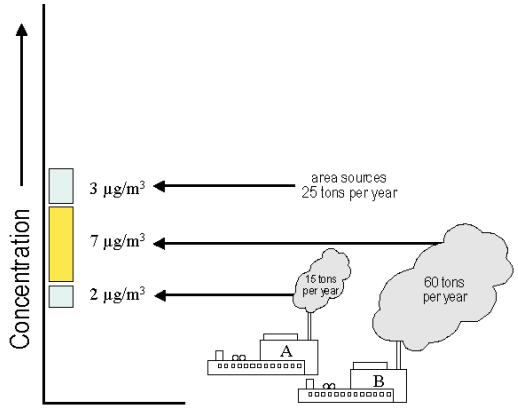
tory of increment-consuming emissions.[98] Moreover, these efforts to define the *quantities* of increment-consuming emissions are merely an intermediate analytical step.

G. How Does EPA Convert the Increment-Consumption Inventory Values to Increment Consumption Consequences in the Ambient Air?

We have now seen how EPA calculates the amounts of pollutants emitted by increment-consuming sources and the quantities of those pollutants that should be allocated to the increment-consumption inventory. Observe that these emissions of pollutants from various facilities and area sources are typically quantified in terms such as pounds per hour or tpy. Emission limitations are often expressed in this manner as well, prohibiting the discharge of more than a specific quantity of pollutants over a specified time period.[99]

But the increments themselves are not expressed in such terms as tpy; instead, the increments are expressed as maximum increases in ambient air concentration values. Suppose we have a reasonably complete inventory of increment-consuming emissions—15 tpy from Source A (a grandfathered facility benefiting from a SIP relaxation), 60 tpy from Source B (a PSD permit applicant), and 25 tpy from area sources. How are these *emitted quantities* of pollutants to be linked to the *increment concentrations* consumed by these emissions? The answer, of course, is air quality modeling—modeling of the same type used to establish the 1 $\mu g/m^3$ plume boundary as depicted in Figure 12 from Part I of this Article.[100] By using such models, EPA converts the inventory of increment-consuming *emissions* of PM_{10}, for example, into a predicted increase in ambient air PM_{10} *concentrations*.

Figure 28: Increment Consumption Analysis—The Emissions Inventory/Modeling Approach



These calculations are depicted in Figure 28. The 15 tpy of increment-consuming PM_{10} emitted by Source A may be projected to consume (increase the ambient air concentration by) 2 $\mu g/m^3$, the 60 tpy emitted by Source B may be projected to consume 7 $\mu g/m^3$, and the 25 tpy emitted by the area sources may be projected to consume 3 $\mu g/m^3$. Based on such modeling, EPA may conclude that the total increment being used up by the activities of these combined sources is 12 $\mu g/m^3$.

Observe that there is no need to compare the increment-consumption calculations of Figure 28 to any baseline concentration value. Indeed, the baseline concentration line is absent from Figure 28 to reflect Agency practice. The only purpose for constructing an inventory of *baseline emissions* is to determine which emissions may be eliminated from the increment-consumption analysis; the Agency has no interest in calculating a *baseline concentration* value. As long as the total $\mu g/m^3$ devoured by the increment-consuming emissions is less than the relevant PSD increment, EPA concludes that all is well.

H. What the First PSD Permit Applicant Must Show Concerning Increment Consumption

The CAA sets forth a list of items that a PSD permit applicant must demonstrate prior to issuance of a permit, including compliance with the increments.[101] The regulations flesh out the increment demonstration requirement:

> [T]he owner or operator of the proposed source or modification shall demonstrate that allowable emission increases from the proposed source or modification, in conjunction with all other applicable emissions increases or reduction (including secondary emissions) would not cause or contribute to air pollution in violation of: . . .
>
> (2) Any applicable maximum allowable increase over the baseline concentration in any area.[102]

The first PSD permit applicant in a baseline area has an advantage not shared by subsequent applicants: the first facility ordinarily need not demonstrate how much of the PSD increment remains because all of it does—by definition, no increment is consumed until the first applicant establishes the baseline date with the filing of a completed application.[103] Stated another way, because none of the increment-consuming emissions can nibble away at the increment until the baseline date has been established, the first PSD permit applicant in an area is ordinarily required to show only that its emissions—standing alone—will not violate the increment. The applicant must do so by modeling the ambient air impacts of its projected emissions.

A word about where increment consumption is measured. To paraphrase John Quarles:

98. The task is even more complicated for NO_2 because a "large portion of nitrogen oxides emissions are from mobile and area sources that are not subject to permit requirements . . . ." 53 Fed. Reg. at 3707. *See id.* at 3707-09.

99. For a discussion of the bewildering numbers of ways in which pollution control standards may be expressed, *see* John-Mark Stensvaag, *Regulating Radioactive Air Emissions From Nuclear Generating Plants: A Primer for Attorneys, Decisionmakers, and Intervenors*, 78 NW. U. L. REV. 1, 100-04 (1983).

100. *See Part I*, *supra* note 10, fig. 12. "The EPA's 'Guideline on Air Quality Models' . . . lists the recommended air quality modeling techniques for estimating air quality impacts of PSD sources and is incorporated by reference in 40 CFR 51.166 and 52.21." 53 Fed. Reg. at 3708.

101. *See* CAA §165(a)(3), 42 U.S.C. §7475(a)(3).

102. 40 C.F.R. §§51.166(k), 52.21(k).

103. Of course, if the applicant's significant impact area (1 $\mu g/m^3$) plume will intrude into a previously established baseline area, the facility is not the first applicant in that additional baseline area and will be required to demonstrate how much of the increment remains in that location. Moreover, if the NAAQS is more restrictive than the value calculated by adding the baseline concentration to the relevant increment, then the full increment is not actually available. *See Part I, supra* note 10, at text accompanying note 35 and fig. 5. Figure 5 depicts the NAAQS constraint on LAAQS ceilings.

> It must be noted that as a stream of air comes out of a stack it is likely to contain concentrations of pollutants far in excess of the [increments]. This is not illegal, since compliance with the [increments] is tested not at the top of the stack but at ground level, and the actual requirement of law is that a source must not cause a concentration of pollutants [violating] the [increments] to occur anywhere at ground level in the surrounding area.[104]

Technically, as Professor Craig Oren says: "If the highest estimate of annual increment consumption, and the second-highest estimate of twenty-four-hour or three-hour consumption, is less than the relevant increment, the source has satisfied the increments."[105] As discussed below,[106] however, there is nothing in the CAA that compels the permit-issuing authority to grant use of the entire increment to the first PSD permit applicant or to any applicant; pollution control officials may decide that it is more advisable to reserve room for future industrial growth.

In any event, if air quality modeling shows that an increment will be exceeded (or if the permit-issuing authority concludes that increment consumption would be excessive), the permit applicant may reduce its projected emissions through more stringent control technology or may amend its application to specify a different location.[107]

I. What Subsequent PSD Permit Applicants Must Show Concerning Increment Consumption

All PSD permit applicants whose emissions will significantly affect a previously established baseline area must make not one showing but two. First, each applicant must show how much of each relevant increment remains unconsumed.[108] Second, each applicant must show that its proposed contribution of the relevant pollutant to ambient air quality will not exceed the remaining increment. The first showing was not required from the first PSD permit applicant; the second showing is identical to the only showing required of the first applicant.

It is not uncommon for a PSD permit applicant to be the first applicant with respect to a portion of its plume (triggering the usual obligations of first applicants) while simultaneously being a subsequent applicant with respect to the portion of its plume that intrudes on a previously established baseline area. Such a possibility is depicted in Figure 22 in Part I of this Article.[109]

J. Demonstrating How Much Increment Remains Unconsumed

The big challenge for subsequent permit applicants will be to demonstrate how much of the increment remains unconsumed. Almost 30 years ago, John Quarles explained the daunting nature of this undertaking, referring to the "bookkeeping problems":

> Any applicant for a PSD permit will have to explore the history of addition and subtractions against the PSD increment in its locality to determine whether it is entitled to build. This inquiry is likely to become increasingly confusing as time passes and an increasing number of changes must be taken into account. Moreover, the process is enormously complicated by the fact that it does not involve additions (or subtractions) of known amounts. Any future plant built under PSD will consume varying portions of the increment at each different point within the full circumference of areas within which its emissions may disperse. If a second plant wishes to build at a location ten miles downwind, the model for the first plant must be consulted to determine how much of the increment there the first plant consumed. A third plant being built five miles farther downwind will require additional calculations. Moreover, there are questions of what is downwind. If the pattern of three plants is a triangle rather than a straight line, their emissions presumably will not impact any given point all at the same time, and therefore for purposes of compliance with a short-term standard their effects are not cumulative, whereas for purposes of an annual average the effects probably will be cumulative. The bookkeeping problems as an increasing number of plants are built may become overwhelming, and it is not hard to visualize extended litigation over the disputes that might arise.[110]

This bookkeeping is made even more complicated by the fact that increment consumption (and expansion) occurs not just through the activities of PSD permittees, but also by changes in emission behavior at baseline facilities, by amendments to SIPs, and by the activities of stationary sources and mobile sources not subject to the PSD permitting requirement.

K. Increment Consumption Bookkeeping: Changes at "Baseline" Facilities After the Baseline Date

When the baseline date is triggered in a given location, the ongoing emissions from preexisting facilities do not chew up increment; such emissions are part of the baseline for the area. This is appropriate. After all, the PSD program is designed to prevent excessive air quality degradation in the future—not to roll back emissions from existing facilities. Thus, if the preexisting emissions—from stationary sources and mobile sources—continued at precisely the same rate from and after the baseline date, only the emissions of new actors would consume increment.

As we have seen,[111] however, emissions from such existing (or baseline) sources may change (and have historically changed) over time for a great variety of reasons, including changes in operations. EPA has struggled with workable

104. Quarles, *supra* note 52, at 13.

105. Oren, *supra* note 83, at 27. The increments are absolute limits:

> This means, for example, that a modeled impact of 25.1 $\mu g/m^3$ for a proposed new source would result in an exceedance of the Class II [NO_2] increment of 25 $\mu g/m^3$, while a modeled impact of 24.9 $\mu g/m^3$ would not. In neither case is the result "rounded off" to 25 $\mu g/m^3$.

53 Fed. Reg. 40656, 40657 (Oct. 17, 1988).

106. *See* text accompanying *infra* notes 131-36.

107. If the applicant is a subsequent—rather than the first—PSD permit applicant in an area, the facility may also seek to induce an existing facility to reduce its increment-consuming emissions, making room for the applicant's emissions.

108. *See* 45 Fed. Reg. at 52678.

109. *See Part I*, *supra* note 10, fig. 22. Figure 22 depicts the situation where a facility is the first to apply for a PSD permit in a given attainment or unclassifiable area—the actor whose completed application triggers the baseline date—but the significant impact plume of the applicant extends into an area in which the baseline date has already been triggered.

110. Quarles, *supra* note 52, at 15. For a discussion of increment consumption involving plume overlap, see Oren, *supra* note 83, at 36-37, 41.

111. *See* text accompanying *supra* notes 72-75.

principles for deciding which emissions increases at baseline facilities will count against the increment and which will be ignored.[112]

The critical thing to note here is that the inputs to EPA's air quality dispersion models (used to calculate the effects of emissions on ambient air concentrations) are themselves the outputs of models designed to demarcate which of a preexisting facility's emissions should be allocated to the increment-consumption category.

L. Increment Consumption Bookkeeping: SIP Relaxations

A "SIP relaxation" is a SIP revision resulting in increased emissions—either from a specific facility or from a larger group of emission sources. "Any SIP relaxations submitted after [June 19, 1978,] that would affect a PSD area must include a demonstration that the applicable increment will not be exceeded."[113] Because increment consumption cannot occur prior to the baseline date, this policy applies only in locations where the baseline date has been triggered.[114] However, "for a plant located in an area where the baseline date has not been triggered, an analysis is necessary for all neighboring areas, impacted by the relaxation, where the baseline has been triggered."[115]

Although some SIP relaxations approved by EPA have consumed only small fractions of the remaining available increment,[116] others have been remarkably generous in consuming remaining available increment.[117] The Agency has indicated that renewal of a limited duration SIP relaxation would require reassessment of increment consumption under then-existing conditions.[118] A generic SIP relaxation (for example, permitting certain types of facilities to burn higher sulfur fuel) might be approved for some sources but simultaneously denied for specified larger sources for which increment violations are predicted.[119]

EPA has invited fine-tuning of the increment consumption bookkeeping associated with SIP relaxations in ways designed to minimize consumption calculations. For example, in the Preamble accompanying the 1980 regulations, the Agency declared:

> Subsequent to the initial review process, increment calculations for SIP relaxations may depart from allowable emissions under the SIP, if the source has not actually increased its emissions. For example, three years after approval of a SIP relaxation, if it is found that the source has not increased its emissions to levels allowed in the SIP, estimates of increment usage should be revised to reflect actual source emissions. If this occurs, EPA would also encourage states to revise the emissions levels allowed in the SIP to represent the source's actual emissions.[120]

M. Increment Consumption Bookkeeping: Emissions From Non-PSD Sources

Once the baseline date is triggered, "[i]ncrement consumption includes not only emissions from PSD-permitted sources, but also emissions from all other sources in the area, including fugitive emissions . . . from minor sources such as . . . surface coal mines . . . ."[121] If a new facility is too small (or if emission increases at an existing facility are too small) to trigger the need for a PSD permit, the newly released pollutants at such facilities will nevertheless consume increment.[122] It is also possible that a major emitting facility may come on line without obtaining the necessary PSD permit[123]; obviously, its emissions consume increment as well. Each PSD permit applicant whose significant impact plume will enter an already established baseline area must demonstrate how much of the increment has been consumed by such sources.

Because the emissions of non-PSD facilities will not be memorialized through the permit issuing process, a new PSD permit applicant may be required to assemble emissions inventory data that is not yet a matter of public record. Moreover, it is possible that the increment may be exhausted by the contributions of these non-PSD actors. As EPA explained in approving an Alaska SIP revision:

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112. *See* 45 Fed. Reg. at 52714, *quoted at* text accompanying *supra* note 73.

113. 43 Fed. Reg. 26380, 26380-81 (June 19, 1978). There is some confusion about whether this policy has a de minimis feature. *Compare* 68 Fed. Reg. 14542, 14543 (Mar. 26, 2003) ("A SIP relaxation would only trigger PSD if the relaxation would have the potential to allow a significant increase in emissions above an actual emissions baseline"), *with* 53 Fed. Reg. 22486, 22487 (June 16, 1988) ("*any* SO_2 or particulate SIP relaxation must contain an increment analysis, and that analysis cannot make use of a significant impact area to limit the extent of the review") (emphasis added).

114. *See* 53 Fed. Reg. at 22487 ("no PSD analysis is required for a SIP relaxation for a source located in an area which has not been significantly impacted by a PSD source (or is not in the same area as the PSD source")). If EPA approval of a SIP relaxation is pending at the time when a baseline date is triggered, the SIP revision is exempt from increment analysis. *See* 52 Fed. Reg. 19541, 19542 (May 26, 1987).

115. 53 Fed. Reg. at 22487.

116. *See, e.g.*, 51 Fed. Reg. 46655, 46658 (Dec. 24, 1986) (approving SIP relaxation for a kraft pulp mill facility that might result in an actual emissions increase of 251 pounds per hour of total suspended particulate (TSP), after calculating that it would consume 9.2 $\mu g/m^3$ of the 37 $\mu g/m^3$ of the 24-hour increment and less than 1 $\mu g/m^3$ of the 19 $\mu g/m^3$ annual geometric mean increment).

117. *See, e.g.*, 66 Fed. Reg. 29493 (May 31, 2001) (approving SIP relaxation for a fiberglass insulation facility, although projected to consume 23.5 $\mu g/m^3$ of the available 30 $\mu g/m^3$ PM_{10} 24-hour increment). *See also* 49 Fed. Reg. at 49458 (approving a site-specific SIP revisions because "EPA has determined that the revised SO_2 SIP limitation will not consume 100% of the increment in any affected PSD area"); 46 Fed. Reg. 44448, 44449 (Sept. 4, 1981) (approving site-specific SIP revision where "82% of the 24-hour increment and 73% of the 3-hour increment would be consumed"). *See also infra* note 135.

118. *See* 46 Fed. Reg. 32271 (June 22, 1981) (one-year site-specific SIP relaxation could not be renewed without "considering the emissions growth which had occurred on a 'first-come, first-served' basis in the intervening period").

119. *See, e.g.*, 45 Fed. Reg. 57459, 57460 (Aug. 28, 1980) (proposing partial approval and partial disapproval of a SIP revision). For another illustration of a generic SIP relaxation consuming increment, see 45 Fed. Reg. 47424, 47427 (July 15, 1980) (Oregon SIP revision allowing increased open field burning would consume PSD increment and might constrain future construction of wood-burning facilities).

120. 45 Fed. Reg. at 52719.

121. 57 Fed. Reg. 38641, 38644 (Aug. 26, 1992). *See also* 61 Fed. Reg. at 38270 ("After the minor source baseline date has been established in an area, all increases, whether subject to major NSR or not, consume increment."); Oren, *supra* note 83, at 26-27.

122. *See* 61 Fed. Reg. at 38270.

123. *See* John-Mark Stensvaag, Materials on Environmental Law 485-88 (1999) (discussing $11.1 million penalty imposed on Louisiana-Pacific Corporation for constructing 14 major emitting facilities in 11 states without obtaining the required PSD permits).

> Alaska's permit program for "minor" sources does not require that PSD increments be met before a permit may be issued. However, this approach is consistent with section 110(a)(2)(D) of the Clean Air Act and EPA's regulations . . . which require minor sources to only meet ambient standards as a condition of receiving a permit. The consumption of increment from minor source growth is to be controlled through airshed management and violations are to be remedied through the SIP process (see 40 CFR 51.166(a)(3)). As a result, the Alaska minor source permit program, which currently meets applicable requirements, might result in a new minor source being permitted even though PSD increments would be violated. However, EPA intends to utilize its oversight and information collection authority to ensure that any such violations are remedied through the SIP process.[124]

N. Increment Consumption Bookkeeping: Area and Mobile Source Emissions

Once the baseline date has been triggered, increments may also be consumed by area[125] and mobile sources.[126] EPA has the following advice for PSD permit applicants struggling to calculate NO_2 increment consumption since establishment of the baseline date:

> [D]ata on vehicle miles traveled in the vicinity of a proposed new or modified major source could be obtained from the State and used to model increment consumption (or expansion) by mobile sources. If a State has no data available on traffic patterns in the vicinity of the source, but has other data available or believes mobile source data from other studies or reports to be more accurate than State data, the use of such alternative data may be approvable on a case-by-case basis. Further, if a new PSD permit applicant is proposing to locate in close proximity to a previous PSD permittee, the new application may incorporate the previous applicant's mobile source analysis if the previous application is less than one year old (or the data have been updated by the new applicant), covers the same general impact area, and no new mobile source data have become available.[127]

O. Increment Consumption Bookkeeping: An EPA Illustration

In promulgating its 1980 PSD permit regulations, EPA set forth a detailed illustration of how increment consumption will be analyzed in cases involving sequential PSD permit applicants:

> In December 1980, a new source (Source A) that will emit SO_2 . . . files a PSD application to locate in an area that is attainment for SO_2 . . . . At maximum operating capacity including application of best available control technology [(BACT)], and assuming year-round continuous operation, the source can emit 700 tons of SO_2 per year. Seven hundred tons per year (tpy) is the source's *physical potential to emit* SO_2. . . .
>
> In the course of review, modeling reveals the SO_2 increment will be violated in the source's area of impact if it emits 700 tons SO_2 per year. The source, therefore, decides to limit its operation so as to decrease its emissions to 600 tons SO_2 per year. This reduction proves sufficient to eliminate the predicted violation. The source is issued a PSD permit that sets an SO_2 emissions limitation of 600 tpy, which reflects the revised source operation (approximately 20 hours a day, seven days a week). This emissions rate is the source's *legal potential to emit*. It is also the source's *allowable emissions*, since it is the emissions rate specified as a federally enforceable permit condition. . . .
>
> During the first three years of operation, from March 1982 to March 1985, the demand for the source's product is less than anticipated. As a result, the source's actual emissions are 250 tpy during the first year and 300 tpy during the next two years.
>
> In April 1985, another new source of SO_2 (Source B) proposes to locate in the area of impact of Source A. Consequently, in calculating its . . . increment consumption, Source B is required to model the emissions of Source A. Under EPA's increment consumption policy . . . Source A's *actual emissions* should be modeled. Because Source A has an individually-tailored PSD permit, the definition of actual emissions allows the reviewing authority to presume that the allowable emissions in Source A's PSD permit reflects its actual emissions, unless the reviewing authority or source applicant has reason to believe that allowable emissions are not representative of actual source emissions.
>
> In the case of Source A, *allowable emissions*, in fact, differ from *actual emissions*. Assuming that the reviewing authority is aware of this difference as a result of its periodic assessment or because Source B has presented this information in its application, Source A is modeled at its actual emissions rate representative of normal source operation during a two-year period preceding the date of concern. In this case, the date of concern would be approximately the date Source B submits its application. The reviewing authority should, therefore, look to the two-year period preceding that date unless that period of time was atypical of normal source operation. For Source A, the two-year period preceding Source B's application can be considered representative of normal source operation. Source A's actual emissions during that period, on an average annual basis, are approximately 300 tpy. The modeling of increment consumption for Source B should assume that emissions rate for Source A.[128]

124. 56 Fed. Reg. 19284, 19286 (Apr. 26, 1991).

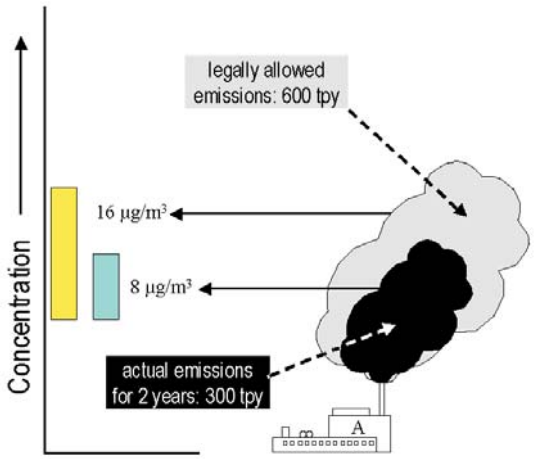
125. *See supra* note 42. When changing the particulate standard from the TSP to the PM_{10} measure, EPA noted that "emissions from motor vehicles and residential wood combustion will have a greater impact on the [PM_{10}] increments than such emissions had on the original TSP increments." 58 Fed. Reg. at 31634.

126. *See* 53 Fed. Reg. at 40668; 58 Fed. Reg. at 31634 ("After the minor source baseline date has been established for a particular area, emissions changes occurring at area sources, including mobile sources, will affect the amount of available increments within that baseline area.").

127. 53 Fed. Reg. at 40663. For a complicated discussion of the recommended models and assumptions to use for NO_2 mobile source increment consumption analysis, see 53 Fed. Reg. at 3708.

128. 45 Fed. Reg. at 52704-05 (emphasis added).

Figure 29: Calculating Increment Consumption by Existing PSD Permittee



The foregoing language is mind-numbing, but the true picture that emerges is startlingly simple, as depicted in Figure 29. In the illustration, EPA is talking about how to blend a new PSD permit applicant (Source B) into a baseline area in which an existing PSD permittee (Source A) is already emitting increment-consuming pollutants into the atmosphere. The existing facility is legally allowed by its PSD permit to emit 600 tpy of SO_2. EPA calls this figure Source A's *allowable emissions*; Figure 29 suggests, for purposes of illustration, that this would consume 16 $\mu g/m^3$. The Agency invites Source B to pretend, however, that only 300 tpy of increment-consuming activity will occur in perpetuity from Source A's operations. Why? Because in the two-year period preceding Source B's PSD permit application, Source A has in fact emitted only 300 tpy—its *actual emissions*; Figure 29 suggests, for purposes of illustration, that this lower quantity of emissions would consume 8 $\mu g/m^3$. Nothing in EPA's writings suggests, however, that Source A's PSD permit will be formally amended to prohibit emissions of more than 300 tpy; instead, the permit issuing authority may simply assume that Source A will continue to emit (in perpetuity) the relevant pollutant at levels far below those authorized in its PSD permit.

Using these kinds of shenanigans, permit issuing authorities—with EPA's blessing—are free to establish PSD permit limitations for Source B on the unenforceable assumption that Source A will never emit what it is legally entitled to blast into the atmosphere.[129] Moreover, when Source C comes along and seeks its own PSD permit, the authorities will once again be free to act as if Source B will never emit what it is legally entitled to discharge. It is hard to imagine a more lenient method for calculating increment consumption by a preexisting PSD permittee—a method plainly designed to maximize room for further industrial growth.[130]

Most importantly, there is nothing to preclude Sources A, B, C, and all subsequent permittees from emitting the maximum amounts authorized by their PSD permits. Indeed, EPA's peculiar assumption that PSD permittees will not emit pollutants up to the limits allowed by their permits is inconsistent with its position that a facility's "potential to emit"—an important concept when it comes to the need for a PSD permit—must be assumed to be the maximum emissions allowed by "federally enforceable" standards or permit conditions.[131]

P. Principles for Allocating Increments

Obviously, any PSD permit, which effectively allows the holder to use up all or a portion of a PSD increment is a valuable permission to use up a fixed and shrinking resource. One would expect that the initial implementation of the program might convey a false sense of security about the system because things would naturally go smoothly as long as sufficient increment remained available for industrial growth. Presumably, however, there will come a day in some areas of the country when one or more increments are exhausted. Imagine, for example, a company applying for a PSD permit to extract oil from vast deposits of shale that it owns in the Rocky Mountains. If an associated PSD increment has been exhausted, the permit may be denied.

How are permit-issuing authorities supposed to ration out these goodies under the Act? The statute is silent on the matter of allocating increments among competing applicants. EPA initially defaulted to a "first-come, first-served" approach, but expressed misgivings:

> EPA generally will allocate use of the increments on a first-come, first-served basis . . . . The Administrator recognizes that this approach may not be adequate on a long-term basis to achieve the purposes of the Act. Other options are available and should be pursued by the States in the development of their plans for PSD.[132]

That default practice seems to have persisted almost everywhere.

Should public officials be more stingy in handing out the increments to PSD permit applicants, preserving opportunities for future applicants? The Agency has recognized that states and local communities have discretion to cut back on increment consumptions proposed by PSD permit applicants:

> The legislative history describes the breadth of State discretion in regulating significant air quality deterioration in a community. While the legislative history recognizes that the BACT requirement helps limit the amount of increment new sources consume, it also recognizes that a proposed source meeting BACT may nevertheless consume substantial increment. The legislative history provides that the permitting authority has broad discretion in deciding how much, if any, incremental air quality deterioration to apportion to a proposed source meeting BACT. The legislative history also indicates that a State has discretion to reject a permit application for a proposed source because of impacts the proposed source could have on the character of the community:
>
> > This congressional directive enables the State to consider the size of the plant, the increment of air quality which will be consumed by any particular major

129. *See* 53 Fed. Reg. 34315, 34318 (Sept. 6, 1988), *quoted at* text accompanying *infra* note 160, for a concrete example of such a calculation.

130. This red thread of PSD increment implementation—maximizing industrial growth—is addressed at text accompanying *infra* notes 194-95.

131. "Potential to emit" is defined in 40 C.F.R. §§51.166(b)(4), 52.21(b)(4). "Federally enforceable" is defined at *id.* §§51.166(b)(17), 52.21(b)(17). The significance of these definitions is explored in STENSVAAG, *supra* note 123, at 481-85.

132. *See* 43 Fed. Reg. at 26381.

> emitting facility, as well as such other considerations as anticipated and desired economic growth for the area. The balancing of these factors allows States and local communities to judge how much of the defined increment of significant deterioration will be used by any major emitting facility. If, under the design which a major facility propose[s], the percentage of the increment would effectively prevent growth after the proposed major facility was completed, the State or community could either refuse to permit construction or limit its size. This is strictly a State and local decision; the legislation provides the parameters for that decision.[133]

New York has had a formal policy against the automatic granting of full increments to PSD permit applicants:

> The Department's policy on PSD, as indicated in Air Guide-12, entitled "PSD Review and Administration" states in pertinent part as follows: "no one PSD affected project should be allowed to consume more than 25% of the available annual increment or 75% of the available short term increment without clearance from the [Office of the Director]."[134]

Despite the possibility of limiting increment consumption to preserve room for future growth, there are many occasions on which states and EPA have freely awarded almost the entire increment to the first applicant.[135] Moreover, EPA has suggested on several occasions that it will approve a PSD permit or SIP relaxation as long as the increased emissions will "consume less than the available . . . increment."[136]

Q. Increment Consumption in Adjacent States

The significant impact area (1 $\mu g/m^3$) plume from a PSD permit applicant may extend into an adjacent state. As noted earlier,[137] EPA has concluded that baseline areas cannot extend across state boundaries. If the plume encounters an out-of-state area for which the baseline date has not yet been established, the plume will not consume increment in the out-of-state location.[138] If the plume encounters an out-of-state area in which the baseline date has been established, however, the plume will consume increment in the out-of-state location.

How should such a circumstance be addressed? EPA has had a "policy of allocating increment consumption equally at state lines in cases of interstate disputes."[139] Notably, this policy applies only in cases involving a dispute. EPA explains how it intends to enforce the policy:

> [W]hen two States are involved in an interstate dispute over increment consumption, no source or series of sources in either State can be approved for construction if they would consume over one-half of the total applicable increment at the State line. Applicable increment here refers to that increment applying in the State where such construction would occur.[140]

Professor Craig Oren has addressed this policy in considerable detail, and is not a cheerleader for it.[141]

R. Aborted Proposal to Establish Significant Impact Levels for Class II and Class III Increments

We have seen that the statute[142] and the regulations[143] require each PSD permit applicant to engage in an increment consumption analysis—to demonstrate that its newly proposed emissions will not cause or contribute to the violation of any increment. This showing must be made for each increment pollutant for which a baseline date has been (or is being) established.[144] In 1996, EPA proposed to amend the regulations to provide that increment consumption analyses would be required only for pollutants for which the applicant's proposed new emissions would "*significantly* contribute to air pollution in violation of" an increment.[145] The proposal would have defined "significant," for these purposes, by reference to a table of projected ambient air concentration impacts.[146] The proposed values are set forth in Table 4.

133. 61 Fed. Reg. at 38272.

134. In re Applications of Consol. Edison Co. of New York, Inc., Application No. UPA No. 20-81-0002, at 62 (N.Y. D.E.C. Sept. 14, 1983).

135. *See supra* note 117. *See also* 46 Fed. Reg. 23768, 23769 (Apr. 28, 1981) (approving SIP relaxation where second-highest predicted impact of 87.3 $\mu g/m^3$ did not exceed the SO_2 24-hour increment of 91 $\mu g/m^3$). *Cf.* 59 Fed. Reg. 13310, 13314 (Mar. 21, 1994) (U.S. Department of Energy (DOE) environmental impact statement indicated that a facility near Denali, Alaska, would consume 88% of the short-term increment for SO_2); 54 Fed. Reg. 51450, 51451-52 (Dec. 15, 1989) (notice of proposed DOE finding of no significant impact where a proposed facility was projected to consume 85% of the short-term increment for SO_2).

136. 46 Fed. Reg. 63042, 63043 (Dec. 30, 1981). *See also* 46 Fed. Reg. 61123, 61124 (Dec. 15, 1981) (the emissions "do not consume more than the available increment").

137. *See Part I*, *supra* note 10, at text accompanying notes 185-87.

138. This seems to have been the case when New York sought a SIP revision allowing the burning of higher sulfur coal at a New York utility. *See* 46 Fed. Reg. 47069, 47070 (Sept. 24, 1981) ("the revision will not interfere with Connecticut's PSD measures since the entire increment for sulfur dioxide is available"). It is difficult to envision a situation—except for the time delay between submission of a completed PSD permit application and the commencement of emissions from the applicant's facility—in which the baseline date has been triggered for a given pollutant without resulting in the consumption of some of the associated increment.

139. 44 Fed. Reg. at 51940.

140. 43 Fed. Reg. at 26402.

141. *See* Oren, *supra* note 83, at 87-89.

142. *See supra* note 82.

143. *See supra* note 102.

144. If the facility is the first PSD permit applicant in an area, the baseline date will be established only for those increment pollutants proposed to be emitted in "significant" amounts. 40 C.F.R §§51.166(b)(14)(iii), 52.21(b)(14)(iii). For most purposes, "significant" means 15 tpy of PM_{10} emissions or 40 tpy of SO_2 or NO_2 emissions. *See id.* §§51.166(b)(23)(i), 52.21(b)(23)(i). *See Part I*, *supra* note 10, at text accompanying notes 65-67.

145. *See* 61 Fed. Reg. at 38293, 38329, 38336 (proposing amendments to 40 C.F.R. §§51.166(k), 52.21(k)) (emphasis added).

146. *See* 61 Fed. Reg. at 38293, 38331, 38338 (proposing 40 C.F.R. §§51.166(b)(23)(v), 52.21(b)(23)(v)).

Table 4
Proposed Significant Impact Levels
for Increment Consumption Analysis
Source: 61 Fed. Reg. 38250 (Jul. 23, 1996)

Pollutant	Averaging Time	Class I Significant Impact	Class II Significant Impact	Class III Significant Impact
SO_2	Annual	0.1 μg/m³	1.0 μg/m³	1.0 μg/m³
	24-Hour	0.2 μg/m³	5.0 μg/m³	5.0 μg/m³
	3-Hour	1.0 μg/m³	25.0 μg/m³	25.0 μg/m³
PM_{10}	Annual	0.2 μg/m³	1.0 μg/m³	1.0 μg/m³
	24-Hour	0.3 μg/m³	5.0 μg/m³	5.0 μg/m³
NO_2	Annual	0.1 μg/m³	1.0 μg/m³	1.0 μg/m³

Although this proposal to formally amend the regulations has not been adopted, EPA has used a more informally codified approach, set forth in great detail in the Agency's draft *Workshop Manual*.[147]

VII. Rube Goldberg Comes to EPA: The *Workshop Manual* Increment Consumption Calculator

And so we come to Rube Goldberg[148] and EPA's wondrous increment consumption calculator. EPA's draft *Workshop Manual* sets forth a detailed, sequential procedure for increment consumption analysis.[149] The procedure was foreshadowed in a 1977 *Federal Register* notice seeking comment on proposed "preliminary screening techniques" to minimize air quality modeling.[150]

A. The Two Phases of Analysis

The draft *Workshop Manual* explains[151]:

> The dispersion modeling analysis usually involves two distinct phases: (1) a *preliminary analysis* and (2) a *full-impact analysis*. The *preliminary analysis* models only the *significant* increase in potential emissions of a pollutant from a proposed new source, or the *significant* net emissions increase of a pollutant from a proposed modification. The results of this preliminary analysis determine whether the applicant must perform a full-impact analysis, involving the estimation of background pollutant concentrations resulting from existing sources and growth associated with the proposed source. Specifically, the *preliminary analysis*:
>
> - determines whether the applicant can forego further air quality analyses for a particular pollutant; . . . and
> - is used to define the impact area within which a full-impact analysis must be carried out.
>
> The EPA does not require a full-impact analysis for a particular pollutant when emissions of that pollutant from a proposed source or modification would not increase ambient concentrations by more than prescribed significant ambient impact levels . . . .
>
> A *full-impact analysis* is required for any pollutant for which the proposed source's estimated ambient pollutant concentrations exceed prescribed significant ambient impact levels. This analysis expands the preliminary analysis in that it considers emissions from:
>
> - the proposed source;
> - existing sources;
> - residential, commercial, and industrial growth that accompanies the new activity at the new source or modification (i.e., secondary emissions).[152]

The draft *Workshop Manual* sets forth significant ambient impact levels for Class II only; the numbers are identical to the values set forth in the Table 4 column for Class II areas.[153] Under the *Workshop Manual* approach, if the projected ambient impacts of the proposed facility do not exceed the Table 4 (Class II) column values for a pollutant,[154] no further increment consumption analysis is required for that pollutant.[155] The analytical steps end with the preliminary analysis stage.[156]

147. *See supra* note 37.

148. *See supra* note 96.

149. The draft *Workshop Manual* also contains detailed, interlocking procedures for demonstrating that the proposed new emissions will not "cause, or contribute to air pollution in excess of any . . . [NAAQS]," as required by CAA §165(a)(3)(B), 42 U.S.C. §7475(a)(3)(B); this Article ignores these portions of the manual.

150. *See* 42 Fed. Reg. 57471, 57473 (Nov. 3, 1977).

151. The draft *Workshop Manual* repeatedly reminds the reader that state and local program requirements may deviate from the procedures suggested in the manual. *See, e.g.*, WORKSHOP MANUAL, *supra* note 9, at C25 ("the applicant should check any applicable State or local PSD program requirements in order to determine whether such requirements may contain any different procedures which may be more stringent").

152. *Id.* at C24 (emphasis in original).

153. *See id.* at C28. The manual further provides: "If a proposed source is located within 100 kilometers of a Class I area, an impact of 1 μg/m³ on a 24-hour basis is significant." *See id*. note *a*. This Article does not address the Class I increment consumption analysis.

154. For the annual average increments in the Class II column, Table 4 provides a significant impact level of 1 μg/m³ to specify when a "full-impact analysis" for increment consumption can be eliminated. This value is also used to demarcate the outer bounds of the "baseline area" under the PSD program. *See* 40 C.F.R. §§51.166(b)(15)(i), 52.21(b)(15)(i). *See also Part I*, *supra* note 10, at note 105 and text accompanying note 102.

The "significant impact level" cutoff for full-impact analysis can be related to Figure 12 in Part I of this Article, which demonstrates how significant impact levels are calculated, in the following way: full-impact analysis will be required unless the *only* modeled ring of impact is the 1 μg/m³ ring; if the proposed facility's emissions will increase ambient air quality by more than 1 μg/m³ at any point beyond the facility's property line, the permit applicant must engaged in full-impact analysis. *See also* James A. Westbrook, *Air Dispersion Models: Tools to Assess Impacts From Pollution Sources*, NAT. RESOURCES & ENV'T, Spring 1999, at 546, 547.

155. *See* WORKSHOP MANUAL, *supra* note 9, at C30 ("a preliminary analysis which predicts an insignificant ambient impact everywhere is accepted by EPA as the required air quality analysis . . . for that pollutant"). The manual stresses, however:

> While it may be shown that no impact area exists for a particular pollutant, the PSD application (assuming it is the first one in the area) still establishes the PSD baseline area and minor source baseline date in the . . . attainment or unclassifiable area where the source will be *located*, regardless of its insignificant ambient impact.

Id. (emphasis in original). If the pollutant's *emission* levels fall below certain separately defined de minimis values, however—for example, 15 tpy of PM_{10}—no baseline date will be established. *See Part I*, *supra* note 10, at text accompanying note 64.

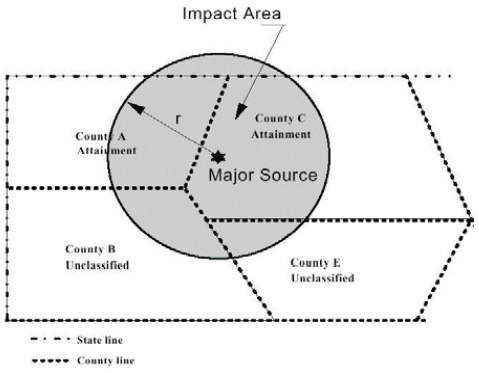
156. For an example of a case in which modeling showed no significant ambient air quality impacts, thus truncating increment consumption

B. Determining the Impact Area

For each pollutant projected to exceed the significant ambient impact level, the PSD permit applicant must perform a second step in the preliminary analysis stage: determining the "impact area." The draft *Workshop Manual* explains:

> The proposed project's *impact area* is the geographical area for which the required air quality analyses for the . . . PSD increments are carried out. This area includes all locations where the significant increase in the potential emissions of a pollutant from a new source, or significant net emissions increase from a modification, will cause a significant ambient impact . . . . The *highest* modeled pollutant concentration for each averaging time is used to determine whether the source will have a significant ambient impact for that pollutant.
>
> The *impact area* is a circular area with a radius extending from the source to (1) the most distant point where approved dispersion modeling predicts a significant ambient impact will occur, or (2) a modeling receptor distance of 50 km, whichever is less. Usually the area of modeled significant impact does not have a continuous, smooth border. (It may actually be comprised of pockets of significant impact separated by pockets of insignificant impact.) Nevertheless, the required air quality analysis is carried out within the circle that circumscribes the significant ambient impacts, as shown in [Figure 30].
>
> Initially, for each pollutant subject to review an impact area is determined for every averaging time. The impact area used for the air quality analysis of a particular pollutant is the largest of the areas determined for that pollutant. For example, modeling the proposed SO_2 emissions from a new source might show that a significant ambient SO_2 impact occurs out to a distance from the source of 2 kilometers for the annual averaging period; 4.3 kilometers for the 24-hour averaging period; and 3.8 kilometers for the 3-hour period. Therefore, an impact area with a radius of 4.3 kilometers from the proposed source is selected for the SO_2 air quality analysis.[157]

Figure 30: Determining the Impact Area[158]



analysis, see Intalco Aluminum Corp. v. Washington Dep't of Ecology, PCHB No. 84-318, at 3 (Wash. Pollution Control Hearings Bd., Aug. 30, 1985).

157. Workshop Manual, *supra* note 9, at C26, C30 (emphasis in original).

C. Full-Impact Analysis

Once the PSD permit applicant has identified all pollutants for which projected new emissions will exceed the significant ambient impact levels, and once the applicant has determined the impact area for each such pollutant, the increment consumption analysis proceeds to the second stage: "full-impact analysis." This stage commences with the establishment of "emissions inventories." The draft *Workshop Manual* explains:

> When a full-impact analysis is required for any pollutant, the applicant is responsible for establishing the necessary inventories of existing sources and their emissions, which will be used to carry out the required NAAQS and PSD increment analyses. Such special emissions inventories contain the various source data used as input to an applicable air quality dispersion model to estimate existing ambient pollutant concentrations. . . .
>
> The permitting agency may provide the applicant a list of existing sources upon request once the extent of the impact area(s) is known. If the list includes only sources above a certain emissions threshold, the applicant is responsible for identifying additional sources below that emissions level which could affect the air quality within the impact area(s). The permitting agency should review all required inventories for completeness and accuracy. . . .
>
> The increment inventory includes all increment-affecting sources located in the impact area of the proposed new source or modification. Also, all increment-affecting sources located within 50 kilometers of the impact area . . . are included in the inventory if they, either individually or collectively, affect the amount of PSD increment consumed. The applicant should contact the permitting agency to determine what particular procedures should be followed to identify sources for the increment inventory.
>
> In general, the stationary sources of concern for the increment inventory are those stationary sources with actual emissions changes occurring since the *minor source baseline date*. However, it should be remembered that certain actual emissions changes occurring before the minor source baseline date (i.e., at major stationary point sources) also affect the increments. Consequently, the types of stationary point sources that are initially reviewed to determine the need to include them in the increment inventory fall under two specific time frames as follows:
>
> *After the major source baseline date*
>
> [• the proposed source;]
>
> • existing major stationary sources having undergone a physical change or change in their method of operation; and
>
> • new major stationary sources.
>
> *After the minor source baseline date*
>
> • existing stationary sources having undergone a physical change or change in their method of operation;
>
> • existing stationary sources having increased hours of operation or capacity utilization (unless

> such change was considered representative of baseline operating conditions); and
>
> - new stationary sources.
>
> If, in the impact area or surrounding screening area, area or mobile source emissions will affect increment consumption, then emissions input data for such minor sources are also included in the increment inventory. The change in such emissions since the minor source baseline date (rather than the absolute magnitude of these emissions) is of concern since this change is what may affect a PSD increment. Specifically, the rate of growth and the amount of elapsed time since the minor source baseline date was established determine the extent of the increase in area and mobile source emissions. For example, in an area where the minor source baseline date was recently established (e.g., within the past year or so of the proposed PSD project), very little area and mobile source emissions growth may have occurred. Also, sufficient data (particularly mobile source data) may not yet be available to reflect the amount of growth that has taken place. As with the NAAQS analysis, applicants are not required to estimate future mobile source emissions growth that could result from the proposed project because they are excluded from the definition of "secondary emissions."
>
> The applicant should initially consult with the permitting agency to determine the availability of data for assessing area and mobile source growth since the minor source baseline date. This information, or the fact that such data is not available, should be thoroughly documented in the application. The permitting agency should verify and approve the basis for actual area source emissions estimates and, especially if these estimates are considered by the applicant to have an insignificant impact, whether it agrees with the applicant's assessment.
>
> When area and mobile sources are determined to affect any PSD increment, their emissions must be reported on a gridded basis. The grid should cover the entire impact area and any areas outside the impact area where area and mobile source emissions are included in the analysis. The exact sizing of an emissions inventory grid cell generally should be based on the emissions density in the area and any computer constraints that may exist. . . . The grid layout should always be discussed with, and approved by, the permitting agency in advance of its use.[159]

Obviously, it is important to include in the inventory of increment-consumption emissions all post-baseline date emissions from PSD permitted facilities. One might think that the values for such emissions would be taken from the PSD permits themselves. For example, if a PSD permittee is authorized by its permit to emit 100 tpy of SO_2, that would seem to be the sensible number to plug into the model. Oddly, however, EPA has indicated that the PSD permit is the wrong place to look when assembling the emissions inventory contributions by PSD permittees; instead, the modeler should plug in *actual*, rather than *allowed* emission levels. Thus, in proposing to approve a relaxation to the Indiana SIP, EPA explained away a projected increment violation by ignoring the limits in a PSD permit:

> Although modeling at the 1.2 lbs./[million British thermal unit (MMBTU)] *limit* in the PSD permit predicts a highest, second high, 24-hour value of 98 $\mu g/m^3$ (and thus a violation of the PSD increment of 91 $\mu g/m^3$), PSD increment for this source is determined by considering actual emissions, not allowable. Maximum *actual* lbs./MMBTU values for 1986 and 1987 for [the PSD permittee] do not exceed 1.1 lbs./MMBTU, and thus the increment actually consumed is less than 91 $\mu g/m^3$. Thus, at the actual emission levels, the 24-hour PSD increment is protected.[160]

In its continuing description of the full-impact analysis stage, the draft *Workshop Manual* instructs PSD permit applicants to select the appropriate air quality models[161]—ideally from a list of models set forth in EPA's *Guideline on Air Quality Models*[162]—to select and use meteorological data "spatially and climatologically (temporally) representative of the area of interest,"[163] to establish a "receptor network" to identify maximum estimated pollutant concentrations,[164] to perform multiple model runs with increasingly fine receptor grids,[165] and to adjust model outputs to account for stack heights in excess of "good engineering practice" stack heights.[166]

And we are still not done with the draft *Workshop Manual* methodology. The manual's discussion of the "source data" conveys the flavor the enterprise:

> For each stationary point source to be modeled, the following minimum information is generally necessary:
>
> - pollutant emission rate . . . ;
> - stack height . . . ;
> - stack gas exit temperature, stack exit inside diameter, and stack gas exit velocity;
> - dimensions of all structures in the vicinity of the stack in question;
> - the location of topographic features (e.g., large bodies of water, elevated terrain) relative to emissions points; and
> - stack coordinates.
>
> A source's emissions rate as used in a modeling analysis for any pollutant is determined from the following source parameters (where MMBtu means "million Btu's heat input"):
>
> - emissions limit (e.g., lb./MMBtu);
> - operating level (e.g., MMBtu/hour); and
> - operating factor (e.g., hours/day, hours/year) . . . .
>
> For those existing point sources that must be explicitly modeled, i.e., "nearby" sources . . . the . . . inventory must

158. *Id.* at C29, fig. C-4.

159. *Id.* at C31-32, 35-36 (emphasis in original).

160. 53 Fed. Reg. at 34318 (emphasis added). For additional analysis of the allowable versus actual emissions issue in the context of increment consumption calculations, see text accompanying *supra* notes 128-31 and fig. 29.

161. *See* Workshop Manual, *supra* note 9, at C37-38.

162. EPA publishes and regularly updates a *Guideline on Air Quality Models*, 40 C.F.R. pt. 51, app. W, a document that specifies models and provides guidance for their use. The PSD regulations provide: "All applications of air quality modeling involved in this subpart shall be based on the applicable models, data bases, and other requirements specified in appendix W." 40 C.F.R. §§51.166(*l*)(1), 52.21(*l*)(1).

163. Workshop Manual, *supra* note 9, at C39.

164. *Id.* at C39; *see id.* at C39-42. The goal is "to locate the maximum modeled impact." *Id.* at C40.

165. *See id.* at C40.

166. *See id.* at C42-43.

> contain the maximum allowable values for the emissions limit, and operating level. . . . For short-term averaging periods (24 hours or less), the applicant generally should assume that nearby sources operate continuously. However, the operating factor may be adjusted to take into account any federally enforceable permit condition which limits the allowable hours of operation. In situations where the actual operating level exceeds the design capacity (considering any federally enforceable limitations), the actual level should be used to calculate the emissions rate.
>
> If other background sources need to be modeled (i.e., adequate air quality data are not available to represent their impact), the input requirements for the emissions limit and operating factor are identical to those for "nearby" sources. However, input for the operating level may be based on the annual level of actual operation averaged over the last 2 years (unless the permitting agency determines that a more representative period exists).[167]

The draft *Workshop Manual* goes on to explain how to handle fugitive emissions, building downwash effects, mobile source emissions, and the like.[168]

D. The Compliance Demonstration

If a full-impact analysis has been conducted, the model will present a cascade of numbers, representing projected ambient air concentrations for each pollutant at each receptor location. What is the permit-issuing authority supposed to do with those numbers? The draft *Workshop Manual* explains:

> [The] compliance demonstration, for each affected pollutant, must result in one of the following:
>
> - The proposed new source or modification will not cause a significant ambient impact anywhere. . . .
> - The proposed new source or modification, in conjunction with existing sources, will not cause or contribute to a violation of any NAAQS or PSD increment. . . .
> - The proposed new source or modification, in conjunction with existing sources, will cause or contribute to a violation, but will secure sufficient emissions reductions to offset its adverse air quality impact.
>
> If the applicant cannot demonstrate that only insignificant ambient impacts would occur at violating receptors (at the time of the predicted violation), then other measures are needed before a permit can be issued. . . .
>
> In situations where a proposed source would cause or contribute to a PSD increment violation, a PSD permit cannot be issued until the increment violation is entirely corrected. Thus, when the proposed source would cause a new increment violation, the applicant must obtain emissions reductions that are sufficient to offset enough of the source's ambient impact to avoid the violation. In an area where an increment violation already exists, and the proposed source would significantly impact that violation, emissions reductions must not only offset the source's adverse ambient impact, but must be sufficient to alleviate the PSD increment violation, as well.[169]

The *Federal Register* notices are, admittedly, a weak resource for judging how frequently increment consumption violations are projected by PSD permit applicants. Nevertheless, these notices suggest that in the vast majority of cases, "the increment test is merely a routine analytical exercise for PSD permit applicants and a record-keeping exercise"[170] for permit-issuing authorities.

One interesting exception to this phenomenon involved not a PSD permit application but a proposed amendment to the Wyoming SIP. In 1992, EPA struggled in reviewing a revised Wyoming "ambient air" definition that would have made air over certain surface coal mining operations in the Powder River Basin "non-ambient" and therefore exempt from the PM_{10} increments and NAAQS.[171] Wyoming's proposed SIP revision would have excluded from "ambient air" vast tracts of land not yet undergoing active mining but covered by 30-year mine plans.[172] One concern expressed by EPA was the possibility that Wyoming's exclusion of excessively large tracts of land from "ambient air" would authorize "unlawful dispersion techniques" in violation of CAA §123(a)(2).[173] EPA initially concluded that increment consumption violations would inevitably accompany the proposed SIP revision:

> The State has publicly acknowledged that the prospect of Class II [total suspended particulate (TSP)] increment exceedances is a concern. . . . [The] Wyoming Air Quality Division acknowledged a concern about consumption of TSP increment, but advised the [Wyoming Environmental Quality Council (EQC)] to adopt the proposed ambient air definition anyway, stating, "The (Wyoming Air Quality) Division believes that the reclassification of this area to a Class III should be undertaken by the coal companies immediately." To EPA's knowledge, no effort has been made to reclassify the area.[174]
>
> As described in public hearing transcripts . . . the EQC voted on April 30, 1987, to initiate "at the greatest speed . . . an investigation into correcting the problem of allowing operations (at surface coal mines) so that we may result in de facto Class III air areas without having the opportunity to consider that in advance . . . ." Such an investigation would not be necessary unless there were some

167. *Id.* at C44-C45, C47 (emphasis omitted).

168. *See id.* at C50.

169. *Id.* at C51-53 (emphasis omitted). In 1988, Professor Craig Oren reported:

> So far, increment constraints have most frequently occurred when a proposed source would by itself consume the twenty-four-hour Class II sulfur dioxide increment—that is, when a source would cause the average sulfur dioxide concentration on any particular day to rise at any location by ninety-one micrograms. This is most likely to occur when the source is located in "complex" terrain—a valley in which the source's emissions are blown directly against a nearby hillside. Moving the source to nearby level ground may be all that is necessary to eliminate the violation. If not, there is no point in considering a shift to another region; since no area is Class III, the same increment violation would occur no matter where the source was located.

Oren, *supra* note 83, at 36.

170. Alan P. Loeb & Tiffany J. Elliott, *PSD Constraints on Utility Planning: A Review of Recent Visibility Litigation*, 34 NAT. RESOURCES J. 231, 243-44 (1994).

171. *See* 57 Fed. Reg. at 38641.

172. *See id.* at 38643 ("Wyoming treated the 30-year mine plan area for each of the six mines (extending from 7.9 up to 22.0 square miles) as exempt from ambient air with respect to that particular mine.").

173. *See id.*

174. Reclassifying an area from Class II to Class III is extraordinarily difficult, *see* CAA §164(a), 42 U.S.C. §7474(a), and has apparently never occurred.

> expectation on the part of the EQC that Class II increment violations would occur.[175]

Following extensive correspondence between Wyoming and federal officials, EPA caved in and approved the SIP revision after imposing a number of conditions whereby the state and the mining companies would engage in various monitoring and modeling activities.[176] In the 1990 CAA Amendments, Congress effectively eliminated these conditions and reined in EPA:

> [T]he Administrator shall analyze the accuracy of [certain models and emission factors] . . . and make revisions as may be necessary to eliminate any significant overprediction of air quality effect of fugitive particulate emissions from [surface coal mines].[177]

As EPA put it: "Wyoming's commitment to initiate the development of modeling tools for fugitive dust emissions from [Powder River Basin] surface coal mines is no longer applicable. This responsibility is now EPA's."[178]

E. Excusing Projected Violations Not Significantly Caused by the Applicant

One might think that a modeled impact showing a violation of an increment would automatically lead to denial of the requested PSD permit. But the draft *Workshop Manual* suggests a way out for the applicant:

> When a violation of any NAAQS or increment is predicted at one or more receptors in the impact area, the applicant can determine whether the net emissions increase from the proposed source will result in a significant ambient impact at the point (receptor) of each predicted violation, *and* at the time the violation is predicted to occur. The source will not be considered to cause or contribute to the violation if its own impact is not significant at any violating receptor at the time of each predicted violation. In such a case, the permitting agency, upon verification of the demonstration, may approve the permit. However, the agency must also take remedial action through applicable provisions of the state implementation plan to address the predicted violation(s).[179]

VIII. Increment Expansions

Because of the way baselines and increment-consuming emissions are defined, EPA has concluded that certain decreases in emissions may result in what it calls the "expansion" of increments.[180] The concept of "increment expansions" is jarring to anyone who takes the statutory regime at face value. The Agency's most thorough *Federal Register* discussion of increment expansion seems to have come in the context of emission reductions occurring *prior* to the baseline date—a context that at first seems to make no sense.[181]

Consider, once more, Figure 4 from Part I of this Article.[182] If the baseline concentration is the ambient concentration, such as 20 $\mu g/m^3$, existing on the baseline date (as the statute provides) and the increment is a fixed value, such as 17 $\mu g/m^3$, set forth in the statute (as amended by the regulations), the idea of expanding the increment because of activities occurring before the baseline date seems illogical. The baseline concentration can only be adjusted in the manner specified by the statute[183] and the regulations,[184] and nothing in those provisions declares that *reductions* in emissions prior to the baseline date can be given any credit. Moreover, nothing in the CAA purports to give to EPA power to allow on a case-by-case basis greater increments than those set forth in the statute (or those promulgated pursuant to the Agency's power to promulgate values for new increment pollutants[185] or revise the formal increment values for particulates).[186] Accordingly, it is hard to see how the increment can be literally expanded by the Agency.

EPA has nevertheless explained why it allows so-called increment expansions for pre-baseline date behavior:

> EPA's policy under the June 1978 regulations is unclear as to whether emissions reductions *prior* to the baseline date increase the amount of available increments. The policy allows decreases after January 6, 1975, and prior to the baseline date, to be used by sources to offset subsequent increases and exempt the increases from the requirement for an ambient air quality assessment. In effect, EPA treats such decrease as expanding available increments, since the decreases permit later emissions increases at the same source to avoid the otherwise required air quality assessment.[187] The policy did not state, however, whether isolated decreases not made in conjunction with intrasource increases were considered to expand available increments. In contrast, the policy is clear that emissions reductions *after* the baseline date increase available increments.[188]

175. 57 Fed. Reg. at 38644-45.

176. *See id.* at 38648.

177. Pub. L. No. 101-549, tit. II, §234 (1990).

178. 57 Fed. Reg. at 38649.

179. WORKSHOP MANUAL, *supra* note 9, at C52 (emphasis in original).

180. *See, e.g.*, 53 Fed. Reg. at 40663 (expansion of the available increment may occur due to "production decreases resulting from economic conditions as well as improved emission control technologies, as is the case with mobile sources").

181. *See* 45 Fed. Reg. at 52719-20.

182. Figure 4 illustrates the baseline-increment-ceiling system for PM_{10} in a Class II area.

183. *See* text accompanying *supra* notes 53-56.

184. *See* text accompanying *supra* notes 56-61.

185. *See* CAA §166(a)-(e), 42 U.S.C. §7476(a)-(e).

186. *See id.* §166(f), 42 U.S.C. §7476(f).

187. This statement seems a bit odd. An administrative decision to waive increment consumption *analysis* for increases by a source that had previously decreased its emissions presumably does not make the increment anything other than what it already was and is. Nor does this act of administrative grace change the *baseline* value as a logical matter; if the baseline value were actually *measured* prior to the proposed increased emissions, that value would reflect the emissions reductions underlying the increment consumption analysis waiver. Nevertheless, EPA seems to be saying that the baseline value *should* include the emissions previously reduced by the facility, thereby shoving up both the baseline and the ceiling. The consequence of such tinkering is similar to that depicted in Figure 7 in Part I of this Article (demonstrating baselines erroneously set too high). To call this an *increment* expansion is not helpful; such an approach is best understood as an adjustment to the baseline.

188. EPA's choice of wording is, once again, confusing. It makes sense to say that emission reductions from any and all sources after the baseline date increase room for industrial growth because such reductions have the effect of decreasing the ambient air concentration and moving it further down from the ceiling. Even though the bona fide increment is a fixed value, the available room for growth may be greater than the value of the increment. The consequence is similar to that depicted in Figure 7, described in *supra* note 187. Nevertheless, referring to this phenomenon as an expansion of the increment seems ill-advised because such a linguistic construction suggests that the increment is an elastic, malleable value—a suggestion belied by the statute.

> As a result of the revised definition of modification which permits offset credit for emissions reductions occurring within a moving five-year period, EPA has decided to clarify its existing policy. All emissions reductions prior to the baseline date at major stationary sources will now be considered to expand available increments. Since contemporaneous emissions reductions accomplished before the baseline date can be used by a source to offset a contemporaneous post-baseline emissions increase, and thereby avoid PSD review, it is also reasonable to allow these contemporaneous pre-baseline date reductions to expand the increment. Without the change, source owners that reduce emissions by retiring or controlling old equipment before the baseline date will be penalized by having increases after the baseline date count against increments even though the pre-baseline decrease might offset the later increase and eliminate the need for PSD review. In contrast, source owners that postpone the reductions and increases until after the baseline date is set would both secure contemporaneous offsets and avoid increment consumption.
>
> EPA believes that this inequity should be eliminated to encourage early retirement of old equipment. Section 169(4) provides that emissions from major emitting facilities that commenced construction after January 6, 1975, shall be counted against available increments. The provision implies that both emissions increases and decreases should be considered for their impact on available increments. In view of the statutory language and policy considerations, EPA has determined that decreases made prior to a baseline date can expand available increments in the same manner as decreases made after a baseline date. However, to ensure that the emissions reductions remain effective, reductions will add to available increments only if the lower emissions limitations are federally enforceable.
>
> The changed policy is reflected in a new definition of "construction" which is any physical change or change in the method of operation of a stationary source resulting in a change in the actual emissions of the source (including fabrication, erection, installation, demolition, or modification). Any construction commencing at a major source since January 6, 1975, may result in an increase or decrease in actual source emissions. If an actual decrease involving construction at a major stationary source occurs before the baseline date, the reduction will expand the available increment if it is included in a federally enforceable permit or SIP provision. An actual increase associated with construction activities at a major stationary source will consume increment.[189]

The Agency has also addressed so-called increment expansion in another context: establishment of the NO_2 increments in 1988:

> [U]nder some circumstances (e.g., urban areas), the decreasing contribution of mobile sources to nitrogen dioxide concentrations will actually improve nitrogen dioxide air quality (albeit temporarily) as controls on nitrogen oxides emissions from mobile sources result in reductions in mobile source emissions. This decrease in mobile source emissions should effectively expand the nitrogen dioxide increment available for other sources. As a consequence, for at least an estimated 5 to 10 years, the inclusion of mobile sources in the increment analysis for nitrogen dioxide should not make this regulation more stringent or the siting of industrial facilities more difficult, overall, than the existing increments for particulate matter and sulfur dioxide.[190]

The foregoing paragraph is not clear about whether the referenced NO_2 reductions from mobile sources will occur before or after establishment of the NO_2 baseline date; presumably, such reductions will occur in both time periods, to a greater and lesser extent depending on when the baseline date is triggered in each location throughout the country. For mobile source NO_2 reductions occurring *after* establishment of a baseline date, it makes sense to observe that there will be increased room for growth in the area (the actual ambient air concentrations will fall that much further below the baseline-plus-increment ceiling), but it seems odd to refer to this as an expansion (or increase) in the increment.

If EPA intends to somehow give credit for mobile source NO_2 reductions occurring *before* establishment of the baseline date, the Agency has mutated far beyond the original meanings of the terms "baseline," "increment," or both. The baseline value would no longer be the ambient air concentration value existing on the baseline date but some artificial construct representing a time when mobile source NO_2 pollution had been greater; alternatively, the increment would no longer be a fixed value but an elastic and malleable number to be manipulated by factoring in improvements in mobile source NO_2 pollution prior to the baseline date, rewarding with higher increment values those locations that had made the most progress in controlling mobile source emissions.

The notion of increment expansion is a troubling and complicated one.[191] For short-term increments, it may be especially difficult to calculate whether a PSD applicant should be able to benefit from a so-called increment expansion:

> The EPA method does recognize increment expansion. The only time the expanded increment would not help the new source to be accommodated is when the new source impacts a receptor on critical days when the existing source does not. EPA does not recognize this as increment expansion because the receptor does not benefit from the reduced emissions for the worst of the short term periods.[192]

The reason, of course, for EPA's "increment expansion" terminology is that the Agency is focused exclusively on emissions inventory bookkeeping. There is no baseline ambient air concentration value because the Agency has abandoned that feature of the PSD program; there is no ambient air concentration ceiling because elimination of the baseline value inevitably destroys the possibility of computing an ambient air concentration ceiling. It is undeniable that emissions reductions occurring after the baseline date create additional room for industrial growth—that would be true if EPA had adhered to the baseline-plus-increment-equals-

189. 45 Fed. Reg. at 52719-20 (emphasis added).

190. 53 Fed. Reg. at 40660.

191. For an illustration of increment expansion, *see* Application by Inter-Power of New York, Case 80010, at 9 (N.Y. Bd. on Electric Generation Siting and the Env't, June 1, 1992) (noting that sources discontinuing operation after establishment of the baseline may expand increment); *id.* at 15 (EPA "refused to accept, for PSD increment expansion purposes, the 'blanket assumption' that an expansion credit was due for sources in operation when the state sulfur limit was decreased . . . from 2.0% to 1.5% . . . [stating] that the reduction would have to be demonstrated on a case-by-case basis").

192. 48 Fed. Reg. at 52715.

ceiling approach established by the statute, and is also true under the Agency's emissions inventory approach. Having abandoned baselines and ceilings, EPA treats "room for new air pollution growth" as a synonym for "remaining increment." It is this reasoning process that causes the Agency to speak about an expanded increment.

IX. Conclusion

And so we come full circle to the question posed at the outset of this two-part Article—how has the PSD increment program been implemented?—and to the simplistic, theoretical overview with which we girded ourselves before entering into the minutia of implementation.[193] How does today's real-world PSD program correspond to the structure initially invented by EPA and codified by Congress? Stated another way, how much does the increment feature of the PSD program resemble—in actual implementation—the structure of Figure 4?[194] The answer can now be stated with confidence: not so much.[195]

A. The Red Threads of PSD Increment Implementation

With the reminder that any conclusions based on the limited database of the statute, the regulations, the *Federal Register*, and reported cases must necessarily be highly impressionistic, it seems fair to say that PSD implementation by EPA over the past 30 years has been marked by two red threads or themes:

(1) The PSD increment program should be implemented to maximize industrial growth and its associated emissions of PM_{10}, SO_2, and NO_2; and

(2) Implementation should be tailored to avoid establishment of baseline ambient air concentration values, to avoid the specification of ambient air quality ceilings, and to avoid the use of ambient air quality monitoring to determine compliance with the increment system.

The preceding sections of this Article bear witness to the primacy of these themes, even though the themes emerge only through the hard work of scrutinizing thousands of pages of admittedly limited materials. Occasionally, EPA voices one or more of these themes overtly, as in the following paragraphs:

> The Agency attempts to make conservative predictions as a result of a very basic procedure found in EPA guidance which applies to all modeling applications. When approaching a regulatory modeling problem, the first step is to perform a screening analysis. Such analysis is designed to be of a simple nature and conservative, in order to avoid having to perform very sophisticated and costly analysis when not warranted. However, if the results of a screening analysis indicates problems, then a more sophisticated ("refined") analysis can be performed for the purpose of accurately predicting ambient air impacts.
>
> EPA considers screening procedures to be essential for long range transport applications (which was the case in determining Westvaco's potential PSD impacts). The reason for this is two-fold:
>
> 1. There is no refined model approved for general use (i.e., a "guideline model") that applies to long range transport situations.
> 2. These sophisticated models that do exist for long range transport are enormously resource-intensive.
>
> Thus, EPA concluded that the conservative screening analysis performed to determine Westvaco's impact on increment consumption was appropriate. However, recognizing the fact that the amount of increment consumption predicted was based on a very conservative screening technique, a new source entering the area would be free to re-model the situation. *All sources, including the source under consideration, should be modeled with as sophisticated an approach as would be needed to demonstrate that the . . . increments would not be violated*. The approach taken could be the same as was performed in the Westvaco case or one could use some other conservative screening technique but which is less conservative than the original screen (e.g., use of the same models but this time accounting for pollutant decay), or finally one could use a sophisticated long range transport model.[196]

193. *See Part I*, *supra* note 10, at text accompanying notes 12-44.

194. *See Part I*, *supra* note 10, fig. 4. Figure 4 illustrates the baseline-increment-ceiling system for PM_{10} in a Class II area.

195. It has become trendy in legal scholarship to argue that "the length of articles has become excessive." David Hricik & Victoria S. Salzmann, *Why There Should Be Fewer Articles Like This One: Law Professors Should Write More for Legal Decision-Makers, and Less for Themselves*, 38 SUFFOLK U. L. REV. 761, 772 n.48 (2005). *See also id*. (noting that "flagship" law reviews "have joined together to request that articles be pared down" in an effort to combat "the troubling trend toward longer articles"). I have argued elsewhere that—at least in the field of environmental law—this attitude is unrealistic:

> [A] new age of . . . "micro-environmental law" is upon us—an age in which the minutiae of environmental statutes and regulations have become extraordinarily important. . . . The fine print is here to stay. As a result, modern environmental law is seldom what it appears to be.
>
> The rise of micro-environmental law has profound ramifications for persons who study, practice, and implement this law, as well as those who seek to shape and reform its content. Students must be forced to confront the likelihood that their initial understanding of each environmental control scheme is misleading, because the scheme will be shown to be vastly different once the fine print has been explored. Practitioners must likewise shed their simplistic first impressions. Those representing regulated entities will doubtless search for and exploit the fine print; after all, that is why the print was created in the first place. Others, representing regulators and environmental advocacy groups, must attack the regulations with the tenaciousness of gardeners, seeking and rooting out whatever weeds lie within their reach.
>
> Ultimately, however, the task of clarifying micro-environmental law will fall disproportionately on the shoulders of the academy. Environmental law scholars must continue to bring all of their analytic powers to bear on what has become a truly frightening tangle of materials, illuminating the fine print and flushing it out for public scrutiny. What is needed is the patient and thoughtful exposure of more minutiae, not less. In the end, there is no other way. If we fail to plumb the fine print, we deceive ourselves, and the real environmental law will surge along, hidden behind the facade that we all too simplistically embrace.

John-Mark Stensvaag, *The Not So Fine Print of Environmental Law*, 27 LOY. L.A. L. REV. 1093, 1102-03 (1994).

196. 49 Fed. Reg. at 49458-59 (emphasis added). This attitude—particularly as exhibited in the italicized language—has been echoed by the Nuclear Regulatory Commission (NRC) when reviewing compliance with radioactive air pollution emission standards. If models indicate that a nuclear generating plant's emissions are violating the standards, the facility has been instructed by the NRC to "reevalu-

More commonly, however, these themes are not articulated overtly; instead, the Agency's approach to baselines, increments, and ceilings is buried in dry, technical discussions of regulatory language and SIP approvals.

B. The Limits of Modeling

It is time to recall the core principle of the PSD program: air quality in clean areas of the country must be prevented from degrading to the levels otherwise permitted by NAAQS.[197] Notwithstanding all the limitations of ambient air quality monitoring, at the end of the day, there is no substitute—when ascertaining ambient air quality—for the activity of measuring ambient air concentrations. In implementing the PSD program's increment feature, however, EPA has systematically eliminated air quality monitoring and replaced it with modeling.

Modeling has great value, but it is a mighty peculiar way to ascertain current ambient air quality. To consider just how peculiar, one need only ask how EPA's approach to PSD increment compliance would look if applied to the majestic ambient air standards—NAAQS—that lie at the heart of the CAA.

Imagine that SIP provisions establishing emission limitations and transportation control plans all over the country are established—as they indeed are—on the basis of air quality modeling. The models tell EPA and the states that emission limits and other SIP features must be designed in such and such a way to guarantee compliance with NAAQS. This is a proper and wholly necessary use of models. Now, however, imagine that precisely the same models used to craft the SIP ingredients are run again and again to demonstrate that the ambient air in each of the nation's airsheds does, in fact, comply with all NAAQS. How do we know that? Because the models prove compliance! Could there be a more fitting dictionary illustration for the word "duh"?

From the beginning, EPA has insisted that baseline values and increment compliance calculations cannot be determined by ambient air quality monitoring, given the limits of that technology. More than 25 years ago, the Agency recognized that it might need to revisit this excuse some day:

> Over time, the development of more sophisticated monitoring techniques may permit increased use of monitoring data to track increment consumption and establish ambient baselines, as well as improve the level of confidence in modeling.[198]

Professor Craig Oren—no friend of the increment system—has nevertheless recognized that it cannot fulfill its intended purpose when implemented in such a convoluted fashion:

> Ideally, the tracking of increment consumption would lead to public participation by providing the public with criteria to judge the need for relatively tight controls on an individual source. This, though, assumes that increment can be tracked in a way that is publicly understandable. But the complexities of modeling and the increment system dictate otherwise. . . . Of necessity, air quality modeling is based on theoretical, not actual, conditions. . . .
>
> All of these intricacies, whatever their justifications, weaken the usefulness of the increment system as a way to ensure public accountability. To allow public participation, risk-assessment devices like the increments must express their results in ways that correspond to easily understandable everyday phenomena. A system that expresses its results in terms of actual air quality might fulfill this criterion; in contrast, the increment system is divorced from common perceptions of air quality.[199]

C. The Case of the Missing Ceilings

The hallmark of the PSD increment system, as envisioned by Congress (admittedly taking its cue from EPA's pre-1977 PSD regulations) is the creation of unique local ambient air quality standards, derived by adding increments to unique, local baseline ambient air concentration values. Not only does the statute bear testimony to this—after all, CAA §163 is captioned "Increments and ceilings"—EPA has conceded it:

> Environmental groups felt that the increments should be treated in basically the same regulatory manner as the ambient air quality standards established under Section 109. A careful review of the legislative history indicates that [this] is the approach intended by Congress.[200]

Nevertheless, a search of almost 30 years of *Federal Register* publications shows that the local ambient air quality ceilings of the PSD program are missing in action. Except for the NAAQS themselves, there are no demarcated ceilings for the PSD increment pollutants—anywhere. Nor is it an accident that Figure 28[201] lacks the ceiling line so prominent in Figure 3 from Part I of this Article[202]; just as EPA has abandoned all pretense at establishing ambient air concentration baselines, it has discarded the concept of PSD ceilings. Instead, all the Agency does is model, re-model, and model again the pollutant emissions (often, themselves, the outputs of models) in a theoretical inventory of emission sources.

D. A Modest Proposal: Resurrecting the Ceilings

EPA has mutated the PSD "baseline-plus-increment-equals-ceiling" program envisioned by Congress into an "increment-consumption-calculation-by-modeling-only" program. Does it have to be this way? Could EPA take the PSD ceiling seriously? If so, might ambient air quality monitoring yet have a role to play in restoring the vigor of the PSD ceilings?

Professor Craig Oren, surely one of the most sophisticated scholars in the CAA and PSD fields, has suggested that the answer may be no:

> [O]ne of the primary advantages of a permitting process—that it gives notice to the operator of a prospective new source of the pollution controls that will be required—would be undercut if the agency were to grant a source a permit on the basis of pre-construction air qual-

ate" the exceeded standards in a special report "using more realistic assumptions." Stensvaag, *supra* note 99, at 130 n.696. "The purpose of the Special Report, therefore, is not to determine ways to reduce emissions but to disprove any violation of" the standards. *Id.*

197. *See Part I, supra* note 10, at text accompanying note 12.

198. 44 Fed. Reg. at 51944.

199. Oren, *supra* note 83, at 94-95.

200. 43 Fed. Reg. at 26380.

201. *See supra* fig. 28

202. *See Part I*, *supra* note 10, fig. 3, described in *supra* note 62.

> ity *modeling* and then to attempt to modify the permit on the basis of post-construction *monitoring* data that showed a different air quality result from that predicted by the modeling.[203]

This is an excellent point. If a PSD permit applicant has acted in good faith by entering appropriate data into and properly structuring and operating air quality models to project its future emissions, it does make sense to provide the permittee with some immunity from permit modification, notwithstanding post-monitoring data casting doubt on the permittee's projected increment consumption calculations.

It does not necessarily follow, however, that when the next PSD permit applicant whose significant impact plume will affect a pre-established baseline area comes forward with a request for a permit, actual ambient air quality monitoring results should be ignored. The first permit applicant has a reliance interest in the calculations spewed out by the model; later applicants have no such interest and should be faced with the true extent of increment consumption that has occurred prior to their applications. To build model on top of model on top of model—all in an effort to avoid ambient air quality monitoring—seems willfully blindered.

Can defensible ceilings—local, as opposed to national, ambient air quality standards—be calculated? There is no denying that Congress created a regime in which the baseline concentration value—expressly made subject to adjustment based on specified factors—is somewhat squishy and mutable. If the Figure 3[204] baseline floats higher and lower on that diagram, then any corresponding ceiling must also float with the baseline. Nevertheless, the whole system would almost certainly work better if EPA devoted its resources to nailing down meaningful baseline values, doing its best to get those values right. The relevant increment should then be added to each baseline value to develop a genuine, meaningful ceiling. If, over the passage of time, it becomes necessary to recompute the baseline, EPA should expressly engage in that activity—rather than chasing the specter of "increment expansions"—articulating a revised baseline with an associated revised ceiling.

When measuring compliance with NAAQS, communities are told that they must monitor ambient air quality concentrations and—if violations are found—must develop and implement measures to assure compliance. EPA does not engage in fanciful deductions for the emissions of "worthy" facilities whose contributions are somehow forgiven. If the measured ambient air concentration deviates from what the law requires, communities must simply suck it up, alter the behavior of emission sources, and bring their ambient air quality below NAAQS levels.

It could be thus with the PSD program. If local ambient air quality ceilings were taken seriously, it would not matter whether monitored ambient air concentration values in excess of those LAAQS ceilings had been caused by "baseline sources," "increment-consuming sources," or Martians. By definition, when a ceiling is exceeded, the increment is being violated. The resurrection of meaningful PSD ceilings is therefore the key to the CAA's increment system. Without such rebirth, the PSD program may remain little more than a game of Three-Card Monte.

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203. Oren, *supra* note 83, at 42 (emphasis added).

204. *See Part I*, *supra* note 10, fig. 3, described in *supra* note 62.