



John S.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

14 OCT 1992

MEMORANDUM

SUBJECT: Quantification of Rule Effectiveness Improvement Measures

FROM: G. T. Helms, Chief *Tom*
Ozone/Carbon Monoxide Programs Branch, MD-15

TO: See Addressees

The General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990 (57 FR 13498, April 16, 1992) identified improving implementation of existing rules, also known as rule effectiveness (RE) improvements, as valid control measures for inclusion in the 15 percent rate-of-progress control strategy. A document entitled, "Growth Factors, Projections, and Control Strategies," which should be issued in November 1992, lists specific control measures which the States could implement and achieve real emissions reductions.

The quantification of expected RE improvement from these measures is a difficult task since the effect of the improvement will depend on the current program. Additionally, the combination of certain measures may result in a synergistic effect or in a diminishing effect (i.e., the measures may not be additive in nature, and some combinations may result in an improvement greater or less than the sum of the effects of the individual measures). Another complicating principle is that programs cannot exceed 100 percent RE. In fact, it is our belief that programs can only approach, but never achieve 100 percent RE, unless a direct determination of the emissions is made, a continuous emissions monitoring program is implemented, or an irreversible process change eliminating the use of volatile organic compounds is made.

To provide a methodologically sound basis for quantification of RE improvements, we intend to use the Delphi Method to develop values for the various improvements. This method can be very effective by systematically incorporating both expert opinions about the value that each RE improvement should carry and exploring the justifications of any dissensions by these experts. After a group of experts is chosen, their opinions are requested and, if dissension arises, the reasoning behind it must be justified and this information released to the other members of the group who may then consider modifying their initial

responses. Attachment A contains a detailed description of our expected approach, and the process schedule.

To determine the appropriate values for RE improvements, we would like to begin by asking you to review the enclosed approach and matrices (one matrix for area sources and one for point sources). In your evaluation, review whether a complete list of the RE improvements is identified in the matrices. If there are measures absent, please include them. Also consider whether there exist any effects of bundling single improvements with others. Indicate whether the measure will have either a synergistic or diminishing effect and in which combination.

Next, we would like your input as to the selection of our experts. We believe the experts should be able to adequately assign a weight to the expected rule effectiveness improvements from the various measures. The person should have adequate experience in the source testing and compliance program areas. We expect our experts to come from State and local agencies, Regional Offices and Headquarters. We believe an appropriate number of experts is 10 to 15. We also solicit your input on the expert selection process. Enclosed is an expert recommendation form (Attachment B) which we ask you to complete and fax to us by October 20.

I have scheduled a call on Thursday, October 15, 1992 from 2:00-3:30 p.m. (Eastern time). The call-in number is 919-541-1591. For members in Durham, please meet in the large sixth floor conference room. The purpose of this call is to gain input from each of you on this process. An agenda for the call is attached (Attachment C). I apologize for the short review period, but we believe it is imperative that we develop this quantification methodology as soon as possible in order to provide the States with adequate guidance for the SIP development process.

Please call Sheila Holman (919-541-0861) to discuss any questions or concerns you may have. Finally, you may fax your comments to Sheila at 919-541-0804. If you are unable to attend the call, I ask that you provide your comments on the approach and the matrices no later than October 22, and any expert recommendations by October 20. Thank you for your cooperation. I look forward to your comments.

Addressees:

Bob Judge
Isabel Rodriques
Lisa Wilde
Floyd Ledbetter —
Christina Prasinos
John York
Mary Mindrup
Ron Rutherford
Ken Israels
Chris James
Linda Murchison
Alan van Aarsdale
Mike Koerber
Bob Collom

cc: J. Silvasi
G. Pomerantz
K. Scavo
S. Holman
J. Calcagni
— M. Mia
L. Lay
P. Reinermann
L. Gabele
Regional Air Branch Chiefs (w/o attachments)

Attachment A

RULE EFFECTIVENESS IMPROVEMENT (RE)

I. Introduction

In the General Preamble that provides guidance on the requirements of Title I of the Clean Air Act, EPA noted its intention to allow credit for improvements to rule effectiveness. The following describes a proposed methodology that EPA staff are developing to allow calculation of such improvement. The development of the methodology relies somewhat on the "questionnaire" developed for use as an option in determining base rule effectiveness. The methodology development will also rely on the participation of "experts" (i.e., State and local agency and EPA Headquarters and Regional Office personnel) upon whose judgment we intend to rely to develop the relative amounts of rule effectiveness improvement. In obtaining their participation, EPA intends to use a form of the "Delphi" technique^{1,2}. [Excerpts from the references are available from the staff upon request.] EPA staff have also developed a set of principles that upon which the methodology is based.

II. Principles

The following principles provided guidelines for the staff in developing the proposed methodology:

- All States will be guaranteed at least 80% baseline rule effectiveness (unless an SSCD protocol study or application of the questionnaire reveals a lower RE). *high value*
- Greater RE improvement credit above the default 80% should be allowed for areas whose actual base RE is in fact close to 80%; those areas whose actual base RE is in fact much lower than 80% should be required to upgrade their program to a greater degree before allowing large amounts of credit for RE improvement.
- All areas that do any improvement (even those areas whose actual RE is far less than the guaranteed 80% default), should be able to receive some credit for any program improvement--however slight--to encourage adoption of improvements.
- Improvements should be documentable; for instance, greater credit should be allowed for improvements that are institutionalized in sources' permits.
- Some individual improvements performed simultaneously with other may not provide RE benefits that are the simple sum of the benefits of each independently. Some provide less than the simple sum of the individual improvements. On the other hand, some RE improvements, performed simultaneously, may provide benefits greater than the simple sum of individual improvements.
- Except for those cases that have "automatically" 100% RE (e.g., direct determination of emissions, elimination of VOCs altogether through an irreversible process change), 100% RE is viewed as something that is approached asymptotically, but rarely, if ever, achieved in

¹Helmer, Olaf. Analysis of the Future: The Delphi Method. The Rand Corporation, Santa Monica, California. March 1967.

²Linstone, Harold A. and Murray Turoff, ed. The Delphi Method; Techniques and Applications. Addison-Wesley Publishing Company, Reading, MA. 1975.

practice.

III. Table of Activities with Weights

Those familiar with EPA guidance on RE will remember the format of the questionnaire that EPA allows to estimate a base RE for a source category. It contains groups of activities or conditions (e.g., frequency of inspections, level of expertise of inspectors, level of recordkeeping and reporting requirements), with a hierarchy of rigor of the activity or condition and weights assigned to each step in the hierarchy. When the questionnaire was completed, the weights were summed to provide the baseline RE.

The proposed methodology for RE improvement would utilize the concept of that questionnaire, with revisions to account for--

- the objective of determining RE *improvement* rather than a base case³
- the forthcoming rules on enhanced monitoring and continuous compliance.

The elements of the questionnaire would form the basis of a table of groups of activities and conditions, to which revised weights would be assigned (as described below under the description of the Delphi technique usage). Each group of activities or conditions would be weighted relative to each other, and increasing levels of activities or conditions within each group would also be assigned weights relative to each other. Thus, one could determine a weighted value for each group by multiplying the weight of each level of activity by the weight of its group. The values would be summed to provide a raw score (which would simply be a relative indicator of RE at that point).

The table would also contain instructions for increasing or decreasing the weight if it is determined that certain groups of activities or conditions performed simultaneously provide enhanced or decreased effect on RE. There would, of course, be a maximum raw score that could be obtained.

To account for the equity issue described above, participants in the Delphi technique will be encouraged to give less weight to lower levels of activities that improve RE and more weight to greater levels of activities. This will result in areas starting from a lower base (but still using the 80% default) being required to do more to obtain the same amount of improvement above an 80% default than an area starting from a higher level (but also still using the 80% default).

With this format, one could calculate a raw score for both a base and an improved scenario.

IV. Estimation of Improved RE

This section describes how the scores described above would be used to compute the improved RE.

Let

$$G(i) = \text{a weight assigned to group (i) of factors, activities or conditions that influence RE (e.g., level or frequency of inspection, nature of the regulation,}$$

³E.g., determination of baseyear RE considered compliance status of sources in the category. In adopting improved air management practices, however, one cannot accurately predict the new level of compliance, although one would expect it to improve, all other things being equal. Therefore, level of future source compliance would not be factored into the estimation of improved RE.

nature of technique for determining compliance, etc)

- $F(j, G(i))$ = a weight assigned to factor, activity, or condition (j) in group G(i) that influences RE (e.g., possible ambiguity or deficiency in rule under group "nature of regulation"). In some cases, the factors, activities or conditions are additive. In others, only one appropriate factor, activity or condition is selected, in which case there is only one $F(j)$ value for the group.
- $F(j, G(i), o)$ = the original value of factor $F(j)$ before improvement (i.e., the base case)
- $F(j, G(i), f)$ = the final value of factor $F(j)$ after accounting for the improvement
- RERS = the combined rule effectiveness raw score.

The combined RERS is given as--

$$RERS = \sum_{G=1}^n \sum_{F=1}^m [G(i) * [F(j, G(i), f) - F(j, G(i), o)]]$$

Also, let--

- RERS(max) = maximum possible combined rule effectiveness raw score
- RE(o) = originally determined RE before improvement (base RE) (for instance, this might be 80 (percent))
- RE(f) = final calculated RE after improvement
- RE(i) = improvement in RE over base RE

Then,

$$RE(i) = [100 - RE(o)] \times \frac{RERS}{RERS(\max)}$$

and therefore,

$$RE(f) = RE(o) + RE(i)$$

V. Determination of Table Weights through Delphi Technique

After an initial conference call with Regional Offices and select State agencies, we will identify the experts necessary for the Delphi method based on recommendations from the Regional Offices and State agencies. We will begin to utilize the Delphi Method and distribute the revised matrices (draft matrices are attached for the group's review) to our group of experts to fill in values for the listed improvements and bundles. The experts will be instructed to weight the groups of measures [G(i)] relative to all the other groups of measures on a scale from 1-10. The experts will also be asked to weight the individual measures within a group [F(i)] relative to each other,

again on a scale from 1-10.

After their responses are received, the mean values and outlying values are calculated. This information is distributed to the group members to provide an opportunity for the outlying answers to be justified. Anonymity is required although the reasoning for the outlying values will be provided to all the group members who in turn may change their initial values given this new information. At this point we plan on sending the matrix out to the experts four times: first to get the initial response, then three iterations for resolving the outlying answers. The schedule for completing this process follows.

VI. Schedule

<u>Process Steps</u>	<u>Due Date</u>
1. Circulate Description to RO's Selected States	10/9
2. Conference Call w/ RO's, States	10/15
3. Identify Experts	10/22
4. Notify Experts — <i>NetDraft of matrix 12/9</i> <i>Internal Review of matrix (ROA, 1, SCD) 12/14</i> <i>Draft to Delphi Land 12/22</i> <i>Review Back 1/7/93</i>	10/26
5. Send out 1st Delphi Run 1st Delphi Run in Send out 2nd Delphi Run 2nd Delphi Run in Send out 3rd Delphi Run 3rd Delphi Run in Send out 4th Delphi Run 4th Delphi Run in	<i>1/14</i> 10/26 11/4 11/12 11/18 11/25 12/7 12/14 12/21
6. Distribute Guidance	1/8

VII. Example

Attached is an example matrix with assigned values for demonstration purposes only to show how the matrix will be used in calculating RE improvements.

Scenario: Agency now places general notices in the newspapers, trade journals, etc., but commits to begin individual source mailings on compliance requirements. Additionally, Agency commits to increase spot checks from 3 percent to 14 percent of the sources. Finally, Agency will publicize in the media all enforcement actions (Agency was not publicizing any enforcement actions). RE in the baseyear emissions inventory = 80 percent.

Calculation of new RE:

Please refer to the equations presented above.

$$RERS = 3*[6+3-3] + 5*[4-2] + 4*[5-0]$$

where (from example matrix):

weighting factor for source education = 3
value for individual source mailings = 6
value for general notices in newspapers = 3

weighting factor for spot checks = 5

value for 10-15 % spot checks = 4
value for 1-4 % spot checks = 2

weighting factor for publicity of enforcement actions = 4
value for all noncomplying sources = 5
value for never = 0

$$\text{RERS} = 18 + 10 + 20 = 48$$

$$\text{RERS(max)} = 3*[6+6+3+4 - 0] + 5*[8-0] + 4*[5-0]$$

$$\text{RERS(max)} = 57 + 40 + 20 = 117$$

$$\text{RE(i)} = [100-80] * (48/117) = 20 * (.41) = 8.2$$

$$\text{RE(f)} = 80 + 8.2 = 88.2$$