

MEMORANDUM

To: Holly Stallworth, DFO
Science Advisory Board Staff Office

From: Nathalie B. Simon, Associate Director
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Date: March 30, 2012

Subject: Charge Questions for SAB-EEAC Advisory on the “Retrospective Study of the Costs of EPA Regulations: An Interim Report of Five Case Studies,” April 19-20, 2012

The purpose of this memorandum is to transmit charge questions for consideration by the Science Advisory Board’s Environmental Economics Advisory Committee (SAB-EEAC) during the upcoming Advisory meeting scheduled for April 19 and 20th on the “Retrospective Study of the Costs of EPA Regulations: An Interim Report of Five Case Studies.”

Benefit-cost analyses are often conducted to inform decision-making at the Environmental Protection Agency (EPA). While the EPA strives to use the best available science and engineering when conducting its economic analyses, they are by their very nature uncertain, relying on forecasted information. While new science and the need to quantify more, previously unquantified benefits has driven benefits analysis, comparatively less work has been done retroactively examining how well EPA estimates the costs (or benefits) of regulation. The ex post cost studies that are available in the literature are often based on limited data and overlap in coverage – many of the same regulations appear in multiple publications. And, while the literature posits a number of hypotheses for why one might expect ex ante and ex post cost estimates to differ, ex post analyses are too few in number to be able to credibly accept or reject these hypotheses.

The National Center for Environmental Economics (NCEE) has launched an effort to evaluate the feasibility of augmenting the existing literature with additional ex post evaluations of costs. Using a case study approach, we attempt to determine if sufficient information can be gathered on individual rules to make a "weight of evidence" determination about whether ex ante costs are higher or lower than ex post costs. If the case study approach is successful, there is much that can be learned from this effort. A careful assessment of ex post costs could help identify systematic differences between ex post and ex ante compliance cost estimation and, ultimately, allow for improvements in the way in which ex ante analyses are done. For instance, if unanticipated changes in market conditions, energy prices, or available technologies regularly result in an over or underestimate of costs, the EPA can invest in improving methods that better capture these effects on costs ex ante.

“Retrospective Study of the Costs of EPA Regulations: An Interim Report of Five Case Studies” (March 2012) summarizes the initial findings from a small set of pilot case studies that attempt to evaluate the costs of EPA regulatory and other policy actions ex post. The initial set of case studies rely on a variety of methods for collecting ex post information – some mainly rely on publically available data and literature and are conducted internally, while others rely on industry experts or third-party data collected by a contractor.

The five case studies presented in the interim report are:

- Integrated NESHAP and Effluent Guidelines for Pulp and Paper (1998)
- NESHAP: Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite and Stand-Alone Semicemical Pulp Mills (2001)
- Methyl Bromide Critical Use Nomination for Preplant Soil Use for Strawberries Grown for Fruit in Open Fields on Plastic Tarps (2004-2008)
- National Primary Drinking Water Regulation for Arsenic (2001)
- Locomotive Emission Standards (1998)

To be clear, the case studies in this report do not aim to estimate ex post costs of these EPA actions. Rather, they examine key drivers of compliance costs to see if informed *judgments* (weighing the evidence) can be made about whether ex post costs are higher or lower than the estimates of ex ante costs.

While a number of these case studies are suggestive of overestimation of costs ex ante, EPA could not cost-effectively gather sufficient information in other case studies to form judgments. As a group they expand our understanding of how and why ex ante costs may differ, but they are not conclusive. First, they only represent a small subset of regulatory and other policy actions taken by the EPA. Second, conducting ex post analysis has proven more challenging than anticipated. With regard to data, these challenges have included the inability to identify qualified industry experts that did not also work on the rule and limited access to industry data. Analytic challenges have included how to evaluate a highly heterogeneous industry with a limited set of information, how to form a reasonable counterfactual, and disentangling the costs of compliance from other factors, to name a few.

Before proceeding with additional work in this area, NCEE is seeking advice from the SAB-EEAC on the case study approach applied in the paper and specifically on appropriate methodologies to be applied in these and future case studies. As such, the findings presented in the report should be considered preliminary and are subject to change.

Please contact me if you have any questions about the attached charge.

Charge Questions for SAB-EEAC Advisory on the “Retrospective Study of the Costs of EPA Regulations: An Interim Report of Five Case Studies,” April 19-20, 2012

Part I: Evaluating the Retrospective Cost Study Methodology

- (1) Section 2 of the report summarizes existing retrospective cost studies. Have we adequately summarized the existing literature or have we mischaracterized it in some way? Are you aware of any studies we have missed? Have we captured key take away messages offered by this literature? How can this discussion be improved?
- (2) Section 3 of the report briefly describes potential reasons ex ante and ex post estimates might differ. Have we accurately described the various hypotheses? If not, how can this discussion be improved? Are there other hypotheses that should be included or considered?
- (3) One goal of this study is to demonstrate the use of different methodologies for obtaining ex-post information on key drivers of compliance cost. While the level of coverage and detail does not match what is typically used in an ex ante analysis in support of a rule, the purpose is to gather enough evidence on key drivers to establish a weight of evidence determination on the direction of ex post costs compared to ex ante costs. These approaches are briefly described in section 4 of the report. Are some approaches more defensible than others? If so, which ones and why? Which of the methodologies are more likely to yield reliable results and why? Or are the merits of each method dependent upon characteristics of the case study to which they are being applied? If some methodologies are more applicable under specific contexts or rule settings, please identify and describe. Are there other methodologies that should be considered for ex post cost analyses?

Part II: Evaluating the Case Study Approach

Conducting ex post cost analyses for the selected rules proved to be more difficult than expected. We encountered a number of challenges, both data-related and analytical in the process. Please answer questions 4 through 6 **for each case study**.

- (4) Each case study encountered a number of data-related challenges. Comprehensive, detailed data on compliance costs simply was not available for any of the case studies. In some cases, we obtained detailed data on compliance costs for a small segment of the affected industry. In others, we obtained aggregate level data for a larger proportion of the industry.
 - a. Under what conditions are different sources of ex-post data useful/not useful for assessing ex-post costs? In responding, please consider each of the following sources of data:
 - aggregate information from states,

- data from demonstration projects,
 - detailed data for a small portion of a heterogeneous industry,
 - detailed data on what technologies have been adopted but unit costs for a “typical” entity,
 - expert opinion on costs without external validation,
 - cost estimates from contractors that worked on the original rule
- b. Is there anything more we could do with the data we have for these case studies that would yield meaningful conclusions?
 - c. Do you have ideas on ways we can collect better ex-post information for these case studies given limited resources? Are there data sources we have not considered that we could use?
- (5) When conducting these ex-post cost analyses, we also struggled with a number of analytic challenges including establishing a clear counterfactual and disentangling costs incurred in response to a regulation from costs associated with other activities pursued simultaneously (e.g., system upgrades, product redesigns).
- a. Do you have suggestions on ways to better meet these challenges?
 - b. Do you have any thoughts or recommendations on how EPA can estimate or better apportion costs across activities pursued by industry and differentiate between the regulatory driven and non-regulatory driven changes?
 - c. What should we do in cases where there is a real paucity of data that limits our analytic options? Are some methods of estimation more or less useful in these cases (e.g. expert opinion, maintain consistency with ex-ante; a rough estimate based on assumptions and publically available data)?
- (6) Given the various data and analytic challenges, is it appropriate to draw “weight of evidence” conclusions on compliance costs based on the examination of key drivers of cost?
- a. Are there cases where drawing conclusions is less or more defensible?
 - b. Some previous retrospective exercises have used hard metrics for evaluating whether costs are over or underestimated (e.g., Harrington et al. used +/- 25 percent). This same metric was applied in the case studies presented in the Interim Report. Should we continue to use this metric? What are the drawbacks, if any, to applying a consistent metric across the case studies given their differences in data quality?

Part III: Moving Forward

- (7) It is difficult to make general statements about the accuracy of ex ante estimates of the costs of a regulation because the promulgation of every regulation is a unique event. Different considerations of timing, technology, industry structure, and a host of other factors go into the estimation of ex ante costs and determine the accuracy of those ex ante estimates relative to ex post experience. With this in mind, how can we meaningfully make generalizations concerning ex ante cost estimates based on ex post

comparisons? How can ex post cost comparisons be used to inform how the Agency estimates costs ex ante for future rules?

- (8) Previous studies in the literature have focused on the relative proportions of over- and underestimates of costs or the average ratio of ex ante to ex post cost estimates. In section 3, we have suggested reasons for which these indicators might not reveal a bias in ex ante cost estimates, and have suggested a regression-based procedure for making such a determination.
 - a. Is it possible to make general statements as to the accuracy of *ex ante* cost estimates? If so, what might be the best way to evaluate their accuracy?
 - b. Is it appropriate to concentrate on the bias of ex ante cost estimates, or might other statistical measures be more revealing?

- (9) The rules addressed in the Interim Report were selected so as to cover a range of media. Rules identified for Phase II of the project were randomly selected using stratified sampling. For both Phase I and Phase II rules, we have encountered (and continue to encounter) data challenges that make it difficult to draw conclusions regarding realized compliance costs. If we continue with this project, is there a way to credibly identify rules that would lead to informative ex-post cost studies from which we can draw conclusions? Specifically,
 - a. What should our priorities be with regard to how we select the sample of rules for evaluation? Should we compromise the random selection of rules in favor of selecting rules with more readily available data? If so, on what types of rules should we focus? What types of rules could we defensibly leave out? What kind of selection biases would we introduce under different sampling methods? For instance, if we exclude rules where the industry is particularly heterogeneous or data are difficult to identify, can we still draw conclusions that would be generally applicable?
 - b. How do we balance pragmatism vs. the purity of our sampling method, given our experiences (e.g., the challenges/limitations we have faced due to lack of participation by industry, an inability to identify industry compliance experts, potential contractor bias, and data limitations)? Should our choice of methodology inform the way we select the sample of rules or vice versa?

- (10) What additional suggestions do you have on how best to build a database of ex ante versus ex post cost comparisons of regulation given the difficulties we have faced thus far?