Final Draft Report

Anticipated Guidelines and Methodology for Post-Rule Assessment

Disclaimer

The SCAQMD staff is releasing this draft report to stakeholders and the AQMD Advisory Group for review and comment. With input from interested parties, AQMD staff will further develop and refine the facility-based analysis approach for future rule development projects.

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Anticipated Guidelines and Methodology for Post-Rule Assessment

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SECTION I.
Introduction

In December 2000, South Coast Air Quality Management District (AQMD or the District) retained BBC Research & Consulting (BBC) to provide potential enhancements to the socioeconomic assessment process. Since then, BBC has worked with AQMD to develop tools for facility-based assessments (FBAs) and post-rule assessments (PRAs). The purpose of this report is to provide anticipated guidelines and methodology for conducting PRAs.

Unlike the development of ***Guidelines and Methodology for Facility-Based Assessment***, which included two case study examples applied to AQMD rules, the guidelines and methodology for PRA were based largely on prior studies conducted by others. When actually applied to AQMD rules, the District may find that some modifications to these proposed guidelines and methodology for PRA are warranted. For this reason, we describe the guidelines and methodology presented herein as "anticipated", pending actual tests using AQMD rules.

As a methodology document, most of what follows is somewhat technical and detailed in nature. Policy-oriented or more general audiences may wish to focus on Section I (Introduction) and Section II (Framework for Post-rule Assessment), in which we present background information and some of the "big picture" issues in conducting PRAs.

Study Approach

In Phase I of this effort to develop additional socioeconomic assessment tools, BBC reviewed the existing economic literature, as well as the state of the practice within other regulatory entities. We also conducted a set of interviews with regulated businesses and other stakeholders within the LA Basin concerning AQMD's impact assessment process. This two-pronged approach identified key challenges for BBC and AQMD to confront in the Phase II guidelines and methodology development.

Phase I research. After conducting the literature review and interviews with the regulated community, BBC made the following observations.

- Information developed through PRA potentially offers the opportunity to improve the accuracy of future prospective assessments of proposed AQMD rules.

- PRA is relatively rare, is almost never conducted "in-house" by regulatory agencies, and seems to be most frequently undertaken by academicians and public policy centers.

- PRA actually comprises two different types of study that focus on two distinct objectives: (1) the determination of the actual cost of compliance, or (2) the analysis of direct economic impacts on the regulated industry.

Based upon the Phase I research, BBC suggested AQMD consider several preliminary recommendations. (These recommendations comprised Task 3 of our contract and the conclusion of Phase I.) Highlights of those suggestions included the following.

- If AQMD wishes to pursue PRAs to better understand actual compliance costs, the District should consider identifying rules that are likely candidates for PRA as they are implemented and seek to establish data tracking and reporting procedures at the outset.

- If AQMD's interest in PRA is to analyze economic impacts resulting from its regulations, the District must recognize that such assessments may not be able to fully isolate the impacts of individual rules or rule amendments.

- PRAs should likely be an infrequent exercise, rather than being standard operating procedure, because they will divert resources from analysis of upcoming rules, and because the benefits of PRA are largely unproven.

Phase II research. During the second phase of the assignment, BBC reviewed existing PRAs conducted throughout the United States to identify methods, data sources and limitations. Unlike the Phase II research into FBA, no original case studies of PRA on AQMD rules were performed.

Other aspects of Phase II research related to PRA include the production of a report entitled ***Criteria and Resources for Facility-Based and Post-rule Assessments***, which highlights when it may be most appropriate to conduct a PRA and required resources for such analyses.

What Is Post-rule Assessment and Why Do It?

BBC's review of the state-of-the-art, state-of-the-practice and the purposes of PRA from AQMD's standpoint leads us to suggest the following definition and reasons to conduct PRAs.

Definition. PRA is the retrospective analysis of the effects of regulations on the regulated industry and/or the regional economy. PRA may be further classified into two distinct types of analysis: (1) the examination of the actual costs regulated firms and industries experienced in complying with the rule, or (2) the analysis of the effects of the rule on economic conditions in the regulated industry.

Why conduct PRAs. For many years, AQMD has responded to public demand and statutory requirements by being a leader among regulatory agencies in analyzing the potential social and economic impacts of proposed regulations. In addition to continuously conducting assessments of regional economic impacts of proposed regulations—using the Regional Economic Models, Inc. (REMI) model—AQMD had previously commissioned or conducted post-rule analyses on its regulations affecting the wood furniture industry and on the Regional Clean Air Incentives Market (RECLAIM) trading program.

In 1999, AQMD convened a workshop, bringing together economists and representatives of the regulated community. The workshop built upon previous efforts to improve the socioeconomic assessment process, including the 1997 formation of the Scientific, Technical, and Modeling Peer Review Advisory Group and an audit by a research team from the Massachusetts Institute of Technology. A strong and consistent request during the workshop and its predecessors was the need to develop information that goes beyond the regional economic impact models in use by AQMD.

Along with FBA (described in other documents produced in this study), one of the suggestions emerging from the workshop process was that AQMD conduct retrospective evaluations of the effects of its rules (PRA). There may be both direct benefits from PRA and indirect benefits. The direct benefit would be in terms of fully understanding the effects of specific rules subjected to such assessments. The indirect benefit would be found in comparing the results from the PRA to the prospective socioeconomic analysis performed prior to rule adoption and, perhaps, using the lessons learned from such comparisons to improve future prospective analyses.

SECTION II.
Framework for Post-rule Assessment

Section II provides a discussion of several big picture issues regarding PRA, as well as a generalized methodology for conducting such assessments at AQMD. More specific details regarding the steps in conducting PRAs is provided in the two following sections.

The Two Distinct Types of Post-rule Assessment

As previously discussed, PRAs generally focus on one of two distinct objectives. Most commonly, the focus is on determining the actual costs of compliance with regulations. Somewhat less frequently, the focus is on determining the economic impacts of regulations in terms of broader measures such as industry growth, employment, value-added or gross output. Section III describes how to determine compliance costs, and Section IV describes how to determine economic impacts.

The general steps involved in conducting a PRA are similar, regardless of the focus of the analysis. BBC has drawn a sharp distinction between the two objectives, however, because the data requirements and methods of data collection differ considerably depending on the focus of the analysis. Further, some types of rules may be more readily amenable to one type of PRA than the other.

It is, of course, conceivable to perform both types of PRA on the same regulation to seek to identify both the actual costs and the actual economic effects of the rule. An example of such a combined assessment can be found in some existing studies, such as EPA's October 1997 report ***The Benefits and Costs of the Clean Air Act, 1970 to 1990.***

Types of Rules for Post-rule Assessment

AQMD promulgates a variety of rules in order to manage air quality within the district. Depending on the nature of the rule, PRA may be relatively simple or quite complex, and one type of PRA may be easier than the other.

The District classifies its rules by regulation number (such as Regulation XIV for toxics). However, a simplified view of air quality rules might classify them into four categories: (1) administrative rules, (2) rules affecting industrial (business) processes, (3) consumer product rules, and (4) incentive-based rules.

We assume the District will not want to perform PRA on purely administrative rules. Exhibit II-1, on the following page, illustrates the likely ease or difficulty of performing the two types of PRAs for the remaining types of rules.

Exhibit II-1.
Relative Feasibility of Post-rule Assessment by Type of Air Quality Rule

		TYPE OF POST-RULE ASSESSMENT	
		Compliance Cost	*Economic Impact*
TYPE OF RULE	*Industrial (Business) Process*	Harder	Easier
	Consumer Products	Easier	Harder
	Market-Based	Easier	Harder

The relative ease of performing the two different types of PRA on the three different categories of rules is primarily driven by data availability. For market-based and consumer product rules, compliance costs can be essentially observed from market prices. Consequently, although PRAs are rare, existing PRAs focus disproportionately on rules related to consumer products and market-based trading systems.

A 1999 study by Resources for the Future (RFF) that attempted to systematically compare pre-rule cost estimates with post-rule analyses was able to identify only 21 environmental regulations in the U.S. with both a detailed pre-rule cost projection and a systematic post-rule cost analysis.[1] Of those 21 studies, 11 could be classified as industrial process regulations (such as industrial coke oven rules promulgated by EPA), 5 could be classified as primarily consumer product requirements (such as the phaseout of leaded gasoline) and 5 were incentive-based rules (most often focused on the allowance trading system created in Title IV of the Clean Air Act). All 10 of the PRAs on non-federal regulations (by or for state or local agencies such as AQMD) that RFF could identify with both pre-rule and post-rule analyses were either consumer product regulations or incentive-based regulations.

Three-Step Approach to Post-rule Assessment

Regardless of whether the objective of the PRA is to determine the actual costs of compliance or the economic impacts of compliance, the conceptual approach to the analysis is similar. Essentially, this approach can be broken down into three analytical steps:

- Step 1: Analyzing actual conditions since rule adoption;
- Step 2: Estimating the baseline in the absence of the rule; and
- Step 3: Assessing the effects of the rule.

Each of these steps is described in further detail in the following sections of this document. AQMD may also wish to undertake additional procedural or reporting steps, such as description of the rule and identification of the affected industries.

[1] ***On the Accuracy of Regulatory Cost Estimates.*** Harrington, Winston, Morgenstern, Richard, and Nelson, Peter. Resources for the Future. (January 1999): 99-18.

SECTION III.
Post-rule Assessment of Compliance Costs

While it may seem that determining compliance costs is simpler than determining economic impacts, a PRA focused on compliance costs can be more difficult to execute. AQMD likely will have to rely almost entirely on collecting original data to conduct PRAs focused on the cost of compliance.

Analyzing Actual Conditions Since Rule Adoption

The first analytical step is to characterize and quantify the costs that have occurred since the rule was adopted. Referring back to the simplified classification of air quality rules presented in the prior section, the analysis of costs since rule adoption may be relatively simple for rules related to consumer products and for market-based rules (such as RECLAIM), since this step will primarily involve the collection of information on market prices.

For rules affecting the content of consumer products, the costs of regulation can be measured by the difference in price between the reformulated product required in the District and the comparable product sold in other locations without similar regulations. Of course, this approach would not account for qualitative differences in the product, which might have to be addressed somewhat subjectively.

For market-based rules, the convention in PRA is to assume that markets function perfectly and that the price of allowances can be taken to represent the marginal cost of pollution abatement. With this assumption, and assuming data on allowance prices are available, calculation of the costs of compliance is relatively straightforward.

Collecting data on compliance costs for rules affecting industrial processes is more complicated. Ideally, AQMD would gather and analyze the costs incurred by the industry specifically related to the regulation under assessment. In some cases, however, it may be necessary to gather broader cost measures—such as the industry's costs for pollution abatement in general. In such instances, the second step of the PRA—estimating baseline costs without the regulation—will take on added importance and complexity.

Identifying cost categories. To analyze the actual expenditures incurred since rule adoption, AQMD may begin by identifying the potential types of costs that regulated firms may have incurred in complying with the regulation. In USEPA's ***A Retrospective Analysis of the Costs of the Clean Water Act: 1972 to 1997— Final Report***, a list of six cost categories is suggested that may be a reasonable starting point for AQMD analyses. The six categories are:

1. Pollution abatement capital expenditures;

2. Operation and maintenance charges;

3. Research and development costs;

4. Regulation and monitoring costs;

5. Other current expenditures, and

6. Cost offsets.[1]

Most of the categories in this list are relatively self-explanatory. "Other current expenditures" refers to such items as remedial actions, process changes and administration. "Cost offsets" refers to revenue increases or cost savings that result from pollution control activities. For example, efficiency gains through changes in the production process to control emissions or the sale of by-products from pollution control would produce cost offsets.[2]

Obtaining data on compliance costs. There are two types of data that might be available for PRA—existing data collected for other purposes and new, original data developed by AQMD.

Existing data. There are a number of conceptual advantages to relying on existing data, where possible. Use of such data can reduce the resource requirements for analysis, facilitate comparisons with areas outside of the District's boundaries and potentially reduce the possibility of strategic responses inherent in conducting original surveys. Unfortunately, existing data suitable for analyzing regulatory compliance costs is quite limited.

The primary existing data compilation related to environmental compliance costs is the Pollution Abatement Costs and Expenditures (PACE) database compiled by the U.S. Department of Commerce, Bureau of the Census. This data is compiled from annual surveys of the manufacturing sector throughout the country, and a relatively consistent data set is available from about 1989 through 1994. After a five-year break due to lack of funding, the survey was restarted in 1999. Approximately 17,000 manufacturing establishments are included in the database, or about 5 percent of all such establishments in the U.S.[3] There is a lag of approximately two years in the development of the data (hence, in 2002, the most recent available data is likely 1999 or 2000).

The PACE data includes detailed capital and operational costs at the plant level for abatement by media (e.g., air, water, solid waste). Costs are available at a level of detail corresponding to the cost categories described earlier in this section. The PACE sample is designed to be statistically representative at the 3-digit Standard Industrial Classification (SIC) level on a national basis, though it may not be a representative sample for smaller geographic areas.[4]

There are, however, several concerns related to the PACE data that may limit its usefulness to AQMD. First, although aggregate statistics from the PACE data are published by the Bureau of the Census at the national level and at the 2-digit SIC level of detail by state, AQMD would likely need access to the microdata itself in order to obtain both the geographic specificity and industry

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[1] ***A Retrospective Assessment of the Costs of the Clean Water Act: 1972 to 1997— Final Report***. U.S. Environmental Protection Agency, Office of Water, Office of Policy, Economics and Innovation. October 2000. Pages 4-2 through 4-3.

[2] ***Ibid***. Page 4-3.

[3] ***Evaluation and Use of the Pollution Abatement Costs and Expenditures Survey Micro Data***. Mary L. Streitweiser, Center for Economic Studies, Bureau of the Census, November 1995.

[4] ***Ibid***.

specificity required for analyzing costs specific to the District's regulations. Like the similar Longitudinal Research Database microdata maintained by the Census, obtaining access would require approval of a proposal by the Census Bureau and/or its local data center at the University of Southern California.

Even if AQMD can obtain access to the microdata and overcome issues concerning its ability to reliably represent the Los Angeles Basin, two other issues would arise. First, PACE only includes manufacturing establishments with 20 or more employees, while the District's rules often affect firms in other sectors and smaller businesses. Second, the costs are broken out by pollutant, but not by specific rule or regulation.

Developing original data. In the absence of suitable existing data, AQMD may need to develop original information to analyze costs since rule adoption. Three potential approaches include retrospective surveys of affected entities, establishing proactive reporting procedures at the outset of the rule and employing a rule-specific hybrid approach. Each of these approaches is discussed below.

Retrospective surveys. The most direct approach to obtaining retrospective data on the costs of compliance would be to survey affected firms. However, both the California Air Resources Board (ARB) and the United States General Accounting Office (GAO) have been relatively unsuccessful in obtaining information through surveys. In the case of GAO's effort to assess the cumulative regulatory cost and burden of federal regulations, most business and public interest groups they contacted did not nominate any companies to participate. Ultimately, only 17 of 51 companies contacted by GAO agreed to participate and, while 15 provided data, none provided complete data.[5] ARB was able to obtain only an 11.8 percent response rate to its survey to obtain data on the costs of regulation, despite a "very time-consuming and intensive effort at survey completion." Moreover, ARB notes that "the most common responses (sic) was a point blank refusal to give any information and expression of anger at the regulators."[6]

There are several reasons why such efforts have tended to encounter low response rates and been unable to obtain complete data from most respondents. Cost data may well be considered proprietary by the businesses, and there is likely little incentive for them to participate. Perhaps even more importantly, as noted in GAO's report, most firm's accounting systems do not isolate costs associated with pollution abatement and regulatory compliance. It may be a significant burden, if not impossible, for these firms to retrospectively report on the incremental costs they have incurred due to a particular regulation.[7]

Proactive reporting procedures. During the literature review and interviews conducted in the first phase of this project, the study team interviewed Richard Morganstern, a senior fellow with RFF and leading expert in the field of retrospective evaluations of environmental regulations. Recognizing the lack of clear solutions to the challenges of obtaining reliable information on the actual costs of compliance, Morganstern recommended that agencies consider instigating procedures to obtain data

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[5] ***Regulatory Burden: Measurement Challenges and Concerns Raised by Selected Companies***. U.S. General Accounting Office, November 1996. Page 4.

[6] Significance of ***California Air Pollution Control Regulation for Business Location Decisions***. California Environmental Protection Agency, Air Resources Board, Research Division. May 1995.

[7] GAO, 1996. Pages 51.

from the time the rule is passed.[8] Proactive reporting requirements could overcome many of the challenges firms face in trying to determine the costs specifically related to particular regulations in retrospect.

If AQMD were to instigate such a process, there appear to be two options. Reporting requirements could be mandatory and built into the rule, though this would raise the administrative burden for the regulated entities. Alternatively, it might be possible for AQMD to provide incentives for firms to voluntarily participate in ongoing reporting of compliance costs—perhaps through credits against permit fees or other mechanisms. In either case, the reporting instrument will have to be carefully designed to properly identify and isolate costs associated with compliance with the specific AQMD rule intended to be subjected to PRA. Self reported data is potentially subject to strategic responses, though comparative analysis of information provided by different firms may lend more confidence in using the results.

Rule-specific hybrid approaches. The third possible approach to obtaining information on the costs of compliance is to employ a hybrid approach consisting of a mix of direct observation and interviews with willing participants or industry experts.

For many industrial process type rules, AQMD may have access to information on the compliance strategies undertaken by the regulated industry that can be used as a starting point for cost estimates. For example, the AQMD permit database, or AQMD inspectors, may be able to provide information on the number, types and brands of add-on emission controls. By contacting the manufacturers, AQMD could then determine the capital costs of compliance. However, interviews with willing firms or industry experts may still be required to quantify other aspects of compliance costs, such as the cost of financing the capital equipment, labor requirements for operations and maintenance, changes in productivity, etc. Such information will have to be used with some caution, as firms willing to participate in the process may or may not be representative of the industry as a whole.

Estimating Baseline Costs Without the Regulation

In order to assess the costs incurred in response to an AQMD regulation, the analyst will have to compare the actual compliance costs to the baseline costs, if any, that would have been incurred without the regulation. Depending on the nature of the compliance requirement and the data collected in the first step of the analysis, this baseline cost estimate may be simply inferred to be zero or more complex estimation may be required.

Inferring the baseline. If the data developed in the prior step represent the ***incremental*** costs of the regulation, the corresponding baseline cost is zero. For industrial process type rules, such circumstances could occur if AQMD adopts a proactive data collection approach at the outset of the rule and the regulated entities can successfully identify the ***incremental*** costs associated with compliance. This circumstance could also occur if AQMD employs the rule-specific hybrid approach described previously and is able to isolate incremental compliance costs.

[8] Richard Morganstern, Resources for the Future, interview with study team, February 2001.

For market-based approaches, the costs reflected by allowance prices are incremental by definition. Many of the previous retrospective analyses of market-based environmental regulations, however, have focused on determining compliance costs relative to a command and control alternative, rather than to the baseline situation without any regulation. In this specialized case, a baseline hypothesizing the alternative, command and control, approach and costs must be developed.

Estimating the baseline. In some cases, AQMD may not be able to obtain information on the incremental costs specific to the rule in the first step of the analysis. In such instances, it will be necessary to estimate baseline costs in the absence of the rule.

A simple example of such circumstances would be the case of rules regulating the content of consumer products. While AQMD can observe the total price of the reformulated product, it will need to estimate the baseline price of the comparable pre-rule product in the absence of regulation to determine the price differential. In this case, such an estimate might well be developed by obtaining prices for the pre-rule product from locations outside the district where it can still be sold.

Industrial process rules may involve more complex estimates of baseline costs. If, for example, AQMD is only able to obtain data on total costs of regulatory compliance (rather than costs specific to the rule subjected to PRA) from data provided by regulated entities or sources such as the PACE data described earlier, it will be necessary to estimate what the costs of regulatory compliance would have been without the regulation.

This is exactly the challenge that confronted USEPA in its efforts to quantify the costs of such national regulations as the Clean Air Act and Clean Water Act. The approach that EPA adopted was to analyze cost data from the period before the regulation and develop equations that could generally predict the level of annual costs based on independent variables (such as population levels). These equations were then used to estimate what costs would have been in the absence of the regulation. Exhibit III-1, below, taken from USEPA's ***A Retrospective Assessment of the Costs of the Clean Water Act: 1972 to 1997,*** provides a graphical depiction of the results of this type of baseline cost estimation.

Exhibit III-1.
Example of Comparison of Actual Costs with Estimated Baseline Costs

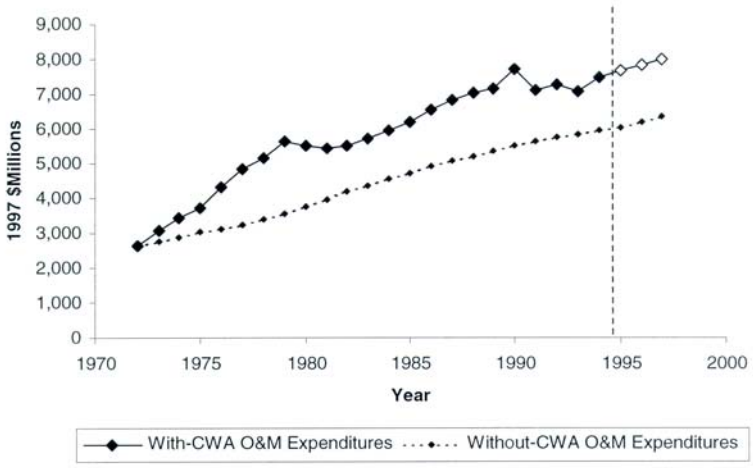

Figure 6-4. Annual Private O&M Expenditures for Water Pollution Abatement Under the With-CWA and Without-CWA Scenarios, 1972–1997 (1997 $millions)

It may be somewhat easier for AQMD to estimate baseline costs for industrial process rules than it has been for EPA. Unlike EPA's national rules, AQMD may be able to use compliance costs information from similar firms outside the District in developing such a baseline.

Assessing Post-rule Information on Compliance Costs

Once the actual conditions since rule adoption have been characterized and quantified, and the baseline has been inferred or estimated, the compliance costs resulting from the rule can be calculated by simply subtracting the baseline from the measured or estimated actual costs. In cases where the costs are developed on a unit basis—such as rules modifying consumer product content or market-based rules with prices measured in dollars per ton—the incremental unit costs will need to be multiplied by an appropriate volume measure to determine total costs throughout the District. For example, if a consumer product rule led to an incremental price increase of $1, and the annual sales of the product in the District was 10,000 units, the annual cost of the regulation can be calculated as $10,000. In this example, these costs are borne by the consumers rather than the producers.

Once the costs attributable to the rule have been determined in a PRA, AQMD may wish to assess their significance. Many of the same types of measures described in ***Guidelines and Methodology for Facility-based Assessment*** can be employed in this context. For example, it may be useful to place the compliance costs into the context of total annual sales or profits of the regulated firms.

SECTION IV.
Post-rule Assessment of Economic Impacts

The second common objective of PRA is to attempt to determine, in retrospect, the economic impacts of the regulation on the regulated industry or the broader economy as a whole. Key questions for such an assessment might include whether a regulation has led to job losses or firm closures in the industry.

Essentially, there are two approaches to conducting a retrospective analysis of the economic impacts of a regulation. The first, which we term "direct estimation," employs a similar, three-step process to that used for conducting a PRA focused on compliance costs. However, unlike PRAs focused on determining the cost of compliance, the principal challenges in this type of retrospective evaluation of economic effects are analytical rather than data related. The balance of this section is primarily dedicated to the direct estimation approach.

The second approach, which we term a "modeling-based analysis," combines information developed from a PRA focused on compliance costs with a regional economic model to estimate economic impacts. This approach is discussed at the end of this section.

Analyzing Actual Conditions Since Rule Adoption

The first step in conducting a PRA concerning the economic impacts of an AQMD regulation using the direct estimation approach would be to characterize economic conditions in the regulated industries since the rule was adopted. The objective would be to produce a time series of relevant data that characterizes the affected industry before and after the adoption of the rule. Ideally, these data series would include the full range of measures of the industry's performance—such as number of firms, number of employees, gross sales, profitability, and so forth. Given the need to obtain annual data both within the District's boundaries and outside of the District (as discussed under the next step, estimating the baseline), the available data may be more limited than the ideal.

AQMD can make use of a variety of federal and local sources of economic data. Annual data on the number of firms, by size, can be obtained at the county level from the U.S. Department of Commerce County Business Patterns (CBP) at the 4-digit SIC code level of industry specification.[1] Compensation paid to all employees in the industry can be obtained from the U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System (BEA) at the county level spanning a period of more than 30 years.

Time series data on the number of employees in the industry can be obtained from several sources. The lengthy BEA time series data on employment, at the county level, is only available at the 1-digit SIC code level of industrial detail. Time series data on industry employees (as well as industry

[1] In more recent years, County Business Patterns has converted to the NAICS system. For a discussion about converting data based on the NAICS system to the previous SIC based system, see Guidelines and Methodology for Facility Based Assessment, Appendix A.

payroll) is available from CBP at the 4-digit SIC code level of detail. Finally, employment data can be obtained from state sources—particularly the California Employment Development Department (EDD). The analyst should be aware that different sources of employment data count jobs in different ways. For example, BEA data includes both employees and proprietors, while employment data from state sources is based on the ES-202 unemployment insurance program and contains only employees of "covered" firms. CBP data also excludes proprietors. These distinctions can be important in the next stage of the analysis—estimating baseline conditions—where it may be necessary to compare data within the District to data in other areas.

While net changes in the number of firms from year to year can be deduced from CBP data, there may be interest in decomposing industry changes since the rule was adopted to analyze rates of firm "births" and "deaths." This type of data is useful for measuring what some describe as "churn" in the economy and, in other assignments, the study team has found that the rate of churn can be much larger than might be expected based on net industry growth or decline. There are at least two types of data that can be used to examine industry churn. Dun and Bradstreet data includes measures of when firms were established which, combined with statistics on net changes in the number of firms in the industry, can provide at least partial information on the extent of churn. The best data source, however, is the ES-202 records filed by establishments with the state government. This data allows the analyst to specifically track the "births" and "deaths" of establishments within the industry. Typically, state agencies are reluctant to provide direct access to ES-202 databases, except for state funded research, but it may be possible to contract with EDD to perform such analyses.[2]

Estimating Baseline Conditions Without the Regulation

While it is relatively straightforward to measure and characterize the economic performance of the regulated industry after the rule was adopted, the biggest challenge in PRAs focused on economic impacts is to estimate how the industry would have performed in the absence of the regulation.

The goal of the second step of this type of PRA is to develop the most reasonable and defensible estimate possible of what the industry's economic performance would have been without the regulation. This estimate is likely to be the most contentious aspect of such an assessment.

In its most rigorous form, the analytical procedure for estimating baseline economic performance would include the following tasks:

- Develop equations which describe pre-rule economic performance (e.g., employment) of the regulated industry within the District based on independent variables. The explanatory variables (and coefficients) would likely differ from industry to industry.

- Use the equations, coupled with measurements of the same independent variables after the rule was passed, to simulate post-rule industry performance in the absence of the regulation.

[2] Apparently, EDD performed such an analysis for Dr. Paul Ong and Dr. Ward Thomas in their assessment of ***Southern California's Home Furniture Industry and Air Pollution Regulations***.

The independent variables for this type of analysis are probably most likely to be drawn from four potential categories of information: (1) variables representing demand for the industry's product (e.g., population levels, housing starts, etc.); (2) variables representing industry cost characteristics (e.g., prevailing wage rates, tax burden or leasing costs); (3) variables describing the performance of the same industry in other locations (e.g., national industry statistics); and/or (4) time-trend variables.

This type of approach was used in the 1998 study of Southern California's Home Furniture Industry and Air Pollution Regulations.[3] It has also been extensively used in a slightly different context, to evaluate the impact of economic development activities such as state enterprise zone programs.[4]

Assessing Post-rule Information on Economic Impact

Much like PRAs focused on analyzing compliance costs, under the direct estimation approach, post-rule economic impacts are calculated by subtracting the estimated baseline from the actual conditions since the rule was adopted.

Results will typically be measured in terms of the rule's estimated impacts on the numbers of jobs, numbers of firms, total employee compensation or other measures of the regulated industry's performance. To some extent, these measures can be compared to the results of the District's traditional prospective socioeconomic rule assessments using the REMI model. However, the PRA approach described here is designed to estimate the direct economic effects on the regulated industry, while the REMI model is intended to capture not only direct, but also indirect effects. The closest comparison between a PRA performed as described herein would be to the REMI results just for the particular sector subject to the regulation, but the REMI results for that sector will still contain some indirect effects not captured in the PRA analysis. Depending on the particular industry, there may or may not be a close correspondence between the regulated industry's definition based on SIC or North American Industrial Classification System (NAICS) codes and one or more of the REMI model sectors. While it is theoretically possible to broaden the PRA approach described herein to include indirect effects, the difficulty of sorting the effects of the rule from broader economic forces become much greater as additional sectors are included.

Even if the estimated baseline appears very robust and defensible, the results of retrospective assessments of economic impacts should be interpreted with some caution. The business climate in the District, and everywhere else, is continually changing, and many factors influence the year-to-year performance of firms and industries. It is entirely possible that other changes occurring at or near the same time within the LA Basin could account for at least part of the economic impact that would be attributed to an AQMD rule using the approach described in this section. Unfortunately, it is likely impossible to perfectly isolate the impact of an individual AQMD rule on an industry's economic performance.

[3] Ong and Thomas, 1998.

[4] See for example, the work of Dr. Leslie Papke to analyze enterprise zone programs in Indiana.

Modeling-based Approaches to Post-rule Assessment of Economic Impacts

Another approach to PRA of economic impacts is to combine PRA of actual compliance costs (as described in Section III) with economic modeling. This is the approach taken by USEPA in retrospective evaluations such as ***The Benefits and Costs of the Clean Air Act, 1970 to 1990***. In essence,

this approach combines the two potential PRA objectives by using the retrospective cost data as an input into an economic model, which then estimates corresponding changes in employment and economic activity.

The modeling-based approach would appear to be relatively easy for AQMD to implement, given its current extensive use of the REMI model. The disadvantage of this method, however, is that it continues to place the economic model, with its inherent assumptions and complexity, in the midst of the assessment. If one of the objectives of PRA is to provide a check on the accuracy of prospective socioeconomic analyses conducted prior to rule adoption, incorporating the same model in the PRA would not appear to be the ideal approach. Similarly, if stakeholders have concerns about the validity of the regional economic model, these concerns will not be alleviated by PRAs which incorporate the model as well.