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AIR QUALITY ANALYSIS WORKSHOP VOLUME II - EXECUTIVE SUMMARY

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Waste Management
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

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by

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1. *INTRODUCTION*

Between November 24, 1975 and December 19, 1975 a series of eight two-day Air Quality Analysis Workshops were conducted by the Energy and Environmental Systems Division of Argonne National Laboratory under contract to the Control Programs Development Division of the U.S. Environmental Protection Agency. It was the objective of these workshops to provide assistance to working level air pollution control engineers and regional, state, and local planners in the use of previously published EPA guidelines[1-13] for the development of an analysis conforming with current federal regulations.[14]

The major emphasis of the workshops was on the analytical and technical procedures rather than on policy. They were designed to cover the entire scope of an air quality analysis and used a fictitious county, County X, based primarily on Fulton County, Georgia, to illustrate the procedures. Several practical problems were included as part of the material. The test case and problems dealt mostly with the analysis of particulate problems. This was done to limit the scope of the workshop to a manageable size.

Workshops were held at EPA Regional Offices in Atlanta, Boston, New York, Chicago, Denver, Seattle, Dallas, and Philadelphia. Representatives of EPA, Region VII (Kansas City), and some of the state and local agencies in that region attended the workshops in Chicago and Dallas. Workshop participants were invited at the discretion of the Regional Office staff and an attempt was made to assemble a cross-section of air pollution control, planning, transportation, and other environmental control agency staff. Table 1 indicates the distribution of attendees. It must be noted that at some workshops a full attendance list was not taken so the counts are somewhat incomplete. The table shows that state and local air pollution control agency staff constituted the largest participant group. With the exception of the Atlanta workshop, all had some representation of planning groups with Chicago having the largest contingent. There was scattered representation of transportation planners, other environmental control groups, and private contractors. The indications were that the workshops reached the desired groups and about in the expected proportions.

The objective of this report is to summarize the results of the workshops in terms of problem areas in the analytical techniques, issues needing

Table 1. Attendance at Air Quality Analysis Workshops

City	Air Pollution Control			Planning		Transportation Planning			Other Environmental			Other[b]
	Federal	State	Local	State	Local	Federal	State	Local	Federal	State	Local	
Atlanta[a]	11	8	10	0	0	1	0	0	0	0	1	2
Boston	11	6	0	0	8	1	0	0	1	0	0	11
New York	9	17	5	0	12	1	7	0	2	0	0	0
Chicago	7	19	18	1	23	2	2	0	0	0	0	0
Denver	6	9	0	1	8	3	5	0	1	2	1	0
Seattle	4	5	7	0	9	0	0	0	0	0	0	2
Dallas	5	10	6	0	14	4	2	0	0	0	0	0
Philadelphia	8	6	15	2	11	0	2	0	0	0	0	2
TOTAL	61	80	61	4	85	11	18	0	4	2	3	15

[a]Counts based on questionnaire responses and do not represent total attendance.

[b]Includes contractor, consumer group, industry representatives.

resolution, and identification of points that require additional guidance. The conclusions presented are designed to aid in the development of future action plans for EPA. The format of this summary will follow that of the air quality analysis workshop; that is, each technical analysis area will be addressed in turn. A review of the policy issues raised and the logistics of the workshops themselves will also be included.

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2. *TECHNICAL PROBLEM AREAS*

2.1 AIR QUALITY DATA

Section 3.1 of the workshop manual discussed the development of a baseline air quality data base. Table 2 summarizes the questions and comments by regional workshop.

Table 2. Distributions of Questions Concerning Air Quality Data

	Number of Questions and Comments		
Workshop	Larsen's Methods	Observation Periods	Accuracy of Measured Data
Atlanta	2		1
Boston	3	2	
New York	2		
Chicago	2		1
Denver			
Seattle			
Dallas	1	2	
Philadelphia	1		
TOTAL	11	4	2

Larsen's Method. The use of Larsen's statistical methods to estimate pollutant concentrations raised the most questions about air quality data. There was considerable concern as to whether a Larsen-type estimate of concentrations should be used as the basis for plan development or whether only measured data should be used. The response to these questions was that Larsen's method may be used as a planning tool and can be used in plan development but that an assessment of a station being in violation of the National Ambient Air Quality Standards could be made on the basis of measured data only. This line of discussion led to inquiries as to the accuracy of Larsen's methods (i.e. do they under- or over-predict), the "tailing off" of air quality data at the upper end of the Larsen line, tests for log-normality, and the use of other statistical means to determine concentrations from incomplete data

sets. The general feeling seemed to be that the use of an estimated concentration based on Larsen's techniques could leave plans open to severe challenges based on the accuracy of the method. Some reemphasis of EPA's position on this issue may be required.

Observation Periods. Another point of uncertainty that appeared several times was the period of time over which concentrations are measured and their representativeness. There was some feeling that since episode conditions could lead to the highest concentration value and also second highest concentration value, use of this sequentially occurring second highest concentration could lead to overly restrictive control plans. Some agencies expressed the desire to eliminate certain data from consideration on this basis as well as data from other unusual conditions (e.g, dust storms). Response from Regional Office representatives indicated that all air quality data should be submitted with the plan but that consideration would be given to requests that certain data be eliminated providing sufficient justification was available.

Accuracy of Measured Data. In several workshops questions arose as to the reliability of monitored air quality data. Results were quoted of experiments that showed two monitors located side-by-side could have substantially different readings. The response to this was that these types of considerations might be included in a discussion of the accuracy and reliability of the analysis as provided for by the proposed regulations.

2.2 METEOROLOGY

Section 3.2 of the AQAW manual addressed the meteorological data requirements. This section did not generate a great deal of problems. Table 3 summarizes the questions.

Worst Case Data. The question arose as to the use of worst case meteorological data. It was not clear if an absolute worst case condition that occurs only once in a long period of time should be used for plan development or if a worst case segment of a typical year should be used. The use of a typical year's data vs. long-term climatological averages also arose in the same context. It appeared that the Regional Offices were not experiencing a great deal of difficulty in resolving these issues on a case-by-case basis.

Table 3. Distribution of Questions Concerning Meteorology

Workshop	Number of Questions and Comments	
	Worst Case Data	Unusual Meteorology
Atlanta		1
Boston	2	
New York		
Chicago		
Denver		
Seattle	1	
Dallas		1
Philadelphia		
TOTAL	3	2

Unusual Meteorology. Some states were having problems identifying the appropriate meteorological data to use for unusual conditions (e.g., peninsula effects, uneven terrain, etc.). The response was advice to be certain that the dispersion model used was, in fact, capable of handling these conditions and to avoid expending a great deal of effort on identifying the meteorology precisely when the model is not sensitive to it. In two regions participants commented that they had already made modifications to existing dispersion models to account for complex meteorology. The models mentioned were Miller-Holzworth and AQDM.

2.3 EMISSION INVENTORY UPDATE

Section 3.3 of the manual described procedures for updating the emission inventory. Table 4 summarizes the questions and comments.

Fugitive Dust. The issue that raised the most questions was, by far, the problem of estimating fugitive dust emissions. The questions arose at every workshop. The most frequent question concerned the quality of the EPA-published emission factors for fugitive sources.[15] Some states were encountering situations where the fugitive dust calculations comprised the largest part of their emission inventory and would, therefore, present severe

difficulties in devising control strategies. One state was using the fugitive dust emission rate to, in effect, calibrate its dispersion model; that is, the emission factors were adjusted until a good validation was achieved. Some states reported such a lack of confidence in the emission factors that they were not using them at all and were, instead, treating the situation as background only. There were questions as to the validity of using a single fugitive dust emission rate rather than one that is seasonally dependent.

Table 4. Distribution of Questions Concerning Emission Inventory Update

	Number of Questions and Comments				
Workshop	Fugitive Dust	Fuel Combustion Sources	Point Source Updating	Trans-portation Data	Validity of Volume 7 Procedures
Atlanta	6	2	3		
Boston	1	4			1
New York	4	1	1		1
Chicago	3	4	1	1	
Denver					
Seattle	1		2	1	
Dallas	4		2		
Philadelphia	4	2			
TOTAL	23	13	9	2	2

There were questions as to the acceptability of using a particle size cutoff of 30 μm. It was stated that HiVol samplers could collect larger particle sizes and thus the emission estimates, especially near the source, could be underestimates. It was also felt that the cutoff values for the smaller particle sizes specified in Reference 15 might not be applicable everywhere.

There were several questions on how soil silt content is determined but these seemed to be the result of a lack of familiarity with soil analysis techniques and thus present no special problems.

A number of questions arose as to how to estimate fugitive dust emissions from sources other than the four listed in Reference 15 (i.e., unpaved

roads, agricultural tilling, aggregate storage, and heavy construction). Dust from paved roads was the most asked-about category but questions also arose about agricultural fertilizer use, and vacant lots. The issue of reintrainment of dust was raised a number of times with many feeling that this phenomenon is creating many problems that cannot be adequately treated at this time.

The general response to the questions on fugitive dust was that EPA recognized the difficulties in getting good emission estimates and that the current information was only a rough start; however, substantial research efforts were under way to improve the information and in the meantime, the published data could be used for plan development. The general impression of the Argonne instructors was that most of the states had attempted to address the fugitive dust emission estimation problem in one form or another and that they would be most receptive to improved information. The many criticisms about the current information were made in primarily a constructive and suggestive fashion rather than in a purely critical fashion and the local insight might make some valuable contributions to the development of better data.

Fuel Combustion Sources. Several difficulties were apparent with the development of an updated inventory for fuel combustion sources, the most troublesome of which was the obtaining of oil consumption data. Several states indicated that fuel oil dealers and state energy agencies were not supplying the type of data needed. In many cases this was due to its general unavailability. One question asked was if there is some form of legislation to require disclosure of the information. Some state energy agencies were compiling state fuel use and energy budget information, which, it was hoped, could be coupled to the air quality analysis.

Commercial/institutional fuel use presented problems in two regions. The procedures in Reference 7 led to negative fuel consumption estimates and it was felt that these sources might require significant effort for emission estimates.

The question of whether or not state energy conservation programs and/or the impact of fuel shortages should be accounted for arose on two occasions. The response was that they definitely should be, especially when a model was to be validated on air quality data taken in time periods where these programs had an effect.

The use of the Steam Electric Plant Factors[16] report by the National Coal Association was considered to be of limited value since the data are two years behind and the data do not contain fuel sulfur and ash contents. More recent and complete data require more resources to extract.

The use of fuel intensity ratios for industrial fuel requirements[7] was questioned. It was stated, however, that these were probably better than using only industrial heating requirements.

Point Source Updating. Virtually every state is using a Level 3, or interview procedure, to update the point source emission inventory. Some states are extending their point source file down to 10 ton/year or 1 ton/year sources rather than cutting off at the 100 ton/year level. In some states, the review is part of a regular surveillance program that will generate a new emission inventory every few years. In other states the update required for air quality maintenance planning is the first that has been done since the development of the original SIPs.

The states are having varied experience with the interview process. Some are finding industry especially cooperative and willing to supply the necessary data, while some are experiencing considerable difficulty.

The use of EPA's SCC source code was questioned since there is virtually no data from other sources that could be correlated directly to SCC codes. The use of Standard Industrial Classification (SIC) codes was suggested as a better alternative.

Transportation Data. Several states encountered difficulty in getting good traffic data (e.g. vehicle-miles-travelled, speeds, etc.) for other than major roadways. Those states with active transportation planning agencies experienced the least difficulties.

Validity of Volume 7 Procedures. In several regions a number of questions were raised as to the accuracy of the procedures outlined in Reference 7 for emission inventory update. There were questions as to whether the higher levels of detail do, in fact, give better results and, if so, by how much. There was concern that the methods had not been tested and verified. The main thrust of the answers to these questions was that an implementing agency might conduct a sensitivity analysis to determine the impact of the

various source categories on the projected air quality and upgrade the level of analysis for the important sources.

2.4 EMISSION PROJECTIONS

Section 4 of the AQAW manual treated emission projections. Table 5 summarizes the questions.

Table 5. Distribution of Questions Concerning Emission Projections

	Number of Questions and Comments	
Workshop	Coordination with Other Agencies	Accuracy of Growth Projections
Atlanta	6	2
Boston		3
New York	1	4
Chicago	2	3
Denver		
Seattle		5
Dallas		
Philadelphia		
TOTAL	9	17

Coordination with Other Agencies. A large number of questions and comments arose regarding the required coordination between air quality maintenance planning and other planning efforts (e.g., 208 water planning, 3-C transportation planning, HUD 701 planning, etc.). The use of compatible data bases and time scales were the issues most often addressed. Many states had not yet entered the emission projection phase and were still trying to identify what a suitable data base was. Some agencies encountered situations where the 208, 3-C, and 701 information were not compatible among themselves and the air quality maintenance planning agency was having a difficult time choosing the proper set of data. In other cases, state legislation dictated the data to be used by all state agencies thus simplifying the situation.

At several workshops the need to make the air quality maintenance planning time frame compatible with other federal planning programs was reemphasized several times in response to questions. The possible use of a less-detailed analysis for periods beyond 1985 at the discretion of the Regional Administrator was also discussed.

The use of the OBERS data for growth projections was, in some areas, being dictated by the fact that the 208 planning agency was using this information. One region suggested that the states could use better local information and not be concerned with discrepancies with OBERS unless serious problems arose. Agency evaluations of the quality of OBERS data ran the full spectrum from being relatively close to other projections to being incompatible and "useless."

Some coordination problems exist with regard to projecting future energy consumption patterns. One state complained that the prediction of future fuel mix should be a federal responsibility (e.g., FEA) and should not be placed on local agencies. Some guidance was also requested on determining the impact of future energy technologies.

In general it can be said that the air quality management agencies are making attempts to coordinate their data with other planning groups but that in a significant number of cases these efforts are being frustrated by forces outside of the control of the agency. Incompatible data from other agencies, indecision on the part of other groups as to what data they will eventually use, and data bases that are not entirely suitable for air quality maintenance planning analyses are among some of the problems. The shorter time scale of the air quality maintenance planning requirements relative to the other planning efforts is only compounding the problem.

Accuracy of Growth Projections. The accuracy and reliability of forecasting future activity was of considerable concern at almost every workshop. The questions ranged from asking where an agency could find data that might accurately reflect growth to whether the EPA would accept plans based on what might be totally unreliable data. The projection procedures of Reference 7 were questioned as to their validity and reliability.

At the same time that questions on the meaningfulness of the whole practice of forecasting the future were being raised, questions on some of

the fine details of growth projections were being asked. Questions concerning the accounting for economic recessions, year-to-year variations in growth rate, the obtaining of growth data by SCC classification, the determining of source-by-source growth patterns, and the use of land use vs. employment based projection procedures were discussed. The indications were that, despite some of the uncertainties recognized by the agencies, they were investigating alternative methods of tackling the problems associated with growth forecasting. In this regard it appears that the integration of long-range planning into the air quality management process is becoming an established practice.

The general response to questions about the reliability of forecasting was to suggest the consideration of alternative scenarios and to conduct sensitivity analyses to identify which growth patterns would have the biggest impact on air quality. While it was generally agreed that this was a useful approach, many groups expressed concern that they would have neither the resources nor the time to conduct extensive analyses of alternatives.

2.5 SUBCOUNTY ALLOCATIONS

Section 5 of the manual dealt with allocating emissions to subcounty areas. Table 6 tabulates the questions and comments.

Table 6. Distribution of Questions Concerning Subcounty Allocations

	Number of Questions and Comments		
Workshop	Data Resolution	Accuracy	Allocation of Growth
Atlanta	1		2
Boston		1	
New York		3	
Chicago	3		
Denver			
Seattle			
Dallas		2	
Philadelphia	1	1	
TOTAL	5	7	2

Data Resolution. Several states commented on the approach they were taking in using data with better than countywide resolution. Master enumeration districts, census tracts, ZIP codes, building permit records, and employment projections were the most frequently referred-to data sources.

Accuracy. As with the emission update and projection techniques, several questions were raised as to the accuracy of the various orders of allocation procedures and the benefits that might be achieved by using a more detailed approach. These were answered by the conclusion that no systematic study of the relative accuracy of the methods had been made.

In the same context, there were several questions about the accuracy to be gained from using different grid sizes. The improvement in predictive capability by using finer grid spacing was questioned and, again, no specific study results could be quoted.

Allocation of Growth. Although there were not a great deal of questions recorded on the issue, the problem of where to allocate emissions from future growth and development appeared to be unclear in many participants' minds. Some states reported that they were planning to conduct their analysis using a growth-in-place scenario. Others stated that they would rely on interviews with industry to provide new plant locations. The process of allocating emission growth on the basis of industrial employment or land use or some other surrogate variable did not appear to be in widespread use at this point in time. In many areas, the analysis has not yet proceeded to the point of performing the subcounty allocation, which may account for the apparent unfamiliarity with the techniques.

2.6 MODELING

Section 6 of the AQAW manual dealt with air quality simulation modeling. Table 7 summarizes the questions.

Model Calibration and Validation. Numerous questions were raised concerning the procedures for and interpretation of model validation and calibration. The use of the simple regression analysis such as that included as part of AQDM, was questioned as being incomplete. The poor regression line slope and correlation coefficient achieved in the County X test case caused

some concern as to the accuracy of modeling in general despite the fact that the model had validated according to EPA guidelines. The response to these concerns was that time restrictions did not permit an extensive effort to improve the correlation but that such a need was certainly indicated. Several suggestions were made that additional statistical tests be applied to determine model validity. Some improvements in correlation results since the original SIP analyses was also reported.

Several states reported problems with validating a model under unusual topographic and meteorological conditions and were considering switching models.

Table 7. Distribution of Questions Concerning Modeling

	Number of Questions and Comments			
Workshop	Model Calibration and Validation	Background Concentrations	Pollutant Scavenging	Appendix J
Atlanta	4	2		1
Boston			1	
New York	2	1	1	
Chicago	2	1	2	1
Denver				1
Seattle	2			
Dallas	1			1
Philadelphia	1	1		
TOTAL	12	5	4	4

Background Concentrations. The question of what are the appropriate values of background concentrations to be used in modeling was raised several times. Several states reported that the inclusion of fugutive dust and a number of sources outside the study region was lowering the overall background level. In several states where this had not yet been done, the question of what the expected impact would be of including these other sources was raised. The general answers given stated that as more sources were included in the inventory, the background would begin to represent mostly those sources that could not be inventoried and may, in fact, decrease from currently used values.

Pollutant Scavenging. Questions were asked about appropriate values of pollutant half-life to represent scavenging effects. The concern was mostly with SO_2 although particulate scavenging was also considered. States using half-life expressions in their modeling reported varying experiences with the best values and ranged from 3 hours to 4 days. The conclusion based on other's experience was that the half-life should be adjusted to give the best correlation results.

Appendix J. Despite the fact that the workshop did not address the oxidant issue in any detail, the discussion of models available for oxidant analysis raised an almost unanimous concern as to the validity of Appendix J as an oxidant model. Numerous criticisms were aimed at this model; however, the only other model being applied to oxidant analysis was the SAI model which is operational in California and is being tested in Denver and Chicago. There appears to be a pressing need to develop a better analytical process for oxidant studies. The response that EPA was working on the development of better oxidant models did not seem to satisfy the immediate demand for workable tools.

2.7 *ANALYSIS OF MODELING RESULTS*

Section 7 of the manual dealt with interpretation of modeling results. Table 8 lists the questions and comments.

Table 8. Distribution of Questions Concerning Analysis of Modeling Results

	Number of Questions and Comments
Workshop	Error Analysis
Atlanta	
Boston	3
New York	
Chicago	2
Denver	
Seattle	
Dallas	3
Philadelphia	
TOTAL	8

Error Analysis. The indication that an evaluation of possible errors and inaccuracies in the air quality analysis would be allowed as part of the determination of whether control strategies were needed raised a great many questions as to how such an error evaluation could be carried out. There was a general lack of guidance from EPA as to what constituted an adequate error analysis and what would be acceptable as far as plan requirements. Several participants asked if any standard error analysis routines were being prepared. The answer was no. The use of a sensitivity analysis to determine the most error-prone parameters was suggested.

One Regional Office representative suggested that the lack of EPA guidelines on the acceptable methods of determining the range of error could lead to some abuses in plan development. The suggestion was made that, in the absence of such guidance, a more workable procedure would be to accept the analysis results at full face value and take a conservative approach in plan development. Many states, on the other hand, greeted the allowability of error consideration as a sign of more flexibility in developing reasonable control plans. In either case, clarification and amplification on how to determine error ranges is needed.

2.8 STRATEGY DEVELOPMENT

Section 8 of the AQAW manual dealt with control strategy development and testing. Most of the states had not proceeded into the strategy development process and hence the discussions did not always reflect problems that had actually been encountered. Table 9 summarizes the questions and comments.

Technological Control Strategies. The use of existing source retrofit as a control strategy was questioned because of potential economic impacts. Likewise, the use of source phaseout was questioned for the same reason. The replies stated that economics could be considered when selecting strategies and these considerations could dictate the use of other methods. The use of phaseout as only a short-term solution to air quality problems was also discussed.

The possibility for imposing emission standards more stringent than federal New Source Performance Standards was raised and it was indicated that this was a state perogative although it might encounter challenges as to its

reasonability. This question was raised in the light of the possibility of a source meeting emission limits but still creating an air quality violation.

Table 9. Distribution of Questions Concerning Strategy Development

Workshop	Number of Questions and Comments	
	Technological Control Strategies	Planning Strategies
Atlanta		5
Boston		4
New York	3	1
Chicago	5	3
Denver		1
Seattle		5
Dallas	2	3
Philadelphia	1	8
TOTAL	11	30

The use of supplementary control systems (SCS) as an interim control strategy was questioned. The reply indicated that SCS could be used provided the published EPA criteria were met by the source.

One state voiced concern that they may be required to demonstrate energy conservation measures as part of their AQMA plan. It was replied that this would not be required by EPA but may be required by the state. In general, it was observed, the air pollution control agency would not have the authority to enforce conservation measures.

The application of regulations to single sources was discussed as it might raise questions of equal protection under the law. It was stated that these types of regulations have withstood court tests.

Planning Strategies. The use of regional planning strategies as a means to achieve air pollution control appeared to be met with mixed feelings. Some states greeted the concepts with interest and some were, in fact, attempting to develop the methods more fully. For example, one area was

seriously considering restricting industrial growth to assembly and distribution facilities to minimize the air quality impacts. Another commented that their experience with an emission density zoning regulation was working and they could identify specific changes in the development pattern as a result. Two others indicated that they were considering emission density zoning and exclusionary zoning and had received considerable help from planning agencies, which were working with them on the plan.

A number of other participants expressed reservations about the use of regional planning for air pollution control on the basis of three issues: (1) The accuracy and reliability of the air quality analysis is too uncertain to base major planning decisions that might have significant socioeconomic impacts on it. (2) There are exceedingly difficult legal problems involved in trying to impose a land use plan on local communities and on areas with overlapping jurisdictional boundaries. (3) The imposition of air pollution considerations on planning decisions can often run contrary to good planning practice; that is, it can encourage urban sprawl and can force industry to locate in relatively clean areas and can conflict with other programs (e.g. 208 waste water management planning, prevention of significant deterioration). There appeared to be a prevelant feeling among the participants who questioned the use of planning measures that these measures would, in effect, reduce to two basic options of no-growth or dispersing industry.

Despite the expressed reservations about the utility of measures related to land use and planning there was a great deal of interest in methodologies available to conduct an analysis of these types of strategies as evidenced by the questions concerning the emission density zoning example strategy. This discussion, perhaps more than any other portion of the workshop, attracted the interest of the representatives of planning agencies. Many questions were aimed at identifying the planning implications of the control strategy, the use of other constraint conditions, and the mechanics of the linear programming solution used to generate the emission density limits for the County X example.

A number of questions also arose about the "first-come-first-serve" problem of planning strategies in which the first industry to locate could utilize the entire air resource and therefore preclude further development.

Several EPA staff indicated that recent court tests have upheld the "first-come-first-served" concept in other frameworks (specifically, several billboard location cases) and it would probably be upheld with regard to air quality.

One participant suggested that an objective of strategy development, particularly land-use-related strategies, should be to enlist the support of other agencies for environmental control. There are some agencies (e.g., coastal zone management, open space preservation, etc.) that are natural allies in the development of environmentally compatible land use plans.

2.9 STRATEGY SELECTION

Section 9 in the AQAW manual dealt with the selection of strategies on the basis of economic, social, and institutional considerations. Only a small number of questions were recorded for this section, although (as will be discussed later) these considerations were identified most frequently as needing further clarification from EPA. The reason for the limited response at this point in the workshops can possibly be explained by two factors: (1) most agencies were not close to this stage of the analysis and had not given much thought to what might be required for plan development; and (2) the workshop presentation was, by design, only a survey of some possible analysis methods that might be useful. Table 10 summarizes the comments that were recorded.

Table 10. Distribution of Questions Concerning Strategy Selection

	Number of Questions and Comments	
Workshop	Delphi Procedures	Economic Analysis
Atlanta		2
Boston	1	1
New York	1	
Chicago		
Denver		
Seattle		
Dallas		
Philadelphia	1	
TOTAL	3	3

Delphi Procedures. The use of the Delphi techniques for decision-making drew some interest. Questions as to how widespread its use was and what the respondent group should be composed of were raised. It was observed that getting all involved agencies to agree on a strategy, even using Delphi procedures, would be difficult.

Economic Analyses. A question was raised as to the requirements for economic analyses in air quality maintenance plan development. It was answered by EPA staff that an economic analysis was not required as part of the plan, but agencies are encouraged to perform some economic evaluations of their strategies.

The use of cost figures that account for inflation in an analysis was suggested. Also, the use of Internal Revenue Service guidelines on the definition of what constitutes pollution control measures for the purpose of making cost estimates was suggested.

2.10 SPECIAL ISSUES

The last portion of the workshop's second day was devoted to a discussion of the policy issues that were raised and any special local problems. In all the workshops this portion was, in general, informal and did not follow any set agenda. Table 11 summarizes the comments.

Table 11. Distribution of Questions Concerning Special Issues

	Number of Questions and Comments		
Workshop	Interagency Cooperation	Resources	Special Circumstances
Atlanta	2	1	
Boston	1	1	1
New York	3	1	
Chicago		1	
Denver	1	1	3
Seattle	2	1	2
Dallas	1	1	
Philadelphia	2	1	2
TOTAL	12	8	8

Interagency Cooperation. The issue that raised the most questions was the need for coordination between the air quality maintenance planning agency and the 208 waste water management agency. Formal coordination efforts are at various stages of development with some areas just initiating contacts and others already on the way toward using common data bases and projections.

Several problems have already been encountered in the coordination efforts. The most frequent has been incompatibility of data bases. Wide variations in the air quality maintenance planning and 208 timetable compounds the problem since some air quality maintenance planning agencies are reluctant to choose a data base until the 208 agency chooses one and they can, therefore, be assured of compatibility. In some areas, the 208-chosen data base is not adequate for the air quality maintenance planning effort and some resolution of the problem is necessary. The fact that many 208 agencies have a local orientation while the air quality maintenance planning agency generally has a statewide orientation creates further difficulties.

A general feeling that 208 agencies are better funded and equipped than are the air quality maintenance planning agencies has led to some frustration on the part of the air quality agencies. Their impression is that their's is a tougher job because of the tight time schedule and yet they must take the risk of developing a plan that is inconsistent with the 208 plan and may have to redo some of their work. Also, they feel that the 208 agency has less incentive to be compatible with the air quality maintenance planning agency because of its larger role.

Despite the complaints about coordination problems, the EPA Regional Office staff did not appear to be confronted by any "surprises" on this issue. Most of the difficulties appeared to have been recognized and some attempt has been made to resolve some of them.

Two questions were raised as to what extent EPA could force cooperation among states. The reply was that EPA had only limited mechanisms to achieve this.

Resources. There were numerous complaints of inadequate resources (money, manpower, time) to perform an adequate air quality analysis. Some states expressed the desire to use some 208 money to develop data bases but believed that they were prohibited from doing so by federal regulation.

Others had already been using 208 money to develop data bases suitable for the air quality maintenance planning effort. There appears to be some uncertainty as to what is permissible under current federal guidelines. Regional Office representatives were frequently questioned as to how much more grant money would be available to use in air quality maintenance area plan development.

The question was raised regarding the development of a short-term plan covering only 3 years to compensate for a lack of data and the resources to collect it. It was stated that this could be considered by the Regional Office.

Special Circumstances. Questions on how to handle several special situations were raised. These included boundary problems (i.e., when a problem source is out of the study area), attainment problems caused by uncontrollable fugitive dust, and marginal indications of attainment and maintenance problems (i.e., where the analysis shows only small violations of the standards). The first issue was answered by stating that the study area may need expansion or that another agency would have to take responsibility for control. The last two issues were not resolved in any consistent fashion in the workshops. Some Regional Office representatives indicated that they would accept plans that showed that uncontrollable fugitive dust or inaccuracy in the data were responsible for indicated air quality problems while others said they did not know how EPA would respond. There appears to be a need for policy clarification on these issues.

3. *EVALUATION OF THE WORKSHOPS*

All participants in the workshops were asked to fill out a questionnaire to evaluate the overall content, presentation, and relevance of the workshop material. This section will summarize the comments.

3.1 *ADDITIONAL INFORMATION NEEDED*

Participants were asked to identify portions of the workshop that needed more emphasis and to list areas in which they felt more guidance was necessary. The following are the subjects listed and the number of times they appeared on the questionnaires. Table 12 summarizes the results by workshop.

Strategy Implementation (41). These comments included considerations such as legal, political, institutional, social, and economic constraints on strategy implementation and requests for information on prior experience with various strategies. The AQAW did not attempt to address these considerations in detail and currently there is little published guidance on how to conduct an air quality analysis with these considerations in mind. The information in the AQMA Guidelines series does not treat these factors in great detail and probably could not do so in any general fashion. Because of the localized nature of these problems, the Regional Offices will probably have to bear the major responsibility in helping the states to resolve these issues. A compilation of prior experience with various strategies might be a useful guideline for EPA headquarters to compile.

Modeling Techniques and Evaluation of Modeling Results (36). Apparently there is still a great deal of unfamiliarity with the methods of air quality simulation modeling. The workshop gave only a survey of the models available and did not go into the details of the mathematical formulations and the techniques of model application. With the large volume of literature available on air quality modeling, it is evident that many agencies have not done a great deal of modeling before and are just "coming up to speed" on the methodologies. What may be necessary is additional instruction aimed at agencies with only limited modeling experience.

Strategy Development (27). Many states have not yet proceeded to the strategy development stage, hence the need for additional guidance at this stage. The workshop material evidently did not cover a broad-enough spectrum of strategy options and possibilities to satisfy the demand for information in this area.

Table 12. Distribution of Recommendations for Additional Guidance

Subject	Number of Recommendations								
	Atlanta	Boston	New York	Chicago	Denver	Seattle	Dallas	Philadelphia	Total
Strategy Implementation	6	3	5	15	5	2	3	2	41
Modeling	6	4	5	6	4	5	4	2	36
Strategy Development	2		7	9		3	3	3	27
Intergovern'l Cooperation	3		4	4		3	7	1	22
Transportation	1	3	1	3	2		6	1	17
Other Pollutants	3		1	1	4	1	2	4	16
Projection Techniques	2	1	4	4	2	2		1	16
Emission Inventory	3	1	2	1		2	1	3	13
Accuracy of the Analysis		3		4		1	1		9
Emission Allocation	3	2			1	1		1	8
Fugitive Dust	4			2	1			1	8
Other Planning Programs		2	1	1	2				6
Interstate Transport			1	2			1		4
Anal. of Existing Air Qlty.	1	1	1		1				4
Level of Analysis						2	1		3
Indirect Source Review						3			3
Particulate Background Conc.			1	1			1		3
Significant Deterioration			1					1	2
Dedesignation	2								2
Other Workshops			1					1	2
Short-term Air Quality				1					1
Adverse Met. & Topography						1			1
Seasonal Variations				1					1

Local, State, and Federal Interactions and Intergovernmental Cooperation (22). The AQAW, by design, did not deal with intergovernmental cooperation. This questionnaire response plus the questions asked during the workshop indicate some significant problems in this area remain to be solved. These problems include formal mechanisms and organizational structures that permit interagency coordination and methods by which other agencies can participate in plan analysis and development. These structural problems are apparently being compounded in some areas by lack of cooperation among the various agencies. The lack of cooperation stems, based on some of the comments, from incompatible goals, objectives, and priorities of the various agencies. In some cases the air quality analysis agency was experiencing difficulty in obtaining information and data from other agencies. There were several comments that expressed a concern for how the air quality maintenance plan would impact on the development plans of other agencies and how the involved agencies could arrive at a mutually acceptable compromise. The problem of a local governmental body being put in the position of enforcing a state-developed plan was also raised.

Transportation Source Analysis (17). As above, little emphasis was placed on the analysis and development of strategies for controlling mobile source emissions. There were a number of comments suggesting that a similar workshop dealing with mobile-source-generated pollutants would be helpful.

Strategies for Other Pollutants (16). Since the AQAW dealt only with particulates there was a good deal of interest in other pollutants. This included concern about potential pollutant interactions.

Projection Techniques (16). Techniques for determining industrial expansion plans (e.g., interview forms), growth rates, and the details of making projections were stated as needing more guidance. The workshop, in general, assumed that this type of information was available from planning agencies. This need for additional guidance may reflect an unfamiliarity on the part of air pollution control agencies with growth forecasting methodologies used by planning agencies. Planning agencies should probably document the techniques used, as opposed to simply providing data, to help the air pollution control groups understand the basis for projections.

Emission Inventory (13). Various aspects of the emission inventory were cited as needing further clarification. These were interpretations of land use plans into an emission inventory, area source data, open burning, point source cutoff criteria, and collecting good data in general.

Accuracy and Reliability of Analysis (9). The comments asked for guidance on conducting an evaluation of the accuracy of the analysis. This included comments on how to evaluate the reliability of the data (e.g., emission inventory, growth projections, etc.), and how to determine the accuracy of the projection and allocation techniques (i.e., Volumes 7 and 13 procedures). Guidance on how to incorporate consideration of the accuracy of the analysis into plan development was also requested.

Emission Allocation (8). Most of these comments related to the need to identify where to locate new point sources. One comment suggested the development of an optimization procedure to allocate emissions.

Fugitive Dust (8). There were requests for better data on fugitive sources and for data on more source categories (i.e., reintrainment, paved roads).

Interface with Other Planning Programs (6). The need for additional assistance in this area was evidenced also by the questions concerning the impact of 208 waste water management planning on air quality maintenance planning.

Interstate Transport of Pollutants (4). The comments requested guidance on how to deal with pollutants that are transported into the study area from sources outside the state over which the agency has jurisdiction and how to adjust control strategies to be compatible in more than one air quality maintenance area.

Analysis of Existing Air Quality and Receptor Location (4). Guidance was requested on evaluating and interpreting monitored air quality data. Several specific comments related to determining if a given receptor location was representative of the air quality picture or was dominated by a single source (e.g., "in a traffic circle") and to handling situations where monitored data was sparse or lacking altogether.

Level of Analysis (3). The comments asked for more guidance on how to balance the level of analysis and planning against time and resource constraints.

Indirect Source Review Procedures (3). Several comments were received asking for clarification of EPA's requirements on indirect source review. This was not included in the workshop because of the uncertainties in the form that the final regulations will take.

Particulate Background Concentrations (3). Comments were received asking for information on determining appropriate levels of particulate background concentrations. One comment was especially interested in background concentrations of particulates smaller than 10 μm.

Prevention of Significant Deterioration (2). Two comments asked for guidance on how to deal with the significant deterioration of air quality in plan development. This issue was not addressed in any detail in the workshop.

AQMA Dedesignation (2). Comments were received asking for guidance on how, when, and on what basis to make a decision to dedesignate an air quality maintenance area and what the reporting requirements would be.

Other Workshops for Special Problems (2). Two participants suggested the possibility of setting up additional workshops to deal with specialized problems as they arose in plan development.

Short-term Air Quality Analysis (1). One participant noted that the workshop did not deal with short-term air quality standards in the County X example.

Adverse Meteorology and Topography (1). One participant requested more detailed information on how to treat unusual meteorology and topography in the analysis.

Seasonal Variations (1). One participant asked for information on how to account for seasonal variations in emission patterns.

3.2 RELATION TO OTHER PROGRAMS

The participants were asked if the AQAW provided insight that would be useful to other control programs. Most answers were a simple "yes" but several indicated the specific programs. These included new source review (16), all programs in general (11), indirect source review (11), prevention of significant deterioration (3), 208 planning (3), land use planning and zoning (3), permit programs (2), and FHWA compatibility analysis (1).

3.3 OVERALL EVALUATION

The participants were asked to give an overall evaluation of the workshops. In general, the comments were very favorable. Of 94 comments tabulated, 65 expressed a favorable reaction to the material. One of the most frequent comments was that the AQAW provided a complete overview of the AQMP process and gave the participants a feeling for the scope of the problems. Several comments indicated that the AQAW manual would serve as a useful guide to the "cumbersome" 13-volume guidelines set. The criticisms of the overview approach came equally from both sides. Half of the comments stated that the material was too general, while the other half stated it was too technical. There were a number of comments that indicated a desire to continue the instruction and delve into some of the specialized topics in more detail.

Criticism about the orientation of the workshop again came equally from two sides. A number of participants said that the material was good but too heavily oriented toward air pollution control personnel. An about equal number stated that the information was a good introduction for planners but not air pollution control agency staff. The diverse backgrounds of the participants made these comments expected.

Several participants stated that the material would have been most helpful 6 to 18 months earlier and that much struggling might have been avoided. Three comments indicated that the material was unrealistic in terms of the resources available to carry out this type of analysis and in terms of the feasibility of some of the strategies.

With regard to the logistics of the workshop, a number of participants expressed satisfaction with the organization and presentation of the material. Several commented that having the manual to work from was very helpful but that it would have been more beneficial to have sent it out several days prior to the workshop. Two participants complained that the presentation followed the manual too closely. Many comments were received that stated that the schedule was extremely vigorous and a great deal of information was covered in a short period of time. Some suggested extending the workshop to 3 to 4 days.

4. *CONCLUSIONS*

Based on the questions, comments, and evaluations received about the Air Quality Analysis Workshops, it can be concluded that they successfully achieved the objective of providing an overview of the entire Air Quality Maintenance Planning process for the working level staff of air pollution control and regional, state, and local planning agencies. The most frequently recorded comment concerned the good organization and continuity of the material. This was, no doubt, the result of workshop preparation by a single contractor and one principal EPA project officer. This approach appeared to work more efficiently than the multiple contractor/multiple project officer approach.

The mixing of air pollution control and planning agency staff as workshop participants was an effective method of promoting the interchange of ideas and perspectives. It generated the unavoidable problem of some of the material being too elementary for some participants and too technical for others. Nevertheless, each group was able to glean some valuable information from the presentations.

Workshop participants indicated that substantial additional guidance and assistance from EPA is needed in the following technical areas:

> Strategy Development. Since most states have not yet entered this phase there is a desire for more information regarding the choice of workable strategies. Special concern was indicated about determining the implementability of various strategies. The mechanics of developing land-use-related measures need further clarification.
>
> Modeling. The use of air quality simulation models is a new experience for many agencies and they require some additional assistance from EPA on the basics of validation and calibration, pollutant scavenging, and background determination. The more experienced agencies are having their greatest difficulties with oxidant modeling.
>
> Accuracy of Analysis. There is a great deal of interest in the fact that the new air quality maintenance planning regulations allow some consideration of data accuracy in plan development. There is also a feeling that there is virtually no guidance on how to determine accuracy, how to conduct

a sensitivity analysis, and what constitutes an adequate and acceptable accuracy analysis. The question of accuracy arose in almost all of the workshop sections and this is one area that may require new guidelines.

Fugitive Dust. More good emission data and data from additional source categories, both urban and rural, is requested. Also, guidance on how to treat non-attainment situations that are dominated by fugitive dust is needed. Fugitive dust generated more questions than any other single portion of the workshops.

Allocation of Growth. Many agencies are apparently attempting to identify specific locations for new industrial plants or are using growth-in-place as alternatives to using the surrogate variable technique described in the workshops. The surrogate variable procedure may require further clarification from EPA.

Projection Techniques. The mechanics of projecting growth appear to be unclear in the minds of many air pollution control agency personnel. There is an apparent dissatisfaction with accepting the concept that growth projections are generated externally and need only be "plugged into" the analysis. Response to this request for guidance could lead to the involvement of air pollution control agency staff into formal planning activities.

In addition to the technical issues, several other problem areas were raised that will require special attention.

Interagency Cooperation. The roles and responsibilities of the air quality planning agency and the 208 waste water management agency are in need of further clarification and development. Coordination with other agencies is also a problem but not as extensive. Although attempts are being made to effect coordination, a great many local problems remain to be solved.

Resources. The amount of additional resources (money, manpower, time) that will be made available to the agencies for air quality planning needs to be determined. Most are not satisfied with their current resources.

Level of Analysis Detail. Additional guidance on balancing the level of analysis to resource constraints was requested.

Any one of several mechanisms may be used to provide the needed assistance. These mechanisms include EPA policy memoranda, additional guideline documents, specialty workshops, and Regional Office-conducted workshops.

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16. ABSTRACT

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