State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE MEMO

Submitted 5/9/75 CKC

FILE WITH BOARD ACTION

To: Metropolitan Service District

Date: May 9, 1975

From: Kessler R. Cannon, Director, DEQ

Subject: Background and Proposed MSD Action on Portland Metropolitan Area Air Quality Program

A comprehensive Air Quality Data Base Improvement Program needs to be undertaken in the Portland Metropolitan area to assure acceptable levels of air quality and economic growth. A lid has been placed on new particulate and sulfur dioxide emissions which will have a major negative economic impact in the Portland airshed by late 1976. The Department of Environmental Quality (DEQ) is seeking the assistance of the Metropolitan Service District (MSD) in securing financial assistance for this critical air quality program, through the actions described in the attached Draft Resolution (Attachment #1), which I urge you to consider adopting today.

The Oregon Department of Environmental Quality (DEQ) has recently projected that compliance with particulate air quality standards could not be attained, and present compliance with sulfur dioxide standards could not be maintained, in the greater Portland Metropolitan Area, with present emissions growth rates. Based on these projections, Oregon's Environmental Quality Commission (EQC) adopted an interim policy limiting new emissions of particulates and sulfur dioxide into the Portland area airshed to 430 tons and 1430 tons, respectively, during the next two years, or longer. While these emissions limitations were deemed essential to insure the achievement of air quality standards, nevertheless, these fundamental limitations on economic activity are widely acknowledged to be not based on the best technical information obtainable, as they should be to avoid unduly restricting economic growth in the Portland area, with unpleasant rippling effects throughout Oregon's economy.

The acknowledged limitations in the methodology and existing data base used by DEQ to make these critical projections can be largely overcome, if DEQ's proposed Air Quality Data Base Improvement Program is fully implemented, to provide the level of information which is absolutely essential if DEQ is to (1) project air quality impacts of emission growth with much greater assurance - the only basis for any meaningful reassessment of present EQC policy restricting emissions; (2) identify the types of emissions sources which contribute most heavily to violations of particulate and sulfur dioxide air quality standards in the Portland area; (3) design and implement selective, long range emission control strategies to reduce ambient concentrations of particulate matter and sulfur dioxide in the Portland area, in order to; (4) indicate where new emissions can locate without violations of air quality standards, and preferably without significant deterioration of existing regional air quality.

In his official budget request, Governor Straub has recommended funding DEQ's proposed Air Data Base Improvement Program during the 1975-77 biennium with $200,000 from the State General Fund, provided that an additional $400,000 is raised from other sources. The Joint Ways and Means Committee of the Legislature has directed DEQ to provide them with a firm indication of the level of other financial support available before they will release allocated General Fund monies to this program. Also, DEQ has subsequently identified additional costs associated with fully adequate implementation of this program, which are needed (1) to insure achievement of all technical objectives of the Data Base Improvement Program; (2) to cover DEQ's administrative and overhead costs associated with this program, and (3) to develop new control strategies for sources found to be major contributors to violations of air quality standards in the Portland area. These additional costs would increase the total funding required for implementation of an adequate program above the $600,000 initially estimated by DEQ (described in Attachment #2).

RLG:rp

Attachment #1
May 9 memo from DEQ to MSD

Draft Resolution

Whereas, the Metropolitan Service District (MSD) is a regional agency created by ORS, Chapter 268 for the purpose of helping provide in metropolitan areas, where such public services are not adequately available through previously authorized governmental agencies, aspects of sewage, solid and liquid waste disposal, control of surface water, and public transportation - all of which are public services required to protect and enhance the environmental quality of an entire metropolitan region, and,

Whereas, other related problem areas may be specified which need to be resolved in order to assure the orderly growth of the metropolitan area, while at the same time maintaining acceptable environmental quality, and,

Whereas, the MSD believes that a regional approach to such problem areas is urgently required,

Therefore, be it resolved that the MSD requests the 57th Oregon Legislature to authorize MSD to:

(1) expand the list of public services contained in ORS 268.030 (3)(a), to which the MSD may provide assistance, to include "control of ambient air quality". *

(2) authorize MSD to levy taxes in order to assist other state and local government agencies in financing programs of environmental significance throughout an entire metropolitan area.

(3) authorize the Portland MSD to levy a "once only" general property tax within its jurisdiction, over a two year period effective as soon as possible, to provide the necessary financial assistance to enable the Oregon Department of Environmental Quality (DEQ) (1) to fully implement its proposed Air Quality Data Base Improvement Program for the Portland Metropolitan area, and; (2) to develop air quality control strategies for the Portland Metropolitan area, based on the findings of this program.

* (The MSD may wish to add items in addition to air quality.)

Attachment #2
May 9 memo from DEQ to MSD

April 18, 1975

Air Quality Data Base Improvement Program

Recently, the Oregon Department of Environmental Quality (DEQ) projected that compliance with particulate air quality standards could not be attained, and present compliance with sulfur dioxide standards could not be maintained, in Portland, with present emissions growth rates. Oregon's Environmental Quality Commission (EQC) then adopted an interim policy limiting new emissions of particulate and sulfur dioxide to 430 tons and 1430 tons, respectively, during the next two years, or longer. Limitations of the methodology and existing data base used to make these critical projections can be largely overcome, if this data base improvement proposal is fully implemented, allowing DEQ to (1) project air quality impacts of emission growth with much greater assurance; (2) evaluate the potential effectiveness of alternative emissions control strategies; (3) suggest where new emissions can locate without violations of air quality standards.

Phase one of this $600,000 special air quality program would substantially upgrade the basic data collection and anlysis systems used by the DEQ in the Portland Metropolitan area to (1) insure compliance with National Ambient Air Quality Standards (NAAQS), and; (2) determine air quality impacts of future industrial growth. This phase of the program would (1) fill critical gaps in present monitoring coverage of the large region involved; (2) provide data on source emissions, ambient air quality, and meteorology essential for the assessment of the air quality impact of proposed development; (3) complete the automation (using telemetry) of data collection both for convenience and to insure the highest quality control of collected data; (4) increase analysis of data to provide more useful summary information; (5) greatly improve dispersion modeling capability.

The second phase of the program is a major applied research study to characterize the total particulate loadings in the Portland area under conditions when NAAQS are most frequently violated. This proposed aerosol characterization study would combine several analytical approaches -- the chemical element (mass) balance technique, optical microscopy, trajectory analysis, air pollutant dispersion modeling, release and analysis of tracer materials, and particulate (Hi-Vol) sampling in two particle size ranges -- with a targeted source testing effort and special meteorological measurements on intensive sampling days. The resulting information will provide (1) a breakdown of the total particulate loadings in Portland (on selected, poor air quality days) into its major chemical components -- sulfates, nitrates, classes of organics, trace metals, water, ammonium ion, etc.; (2) a separate mass balance of the total particulate in terms of major contributing source types; (3) and, through separate analysis of the submicron particulate fraction, a similar breakdown of the source types contributing most heavily to the visibility reduction, which is closely associated with particulate in the smaller particle size range. This phase of the program is designed to answer the following fundamental questions: "What are the major species (on a weight basis) that make up the particulate matter in Portland? What types of sources emit most of this particulate matter?" Only by specifically identifying the predominant types of particulate matter, and the general types of sources most likely to have emitted them, can DEQ formulate selective, long-range control strategies most likely to be effective in reducing particulate levels in Portland. The monitoring network improvements are equally important both for checking day-to day compliance with NAAQS, and to evaluate alternative AQMA control strategies, using substantially improved air pollution diffusion models. The information system provided through this program should become the needed cornerstone data base for coordination of all Portland area planning efforts with respect to air quality impacts, thereby enabling the identification of the most suitable locations for future industrial growth. The basic program elements and their costs are summarized below.

1. Emissions Inventory Improvements - point source testing; improve area source emission factors; 1 FTE	$ 47,100
2. Monitoring Network Improvements	
a. Meteorology - new stations; upper air data (EMSU); data analysis by consultant; 2 FTE	124,511
b. Ambient Air Quality - new particulate, SO_2 oxidant, and CO instruments and support equipment; mobile station, 2 FTE	184,150
c. Data Acquisition - telemetry, consultant services, systemwide performance criteria	105,000
3. Model Development - retainer, Willamette Simulation Unit/OSU	5,000
4. Portland Aerosol Characterization Study - Consultant Services	256,060
Total Cost of Activities	721,821
(Budgeted Items contained elsewhere in DEQ's 1975-77 Budget Request)	121,846
Additional Funding for Special Air Data Base Improvement Program	$ 599,975

DEPARTMENT OF ENVIRONMENTAL QUALITY

VEHICLE INSPECTION DIVISION

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~~Chuck~~ Merle JEAN FILE NOW

INFORMATION BULLETIN

74207

To acquaint the motoring public with auto exhaust emission testing procedures the Department will offer public testing at various shopping centers in the Metropolitan Service District beginning in August.

Trained inspectors will conduct the free exhaust test, using mobile vans equipped with the same type of emission measuring instruments which will be used in the permanent inspection stations.

Due to accelerated use of mobile vans, emission testing at 1905 N.W. Thurman Street will terminate on July 31, 1974.

# # # #

Included with this bulletin is a sample of the "FAILED" form currently given to our customers when their vehicle is unable to meet the interim criteria. Additionally, an "IF YOUR CAR FAILED" brochure is offered with more detailed information of the causes for failure.

# # # #

The Department has received numerous inquiries regarding the type of exhaust gas analyzer which would be sufficient for a tune-up shop or repair facility application. As outlined in our bulletin #742, California has set standards for this type of equipment and now requires all Class A repair facilities to have an analyzer from the approved list. On the back of this page is a current listing of California approved exhaust gas analyzers.

CALIFORNIA APPROVED EXHAUST GAS ANALYZERS

Allen Testproducts Division
Allen 23-060-CA, 23-070-CA, 23-080-CA, 18-090-CA, 18-150-CA
Amserv 23-067-CA, 23-077-CA, 23-087-CA, 18-097-CA, 18-157-CA
MTSE 23-066-CA, 23-076-CA, 23-086-CA, 18-096-CA, 18-156-CA
Rotunda 23-065-CA, 23-075-CA, 23-085-CA, 18-095-CA, 18-155-CA

Autoscan, Inc.
Autoscan 705-C, 710-C, Series 4000-IR-C
Rotunda 705-C, 710-C, Series 4000-IR-C

Barnes Engineering Company
Christie EA-74C, Barnes 1836C, King 770C

Applied Power, Incorporated
Marquette 42-159, 40-225, Atlas AET-345, Rotunda BRE 42-732

Peerless Instrument Company
Peerless 660 "C" designation following serial number

Robert Bosch Corporation
Robert Bosch EFAW 289

Stewart-Warner Alemite Sales Co.
Stewart-Warner 3160-AC

Beckman Instruments, Incorporated
Beckman 590

Kal Equip Company
Kal Equip 4094D, Poweready 370-400, NAPA Balkamp 14-4787, AC GM ST-500

Chrysler Motors Corporation
Chrysler III C, III C with MOPAR logo, III C with MTSE logo

Horiba Instruments, Inc.
Horiba GSM-300-CA

Sun Electric Corporation
Sun EPA-75 (D), U-912-1 (C), EET-910-1 (A) or later production date applying to all three

Atlas AET-330

# # # #

Attached is a copy of Chrysler Corporation Huntsville Electronic Division "Carburetor Tune-Up Adjustment Procedure" for your information and assistance. Although the Model III C is referred to, any of the exhaust gas analyzers shown on the above California approved list will allow you to perform these operations easily.

Attach.

MODEL III EXHAUST EMISSION ANALYZER

CARBURETOR "TUNE-UP" ADJUSTMENT PROCEDURE

VEHICLE PREPARATION

- Automatic transmission in neutral, emergency brake engaged.
- Check vacuum hoses for proper attachment, leak-free condition — check and repair any exhaust system leaks — for vehicles equipped with air injection systems, disconnect and plug the air pump outlet hose.
- Air cleaner installed
- Engine running at normal operating temperature (choke open) with timing and idle speed set to specifications. Engine overheating can significantly increase HC and CO emissions. Make mixture adjustments as soon as practicable after operating temperature has been reached.

Note: For late model cars, timing and idle speed specifications will be indicated on the Vehicle Emission Control Information Label located in the vehicle engine compartment. Read the label carefully for other conditions which may be specified for that vehicle. For older cars without an Emission Control Information Label, consult tune up specification manual for proper timing and idle specifications.

MIXTURE ADJUSTMENT - CURB IDLE

- Rev engine to approximately 2500 RPM for a few seconds to clear any accumulated engine deposits. If mixture settings require more than two or three minutes repeat as necessary to maintain a "clean" engine.

Note: Avoid sudden throttle releases when the analyzer probe is in the tail pipe as unburned fuel will saturate the sample line and cause high HC readings until the analyzer pump cleans the line of residual evaporated hydrocarbons.

- Insert analyzer probe (Analyzer warmed up and calibrated according to instructions) approximately one foot into tail pipe. On dual exhaust vehicles, use tail pipe opposite heat valve side.
- Adjust carburetor mixture screw (for 2-barrel and 4-barrel carburetors, turn each screw an equal amount to avoid carburetor bore imbalance) 1/16 turn richer and allow 5 seconds for HC meter response. Observe HC meter for a definite increase in reading. If necessary, repeat the 1/16 turn step until the increase in richness is observable as an increase in the HC reading. Make sure you are turning in the proper direction for a richer mixture since an increase in HC will also be indicated when the carburetor is leaned out enough to cause misfire.
- When it has been established that the meter is indicating a rich mixture, proceed to slowly lean the mixture (taking care to adjust each screw equally) until the HC reading levels out (generally in the range of values listed in emission table below) and a smooth idle is obtained.
- If idle speed has changed as a result of the previous operation, adjust idle speed and readjust mixture screws to obtain desired HC range and smooth idle.
- Observing CO meter, final mixture adjustments can now be made by adjusting mixture screws (enriching mixture for higher CO reading and leaning mixture for lower CO readings) to obtain desired CO reading. For late model vehicles, the desired CO level will appear on the Emission Control Information Label.

For others, the emission table below will serve as a guide.

Note: The air cleaner may have a significant effect on mixture ratio. If it is impractical to adjust mixture screws with air cleaner in place it will be necessary to adjust to lower than specified CO reading (leaner). Replacement of air cleaner will enrich the mixture (increase CO reading). Several iterations may be required, noting CO readings alternately with and without the air cleaner, to obtain desired CO with air cleaner installed.

- Check idle speed and adjust to specification value if required. Readjust mixture screws per previous step.
- Rev engine to approximately 2500 RPM and note HC and CO readings. Higher than idle readings indicate an engine malfunction which will affect road performance.
- Road Test vehicle from a cold start to insure you have not created performance problems. In some cases (particularly older cars) you may have to enrich the carburetor mixture to obtain satisfactory start-up and/or road performance.

TARGET EMISSION LEVELS TABLE *

Vehicle Model Yr.	CO	HC
Pre - 1968	4.0% (± 2.0%)	400 PPM (± 300 PPM)
1968 - 1972	2.0% (± 1.0%)	200 PPM (± 100 PPM
1973 - 1974	1.0% (± .5%)	100 PPM (± 75 PPM)
1974 Less than 500 miles	.5% (± .2%)	75 PPM (± 50 PPM)

* Considerable tolerance must be allowed for older model vehicles. Setting mixture adjustments to lowest possible emission levels can cause severe performance reductions. The principal values in the above table were selected to avoid performance degredation. However, to insure that you have not created performance problems, always road test the vehicle (preferably from a cold start) or you may see it again the next day, along with an irate customer.

TROUBLE SHOOTING GUIDE

Inability to obtain acceptable HC and CO emission levels by carburetor mixture adjustments is generally an indication of either malfunctioning components or simply a badly worn engine. In most cases simple replacement of parts such as the air cleaner, PCV valve, spark plugs, etc. will rectify the problem. Using the below table your Model III Analyzer will greatly assist in narrowing down the likely suspect.

EMISSION READING	COMMON MALFUNCTION	DIAGNOSTIC PROCEDURE
HIGH HC	• Ignition Misfire — Fouled Plugs — Defective ignition wires — Defective Points	• Generally HC above 1500 PPM — Isolate bad plugs or wire by pulling one ignition cable at a time to determine which least affects the reading. If HC needle is pegged (over 2000 PPM) a visual inspection will be necessary. — Visual Inspection
	• Vacuum Leaks	• Partially block the air cleaner snorkel. A significant reduction in HC indicates a leak. Inspect hoses, gaskets and vacuum operated components. Generally accompanied by a lower than normal CO.
	• Overly Lean or Rich A/F Ratio	• See Carburetor Tune-up Procedure
	• Engine Problems — Gasket Leaks — Defective Valves, Rings, Pistons, etc.	• A Complete Electronic Engine Tester will be required to isolate compression or other internal engine problems.
HIGH HC and HIGH CO	• Inoperative PCV Valve	• Remove valve from engine, plug open end of valve, CO & HC will significantly increase if valve is functioning properly.
	• Inoperative Air Pump (Air Injection)	• Engine at 1000 RPM, note HC & CO, maintaining RPM disconnect air supply hose to exhaust manifold, CO & HC will increase if pump is operating properly.
	• Stuck Carburetor Air Preheater Door	• Visual inspection, heat control door should be up (heat on) for cold engine and down (heat off) for warm engine.
HIGH CO	• Dirty Air Cleaner	• Removal of a dirty air cleaner will result in a large reduction in CO.
	• Defective Choke	• From a cold start CO reading should significantly reduce as choke opens when the engine operating temperature is reached.
	• Low Idle	• Check RPM Vs. Specification
	• Overly Rich A/F Ratio	• See Carburetor Tune-up Procedure

LEAK DETECTION

The Model III Analyzer is sensitive to fuel vapor (HC) and Carbon Monoxide (CO). Leaks can be easily detected by placing the probe in the vicinity of suspected leakage. In the passenger compartment itself contaminated air from the engine compartment will show up as an HC reading while exhaust leakage will result in a CO reading. Any leaks should be traced down and corrected immediately. While HC merely presents an annoyance problem with objectionable odors CO (which cannot be detected by smell) is potentially lethal.

CARBURETOR POWER VALVE VERIFICATION

Performance problems are frequently the result of a malfunctioning power valve. The following test may be quickly performed to insure the valve is functioning.

1. Note CO level at normal idle speed.
2. Rev engine to approximately 2000 RPM — CO should decrease.
3. Place vehicle in gear and with one foot on the brake quickly press the accelerator to full throttle and release — CO should significantly increase and then drop back to level noted in Step 1.

DEPARTMENT OF ENVIRONMENTAL QUALITY
VEHICLE INSPECTION DIVISION
EMISSION CONTROL TEST RESULTS

FAILED

○ Carbon Monoxide ○ Hydrocarbon Gases

○ Pollution Control Equipment ○ Smoke

Vehicle Year and Make _____ Test Date _____

License No. _____ Mileage _____

Vehicle Class	TEST RESULTS		Interim Idle Standards	
Model Year	Carbon Monoxide	Hydrocarbon	Carbon Monoxide	Hydrocarbon
Pre 1968	_____ %	_____ ppm	6 %	1,200 ppm
1968-1969	_____ %	_____ ppm	5 %	600 ppm
1970-1971	_____ %	_____ ppm	4 %	500 ppm
1972-1974	_____ %	_____ ppm	3 %	350 ppm
1975	_____ %	_____ ppm		

Visible Smoke - Satisfactory _____

Excessive _____

Emission Control Equipment

Not required _____

Satisfactory _____

Defective _____

Specific vehicle class standards may supercede the general requirements.

Inspector _____

DEQ/VID 74141

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10383
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"THE QUALITY OF THE AIR WE BREATHE MAY WELL DETERMINE WHETHER MAN CAN SURVIVE IN THE URBAN ENVIRONMENT. MAINTAINING OUR CAR TO CONTROL POLLUTION IS A SMALL PRICE INDEED WHEN WHAT IT BUYS MAY BE LIFE ITSELF."

KESSLER R. CANNON
Director, Department of Environmental Quality

Here may be some reasons why your car didn't pass our pollution test (for more detailed information refer to our guide "If Your Car Failed"):

1. Excessive carbon monoxide emissions are generally caused by:
   * Incorrect carburetor adjustments
   * Choke malfunction
   * PCV valve restricted
   * Severely restricted air cleaner

2. Excessive hydrocarbon gases are generally caused by:
   * Faulty ignition system
   * Improper timing
   * Lean misfire
   * Defective emission control equipment
   * Leaking exhaust valves

3. Visible smoke is generally caused by:
   * Improper or inadequate maintenance
   * Worn piston rings or valves

4. Pollution control equipment:

   Oregon law prohibits disconnecting, or modifying or altering the required pollution control equipment. If the inspector detects that the pollution control equipment has been removed or altered or modified in a manner that decreases its effectiveness in controlling air pollution, the vehicle will fail.

Usually an emission tune-up will correct the pollution problem and also improve your engine's performance and increase your gas mileage.

Not until July, 1975, will the emission control inspections become mandatory and repair and reinspection necessary. However, we hope you will repair your car and return for free reinspection during this voluntary stage of the program.

If you have your car repaired and return for reinspection, please complete the attached card and bring it with you. If you are unable to have your car reinspected but have made repairs, detach the completed card and mail it back to us.

THANK YOU FOR CONTRIBUTING TO OREGON'S CAMPAIGN FOR CLEANER AIR.

Car make	License Plate No.	Car Model Year	Failure Mode
			Carbon Monoxide (CO)_____
			Hydrocarbon (HC) _____
			Smoke _____
			Equipment _____

Work performed

( ) Carburetor adjustment ( ) Spark plugs replaced
( ) Electrical tune-up ( ) Valve grind
( ) Engine overhaul ( ) Other _____

Cost of parts and/or labor

( ) Under $10 ( ) $50 - $70
( ) $10 - $30 ( ) $70 - $90
( ) $30 - $50 ( ) Over $90

Work done by:

( ) Dealership service dept. ( ) Self
( ) Independent garage ( ) Other
( ) Service station

Were repairs satisfactory? ( ) Yes ( ) No

If not, why? _____

_____

Remarks _____

_____

DISCUSSION DRAFT

CRAG ROLES IN AIR QUALITY PLANNING

PREFACE

A. Purpose of this Paper

The purpose of this paper is twofold:

1. To present and discuss the major problems involved, both present and potential, in relating air quality considerations to CRAG's planning process; and

2. To make recommendations leading to the formulation of a CRAG position on air quality planning.

B. Limitations

Of necessity[1], this paper is concerned with a broad overview of major issues rather than with a detailed analysis of same. It draws heavily on the following published documents:

EPA Guidelines - Volumes 1-12, 1974.
EPA Workshop Papers and Lecture Materials (Boulder, Sept., 1974)
State Implementation Plan for Oregon, Jan., 1972
Washington State Highway Dept., State of the Art Study.[2]

The EPA guidelines outlined in the first two references are "proposed" - i.e. subject to change before final adoption [3] and the State Implementation Plan is two years old. Thus, some of the information contained herein may not be accurate in all respects. Nevertheless, in general it should fairly well reflect the key aspects of the broad issues singled out for discussion, since additional information, where deemed necessary, was obtained by contacting the following agencies: EPA (Portland Office) DEQ, Dept. of Ecology in Washington State (DOE), the Southwestern Washington Air Pollution Control Agency (SWAPCA), Port of Portland, and the Oregon and Washington State Highway Departments.

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[1] The primary constraint being time.

[2] Rossano, A.T., A Critical Review of Mathematical Diffusion Techniques...,University of Washington, Dept. of Civil Engineering, June, 1973.

[3] They are the latest available, however.

C. Scope

1. Problem Delineation

This paper concerns itself with two broad problem areas; complexity and uncertainty. The problems related to complexity are discussed in four parts:

a. inter-governmental
b. legal
c. political
d. technical

Those related to uncertainty fall into two categories:

a. frequency of changes in guidelines, rules, regulations, etc.

b. resources (funding and staffing)

2. Recommendations

Given the nature of the complexity and uncertainty problems, time constraints and other factors, this paper recommends two general approaches to CRAG's role in air quality planning.

D. Order of Presentation

This report is divided into four sections plus Appendices. Section I deals with background information on pollutants, their types, sources and controls. It includes definitions and general classification systems related to pollutants, regulations, and others employed in sorting out relationships examined in air quality plans by air quality technicians.

Section 2 covers a brief analysis of where CRAG is in air quality planning and points out some of the major reasons for the need to make a decision fairly soon on the extent and nature of its future commitment.

The complexity-uncertainty problems related to making that decision are discussed in Section 3 and recommendations in Section 4.

The last page of this report contains translations of acronyms commonly used in air quality publications by EPA and state environmental agencies.

SECTION I

GENERAL OVERVIEW OF AIR POLLUTION:

Types, Sources, and Controls

I. Definitions

A. General

To provide a framework for this paper, the following definitions are given:

1. ambient air and air pollution
2. emissions versus air quality standards
3. primary and secondary air quality standards
4. classes of rules and regulations
5. hot spots

B. Ambient Air and Air Pollution

1. Ambient Air

Ambient air is the air surrounding the earth.[1] The global air shed is generally broken down into regional air sheds and sub-areas within these air sheds for ambient air analyses. The smaller air sheds and their sub-areas are usually designated along political, administrative, topographic, meteorological and other factors, either singly or in some combination.

2. No Such Thing as "Pure" Air

In a precise chemical sense there is no "pure" air. Chemically speaking, purity refers to a single element or compound, and the presence of any other element or compound in lesser amounts constitutes an impurity. Air, therefore, by being a mixture of several gaseous elements and compounds, is not pure. It is approximately 80% nitrogen and 20% oxygen with small quantities of argon and carbon dioxide and trace quantities of the inert gases such as helium and neon. As a basis for definition of air pollution, therefore, one cannot use a chemical definition of purity, but must use the concept of pure air in the sense that 1) it is not injurious to the health of humans, animals, or plants; and 2) it is the best air for a particular purpose or purposes.

In summary, air pollution is defined not in terms of the absence of impurities, but in terms of the quantity and characteristics of impurities. Air is said to be polluted when the effects it causes (or may be expected to cause) are damaging or detrimental to the use or uses of that air.

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[1] Excluding that in buildings and structures - i.e. the outdoor air.

3. Legal Definition of Air Pollution

To control air pollutants to the extent that they do not cause negative impacts, definitions other than those based on physical and biological criteria are necessary. These constitute the legal definitions of air pollution.

The legal definition used in this report is:

"Air pollution is the presense in the outdoor atmosphere of one or more contaminants, or any combination, thereof, in sufficient quantities and of such characteristics and of a duration as are or are likely to be injurious to public welfare, to the health of human, plant, or animal life or to property, or which unreasonably interfere with the enjoyment of life and property." [1]

Simply stated, air pollution in a technical sense, covers concentrations of contaminants lasting long enough to potentially negatively impact health, aesthetics, property, etc. The key words in terms of establishing and maintaining air quality standards are concentrations and duration.

C. Emissions versus Air Quality Standards

Emissions standards are those related to air contaminants at their source. These include standards for smoke stack exhausts, automobile exhausts, etc. Air quality standards are not generally intended as a means of determining the acceptability or unacceptability of emissions from specific sources of air contaminants, because ambient air quality in an area depends not only on what is emitted there, but on how much of what is emitted stays in the area,[2] how much is blown in from emitting sources in other areas, and other factors.[3]

Therefore, Ambient Air Quality Standards (AAQS) define the desired limit on the concentrations, exposure times, and frequencies of occurences of an air contaminant or multiple contaminants in the ambient air which cannot be exceeded.

D. Primary and Secondary AAQS Standards

NAAQS[4] consist of primary standards which are designed to protect the public health, and secondary standards which

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[1] Oregon State Implementation Plan.

[2] i.e. how much is blown out of the area or otherwise dissipated.

[3] Such as contaminants from natural sources -- e.g. erosion.

[4] National AAQS.

are designed to protect public welfare. Effects of air pollutants on public welfare include effects in soil, water, crops, vegetation, man-made materials, animals, wildlife, visibility, and climate; damage to and deterioration of property; hazards to transportation; and effects on economic values and on personal comfort and well-being.

The primary standards are to be achieved by mid-1975 whereas the secondary standards must be achieved within a "reasonable time".

E. Classes of Rules and Regulations

These fall into two broad types: standards and administrative rules. Standards relate to emissions and air quality, as described above. Administrative rules relate to systems for plan review, regulation, permits, etc.

F. Hot Spots

As indicated, these are existing air pollution problem areas. They are usually major industrial activity centers, and/or areas affected by prevailing winds from same. Areas subject to air inversions, due to topographic and atmospheric conditions, are also potential hotspots. The same is true of areas impacted by traffic congestion -- i.e. parking and circulation problems -- such as major central business districts.

II. Pollutants and Their Sources

A. Major Pollutants

1. General

NAAQS and Oregon State AAQS exist for six major pollutants. These and their sources are shown in the table on the next page.

Standards, state and national, also exist for photochemical oxidants. These are primarily NO_x and HC in certain concentrations. (See Table 1) That is, NO_x and HC are regulated both as photochemical oxidants and/or separately when they occur in high concentrations individually.

2. The CRAG Area

The two state environmental agencies in the CRAG Area[1] have cited it in their planning studies as having existing

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[1] DEQ, Dept. of Environmental Quality, in Oregon; and DOE, Dept. of Ecology in Washington.

Table 1

Major Pollutants and Sources

Pollutant	General Source(s)
SO_x	Industrial processes; Space heating;[1] Fuel combustion
TSP [2] (Dust, soot, etc)	Industrial processes; Space heating; Incineration (field burning, etc) Erosion Motor vehicles
CO[3]	Motor vehicles Fuel Combustion
NO_x 4,5	Motor vehicles Fuel Combustion
HC 6,5	Industrial processes Motor vehicles

1 As in the generation of electricity from fossil fuels.
2 Total suspended particulates
3 Carbon Monoxide
4 Nitrogen Oxides
5 These contribute to photochemical oxidant pollution problems (e.g. smog)
6 Hydrocarbons

and/or potential problems in meeting NAAQ's by 1975 and/or maintaining them through 1985 for four out of the six pollutants for which NAAQS exist. These are: SO_2, TSP, CO, and photochemical oxidants. NO_x and HC, except as they contribute to the latter, are not now or expected to be a problem.

B. Other Pollutants

1. Lead

Lead particulates along the Minnesota Freeway have been cited as a potential problem by environmental and anti-freeway groups [1] which have petitioned DEQ to establish standards for them. No NAAQS currently exist specifically addressed to lead. The lead problem associated with automobile emissions should be drastically reduced with the catalytic converter[2] since it can only be used on vehicles operating on leadfree gasoline. DEQ's newly proposed Indirect Source Regulations [3] do, nevertheless, specifically require the estimation and projection of lead from motor vehicle exhausts.

2. Other

In addition to the above, Oregon has AAQS for pollutants for which there are no NAAQS. These cover Calcium Oxide (CaO) and particulate fallout.

3. Summary

There are undoubtedly other types of pollutants for which regulations exist. The ones cited probably represent the major types as far as the CRAG Area is concerned.

III. Categorizing Pollutants

The pollutants described in the previous material have been categorized as organic gases, particulates, and inorganic gases. These categories are shown in the table on page 8.

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1 Petitioners included: End Needless Urban Freeways (ENUF); Oregon Environmental Council (OEC); Coalition for Clean Air; Sierra Club; Sensible Transportation Options for People (STOP); and others.

2 The latest (?) automobile exhaust emissions control device.

3 A revision of existing ones. See page 10 for description of indirect sources.

TABLE 2

DEFINITION OF CONTAMINANT CATEGORIES

The basic contaminant categories included in this manual are three: organic gases, particulates, and inorganic gases. Total organic gases are further classified as high-reactivity and low-reactivity organics. Particulate matter is broken into fine and total particulates. Inorganic gases include nitrogen oxides, sulfur oxides, carbon monoxide, and "other inorganics". Description of these categories are as follows:

High-reactivity organics	- This category includes primarily the unsaturated hydrocarbons with a high propensity for participation in photochemical reactions.
Low-reactivity organics	- Includes methane and other saturated hydrocarbons which do not react photochemically, plus aldehydes and other oxygenated hydrocarbons that are frequently the product of photochemistry.
Total organics	- The total of reactive and unreactive hydrocarbons.
Fine particulate	- Fine particulate is defined for emission inventory purposes as that part of the total particulate having a particle size of 10 microns and under.
Total particulate	- This category includes all solid and liquid particulate matter of all sizes emitted from the given source.
Nitrogen oxides (NO_x)	- While most of the emission factors are specified in terms of NO_2, the actual emissions may include NO, N_2O, or NO_3.
Sulfur oxides	- Sulfur oxides include SO_2 and SO_3, with emissions reported as SO_2.
Carbon monoxide	- Self-explanatory
Other inorganics	- Included in this category are flourides, halides, and any other gaseous emission not classified in the above categories, including total reduced sulfur (TRS).

Source: Oregon State Implementation Plan.

IV. Classifying Pollutant Sources

A. General

Since the two broad types of pollution regulation [1] attempt to control emissions at their sources (to the extent possible, practical, or feasible), it is important to understand the major classifications of pollutant sources[2] used in regulations, rules, permits, etc.

First, there are two broad classifications: stationary and mobile. Within these two there are five others:

1. point sources
2. line sources
3. indirect sources
4. area sources
5. natural sources

Each of these is discussed in the paragraphs which follow.

B. Stationary and Mobile Sources

Generally, mobile sources are primarily motor vehicles related and stationary ones are not. That is, mobile sources involve automobiles and depend on such factors as: vehicle miles travelled; speed; cold start/hot start; congestion (i.e. idling); and others. Stationary sources are related to industrial, commercial, and residential activities and depend on such factors as process used, fuel used, waste incineration, and others.

C. Point Sources, Line Sources, and Area Sources

Generally, point sources cover emissions from industrial[3] and major commercial sites.[4] Line sources involve emissions from automobile travel on freeways and major throughfares, and area sources those from residential and small commercial space heating.

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[1] Emissions standards, or controls and permit review, etc. procedures.

[2] The classifications' terminology is also important in relating air quality to land use and transportation planning. However, it should be noted that the classifications described herein are in some ways arbitrary -- i.e. overlapping. They are, nevertheless, discussed to assist in a general understanding of applicable terminology.

[3] From processing and space heating.

[4] From space heating and incineration.

D. Indirect and Natural Sources

Indirect sources are related to emissions from automobiles and cover all major[1] attractors of same, including such facilities as parking lots, apartment complexes, stadiums, etc. Indirect sources in addition to the foregoing, also cover major airports and roads with a specified number of vehicle miles travelled.

Natural sources involve air pollutants derived from nature which include erosion, forest fires, and similar phenomena not amenable to air quality regulation.

V. Classification of Control Types

A. Traditional Controls

There are two general classes: emissions controls and transportation controls or strategies. Each has both standards and rules (i.e. permits, plan review, etc.).

Emissions controls include regulations such as the following: New Source Performance Standards (NSPS)[2], special operating conditions, stack height regulations, and other controls aimed at trapping pollutants or converting them to nonpollutants, before they enter the air.

Transportation controls include mandatory automobile inspections and pollution control devices on new automobiles, the indirect source review and permit system, and transportation plan review.[3] Transportation plans are not only required to analyze air quality impacts of proposed networks or segments but to promote the use of mass transit - i.e. reduce the number of automobiles on the roads.[4] The regulatory whip in the case of transportation plan review, is the withholding of federal and state transportation funds for planning and/or implementation purpose.

Other kinds of controls relate to incineration permits, requiring plans[5] and plan reviews[6] for slash burning, and the sulfur content of fuels regulation[7].

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[1] The definition of major varies between areas.

[2] These specify lower allowable emission rates for new than for existing sources.

[3] For either highway segments, for which environmental impact statements are required, or regional systems (such as CRAG'S) for which air quality impact analysis is required. See page 23.

[4] Incentives and disincentives to mass transit and automobile usage respectively are called transportation control strategies rather than transportation regulations or controls.

[5] From both federal and state forestry agencies.

[6] By EQC.

[7] Which limits the sulfur content of distillate fuel oil sold in the state of Oregon.

B. Land-Use and Planning Controls

1. General

These have been included in EPA's new proposed guidelines for the development of air quality plans. The rationale is that they are needed to prevent over-intensive development from negatively impacting air quality. Specifically, land-use controls would require review, approval, and regulation of new source locations. Types suggested by EPA include:

1. Emissions allocation
2. Regional development planning
3. Emission density zoning
4. Zoning approval
5. Transportation controls - i.e. location of park & ride stations, shuttle bus service, etc.

While all of these measures have been suggested as ways of diverting additional emissions away from problem areas into other areas better able to accomodate them; it should be pointed out that none has been tested for effectiveness in air pollution control.

The differences between emissions allocations, emissions density zoning, and regional development planning are described in what follows. The remaining measures are self-explanatory.

2. Emissions Allocation, Emissions Density Zoning, and Regional Development Planning

Emissions allocations involve an administrative approach to air quality maintenance. It has both advantages and disadvantages. The procedure involves dividing a region into sub-areas and establishing total emissions limits for each pollutant in question in each sub-area; and estimating existing emissions and potential land uses in the same sub-area. Then a plan is developed for each sub-area for allocating the remaining allowable emissions among the various individual land uses or changing some projected land-uses so that emissions levels can be maintained.

The advantages are: that it provides a mechanism for singling out and better dealing with problem areas i.e. "hot spots"; and that it can be applied at the local and regional level. The disadvantages are the difficulties associated with defining sub-areas and obtaining data on existing conditions by sub-area. Further, it may be subject to legal challenges on both counts i.e. on inequities in the rationale for sub-area boundaries and on data.

Emissions density zoning differs from emission allocation in that emissions limitations on land-uses are written directly into zoning ordinances. The emissions limitations in the ordinance must be met in addition to other applicable emissions regulations. Allowable emissions rates would vary with different zoning classes --i.e. heavy industrial zones may be permitted to yield up to 3 tons per acre per year, whereas commercially zoned land may be permitted to emit half as much of a particular pollutant. Emission density zoning is like emissions allocation in that allowable emission rates may be dictated by existing emissions in some zones or based on anticipated total emissions from zones at full development. It is also similar in that it would prevent clusters of sources from preventing air quality standards to be exceeded. Properly used, with attention to surrounding zoning (e.g. green belts or some open spaces around some zones) it can be used as both an air and water quality regulator. Disadvantages include the handling of requests for zone changes and variances and, of course, establishing emission rates themselves.

Regional Development Planning involves simulation of projected air quality levels associated with comprehensive regional planning, together with an identification of constraints and modifications to the plan if the simulation indicates that standards may be exceeded. This technique suffers from the disadvantages associated with the limited accuracy of emission projection and modeling techniques and from the very broad nature of regional land use plans, which by definition are concerned with issues and facilities having regional impacts.

C. Summary

The two major traditional controls are emission controls and transportation controls. Land-use controls are now included in proposed air quality plan guidelines as a third major type of control.

The matrix on the next page shows these three classes of control measures and the primary pollutants affected.

FIGURE 1

CONTROL MEASURES

AND

POLLUTANTS AFFECTED

CONTROL MEASURES	PRIMARY POLLUTANT AFFECTED			
	TSP	SO_2	CO	HC/NO_X
EMISSION CONTROLS (POINT, SOURCE)	X	X		X
TRANSPORTATION CONTROLS (INDIRECT AND LINE SOURCES)			X	X
LAND USE CONTROLS (POINT, AREA, INDIRECT AND LINE SOURCES)	X	X	X	X

SECTION 2

Past and Pending Air Quality Activities of Significance to CRAG

I. Past Activities

A. General

Major past air quality activities having a bearing on CRAG include:

1. Designation of the Portland Interstate Air Quality Region (PI/AQCR, 1971-2)
2. The 1972 State Implementation Plan (SIP) for the State of Oregon[1];
3. Designation of CRAG's Transportation Planning Area (TPA) as an Air Quality Maintenance Area (AQMA) in 1974;
4. Formation and dissolution of The Columbia Willamette Air Pollution Control Authority (CWAPA);
5. CRAG's Unified Work Program in Transportation and 23 CFR 770;
6. The Supreme Courts' decision on maintenance of NAAQS;
7. EPA's establishment of an Office of Transportation and Land Use Policy.

The significance of each of these is described in the paragraphs which follow:

B. Portland Interstate Air Quality Control Region (PI/AQCR)

The PI/AQCR was one of five (four of which were interstate, including the PI/AQCR) AQCR's designated by EPA with the concurrence of the State of Oregon.[2] Oregon AQCR's are shown in Figure 2 on the next page.

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1 and that of Washington State which was not reviewed in the preparation of this paper but which was referenced in the Oregon one.

2 Stated another way the State of Oregon was divided into 5 AQCR's.

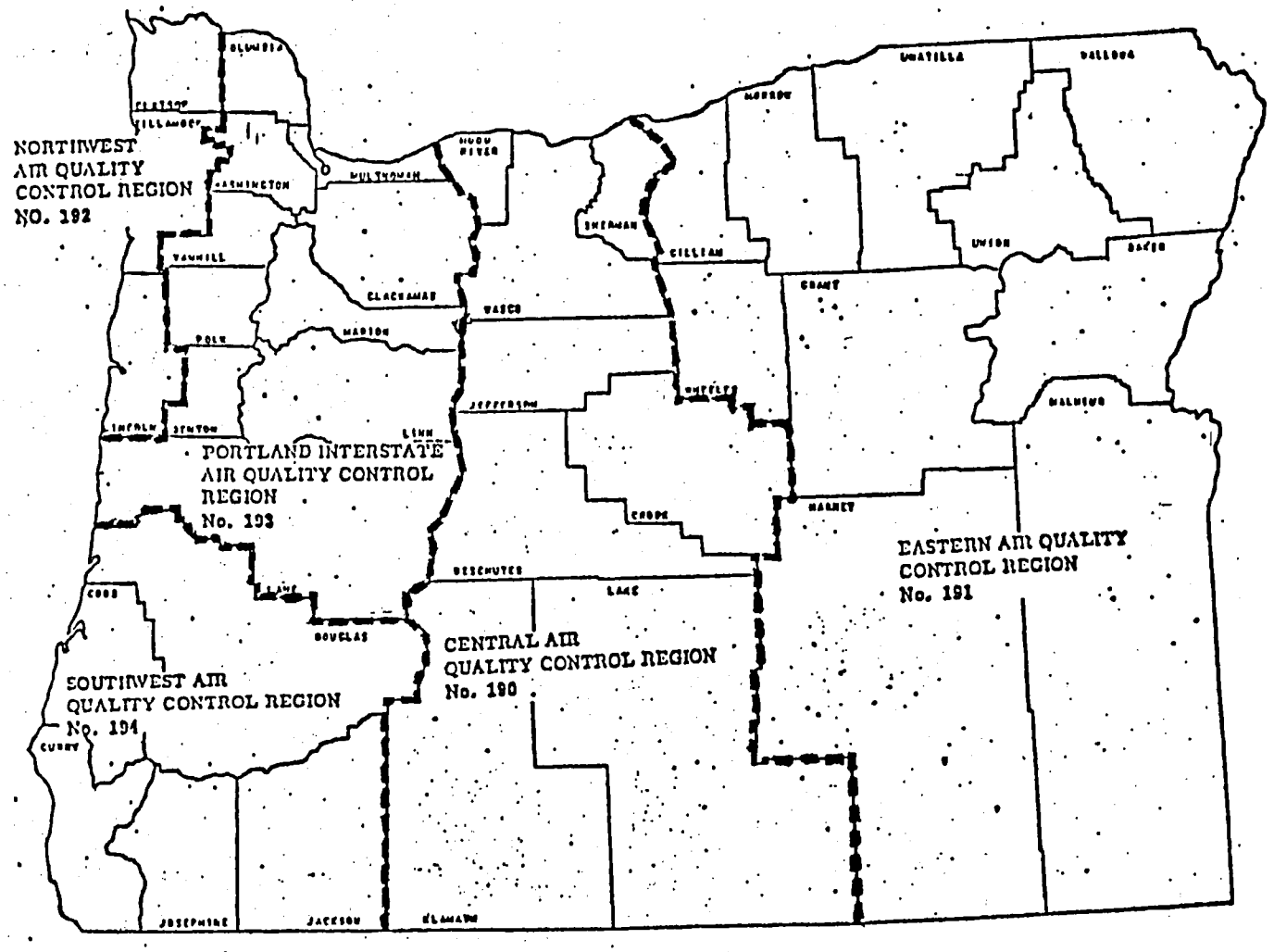

FIGURE 2

OREGON AIR QUALITY
CONTROL REGIONS

Counties comprising the PI/AQCR are shown in Figure 3. In general, the PI/AQCR is comprised of the Willamette Valley and the lower Columbia Basin. At the time of its designation, its air quality control activities were under the jurisdiction of four Air Pollution Control Authorities (APCA's):[1]

SW/APCA - Southwestern Washington / APCA
CW/APA - Columbia Willamette / APA [2]
MW/APA - Mid-Willamette Valley / APA [2]
LR/APA - Lane Regional / APA [2]

Three of Oregon's largest COG's were also covered by the PI/AQCR: CRAG, Mid-Willamette, and Lane.

The significance of the PI/AQCR to CRAG include:

1. The entire CRAG Planning Area is included;[3]
2. The designation still stands;
3. It is an unwieldly planning and administrative district
4. It is the required planning area under 23 CFR 770;[4]

C. The State Implementation Plan (SIP)

The objective of the SIP was to present an analysis to EPA of whether or not Oregon's AQCR's would be able to attain NAAQS by 1975, and to assure EPA that adequate control measures would be, or had been, instituted to bring the AQCR's into compliance.

The significant aspects of the SIP to CRAG are:

1. It became the basis for Air Quality Maintenance Area (AQMA) designations;

2. It required a transportation control strategy for the PI/AQCR;

3. It may have represented the first effort at intergovernmental coordination in air quality planning;[5]

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1 That is, the boundary of the PI/AQCR was coterminus with the collective jurisdictional boundaries of the four APCA's. See Figure 4.

2 On the Oregon side of the PI/AQCR, Air Pollution Control Authorities are called Air Pollution Authorities -- i.e. APA's not APCA's. However, the acronym APCA, as used throughout the remainder of this text, refers to regional agencies, empowered to control air pollution in either state.

3 Columbia County as well as the SMSA

4 See page 24 on certification requirements related thereto.

5 In both development of plans and implementation.

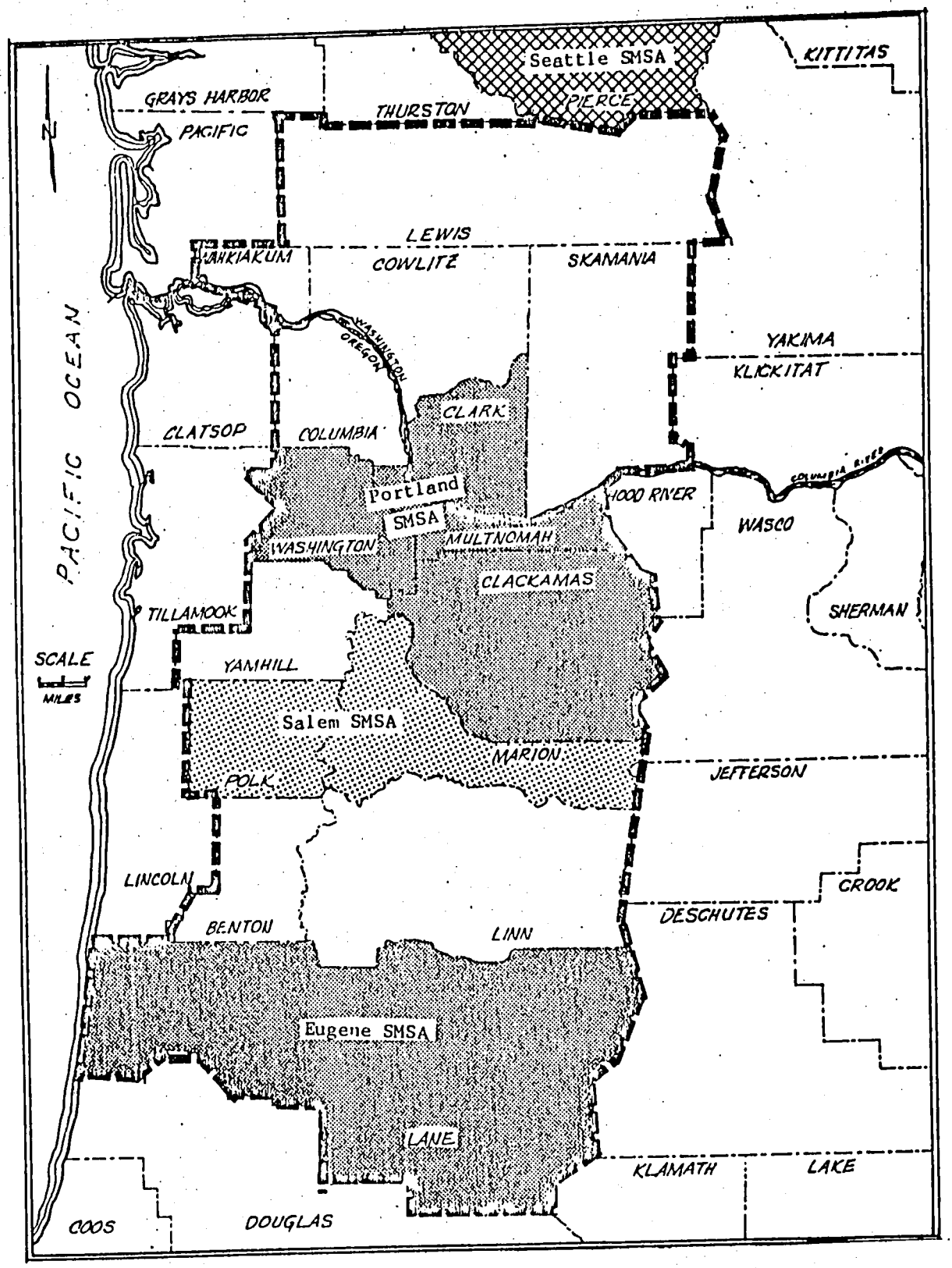

FIGURE 3

Portland Interstate Air Quality Control Region
and Standard Metropolitan Statistical Areas

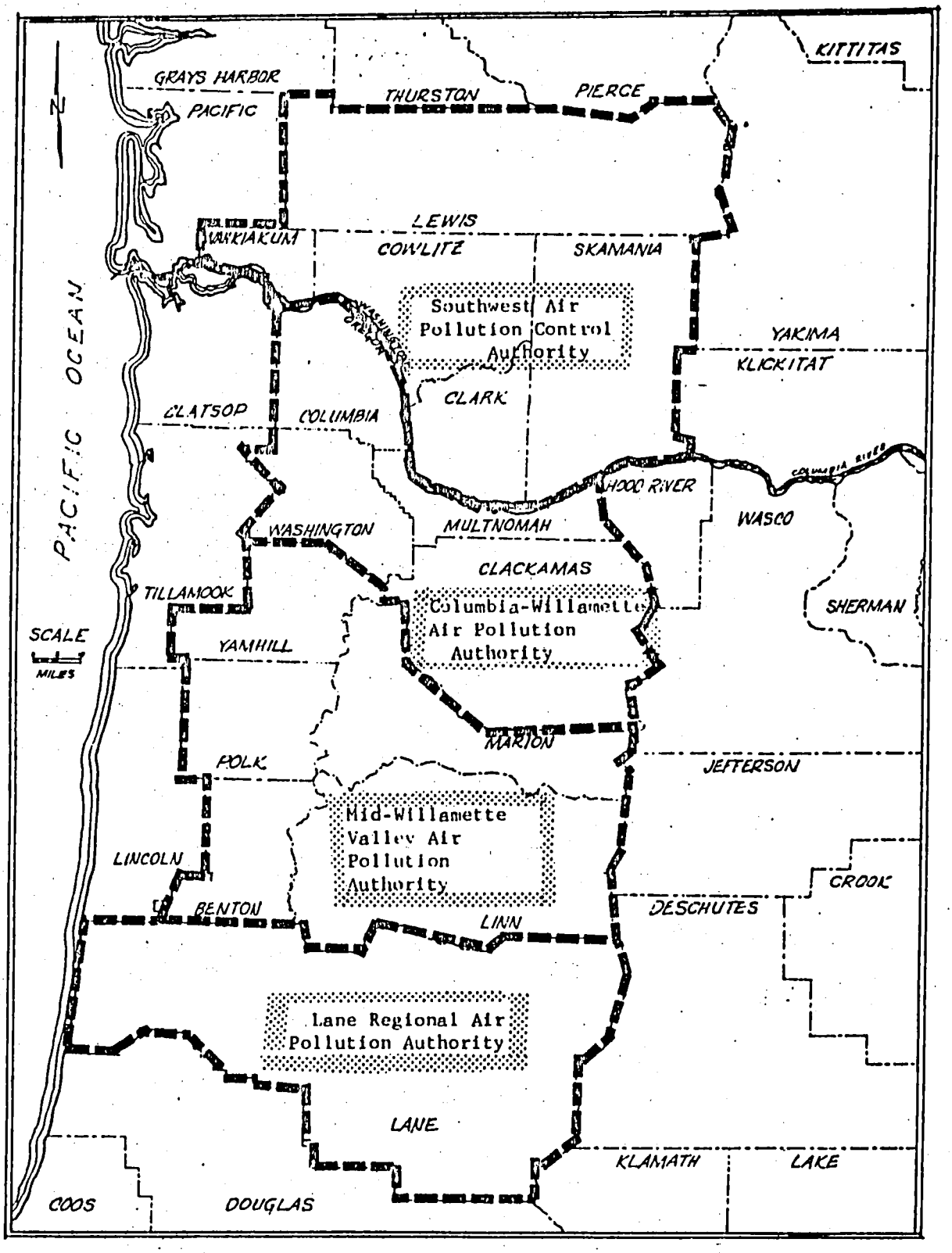

FIGURE 4. Air Pollution Control Authorities Within the PI/AQCR

4. Agencies cited as needing to continue to cooperate in the CRAG Area were the City of Portland, SWAPCA, Tri-Met, and CWAPA -- i.e. CRAG was not included in the list;

5. The CRAG Area was dealt with as a part of the whole AQCR -- i.e. not singled out for individual attention -- although several cities were discussed. These included Portland, Lake Oswego, Oregon City, Camas-Washougal Area, and Beaverton;[1]

6. It was later rejected[2] by EPA because it did not contain a maintenance plan, per the Supreme Court decision.

D. The Supreme Court's Ruling on Non-Degradation

Barely a year after most of the SIP's had been approved by EPA, EPA lost its nondegradation court case. The basic points on which EPA lost were:

1. attainment of NAAQS was not enough -- NAAQS had to be maintained as well;

2. maintenance had to be state-wide; and

3. clean air areas[3] could not be permitted to significantly deteriorate.[4]

EPA has asked Congress to clarify the Supreme Court's ruling, because strictly interpreted, growth may not be allowed anywhere.

While EPA waits for Congress to do something, it is saying that deterioration of air quality can be regarded as "significant"[5] only within the broader perspective of public expectations concerning the manner in which their area should be developed. That is, EPA's position is that significant deterioration is relative to other considerations and can

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1 The main emphasis was on the City of Portland. The other areas were cited with reference to particular industrial installation(s) only.

2 As were SIP's across the country. The purpose of the SIP was to attain NAAQS by 1975--i.e. not to develop long range strategies to maintain NAAQS through 1985.

3 Those with higher air quality than NAAQS.

4 "Permitting the states to submit plans which allow pollution levels of clean air to rise to the secondary level of pollution is contrary to the legislative policy of the Act and therefore invalid," excerpt from The Supreme Court decision as given in Conservation Report, 8/23/74, page 96.

5 "Significant" is the key word in the nondegradation issue, not deterioration". Apparently, some deterioration is permitted under the Clean Air Act.

best be determined only at the state and local levels. In keeping with this philosophy (which is essentially the same position EPA had before the Supreme Court ruling), EPA is issuing new guidelines for state use in classifying areas:

1) in which no change in air quality may take place;

2) where moderate change may take place;

3) where increases in pollutant concentrations are permitted to reach NAAQS;

The significance of the foregoing to CRAG includes:

1) either Congress, or another lawsuit, or both are likely to have some bearing on currently proposed EPA guidelines; until then, however,

2) CRAG is likely to become involved in assisting the state in its determination of whether or not "pure" air areas within CRAG's A-95 or SB 769 review should be designated areas of regional concern and protected;

3) Since the state SIP has been disapproved, there would appear to be no air quality plan for this area.

E. Air Quality Maintenance Areas (AQMA's)

Following the Supreme Court's ruling and the resultant rejection of SIP's, EPA issued a new series of guidelines on the preparation of air quality maintenance plans. The first step in the development of such plans was to designate AQMA's. The major criteria included:

1) Any SMSA, or portion thereof, "which due to current air quality and/or projected growth rates" had the potential for exceeding NAAQS over the next ten years (the 1975-1985 period);

2) Any AQCR, in whole or in part, for which SIP's had required a transportation control strategy for photochemical oxidants;

3) The involvement of local and regional agencies in the designation process.

The PI/AQCR met the requirement of (2) above and CRAG was consulted per (3) above. After some discussion, CRAG's Transportation Planning Area was designated the AQMA for the CRAG Area. The determination centered about:

1. Much of the CRAG Area, being rural, was not likely to develop over the next ten years;

2. The same was true of the SMSA;

3. The area selected should not be so large as to be unmanageable nor so small as to severely restrict growth and development under some new interpretation of the nondegradation clause;

4. The Transportation Planning Area (TPA) was sufficiently large to permit growth over the next 20-25 years and, because of the on-going planning, a body of data was available.

The relationship between the CRAG Planning Area, the SMSA, and the AQMA (TPA) is shown in Figure 5 on the next page.

The significance of the AQMA designation to CRAG includes:

1. An Air Quality Maintenance Plan (AQMP) will be developed for it, probably over the next two years;[1]

2. The AQMA is more manageable than the PI/AQCR and brings air quality planning closer to those affected by it;

3. The economic data used in the AQMA document was not CRAG's;[2]

4. CRAG did not participate in the selection of the methodology used for projecting growth in economic activity, population, or land use allocations;

5. The TPA was designated for four pollutants (TSP, SO_2, CO, and Photochemical oxidants) but the AQMA document contained no in depth discussion of the area's air quality problem(s) or any analysis thereof.

F. CWAPA

CWAPA's legal authority and functions are described in ORS 449.855. In general, it had almost the same powers as EQC.[3] The Oregon portion of the CRAG Area came under EQC's control after the dissolution of CWAPA.[4]

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[1] June 1975 was the original deadline for the AQMP. Now it appears that AQMP's may be developed over a two year period with Phase I due by June 1975.

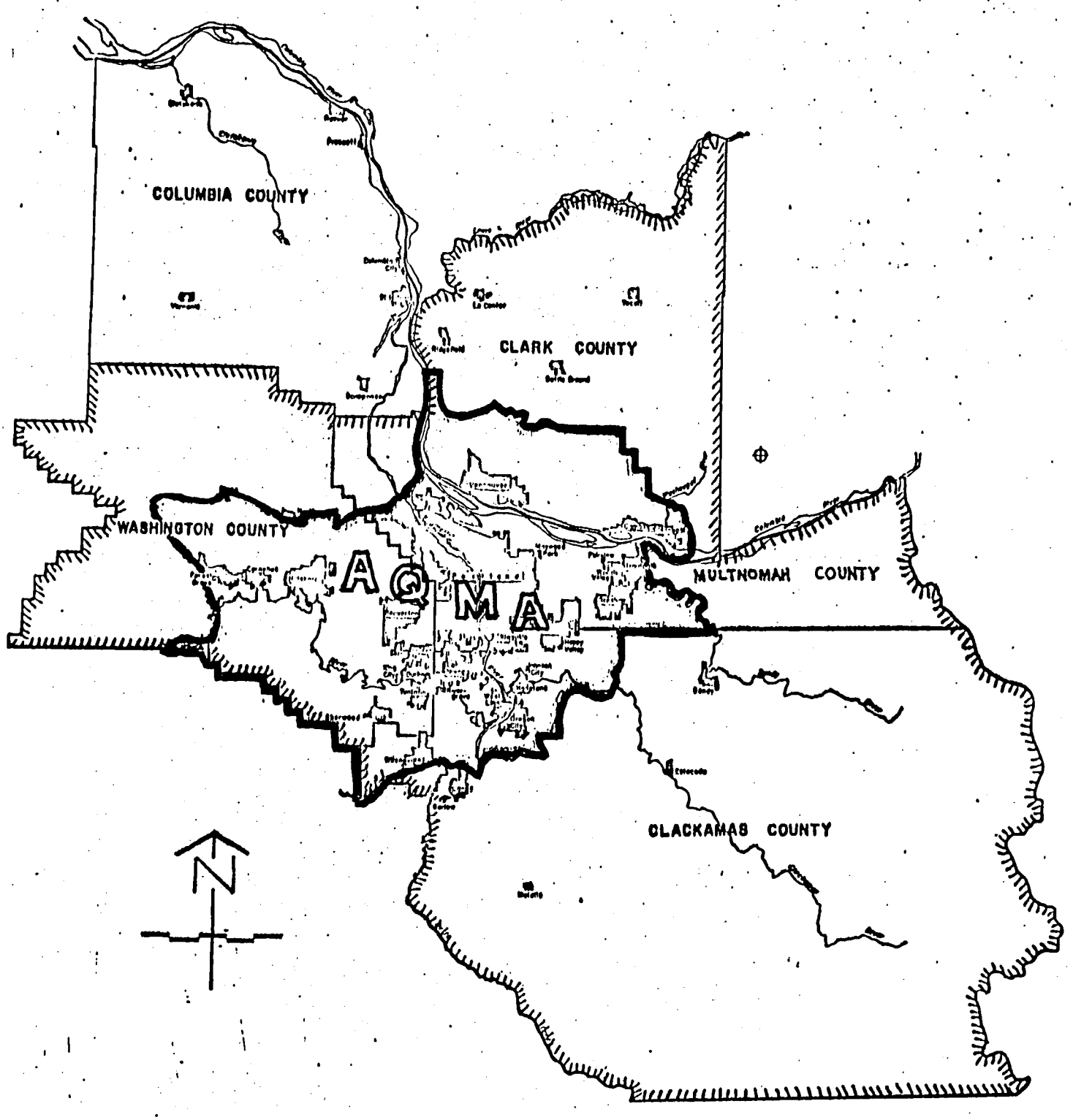
[2] CRAG had data for 1970, 1980, 1990, and 2000 -- but nothing for 1975 & 1985.

[3] EQC retains exclusive jurisdiction over a few specific control programs even where APCA's exist. (For example, EQC retains pollution control over aluminum reduction plants and over kraft and sulfite paper mills.) Otherwise APCA's in Oregon can have almost exclusive jurisdiction over their areas and, for the most part, can operate independent control programs, including the setting of standards.

[4] According to Oregon law, EQC has jurisdiction in areas without APCA's.

FIGURE 5

CRAG PLANNING AREA



The significance of CWAPA lies both in its demise and in the willingness of local jurisdictions to put air pollution control activities in their areas under a state rather than a regional agency. Roughly 22%[1] of CWAPA's 1971-72 budget of $505,000 was based on local support and 11% of state funds. The remaining 67%[2] came from federal sources.

The figures in the above paragraph are cited for a number of reasons:

1) the local match had a large multiplier effect --i.e. was low compared to some federal/state programs which tend to run either one third/two thirds of fifty-fifty;

2) on a per capita basis, the local match amounted to approximately 12¢;[3]

3) financial reasons are cited for the dissolution of CWAPA.

G. Transportation Planning and Title 23 CFR[4] 770.

Part 770, a proposed amendment to Title 23, is a new regulation requiring that air quality impacts of highway plans be assessed as part of the planning process; that coordination between transportation planning and environmental agencies be an incremental part of that process; and that compliance with both consistency and coordination be mandatory for annual certification of 3-C agencies.[5]

Part 770 became effective in November 1973 on an interim basis.[6] Its significance to CRAG lies in the following:

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1 Roughly $112,000.

2 $339,000.

3 Based on the population of the 4-county area of 946,700 in 1972.

4 Refers to regulations adopted by the FHWA pursuant to the Federal Highways Act of 1970.

5 3-C stands for: Continuing, Comprehensive, and Cooperative. CRAG is a 3-C agency.

6 As stated in the Federal Register, Vol. 38, No. 221, 11/16/73, "It is now necessary to have guidelines to assess highway plans against these (AQCR) standards. For this reason, it is determined in the public interest to put the proposed regulations... into effect as of this date on an interim basis."

1. It is likely to change[1] because:

   a. it is intended only for interim use;

   b. it is based on approved SIP's and there is no longer such a thing;[2]

   c. it uses the AQCR as the air quality/transportation planning area rather than the newly designated AQMA's;

2. It mandates EPA's direct involvement in the review of transportation plans and CRAG's certification;

3. It mandates direct involvement of state and regional air pollution control agencies in CRAG's transportation planning;

4. It mandates compliance of transportation plans, programs, and projects with the Clean Air Act.

It should be noted additionally that:

1. the AQMA designation document does not constitute a plan and is not a substitute for the rejected SIP's;[3]

2. environmental agencies in the CRAG Area are now indirectly involved in CRAG's certification;[4]

3. CRAG will meet certification requirements this year because:

   a) of its establishment of the Air Quality Technical Advisory Committee; and

   b) of its use of the CAPM[5] model to test the air quality impacts of the transportation element of the Focussed Growth Sketch Plan.

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[1] Not in the general emphasis on coordination and consistency with air quality, but in the specifics.

[2] i.e. because of the Supreme Court's decision and EPA's subsequent rejection of SIP's, it would appear that there is no currently approved air quality plan for the CRAG region against which to assess the consistency of CRAG's transportation plans.

[3] Plans are to be developed for AQMA's. Designation of same was just the first step.

[4] To the extent that their assessment of the degree of coordination and plan consistency is used as a required input into the final reviews of the regional FHWA/EPA administrators.

[5] Community Aggregate Planning Model.

H. EPA's New Office of Transportation and Land Use Policy (OTLUP)

EPA is serious about the addition of land use controls to the existing system of emissions and transportation ones. This seriousness is attested to by the establishment of its new division, OTLUP. It is further attested by the placement of OTLUP in the EPA heirarchy. OTLUP is on a par with, and not a sub-division under, the Office of Air Quality Planning and Standards (OAQPS). Both OTLUP and OAQPS report directly to the Assistant Administrator of Air and Waste Water Management Programs.

Of potential significance to CRAG in EPA's new OTLUP is:

1. OTLUP is headed by the former chief of the Delaware Department of Transportation;

2. EPA is now "officially" in the land use business as this relates to attaining and maintaining AAQS;

3. EPA is now in a position to begin negotiations with HUD, the results thereof may be new HUD guidelines on the order of 23CFR770;[1]

4. One of OTLUP's assignments is to look at the potential for developing national model ordinances for emissions density zoning and other land use controls;

5. EPA may seek authority to issue grants for land use/air quality planning.[2]

II. Pending Actions of Significance to CRAG

A. General

The following pending actions are of significance to CRAG:

1. Proposed EPA guidelines for preparing AQMP's;

2. DOE/DEQ requests for CRAG/local involvement in the preparation of AQMP's;

3. EQC's adoption of an emissions allocation system for the CRAG AQMA;

4. Proposed Indirect Source Review and Noise Regulations;

5. CRAG's 208 planning program.

Each of the above is discussed in the following paragraphs.

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[1] i.e. with the same certification clout.

[2] It has no such authority now. See page 57.

B. Proposed EPA Guidelines for AQMP's

1. General

The important things about the proposed guidelines, aside from the fact that they are only proposed and hence subject to change, lies in the following:

a. the deadline for AQMP submittal;
b. use of land use plans;
c. involvement of local and regional agencies with legal authority to control land use; and
d. plan requirements: data, technical and funding constraints.

2. Deadlines

The guidelines call for the submittal of AQMP's by June of 1975. However, because of the difficulties inherent in developing a creditable AQMP by that date, EPA is suggesting an alternative approach. For those, who cannot prepare a full-scale AQMP by June, EPA will permit plan development in two phases.

The Phase 1 plan (to be completed by the June deadline), while somewhat broadbrush, is required to contain: an analyses of what is; duly adopted emission control measures to cover the AQMA during plan development; and a detailed work program for conducting studies and doing such other activities as will lead to a comprehensive Phase II plan.

The significance to CRAG of the two-phase plan alternative is that it provides CRAG an opportunity to carry out the recommendations contained in this paper.

3. Use of Land-Use Plans

EPA guidelines are explicit in the requirement that AQMP's contain land-use and transportation considerations, and, where applicable, control strategies. While state and local APCA's have the authority to designate "clean air areas" and to prevent industry and major commercial facilities from locating therein,[1] and while they can also control the transportation element of local and

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[1] Which constitutes land use control as far as those kinds of activities are concerned.

regional land use plans,[1] EPA does not feel that this is enough. The reason is that AQMP's are supposed to control existing and projected emissions -- i.e. are to ensure that projected growth will be compatible with the maintenance of AAQS throughout the 1975-1985 period. Since it is not possible to make an assessment of the compatibility of growth with AAQS without some knowledge of where that growth is slated (or likely) to take place, land use plans must be considered.

The significance for CRAG of EPA's land use assessment guidelines lies in the following:

a) CRAG cannot make air quality assessments of its land use plans without some knowledge of what the air quality problems are and how they relate to land use;[2]

b) Even if CRAG had the above knowledge, it lacks a land-use plan and projections for the year 1985;

c) Projections refined enough to adequately address the spatial allocation of land for industrial, major commercial, and high density residential uses would take at least one man year.[3]

4. Involvement of Local and Regional Planning Agencies

The reason for this requirement is the obvious fact that neither EPA nor state environmental agencies are authorized to draw up land use plans or enforce the zoning and other land use controls necessary to implement them.

The significance to CRAG with reference to this guidelines is:

a) State environmental agencies are required to enter into fairly structrued agreements with those local and regional agencies empowered by law to enforce land use regulations;[4]

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1 Through the certification requirements under 23 CFR 770 and indirect source review, both of which constitute froms of land use control.

2 The AQMA document, as noted, contained no analyses of the problem, or its spatial characteristics.

3 The projections would have to include: employment projections by industrial process type; housing demands by structure type; fuel use and consumption; etc.

4 Without legal power to enforce plans, EPA has no assurance that the plans will ever be developed.

b) CRAG, under SB 769, may have the potential to designate "clean air areas" and set up administrative procedures to protect them;

c) A structure exists within CRAG, through its AQTC, (Air Quality Technical Committee) to satisfy the initial requirements of intergovernmental coordination in air quality planning;

d) The AQTC may have to be expanded to include land use representatives.[1]

5. Plan Requirements

The data, technical, and funding requirements of putting an AQMP together are significant. AQMP components, of which there are six, are shown in Figure 6 on the next page.

For example, Component I of the AQMP, requires: current land use and emissions inventories; meteorological and topographic data; estimates of air pollution concentrations by sub-area; projections of the latter to 1985; and problem analyses by pollutant by sub-area (where applicable).

The complexities involved in the above include: the technical complexities (mathematical, physical, and chemical) in relating emissions to concentrations; state of the art complexities in modelling the relationships (existing and projected) between emissions and topography and meteorology; and the analytical complexities of correlating the foregoing with land use.

Factors of significance to CRAG include the following:

a) Some of the steps in the AQMP process are already being done by APCA's in the CRAG Area -- e.g. the surveillance aspects of AQMP's;[2]

b) Even if CRAG knew the current relationship between land-use and air quality, in order to project that relationship CRAG would still have to know how much of that relationship was due to such factors as: energy use; density of use; process type; age of structures; topography; meteorology; and other factors -- i.e. CRAG would need funding to run air quality/land-use simulations based on different assumptions concerning land use types and configurations, energy, density, etc.

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1 Especially in Clark County which is not covered by SB 769.

2 Which requires monitoring equipment and laboratory facilities in addition to the requisite scientific and technical personnel. See Figure 7 from EPA guidelines, volume 4, on the steps involved in the "Air Quality Impact-Land Use Planning Process."

FIGURE 6

6-PART AQMP

I. Analysis of Problem	1. Estimates of Existing Problem by Pollutant 2. Projections and Allocations of Emissions to 1988 by sub-area 3. Estimation of Pollution Concentrations from Projected Emissions 4. Quantification of the Problems In Terms of Needed Emissions Reductions
II. Maintenance Strategies	1. Description of a Maintenance Strategy(s) (using both traditional[1] and[2] land-use controls or strategies) by Pollutant[2] 2. Summary of Reductions in Emission Levels and Quality of Air to Result from the Strategies
III. Description of Legal Authority	1. Demonstrate that the State Has the Necessary Legal Authority to Implement the Plan 2. Description of the Agency (State, Local, and/or Regional) To Enforce the Land-Use Measures[3] Required by the Plan
IV. Plan Surveillance	1. Description of Emissions Source Surveillance 2. Description of Air Quality Surveillance inlcuding: Existing Monitoring Network, Deficiencies in Same, Proposal of New and/or Additional Sites, and Installation Schedule for Same.
V. Resources to Accomplish Plan	1. Descriptions of Available State and APCA Resources and Those in Other Participating Agencies 2. Estimate of Additional Resources Needed
VI. Inter-Governmental Coordination and Citizen Input	1. Description of the Structural Framework[4] to be Used in Executing the Plan Including a Definition of the Specific Responsibilities of Each Agency 2. Description of the Provisions Utilized to Achieve Citizen Input[5]

1 Traditional ones include: emissions (point) controls, and transportation controls (indirect source, enhance mass transit)

2. One strategy for each pollutant for which the AQMA was designated. The strategies may apply to the whole AQMA in the case of HC and NO_x or to select areas for TSP, SO_x and CO.

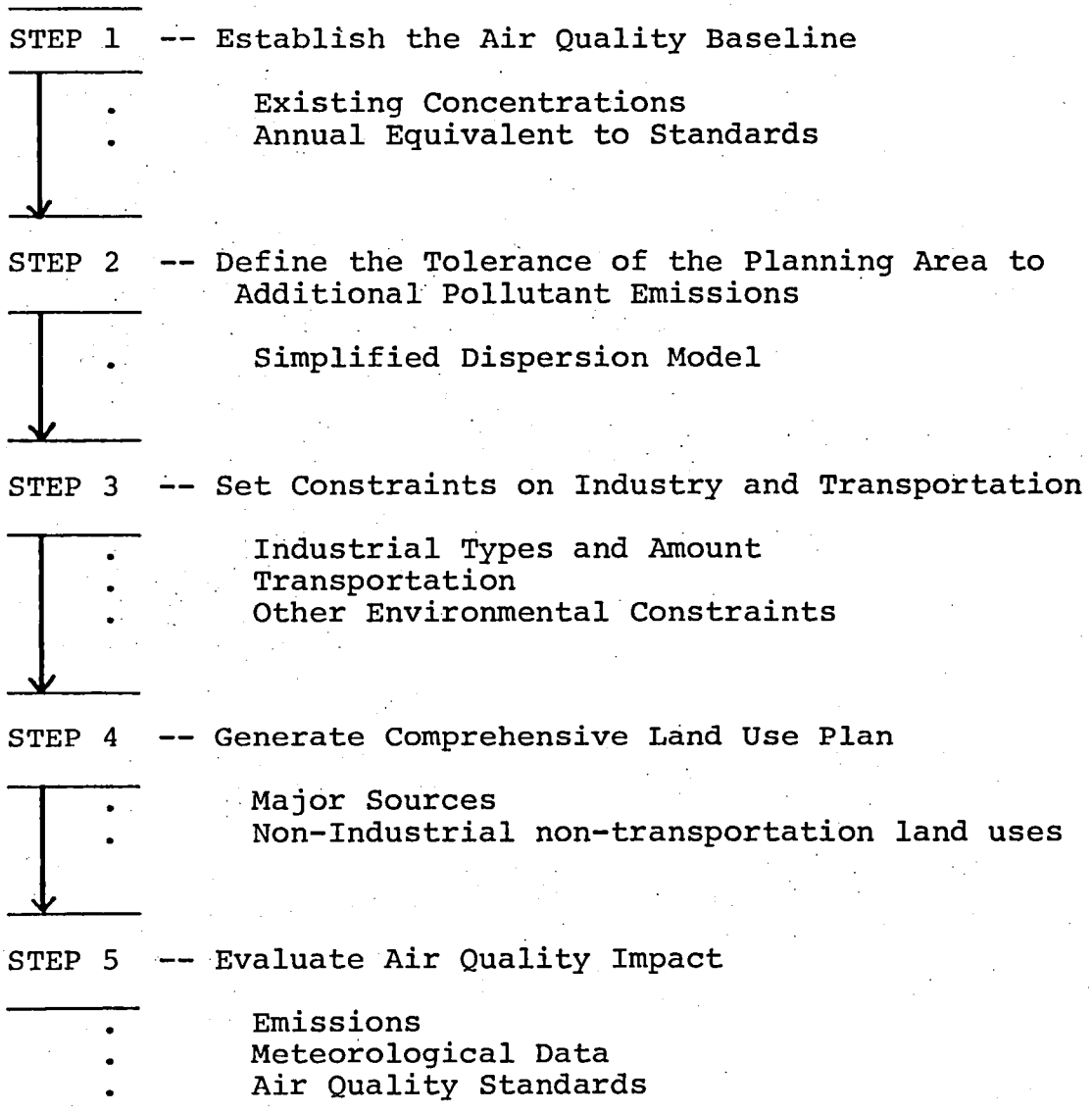
3 Zoning, emissions allocations, building codes, building permits and design review.

4 State is to required to choose an intergovernmental structure: including the involvement of local and regional governmental entities.

5 Citizens input is a requirement.

FIGURE 7

THE AIR QUALITY IMPACT-LAND USE PLANNING PROCESS



Source: Environmental Research and Technology, Inc., "A Guide for Considering Air Quality in Urban Planning," (Lexington, Mass: March 1974)

c) CRAG has no legal authority to implement some control strategies;[1]

d) CRAG does have the authority and infra-structure to accomplish Component IV (Intergovernmental coordination) especially as this relates to:

1. achieving a consensus on growth and development patterns;

2. arbitrating potential disputes over emissions allocations;

3. bringing jurisdictions together to solve problems in air sheds transcending political boundaries.

Stated another way, if CRAG is going to include air quality maintenance in its comprehensive planning effort,[2] (whether through intergovernmental coordination or more directly), it will have to explore three areas:

a) technical requirements of AQMP and the costs thereof for different levels of involvement;

b) procedural requirements for incorporating AAQS criteria into SB 769 land use ones, ensuring that such criteria are enforceable, and providing for the resolution of conflicts;

c) the need to show how the regional plan for 2 million people is to be developed over time.[3]

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1 i.e. CRAG cannot regulate industrial smokestack emissions, field burning, noise, etc. as required in Component II.

2 And, it would appear that it will have to. That is, it would appear that more than transportation/air quality relationships will need to be included.

3 This would involve the development of some framework plan showing how growth would be phased over time through capital inprovements programming and other factors.

C. DOE/DEQ Notification of Intent

Both DOE/DEQ through letters and meetings, have notified CRAG and its member jurisdictions, of their intentions to involve them in the AQMP process. That is, both agencies have begun the intergovernmental coordination step in AQMP preparation dictated by the proposed EPA guidelines. Both agencies are also following EPA guidelines in delineating the kinds of coordination possible.[1] There are four basic types, each of which is described briefly below:

1. The state conducts all AQMP preparation and implementation activities. Regional and local agencies provide only data and review;

2. The state, local and regional agencies prepare and implement the plan together - i.e. any or all of the plan preparation and implementation can be done by local and regional agencies by mutual agreement with the state;

3. The plan is prepared jointly by the state and sub-state agencies, but implementation is done by the state;

4. The plan is prepared jointly by the state and sub-state agencies, but implementation is done by sub-state agencies.

Of significance to CRAG in the DOE/DEQ requests for coordination are the following:

1. Since SWAPCA and DEQ are in charge of emissions control measures, monitoring, and enforcement in the CRAG Area, DOE/DEQ are essentially asking that CRAG complement SWAPCA/DEQ activities through its land-use planning function;

2. CRAG's member jurisdictions, which have received the same requests for coordination from DOE/DEQ, may elect to do their own air quality planning[2] --i.e. coordinate directly with SWAPCA/DEQ rather than indirectly through CRAG as an intermediary;

3. CRAG's member jurisdictions may elect to pass on all or part of the added planning and coordinating functions to CRAG;

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[1] As outlined in EPA Guideline Series, Volume 1.

[2] The City of Portland and the Regional Planning Council of Clark County, for example.

4. Neither DOE/DEQ has offered funding to cover the added responsibility, although both have offered technical support;

5. CRAG may be asked to take some position soon on the extent of its coordination, not only because of the requests of DOE/DEQ, but also because of the requests likely to emanate from its member jurisdictions who are also likely to have to take a position soon since, as noted above, they have received the same DOE/DEQ requests.

D. EQC and Emissions Allocations

One of the land use control measures suggested by EPA in its Guidelines Series as appropriate for use by local and regional planning agencies is emissions allocations.[1] EQC has recently adopted what amounts to a system for same in the CRAG AQMA.

Of significance to CRAG are the following:

1. The action covers a two year interim period --i.e. will be in effect until there in an approved AQMP;

2. There is an apparent conflict between AAQS and CRAG's Focussed Growth Sketch Plan;[2]

3. There may be a conflict between adopted CRAG goals and policies and AAQS;[3]

4. EQC action may obviate CRAG's use of either its Interim Development Policy (IDP) or Focussed Growth Sketch Plan as bases for making A-95 reviews;[4]

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1 See description of pros and cons on page 11.

2 CRAG's plan calls for more intensive use of the Rivergate, North Portland, CBD area than would appear to be consistent with AAQS (as evidenced by the EQC ruling which was instituted because of problems, existing and/or potential, in those areas.)

3 Specifically those related to enhancing the potentials for mass transit and preventing urban sprawl.

4 i.e. in making decisions about the location of major regional facilities, in the event that vacant suitably zoned land is not available for development because of EQC's allocation system, CRAG may have to permit lands, other than those permitted under the IDP or the land use plan, to be opened up to development.

5. EQC's proposals, which are required to go through hearings, are not required to go through the A-95 review process, even though they may have regional significance;[1]

6. A-95 reviews are required for AQMP's (which is a curious twist apparently based on EPA's need to involve local and regional land use plans and/or agencies in AQMP's)[2];

7. CRAG may get "pushed" into the land use aspects of AQ (not by DOE/DEQ, neither of which has any financial leverage at this time) but by EQC decisions (or threats thereof) and what member jurisdictions perceive as the impact of those decisions on the integrity of their plans, their fiscal structure, etc.

E. Indirect Source and Noise Regulations

Since the adoption and enforcement of either of the proposed regulations by either of the state agencies preempt CRAG's land use and transportation plans, where conflicts may occur, much the same things can be said about these proposed regulations as about the interim emissions allocation systems discussed above.

The proposed regulations are treated separately in the listing of pending actions of significance to CRAG (rather than treated generally, along with EQC's action as a sub-set of the whole subject of regulations) because:

1. The number of types of different regulations are of significance in themselves;

2. DEQ's Proposed Indirect Source Regulation, covers parking facilities with 50 or more spaces[3] - i.e. apartment complexes with 25-35 units, stadiums, shopping facilities, etc.-- and, thus, while termed a transportation control strategy[4], does involve residential, commercial, and other land uses not covered by EQC's action;

3. The AQTC, as presently constituted, can evaluate the transportation impacts of proposed regulations but cannot adequately evaluate the land use ramifications;

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[1] i.e. as regards the location of water-oriented heavy industry; Vancouver Lake vs. Rivergate development, etc.

[2] i.e. AQMP's with or without emissions zoning and other land use regulations are required to go through the A-95 process, but an EQC proposal with same is not.

[3] In the City of Portland, 250 outside the city for the balance of the Oregon part of the SMSA--i.e. the regulations cover considerably more than the AQMA. See Figure 5, page 22.

[4] Because they are directed at automobile usage. See page 10 .

4. The proposed Indirect Source Regulations differ between DEQ and SWAPCA;[1]

5. DEQ's proposed Indirect Source Regulations cover the Oregon portion of the CRAG Area, while EQC's emissions allocation system applies to the AQMA only.[2]

F. 208 Planning

The Oregon portion of the CRAG Area has been designated for Section 208 areawide wastewater treatment planning.[3] The program funded under EPA, is expected to be funded at approximately $1 per capita which amounts to about $1 million for the CRAG Area.

In addition to the amount of funding involved, the Federal Pollution Control Act of 1972 gave EPA significant clout in persuading communities to make their development plans compatible with clean water goals. At the EPA conference on air quality in Boulder in September of this year, it was stated that some of this authority may be used by 208 areas to promote clean air.

According to statements at the conference, 208 plans should:

1. consider the impact of 208 planning on both land use and air quality;

2. promote complementary air and water management strategies;

3. ensure that 208 plans are consistent with applicable portions of AQMP's.

Also suggested at the conference was that air quality planning agencies (whether the same as 208 agencies or not) should review and comment on the air quality data and analysis contained in all water grant applications.[4]

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[1] SWAPCA's are patterned after EPA's newly proposed ones in that the minimum is 250 parking spaces, not 50 as in DEQ's. EPA's existing regulations have the 50 space minimum. Its proposed new minimum stems from both administrative and compliance difficulties with the 50.

[2] Differences in areas covered by control strategies could cause some confusion - i.e. it would appear that CRAG may want to recommend to DEQ that the AQMA be the appropriate area for control strategies since the purpose of designating AQMA's was to delineate areas where control strategies may be needed.

[3] i.e. excludes Clark County

[4] The intent is to let AQMA planning agencies determine if the application needs modification (or denial) on the grounds that undue expansion of treatment facilities could lead to AAQS problems.

Examples of complementary air/water control strategies cited at the conference included:

1. Use of open space, including parks and planted areas along streets to:

   a. increase air volume and land area for diffusion, dispersion, and fall out of air pollutants
   b. increase humidity to reduce dust
   c. retard and decrease erosion and storm runoff
   d. increase infiltration capacity of soil
   e. attenuate noise

2. Employment of multiple use concepts in land use planning e.g. using golf courses, large parks, land around airports, agricultural land etc. as sites for disposal or productive use of sewage and placing these large uses in such ways as to also accomplish #1;

3. Locating trunk sewers and wastewater treatment facilities to:

   a. guide urban growth into areas with meteorology favorable for mixing and dispersion of air pollutants;
   b. to preserve open spaces for reasons given in #1 and #2; and
   c. minimize air and water pollution generated by transportation sources.

The significance to CRAG of the foregoing includes:

1. EPA suggestions have a way of working their way into guidelines --i.e. new 208 guidelines may be developed to more specifically address air quality, (OTLUP may have some bearing[1] on this);

2. EPA may have a two-fold whip over CRAG's involvement in air quality planning -- one through 23 CFR 770, already discussed, and one through its control over 208;

3. The 208 planning effort may need to look at a systems approach to waste water management so that the impacts of same on air quality, land-use, and transportation can be assessed in the whole rather than through individual studies;

4. Some of the 208 money may be used to buy CRAG some expertise in air quality (e.g. a meteorologist, an air quality engineer, etc.)

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[1] By virtue of its placement within the EPA heirarchy. See page 25.

III. Summary

A. Status of Air Quality Planning

1. General

Air quality planning in the CRAG Area has gone from CRAG's generalized inclusion in the 14 county, 3 COG, 4 APCA, EPA designated PI/AQCR in 1972 to certification mandates in 1974.

2. Following the Supreme Court's Decision

a. FHWA mandated -- i.e. required for certification -- the inclusion of air quality assessments and coordination in transportation planning and the submittal of proof of same to joint reviews of regional administrators of EPA/ FHWA.

b. EPA's new round of guidelines led to CRAG's TPA being designated as an AQMA and to requests by DOE/DEQ to coordinate in the development of the AQMP for that area.

Both DOE/DEQ initial approaches to CRAG have also been made to CRAG's member jurisdictions.

3. CRAG's involvement in 208 planning may carry with it some pressure to get involved in air quality/land use planning.

4. Conclusions

CRAG must comply with FHWA regulations on air quality/ transportation impacts and is so doing through AQTC and the CAP-M modelling of the Focussed Growth Plan. In addition, it is receiving some pressure from EPA, through DOE/DEQ (and potentially through 208) to get involved in AQMP preparation, the consideration of air quality as a land-use constraint, and the development of land use plans which complement AQMP's (and potentially 208 plans). Finally, CRAG faces potential pressure from member jurisdictions on the air quality/land use issue.

B. Status of Air Quality Control in the CRAG Region

1. Air quality control activities have gone from the regional to the state level on the Oregon side of the CRAG Area-- i.e. from a SWAPCA/ CWAPA arrangement to a SWAPCA/DEQ one.

2. Control activities differ between the states. EQC's emissions allocations strategy covers the Oregon portion of the AQMA. There is no similar strategy on the Washington side. Proposed noise and indirect source regulations also differ between the two states.

3. Control measures have some bearing on CRAG's land use planning effort but are not subject to Regional A-95 review. CRAG can participate in DEQ/DOE Hearings on proposed regulations, but to date has not.

4. CRAG's AQTC can review the transportation impacts of proposed controls but is inadequately represented by land use, water quality, and (perhaps) medical interests to review the implications of proposed controls from these aspects.

5. CRAG needs environmental policy guidelines against which criteria can be developed for assessing the various regional impacts of air quality control activities.

C. CRAG is Facing:

1. The need to make a decision about the degree of its involvement in AQMP preparation, air quality/land use planning generally, and the review of proposed environmental regulations;

2. The need to make a decision on how to handle air quality/land use considerations in the 208 planning effort;

3. The need to wrestle with the tough issue of ferreting out local vs. regional responsibilities in environmental planning under SB 769.

The next Section deals with some of the issues which need to be addressed in making the above decisions.

SECTION III

PROBLEMS IN AIR QUALITY PLANNING

I. Introduction

The major problems in air quality planning as they relate to CRAG and regional land use planning are the complexities of the subject and the uncertainties surrounding it. The complexity problems are four-fold: technical; intergovernmental; political; and legal. The uncertainty problems encompass changes in guidelines, regulations, and environmental legislation. Also included in the uncertainty area are problems related to authority for land use/air quality research grants.

Each of these problem areas is discussed in this section.

II. Complexities

A. Technical Problems in Measuring, Monitoring and Projecting Air Quality

1. Complexity of the Phenonenon of Air Pollution

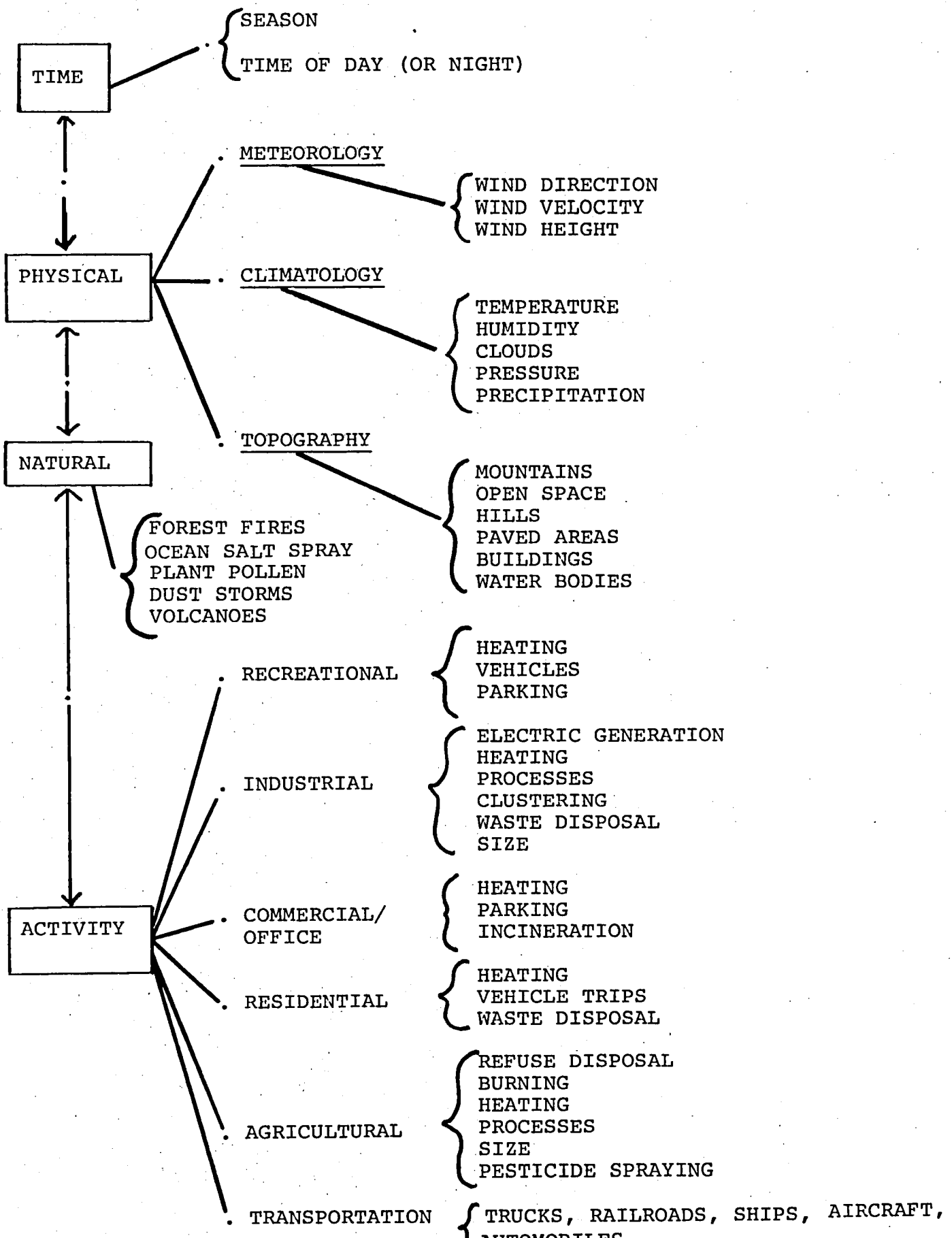
As shown in Figure 8 on the next page, the pollution level in any one location depends on what is there (natural sources), what is coming out of smokestacks (industrial, commercial, and residential), and automobile exhausts. It also depends on:

a. time of day (for CO)
b. season (for NO_x, HC, SO_2)
c. wind direction
d. topography (plain, valley, hilltop)
e. building heights (architectural topography)
f. climatology (the sun reacts with certain chemicals under some conditions to form haze, moisture with others to form acids such as H_2SO_4)
g. chemical processes (other than those listed above)
h. pollutant weight
i. others

Thus, for example, the pollutant level in downtown Portland depends on what is produced there, what is blown in from what direction, how much of what is produced there or blown in gets trapped, season, temperature, time of day, and where the pollution level is measured.

FIGURE 8

COMPLEXITIES OF AIR POLLUTION ARE DUE TO THE FOLLOWING INTERRELATED FACTORS:



The complexities related to chemical actions are not yet clearly understood. Control devices for some pollutants have produced more serious problems than the pollutants controlled--e.g. some smokestack controls for SO_2 have reacted with exhaust vapors to produce H_2SO_4. Similarly, mandatory motor vehicle inspection leading to tune-ups etc. to control CO can result in the emission of more NO_x.

The combination of natural phenomena (climatology, topography, seasons, etc.) resulting in air pollution from a given volume of emissions are also not fully understood and are difficult to predict.[1] The inaccuracies in day-to-day weather forecasts and in the annual forecasts in the Farmers Almanac point to some of the difficulties.

In summary, the modelling, mathematics, and engineering involved in air quality analyses is still more or less in its infancy. Measuring, monitoring, and projecting air quality is far from an exact science in spite of the battery of equipment and scientific methods and manpower involved. While not a new science, air quality analyses is a new enough academic discipline to be variously housed on college campuses (as was urban planning a decade or so back)[2] and not fully integrated into other disciplines. If it can be said that the technical aspects of air pollution are in their infancy, it can be said that the land use aspects are at the fetal stage.

2. Problems in Monitoring Air Quality: Method, Siting, and Data Derived

a. Methods

Air pollution is monitored by both industry and environmental agencies using monitoring equipment and laboratory processes which get at both the physical and chemical properties of pollutants and their concentrations. However, the equipment and the processes change over time as better analytical methods are developed.

The state of the art with reference to monitoring methods is shown in Tables 3A and 3B which covers EPA's latest rating of those in use in 1972 and 1973. As shown, some methods rated as not acceptable were still in use. For example, in 1973, 61% of the monitoring for NO_2 and 42% of that for photochemical oxidants was being done via unacceptable methods.

How many of the methods falling in the unacceptable category were used to derive the data that went into either the 1972 SIP or the 1974 AQMA designation document for the CRAG Area cannot be determined from either document without more effort than is warranted in this kind of a report. However, it is an area CRAG may want to explore at some later date.

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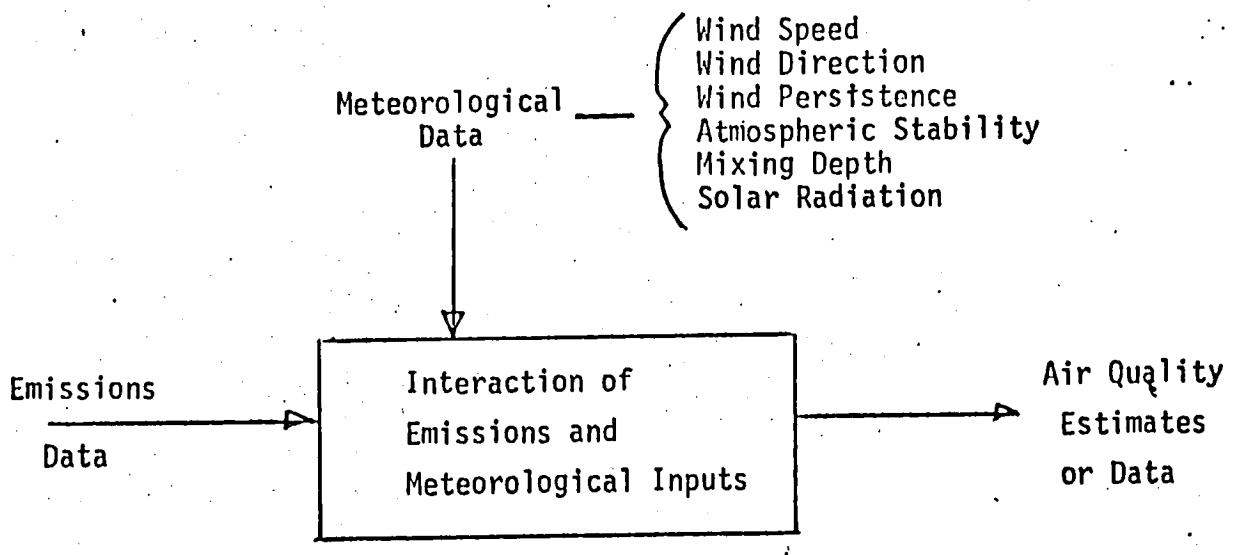
[1] See Figure 9.

[2] When it could be found either under the School of Architecture or the School of Sociology.

FIGURE 9

ROLE OF METEOROLOGICAL CONDITIONS IN DETERMINING AIR QUALITY



TABLES 3A & 3B

MONITORING METHODS BY POLLUTANT

3A

POLLUTANT	METHODS IN USE, 1972 & 1973 (NUMBER)			
	TOTAL	APPROVED	UNAPPROVED[1]	UNACCEPTABLE
TSP	1	1	-	-
CO	3	1	1	1
SO_2	10	1	7	2
NO_2	11	-	8	3
PHOTOCHEMICAL OXIDANTS	9	1	4	4

3B

POLLUTANT	METHODS IN USE, (PERCENTAGE DISTRIBUTION)*					
	1972			1973		
	APPROVED	UNAPPROVED[1]	UNACCEPTABLE	APPROVED	UNAPPROVED[1]	UNACCEPTABLE
TPS	100	-	-	100	-	-
CO	99	1	-	96	4	-
SO_2	76	21	8	77	23	-
NO_2	-	19	81	-	39	61
PHOTOCHEMICAL OXIDANTS	17	28	55	30	28	42

[1] Acceptable on an interim basis

*All methods for each pollutant (Approved, Unapproved, and Unacceptable) = 100 %

b. Siting

Aside from the influence of the method used in producing acceptable measurements of air quality, the reliability of the data collected by monitoring equipment depends also on where it is placed. Siting requirements differ for different emissions sources but generally they involve distance from source and height. Improperly sited monitoring equipment can lead to significant errors in the resultant measurements.

The frequency of monitoring at particular sites also has a bearing on the quality of data collected. Intermittant monitoring can produce some distorted data. Frequency distributions, measuring the reliability of data collected by frequency of monitoring, have been constructed by EPA, but it is difficult to assess their usefulness to the CRAG Area given geographic differences between the CRAG Area and the area(s) for which the data was collected.

c. Data Derived

Assuming that the data derived from monitoring methods is adequate[1], there are problems attendant on its use. A major problem is related to indentifying how much of the pollutant(s) measured were generated by emissions in the area versus how much was transported into the area from somewhere else. Another problem relates to determining how much of a particular pollutant is associated with particular sources of that pollutant. For example, if monitoring equipment shows a high concentration of TSP in an area, the data alone does not indicate how much was generated in the area, was background in the area, or was blown in; nor does the data show how much of it was from automobile emissions, industrial, or area sources.

One of the more frequently used data series is that collected by APCA's per EPA mandate, and fed into the National Environmental Data System (NEDS) operated by EPA. The data is collected according to a specialized format (including UMT coordinates, see below) and is available on request. Problems cited by consultants who have used the NEDS data include:

1. inconsistencies between NEDS and alternative sources of data;
2. lack of coverage on fugitive dust;
3. no way to determine if NEDS data for past years is accurate in describing air quality because of unknowns and methods;
4. difficulties in determining if there was anything unusual about any of the years covered by the data, especially the baseline year used in their studies.

Use of the NEDS data in relating land use to air quality presents particular problems, especially, perhaps in the CRAG Area where extensive time and money have been spent in developing a map-model system based on

[1]Which is probably an invalid assumption for the reasons cited in (a) and (b) above.

a different coordinate system. The NEDS system is based on UTM (Universal Transverse Mercator) coordinates and grids. The basic grid is a square measured in meters. Use of the UTM grid and coordinate system in air quality/land use correlation studies (which have been very few in number) probably explains in part the failure of the studies to come up with something difinitive. The reason lies in the approximation system used in fitting irregular shapes, and data based thereon (such as housing units, acres of open space, etc.), to the grid network. Most social, economic, and land use data cannot be fit to a grid system because it is collected for irregulary shaped areas (census tracts, traffic zones, incorporated areas, drainage basins, tax parcels, etc.) For example, in estimating housing by grid from census data by census tract, EPA's assumption is that housing is spread evenly over the tract. The grid system is laid over tha tract system and housing allocated to grids on the basis of the proportion of the tract in the grid. This is, of course, spurious since the housing in a census tract may lie in only one of the grids that comprise it.

Using the NEDS system there is no real way to relate pollution estimates by grid to land use information by acreage, census tract,etc. except through the kind of approximation outlined above which does not (or would not appear to) adequately address the needs of land use planning agencies. Stated another way, the science of air quality estimation could be improved if it were based on a more flexible coordinate system and on the technology developed by other disciplines, e.g. planning. CRAG's map-model system would appear to have some value in this regard in that it is based on the state plane coordinate system and developed for land use planning purposes (although it has been used for other purposes). It has as "scientific" a base as the NEDS system but is more flexible in that it can calculate the area of irregular shapes, handle point source information, aggregate data or disaggregate it for various levels of geographic analysis, etc.

Time did not permit an analysis of the compatibility of the map-model and UTM coordinate systems. Depending upon the degree to which CRAG decides to become involved in air quality/land use, this is an avenue which might be explored.

3. Modelling

a. General

Existing air quality models vary from the simple slide rule variety to very complex and expensive-to-run[1] computer simulations. A description of each and their major weaknesses and strengths is given in Table 4. The computer models are classed in two broad types: Gaussian diffusion and mass conservation. The one used in the Oregon

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[1] For example, a model built for Baltimore (2 million population) cost $10,000 in computer running time alone.

Table 5

Summary of Simulation Model Characteristics

Model Name	A. Pollutant Specification	B. Averaging Time Specification	C. Emission Data	D. Meteorological Data	E. Concentration Estimates	F. Ease of Use	G. Availability	H. Reliability	I. Applicability to AQM
Rollback	1	1	1	1	3	1	1	3	3
Appendix J	2	3	1	1	3	1	1	3	3
Miller-Holzworth	2	2	1	3	3	1	1	1	3
Hanna-Gifford	2	2	1	2	3	1	1	1	3
Hanna-Gifford	2	3	2	5	2	2	1	1	2
w. Point Source model	2	3	3	5	1	2	2	1	1
w. HIWAY	2	3	3	5	1	2	2	1	1
AQDM	2	2	3	4	1	3	2	1	1
SCIM	2	3	3	5	1	3	3	2	1
APRAC-1A	2	3	3	5	1	3	2	2	1
SAI	1	3	2	5	2	3	3	2	2

Key to Table 1

A. Pollutant Specification
   1. Any Pollutant
   2. Specific Pollutants

B. Averaging-time Specification
   1. Any Averaging-time
   2. Long-term Average
   3. Short-term Peak

C. Emission Data
   1. Area-wide Emissions Total
   2. Total emission distributed as finite area sources
   3. Detailed point, line and area sources

D. Meteorological Data
   1. None
   2. Average wind speed
   3. Average wind speed and mixing height
   4. Frequency distribution of wind direction, wind speed, stability and mixing height
   5. Hourly variations of wind direction, wind speed, stability and mixing height

E. Concentration Estimates
   1. Estimates at any specified point
   2. One estimate for each area source grid
   3. One estimate applicable to entire AQMA

F. Ease of Use
   1. Slide-rule
   2. Small computer effort
   3. Major computer effort

G. Availability
   1. Open literature
   2. National Technical Information Service
   3. EPA, upon request

H. Reliability
   1. Can be verified and calibrated
   2. Verification is incomplete, possibility of calibration is uncertain
   3. Questionable, acceptable for crude estimates only

I. Applicability to AQM
   1. Can distinguish between specific source and land use type
   2. Can distinguish between land use types only
   3. Considers no distinction between sources or land uses

SIP, APRAC-1a, was a Gaussian diffusion model. Washington's SIP was based on the Rollback model. (See Table 4.)

In general, even the most sophisticated of the models shown can accommodate only a limited number of pollutants. They are also limited by the number of inputs they can handle (emissions data, meteorological variables, averaging time specifications, topographic constraints, and others). That is, there is no all inclusive model which can measure all the pollutants in question under the entire range of conditions which prevail for them to occur.

b. Modelling in the CRAG Area

Models currently being investigated, developed, or applied in the CRAG Area include the following:

1) CAP-M using CRAG data but run in Washington D.C.;
2) Oregon Graduate Center work on a combination of models (a hybrid grid cell Gaussian diffusion model and a finite difference line source model) to measure the effects of SO_x and TSP on visibility reduction. The combination of models permits measurements of the characteristics of terrain and meteorological conditions, both of which are important in assessing air quality in the CRAG Area.
3) Oregon/Washington State coordinated modelling effort, funded by EPA, and covering the area between Portland-Vancouver and Longview-Kelso. The model, to be built by a consultant with completion scheduled for January 1975, is concerned with calibration, estimation, and projection of SO_2 and TSP.
4) ODOT has in use and/or is developing the California DOT models: XWIND (line sources) and PWIND (point sources), both Gaussian diffusion models; and EXPLOR and NEXUS(which handle complex terrain, wind variations, and assumes an infinite line source),both finite difference models.
5) WSHD has just completed a "state of the art study" and has contracted a study to determine the best model(s) for use by them.

CRAG's AQTC will be looking at these models and others.

4. Projecting

To date, the relationship between growth and air quality has not been determined. Assumptions, however, have been made about that relationship, and those assumptions are reflected in SIP's and AQMA designation documents.

The major emphasis in air quality research has been on the environmental sciences end of air quality -- i.e. in trying to solve the technical complexities of measurement, model development and calibration (so that past data can be used to predict current conditions with lower fudge factors), development of emissions control and monitoring equipment, etc. While this emphasis was probably realistic initially, it is less so now. Two-to-three year projection horizons for the attainment of NAAQS was one thing --i.e. the economic and land use assumptions were less critical. However, a ten year time frame for the maintenance of AAQS is something else. That is, simplistic assumptions about the relationship between growth/land use development and air pollution concentrations can result in distorted projections of the latter in spite of the best air quality models and the best environmental input.

If creditable AQMP's are to be developed, research dollars will need to be spent on the non-environmental sciences side of the projection equation. The relationships between economic and population growth and land use patterns are very complex in themselves, and relating these complex inter-relationships to air quality ones will require research to sort out. For example, economic growth in one area may depend on "smokestacks" and in another area on research facilities; population growth in one area may result in high rise and in another in urban sprawl; etc. The population equivalent of a population growth rate of 2% would differ between Hawaii and Florida, not only because of differences in climate and fuel usage, but also because of the spatial distribution of activities and the economic base -- i.e. tourism versus agriculture. Similarly the pollution equivalent of a 2% growth rate in economic activity would differ between areas, not only because of differences in processes and fuel usage, but also because of spatial distribution, firm size, industry mix, transportation dependencies (air, water, rail, truck,) for shipping and receiving goods, etc. (The pollution equivalents of population and economic growth would, of course, also be dependent on topography, meteorology, etc.)

EPA guidelines do admit that the correlation between population and economic growth and pollution is unknown. The crux of the problem, however, lies in the assumption that the admittedly unknown can be projected - - i.e. the guidelines require that projections be made and suggest using a methodology which relates future air quality to projected growth(as measured in population and earnings) without considering how that growth is spatially distributed or what its characteristics are.

5. Summary

Given the state of the art in air quality data and modelling, and the technical expertise required to either apply or expand on what is known, it would appear that if CRAG were to become involved in air quality/land use planning, it may want to specifically address: the relationship between land use/growth and pollution and the use of its map-model system therein. That is, CRAG cannot develop an air quality constrained land use plan if it does not know what the relationship between land use and air quality is in its planning area and the best way to handle land use data (and relate it to past and projected growth) is probably through its map-model system.

B. Intergovernmental, Political, and Legal Complexities

1. Intergovernmental

The intergovernmental coordination problems facing CRAG in air quality planning are somewhat like those CRAG faced in going from predominately HUD/local financing arrangement to the existing one. The addition of FHWA/UMTA alone necessitated coordination between CRAG/ODOT/WSHD/Tri-Met and local government transportation planners.

Since the adoption of 23 CFR 770, FHWA funding requires coordination not only with ODOT/WSHD but also with DEQ/DOE. CRAG has not only complied with CFR 770 in this regard, but via its AQTC, has added the Port of Portland and SWAPCA. CRAG has, of course, through its transportation committees, continued to effect coordination with local governments on transportation issues.

The point is, that because of CFR 770 alone (which involves but one aspect of air quality planning) CRAG has added 2 more state and 2 more regional agencies to the list of those with which it coordinates its transportation planning efforts. Altogether, there are now 7 state and regional agencies with which CRAG coordinates on the one air quality related issue: 4 state (ODOT/WSHD and DEQ/DOE) and 3 regional (Tri-Met, Port of Portland, SWAPCA).

Further, again through 23 CFR 770, another federal agency has been added to the list of those whose requirements must be met in transportation. The list now stands at 3: EPA/FHWA/UMTA. The total list of agencies, then (not counting local jurisdictions) stands at 10: 3 federal, 4 state, and 3 regional.

The implications, as far as CRAG's further involvement in air quality/land use planning are fairly obvious. Without considering the kinds of coordination which may be, or are, required under 208, if CRAG adds an air quality element to its land use planning effort, it will undoubtedly have to coordinate with additional federal, state, and regional agencies -- i.e. with the Regional Planning Council of Clark County (since Clark County is not covered by SB 769); LCDC (because CRAG's air shed is part of the Willamette shed, which is a state concern), etc.

Aside from the complexity problems in meeting the coordination and other certification requirements of funding agencies, CRAG may face additional governmental complexities with further involvement in air quality. These relate to the involvement of implementing agencies whose activities have or may have a bearing on air quality but which are not now either members of CRAG or on any of its committees. Specifically these agencies include: Metropolitan Service District, Unified Sewerage Agency, and the economic development agencies (the regional one in Clark County and the inner city development one in Portland).

Existing roles and responsibilities in air quality planning and control at different governmental levels are shown in Figure 10. The chart does not show the City of Portland, which is working with DEQ on transportation strategies (including traffic and circulation plans which gives it some authority, or potential authority in handling indirect source regulations).

Another thing the chart does not show is the difference between the states of Oregon and Washington in the air quality power structure. Washington has no counterpart of EQC. DOE is both a policy and administrative agency. It has an advisory body, The Washington State Ecological Commission (WSEC) but establishes its own policies and adopts its own regulations. Further, it appears (and this was not researched in depth) that DOE delegates more authority --i.e. places emphasis on local and regional rather than state power -- than does Oregon's counterparts DEQ/EQC.

Oregon separates policy and administration except where APCA's exist. APCA's which are empowered by EQC and which must defer to EQC in setting standards (which cannot be lower than state ones and which cannot apply in cases of specific point sources or other regulations over which EQC through DEQ retains authority) by going through a form of review and comment process. Other than that, APCA's in Oregon are pretty much on their own and can pretty much run their own operations. Where APCA's are not present, however, EQC is the control authority (in policy matters) and DEQ the administrator of that authority.

EQC members are appointed by the Governor with the concurrence of the Senate, but can be removed by the Governor. The Director, who is required to be an engineer registered in the state, is also the Administrator of DEQ.

2. Political Complexities

Air quality maintenance planning involves potential decisions in such politically sensitive areas as:

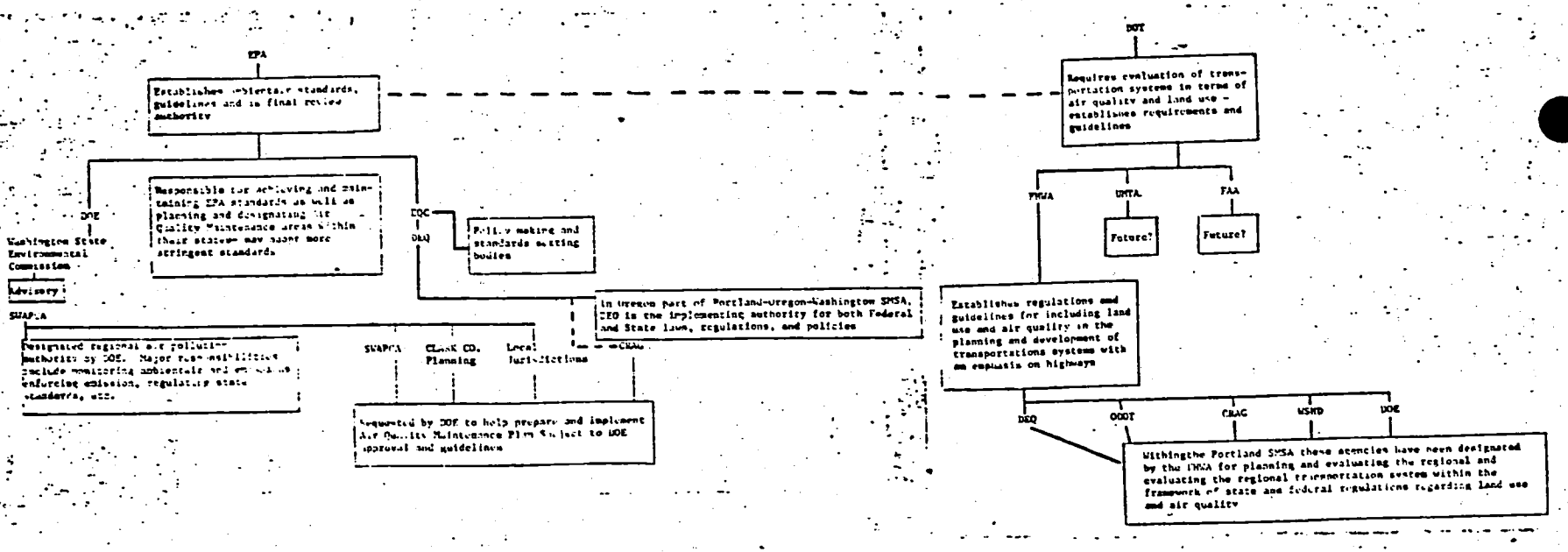
a. defining the regional air shed;

b. planning for the Clark County portion of the AQMA -- and/or enforcing land use plans related to AQMP in that county -- since it is not covered by SB 769;

c. ditto for Columbia County (which is both outside the AQMA and the purview of SB 769, but which because of Trojan and other industrial activity has or may have some bearing on CRAG's air shed);

FIGURE 10

STRUCTURE OF INTERGOVERNMENAL COMPLEXITY



d. achieving concensus on the allocation of activities in sub-area air sheds;[1]

e. achieving concensus (when the regional air shed is alright, but there are problems in sub-areas which cross jurisdictional lines) about how air quality problems will be resolved and by whom;

f. ditto when the regional air shed has problems due to activities in one or more than one jurisdiction;

g. achieving concensus on an uniform set of growth and development policies and projections;[2]

h. achieving concensus on using CIP's[3] as tools in staging and locating growth consistent with AAQS.

In summary, the political complexities revolve about the degree to which, and by what agencies, local jurisdiction will permit the imposition of growth and development regulations in order to maintain AAQS. However, in listing the above sensitive political decision areas, it should be noted that they were termed "potentially" sensitive decision areas. That is, the list is included because these are the areas where EPA feels decisions will need to be made (hense its emphasis on including agencies with legally enforceable land use plans) and where because of this, the state environmental agencies are saying much the same thing. However, as will be shown later,[4] EPA in making these suggestions is operating on untested assumptions about the relationships between land use/economic development/growth and air quality. That is, if the relationships EPA thinks exist, do not in fact exist, then CRAG may not need to be involved in all the areas cited in the above list.

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1 The Interim Development Policy should be considered in this regard. While endorsed (or adopted) by the General Assembly, which is certainly concensus, it has been put into operation by less than a third of CRAG's member jurisdictions.

2 CRAG is currently having some difficulties obtaining acceptance of the population and employment allocations given in its Focussed Growth sketch plan even though this plan was endorsed by the CRAG Board of Directors.

3 Capital Improvement Programs.

4 And, was also pointed out in the listing of technical problems previously discussed in this Section. See under "Projecting", page 47.

3. Legal Complexities

The first relate to questions concerning CRAG's power under SB 769:

a. does CRAG have the power and the authority to review local plans for consistency with AAQS when it has no AQMP;

b. do CRAG's legal powers under SB 769 conflict with those granted EQC/SWAPCA -- especially as regards (a) above.

The second listing of legal complexities refers specifically to state environmental legislation and to Oregon's Fasano decision.

a. Since CRAG is covered by bi-state environmental legislation, potentials for legal conflicts (i.e. major legislative differences with legal implications for CRAG) may exist and should be explored.

b. What legal arrangements are needed to assure compliance of Clark County with the AQMP developed for the CRAG Area.-- i.e. what legal tools would CRAG need if it were to develop air quality/land-use controls for its planning area.

c. What is the legal definition of a comprehensive plan-- that is, does CRAG, or its member jurisdictions, have a legal comprehensive plan given that air quality (which is a constraint on "other vacant suitably zoned land"[1]) is not covered.

d. What agency is legally empowered to assess the trade-offs between broad community goals and AAQS -- i.e. the economic and fiscal implication of differences in clean air criteria. EPA maintains that these issues can best be assessed at the state, local and regional levels, but EQC maintains that it is empowered to consider only environmental issues -- i.e. has no authority to consider broad community goals, economic tradeoffs etc. ORS 449.785 would indicate, however, that EQC is not only empowered but required to consider these things. This area needs exploring.

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[1] The Fasano decision references both comprehensive planning and "other vacant suitably zoned land."

4. Summary

The intergovernmental, political and legal problems associated with CRAG's involvement in air quality are on about the same order of magnitude as those associated with the development of SB 769. Putting SB 769 together required working through local jurisdictions and their legislators. Putting an air quality plan together under EPA guidelines, would require achieving concensus with the same groups but would have the added dimension of achieving concensus with state environmental agencies, environmental groups, industrial development, business interests, and others.

III. Uncertainties

A. Guidelines and Regulations

Environmental rules keep shifting and whatever role CRAG should decide to play should be characterized by flexibility, a zeroing-in on the basics, and an awareness of the following:

1. EPA's proposed guidelines may change in particulars depending on:

   a. Congressional interpretation of "significant deterioration;"

   b. How conflicts stemming from the 1974 Energy Supply and Environmental Coordination Act are worked out;

   c. What happens to the economy in the short run;

   d. The influences and direction of OTLUP;

   e. How much attention EPA decides is needed on air quality in 208 planning.

2. 23 CFR 770, which is for an interim unspecified period, may change in some particulars because of some of the above and also because it contains some unworkable stipulations -- e.g. those associated with assessing air quality/transportation impacts in AQCR's using approved SIP's as the basis for the assessment.

The above kinds of transitional refinements in specifics probably will not alter very much the basic intent of FHWA, EPA, or Congressional positions on the importance of, and need for, air quality planning and the maintenance of AAQS. Because of what would appear to be this fairly basic concensus, it is likely that HUD may also seek involvement by requiring an air quality component in land-use and housing plans. OTLUP may be the determining factor in stimulating HUD's interest in the inclusion of air quality in its 701 planning program. That is, there would appear to be some turf at issue here.

B. Relationships Between Air Quality and Land Use

Because of the unknowns surrounding the whole subject of the relationships between air quality and land use, CRAG may want to focus its role on determining what the relationships are. By assuming this role, CRAG could:

1. assist in working out some of the problems in the weakest part of the AQMP (the projections and assumptions around which the maintenance strategies are to be developed) -- i.e. make the AQMP a better document;

2. assist in furthering the state of the art in air quality analyses which has been long on engineering and the air sciences but short on land use and economics;

3. provide a more solid base for determining if, and if so which, land use control strategies are needed to maintain AAQS:

As the article on the next page shows, the above role suggested for CRAG appears both timely and appropriate. According to the article, EPA's transportation control strategies appear to have been based on inadequate research i.e. on untested assumptions about the land use/transportation/air quality relationships. Given the involvement of the powerful Senate Public Works Committee in the National Research Council report cited in the article, it would appear that the time may have come for CRAG (or someone else) to zero in on one of the major unexplored areas in the air quality field e.g. the impact of land use, and the spatial distribution and characteristics of that use, on air quality.

C. Funding

The only agency which has backed air quality/land use research has been FHWA and that as it applies to transportation only. EPA currently has no specific grant authority for this activity, but may support it through 208 funds. HUD, while it apparently has the authority because it has funded one or two such research projects, lacks the funds to do much more.

FIGURE 11

Urban Growth

854 National Press Building
Washington, D.C. 20045

Vol. II No. 17

Phone 202/628-NEWS
202/628-6397
703/536-4031

DENSITY VS. TRANSIT EQUAL DILEMMA

Land use policies aimed at creating higher denisites and thus encouraging mass transit probably would expose more people to bad air for longer periods rather than improving air quality. So says a report to the Senate Public Works Committee by the National Research Council. The report, by a group of emminent scientists who serve without pay, endorses present standards for air quality. It will be a major force against attempts to ease those standards, particularly in regard to automobile emissions.

In a cost/benefit analysis, the Research Council says that centralizing urban residences and jobs seems to increase rather than reduce exposures to unsafe air quality levels despite the resultant decrease in automobile travel. The increase in total vehicle miles of travel created by decentralizing seems to be offset by reductions in spot densities. Decentralization is a cheap and easy method (compared to other courses) for limited reduction of exposure to harmful levels of polluted air, the report says, but objectives of the Clean Air Act can be fully met only by removing the pollutants from the emissions of cars and stationary sources. (The published summary of the report contains no other land use information. Photocopies of the land-use portion of the unpublished four-volume report can be obtained through *Urban Growth* later.) Obtain copies of the summary by writing the Government Printing Office for *Air Quality and Automobile Emissions Control*, Washington, D. C. 20402, $1.40.

—O—

However, two factors may change all of the foregoing. The first is EPA's new OTLUP and the second is the National Research Council Report just cited. OTLUP will probably seek grant authority to carry out its new function. The Report will give it some leverage in this regard. But, since the Report may also give HUD leverage, or FHWA, it is uncertain which agency will prevail. There is, of course, the possibility that all or none will. The latter is possible given the impact of anti-inflationary policies on the federal purse strings.

Should funds be made available to any of the above agencies, Oregon has some leverage in obtaining them because of its tough stand on environmental issues; and CRAG has some leverage which may not be available to other Oregon COG's (because of its bi-state orientation, population-size-class, topography, SB 769, etc.) or to local jurisdictions (because of its A-95, EIS 1 processing and 208 planning roles).

Thus, while there are some uncertainties about funding sources -- and funding, per se -- should funding be made available, it would appear that CRAG stands a good chance of obtaining same.

If none of the above transpires, depending on the role it decides to play, CRAG may want to explore the following sources of funding:

1. 701. 701 funds used in processing EIS by A-95 agencies could probably be used to develop regional air quality/land use evaluation criteria.

   CRAG's AQTC could be used to help establish such criteria and provide the necessary reviews based thereon.

2. SB 769. State monies may be available under SB 769 for use in establishing evaluation criteria for regional compliance review of the air quality component of local plans. The AQTC could assist as in 701 above.

3. 208. As stated, CRAG's 208 designation carries with it the potential for using some of the 208 monies to coordinate waste water planning with air quality/land use planning. Thus, CRAG, on the rationale that plans meeting water quality standards could potentially violate air quality standards, could incorporate an air quality element into its 208 planning program.

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1 Environmental Impact Statement

IV. Summary

Analyses of the technical problems in air quality suggests that CRAG's role be developed around one or more of the following:

1. assessing data and modelling adequacy;

2. exploring the use of its map/model system in handling NEDS data and for use in air quality/land use modelling;

3. performing basic research on land use/air quality relationships and projections;

Analysis of the intergovernmental, legal, and political complexities suggests that CRAG either:

1. employ a "wait and see" attitude on what happens at the national level (Congress, EPA, OTLUP, HUD, FHWA, etc.); at the state level (DEQ/DOE); and at the local level (SB 769); or

2. assume that something will be required in air quality (in addition to that currently under 23 CFR 770 and potentially under 208) and that rationales exist for regional planning agencies to explicitly address air quality considerations in the development of their land use plans.

Analysis of funding uncertainties suggests that funding may be available for basic land use/air quality research and that CRAG is in a good position to receive such funding.

SECTION IV

RECOMMENDED ACTIONS

I. Overview

As stated at the conclusion of the previous Section, CRAG has two major options. It can adopt a "wait and see" position--i.e. do nothing more than is currently being done in air quality/transportation -- or it can adopt the position that additional work will be required and focus its attention on determining how much more can or should be done.

If CRAG were to choose the latter "move forward" option, it can follow one of two broad courses of action: it could either set up a task force charged with the assignment of defining its role in air quality; or CRAG staff could propose roles. Each of these two broad courses of action are described in what follows, and delineated in the Decision Tree shown in Figure 12 on the following page.

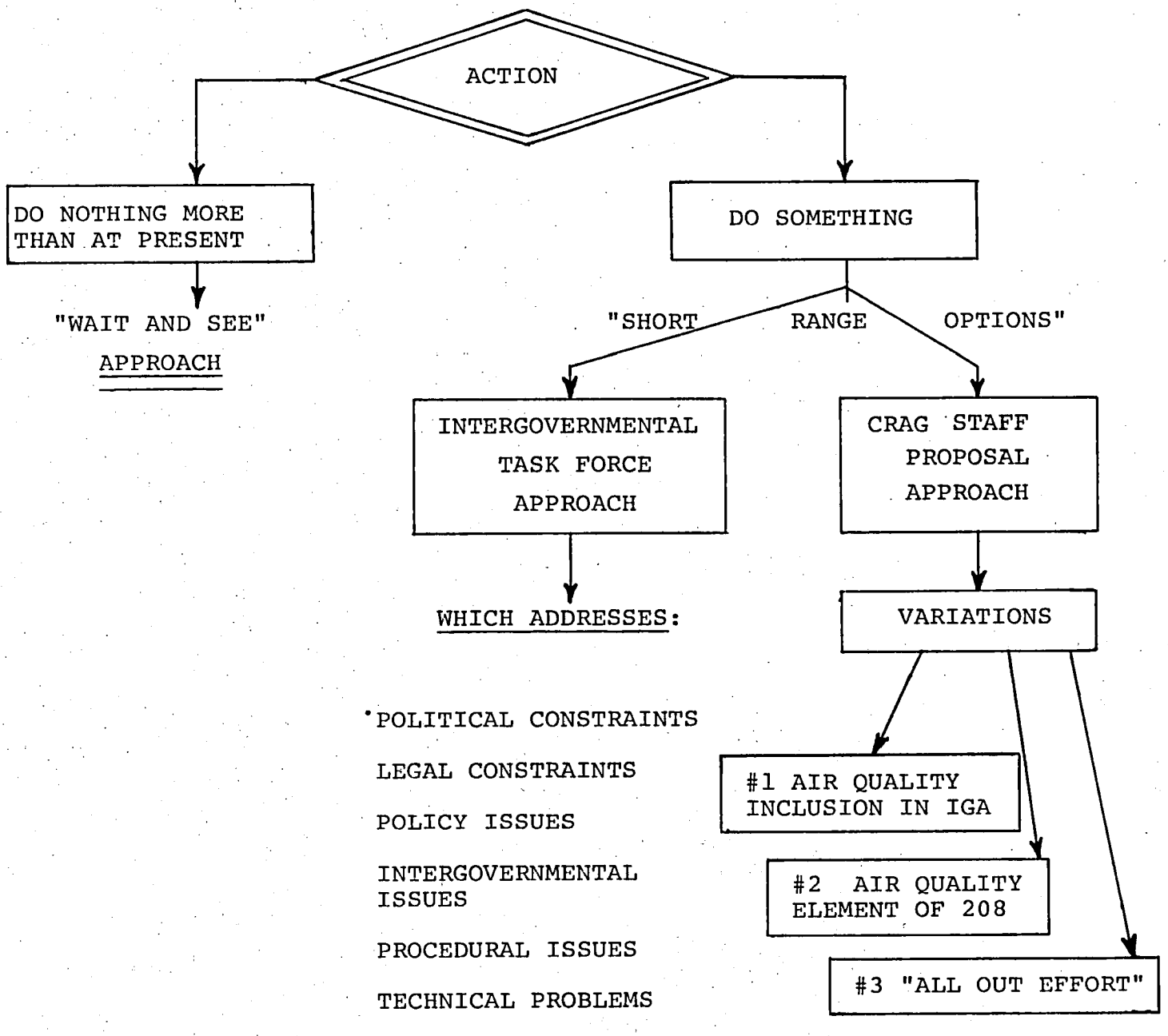
II. The Task Force Option

One route CRAG can go is to establish an intergovernmental task force (composed of member jurisdictions and state environmental agencies) and assign it the task of defining CRAG's role. The task force should be on the order of the Actions and Directions Committee used in coming up with SB 769 rather than on the order of the Governor's Task Force which relied on persons outside the area.

In general, the Task Force should address: political and legal constraints; policy, intergovernmental structure, and procedural issues; and the technical problems. Specifically, it should:

1. Identify CRAG goals, policies and actions;
2. Review existing institutional framework:
   a. local responsibility
   b. COG responsibility
   c. state responsibility
   d. APCA responsibility
3. Evaluate technical issues related to:
   a. personnel capabilities
   b. the map-model system
   c. participation (political, citizen, technical)
   d. plan credibility
4. Explore constraints
   a. time
   b. funding
   c. legal authority
   d. jurisdictional complexity
   e. certification requirements

FIGURE 12


ACTION
DO NOTHING MORE THAN AT PRESENT
"WAIT AND SEE" APPROACH
DO SOMETHING
"SHORT RANGE OPTIONS"
INTERGOVERNMENTAL TASK FORCE APPROACH
CRAG STAFF PROPOSAL APPROACH
WHICH ADDRESSES:
VARIATIONS
•POLITICAL CONSTRAINTS
LEGAL CONSTRAINTS
POLICY ISSUES
INTERGOVERNMENTAL ISSUES
PROCEDURAL ISSUES
TECHNICAL PROBLEMS
#1 AIR QUALITY INCLUSION IN IGA
#2 AIR QUALITY ELEMENT OF 208
#3 "ALL OUT EFFORT"

5. Examine coordination mechanisms.
6. Make recommendations.

Going the task force route assumes that there is no point in CRAG's going any further into air quality than it has already until it has determined what is politically and legally possible.

III. CRAG Staff Proposal Options

A. General

These options are all based on the same basic assumption. That assumption is that CRAG should take a lead position in defining its role because the timing seems appropriate (propitious, even)[1], funding may be made available[2], and the framework exists.

The assumption that CRAG should take a lead position in defining its role is also based on the following:

a. The rationale that air quality (like transportation and 208 planning) transcends local boundaries;
b. The recognition that air quality is an important aspect of comprehensive land use planning;
c. CRAG's own need to confront, at the work program level, 23 CFR 770 mandates, 208 requirements, and the coordination of these with its HUD and SB 769 activities;

B. Variations in the CRAG Staff Proposal Options

The variations are:

1. Development of a proposed air quality work program for inclusion in next year's IGA:[3]

2. Development of a proposed air quality element for the 208 plan;

3. Development of a separate proposal requiring additional and new sources of funding.

Variation 1 would represent a minimum effort using existing staff to develop materials for the AQMP under the direction of DOE/DEQ.

Variations 2 and 3 represent significantly expanded efforts requiring additional staffing and outside contractural services.

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[1] See page 55.

[2] See page 57.

[3] Intergrated Grant Application.

Variation 3 represents what might be called an "all out effort." It would cost in the neighborhood of $300,000 and would be spread over a two year period. Because Variation 2 can be developed from the work elements described in Variation 3, only Variation 3 is outlined.

C. Variation 3

1. Problem Statement

The relationships of land uses to air quality have been assumed but remain virtually untested. Recent studies indicate that transportation control strategies to decrease CO through disincentives to the automobile, coupled with incentives to mass transit, have resulted in increased pollution concentrations from other sources due to the higher density population, industrial, and commercial land use required to support mass transit.

Further studies may indicate that other land use strategies (e.g. emissions allocations) may have either similarly negative side effects or little effect at all because the assumptions underlying their usage have not been tested.

Very limited research has been done on the relationship of land use to air quality. What has been done has been inconclusive. Review of this research indicates that the techniques applied in modelling the land use end of the relationship have been less informed and less rigorous than those used in modelling the air sciences side. This proposal is therefore addressed to determining the land use/air quality relationship by more throughly researching the land use component.

2. Products

This proposal will result in the development of the following:

a. Pollution Emission Equivalents for population, economic, and land use activities

b. Pollution Concentration Indexes by land use activity, size and location

c. Air Quality-Constrained Growth Factors by land use type and location

d. Other

3. Work Elements leading to Products 1-3 on the previous page

a. Data gathering and computerization (using map-model system)

1. Land use inventory by parcel size by sub-area (see "b") with special emphasis on unused land (including vacant useable, flood plain and other unuseable, parks and other public open space) for use in determining the ability of same to dissipate pollutants, the capacity of sub-areas to absorb new growth, and for allocating projections.

2. Survey of existing zoning on vacant land to determine capacity of sub-areas to absorb particular types of growth and for use in allocating projections.

3. Industrial and major commercial facilities survey by location, acreage/square footage, process type/ fuel usage, and employment size.

4. Compilation of air sciences data (emissions, concentrations, meteorology, and topography) by sub-area.

b. Delineation of appropriate sub-areas for analytical purposes using land use as well as air sciences criteria such as meteorology and topography.

c. Cross classify data in (a) above with social/economic data from other sources.

d. Develop regional projections of housing, employment and population for use as control totals in allocating growth based on air-quality-constrained growth factors.

e. Run simulations and statistical tests of the relationships between air quality and land use using the data from (a) and (c) above in various combinations. Statistical tests shall include but not be limited to: limited data maximum likelihood, multiple regression, and nonlinear analyses.

4. Other Work Elements

a. Based on tested relationships between air quality and open unused land, reevaluate Park and Open Space Plan.

b. Develop model ordinances addressed specifically to air quality.

c. Develop a systems approach for analyzing interrelated impacts of land use, 208, transportation plans, and energy use on air quality.

d. Develop air quality/land use siting criteria for special industries.

e. Develop criteria for designation and procedures for protection of clean air areas.

f. Develop a model for evaluating the economic and social costs of proposed environmental policies and regulations.

g. Determine what additional work is required to determine the long run carrying capacity of the CRAG Area based on air, water, and land capacities.

ACRONYMS

AAQS	Ambient Air Quality Standards
APCA	Air Pollution Control Authority
AQCR	Air Quality Control Region
AQMA	Air Quality Maintenance Area
AQMP	Air Quality Maintenance Plan
AQTC	Air Quality Technical Committee
CIP	Capital Improvement Program
CO	Carbon Monoxide
COG	Council of Governments
CRAG	Columbia Region Association of Governments
CWAPA	Columbia Willamette Air Pollution Authority
DEQ	Department of Environmental Quality, State of Ore.
DOE	Department of Ecology, State of Washington
DOT	Department of Transportation, U.S.
EIS	Environmental Impact Statement
ENUF	Committee to End Needless Urban Freeways
EPA	Environmental Protection Agency
EQC	Environmental Quality Commission, State of Ore.
FHWA	Federal Highway Administration
HC	Hydrocarbons
H_2SO_4	Sulfuric Acid
HUD	Department of Housing and Urban Development
IDP	Interim Development Policy
IGA	Integrated Grant Application
MSD	Metropolitan Service District
NO_x	Nitrogen Oxides
NSPS	New Source Performance Standards
OAQPS	Office of Air Quality Planning and Standards
ODOT	Oregon Department of Transportation
OEC	Oregon Environmental Council
OTLUP	Office of Transportation and Land-Use Planning
PIAQCR	Portland Interstate Air Quality Control Region
RACT	Reasonably Available Control Technology
SAROAD	Storage and Retrieval of Areometric Data
SIP	State Implementation Plan
SMSA	Standard Metropolitan Statistical Area
SO_2	Sulfur Dioxide
STOP	Sensible Transportation Options for People
SWAPCA	Southwest Washington Air Pollution Control Authority
TPA	Transportation Planning Area
TSP	Total Suspended Particulates
UMTA	Urban Mass Transportation Administration
USA	Unified Sewerage Agency
UTM	Universal Transverse Mercator
VMT	Vehicle Miles Travelled
WSEC	Washington State Ecological Commission
WSHD	Washington State Department of Highways