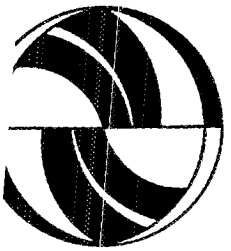

Seaport-Surface Transportation Access and Air Quality

Peter L. Shaw

Final Report
UCTC No. 181

The University of California
Transportation Center

University of California
Berkeley, CA 94720

The University of California
Transportation Center

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Seaport-Surface Transportation Access and Air Quality

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Final Report
October 1993

UCTC No. 181

The University of California Transportation Center
University of California at Berkeley

Disclaimer

The ideas, data and opinions expressed in this report are those of the author. They are designed to inform, clarify and suggest possible courses of action on this important subject.

The contents of the report do not represent the views of the research sponsors: U.S. Department of Transportation, California Department of Transportation, University of California, and California State University Long Beach (Graduate Center for Public Policy and Administration; Office of Research; Foundation).

EXECUTIVE SUMMARY

Seaports are dependent upon the supporting surface transportation network. Where port cargo volume is growing in already air-polluted urban areas, increased highway and rail traffic is perceived as exacerbating air quality conditions. In some seaport locations, stringent air quality control measures may impact operations and access, thereby possibly causing serious negative impacts on the economy. In still other areas, inadequate air quality controls may inadvertently foster more air pollution.

The challenge for such seaport-urban areas is to strike a balance, attempting to meet both trade/economic needs with air quality needs. Southern California may well be at the forefront of facing multifaceted and seemingly opposite public policy goals.

Two trends were evident through 1992. First, trade demands continued to grow, though regional economic growth was slowing. Second, Southern California undertook stronger steps to control air pollution. In 1987 State Senate Bill 151 gave the South Coast Air Quality Management District sweeping power to mandate: transportation control rules, indirect source control rules, standardized reporting on air quality, economic incentive systems, and rules on best available control technologies (BACT) for existing and new systems. It also increased authority over purchases of fleet vehicles (clean fuels), diesel fuel composition and curtailment of heavy-duty truck operation during rush hour.

Considering the complex background and current fluidity of the situation, this study is designed to explore the long-term major public policy perspectives of stakeholders in the issue by reviewing the following conceptual points: general access issues in urban areas; air quality regulations through 1992 (federal, state, local); policy stakeholders; and, policy strategies. The situation is reviewed from the perspective of key stakeholders: ocean carriers; seaports; land carriers (surface freight truck/rail); shippers; economic interests (workers, tax revenue, consumers); air quality (public health, technology, R&D); and, public policy.

The report is part of a series reviewing the relationship of urban seaports to their supporting surface transportation systems. The first report examined general surface transportation issues and seaports. The second work was a case study of an innovative model -- the Southern California Alameda Consolidated Transportation Corridor program. The third focused on seaports and surface transportation congestion. This fourth study, by examining air quality, concludes the multi-year review of the major factors affecting surface transportation access to seaports.

ACKNOWLEDGEMENTS

The subject of surface transportation access to seaports and air quality sharply focuses the sometimes seemingly opposing goals of public policy. In this case, the imperatives of international trade and clear and present local negative impacts are evident.

A certain sense of optimism was found in prior research contacts with many public and private officials. The economy was growing, new federal legislation added recognition and potential support to needs of surface transportation access. But it was obvious by 1992 that matters had reversed. The regional economy was very weak. Confidence in anticipated public and private resources diminished. Furthermore, air quality officials tempered proposed control strategies to reflect economic realities and the public mood of economic fear. Southern California was still experiencing a wrenching economic restructuring and downsizing, especially aerospace. All in all, the sense of the desirable in terms of air quality became more a sense of slowing down or gradualism. Accordingly, the goal of clean air often may need to be carefully balanced and readjusted as regional conditions fluctuate. With that in mind, most officials believed the needs of trade and its supporting surface transportation can be served while meeting air quality needs.

The author greatly appreciates their insight and assistance: U.S. Department of Transportation (Office of the Secretary, Federal Highway Administration, Maritime Administration); U.S. Army Corps of Engineers; Transportation Research Board; American Association of Port Authorities; American Association of Railroads; American Trucking Association; California Transportation Commission; California Department of Transportation; Southern California Association of Governments; South Coast Air Quality Management District; Los Angeles County Transportation Commission; City of Long Beach; Port of Long Beach; City of Los Angeles; Port of Los Angeles; Propeller Club of the United States --Ports of Long Beach/Los Angeles Chapter.

Valuable administrative and technical assistance were provided by the U.C. University Transportation Center, Berkeley and the U.C. Institute for Transportation Studies, Irvine. Melvin M. Webber, Wilfred Recker and their staff provided important guidance and support. At California State University Long Beach, timely assistance was also appreciated from the Foundation, Office of Research and Graduate Center for Public Policy and Administration.

Two Transportation Fellows, Anna Day and David Sutton, were excellent researchers and colleagues on the project team.

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SEAPORT-SURFACE TRANSPORTATION ACCESS AND AIR QUALITY

Introduction

Seaports are dependent upon the supporting surface transportation network. Where port cargo volume is growing in already air-polluted urban areas, increased highway and rail traffic is perceived as exacerbating air quality conditions. In some seaport locations, stringent air quality control measures may impact operations and access, thereby possibly causing serious negative impacts on the economy. In still other areas, inadequate air quality controls may inadvertently foster more air pollution.

The challenge for such seaport-urban areas is to strike a balance, attempting to meet both trade/economic needs with air quality needs. Southern California may well be at the forefront of facing multifaceted and seemingly opposite public policy goals.

Two trends were evident through 1992. First, trade demands continued to grow, though regional economic growth was slowing. Second, Southern California undertook stronger steps to control air pollution. In 1987 State Senate Bill 151 gave the South Coast Air Quality District sweeping power to mandate: transportation control rules, indirect source control rules, standardized reporting on air quality, economic incentive systems, and rules on best available control technologies (BACT) for existing and new systems. It also increased authority over purchases of fleet vehicles (clean fuels), diesel fuel composition and curtailment of heavy-duty truck operation during rush hour.

Purpose

Southern California may be facing a Hobsonian choice or at the very least, one in which there are no clear winners. Traditionally, the crucible of public policy would be expected to "hash" it out, air all sides in a methodical, linear logical analytic sequence. All perspectives would be considered and a reasoned result, balancing all interests, would likely occur. To date, that outcome has not been fully evident.

Considering the complex background and current fluidity of the situation, this study is designed to explore the long-term major public policy perspectives of stakeholders in the issue by reviewing the following conceptual points:

1. general access issues in urban areas

2. air quality regulations

3. policy stakeholders

4. policy strategies

Significance

This study is the final phase in a four-part series reviewing the relationship of urban seaports to their supporting surface transportation systems. The first report examined general surface transportation issues and seaports.[1] The second work was a case study of an innovative model -- the Southern California Alameda Corridor program.[2] The third focused on seaports and surface transportation congestion.[3] This fourth report, by examining air quality, concludes this multi-year review of the major factors affecting surface transportation access to seaports.

As stated earlier, seaports in large urban areas are dependent upon their urban surface transportation network. Should that surface system of highway and rail transportation become less economic and efficient for any reason, then the seaport itself may well become less competitive on a regional if not coastal comparative basis.

Where port trade volume is growing, e.g., Southern California, surface transportation air pollution impacts are causing concern. Ports realize, as a "good civic member" of the urban community, that it is desirable to find ways to lessen such negative impacts on the quality of air in port and urban areas.

In the case of Southern California, the ports and supporting surface transportation systems now have institutional and legal incentives and disincentives. If they do not respond, the economic

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[1]Peter L. Shaw, Surface Transportation Policy and Seaports (University of California University Transportation Center, 1992, UCTC 138).

[2]John K. Parker, Alameda Corridor Consolidated Transportation Authority (University of California University Transportation Center, 1992).

[3]Peter L. Shaw, Seaport-Surface Transportation Access and Urban Transportation Congestion (University of California University Transportation Center, 1992, UCTC 116).

viability of the area is at risk. Transportation investments and actions must now factor in air quality controls as a cost of business and normal operations. Furthermore, if status quo continues, declining service due to congestion and tighter air quality controls will almost certainly lead to serious economic impacts.

California State Senate Bill 151 (1987) reorganized the board of the South Coast Air Quality Management District (AQMD), provided sweeping new power to impose pollution controls on residents and business and required new programs. The law required the AQMD to take certain actions:

Transportation Control Rules: Develop transportation control measures. In developing such regulations, the District is directed to consult with the Department of Transportation, the California Highway Patrol and the transportation commission of each county. Transportation control measures can include synchronization of traffic lights, carpool lanes on freeways, improved traffic flow through use of one-way streets, or freight delivery restrictions (time of day, route).

Indirect Source Controls Rules: Develop rules for indirect source controls in areas where there are high pollutant concentrations or for new facilities that would have a significant air quality effect, and to incorporate them into the Air Quality Management Plan. Indirect sources are facilities such as shopping centers or stadiums which attract large number of vehicles, thereby increasing emissions in the area.

Economic Incentive System: Prepare and submit to the Legislature and California Air Resources Board a draft plan for rules and regulations for a system of emission charges as an economic incentive system for reducing emissions and improving air quality.

Rules on BACT and BARCT: Adopt rules requiring Best Available Control Technology (BACT) for new and modified sources and the use of Best Available Retrofit Control Technology (BARCT) for existing sources.

Clean Fuel Vehicle Purchase for Fleets: The District can require operators of public and commercial fleet vehicles consisting of 15 or more vehicles to purchase vehicles capable of operating on methanol or other clean burning fuels.

Diesel Fuel Composition: After one year, the District

Board is authorized to adopt rules that specify the composition of diesel fuel to be sold in the South Coast Air Basin. If the District exercises its authority,it could adopt rules requiring cleaner diesel fuel that has lower emission rates. These rules must be approved by the California Air Resources Board.

Curtailment of Heavy-Duty Truck Operation During Rush Hour: The District Board may adopt rules that prohibit or restrict most heavy-duty truck travel during hours of heaviest traffic on freeway and other high-traffic highways. This would result in improved traffic flow, thereby causing reduced emissions. The District is required to consult with transportation agencies in the development of these rules.

The statute was designed for point (single source) or non-point (diffuse sources) generators of air pollution. Surface transportation is viewed as both. As a point source, a facility in one area, or concentration of facilities would create potentially significant levels of pollution. For example, a railroad classification yard, freeway interchange, intermodal container transfer facility represent point sources. If the emissions are severe enough, even a linear corridor such as a right-of-way would be considered one. In contrast, nonpoint sources are those that are more diffused in an area. One million automobiles and trucks, by virtue of their ubiquitous presence, seem to be everywhere.

Lastly, what is the perspective of the key stakeholders:

1. ocean carriers
2. seaports
3. land carriers (surface freight truck/rail)
4. shippers

And how do the interests of the stakeholders fit with the governmental goals relating to the:

5. economy (workers, tax revenue, consumers)
6. air quality (public health, technology, R&D)
7. public policy (other related functions)

Research Approach

The topic of air quality and the role of surface transportation to seaports appears to be straightforward. However for a variety of legitimate reasons, the short-term context of public policy for transportation and environmental quality has been evolving quickly. Such transformation is principally caused by a deteriorating economy in Southern California and the state of California at a time when technology is beginning to reify the goals of air quality public policy.

Southern California has been experiencing at least a five year recession yielding long-term structural changes: shrinkage in overall employment; declining workforce skills; and falling tax revenues for local and state government while there is greater public demand for social services and other governmental programs. By the summer of 1992, large local and state governmental service cutbacks were necessary.

The same shift in background context occurred for the previous year's study on congestion. Unfortunately, the same negative forces evident in 1990-1991 were worsening in 1992.

In short, neither the urgency of the problem nor the institutional capability for effective solution are looming on the near horizon. Other pressing issues, such as defense base closures, aerospace industry reductions, immigration, social stress, public education and safety and related fiscal crises, have taken center stage.

At the technical level, work is still being done and progress made. For the most part, any action which results in a further loss of regional jobs, tax revenue and more outmigration will almost automatically be put on hold until the situation stabilizes. Actions might be considered if they are perceived as not leading to any of the above.

Keeping these conditions and trends very much in mind, research of federal, state and local government sources was conducted. Increasingly, a related body of literature is available as the nation focuses upon air quality. California has developed a large statutory core of air quality programs. Related transportation programs at the state and federal level have been developed and now are influencing air quality decisions.

The Transportation Research Board started to focus on the subject. In 1991-1992, four major initiatives were undertaken:

1. **Conference Roundtable - Ports-Public Policy Issues:** at the annual national 1991 TRB meeting, a special Roundtable on "Ports-Public Policy Issues" (Panel Session No. 93, January 15, 1991) addressed the subject.[4] A proceedings of the roundtable has been published as a TRB Circular.[5] The author organized the roundtable and edited the proceedings.

2. **Research Advisory Committee - Ports-Land Access Issues:** TRB studied ports-land access issues under contract to the U.S. Department of Transportation, Maritime Administration. Advisory committee meetings addressed intermodal container cargo and bulk cargo issues. An interim report to Congress was published, summer 1991[6] and a first phase final report, February 1992.[7] The author served on the Advisory Committee. Successful influence on federal transportation legislation was achieved by suggesting that intermodal concepts, needs, seaports and trade considerations be incorporated. The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) addressed such issues.[8]

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[4]Transportation Research Board, Roundtable on Ports-Public Policy Issues (TRB Annual Conference, Panel No. 93, January 15, 1991). Panelists represented key elements of government and industry: Arlene L. Dietz, U.S. Army Corps of Engineers, Robert Remen, California Transportation Commission, Lawrence D. Dahms, Metropolitan Transportation Commission, Gill V. Hicks, Alameda Corridor Transportation Authority, David J. Hensing, American Association of State Highway and Transportation Officials, D. Henry Watts, Norfolk Southern Corporation, Robert E. Farris, American Trucking Associations, Erik Stromberg, American Association of Port Authorities, Carl W. Stenberg, American Society for Public Administration.

[5]Peter L. Shaw, Editor, Transportation Research Board Proceedings of the Roundtable on Ports-Land Access:Public Policy Issues (TRB Circular 391, March 1992).

[6]Transportation Research Board Committee on Landside Access to General Cargo Seaports, Interim Report (TRB Policy Study Committee, August 1991).

[7]Transportation Research Board Committee on Landside Access to Seaports, Landside Access to U.S. Ports; Phase 1: General Cargo Ports (TRB Policy Study Committee, February 1992).

[8]U.S. Statute, Intermodal Surface Transportation and Efficiency Act of 1991 (U.S. Congress, Conference Report to Accompany H.R. 2950, Report 102-404, November 27, 1991).

3. **Conference on Strategic Planning and Management Issues for U.S. Seaports:** TRB conducted a special meeting to focus on long-term issues and published a proceedings.[9] The author served on the Conference Steering Committee.

4. **Conference on Intermodalism:** Planning for a major conference was initiated and the meeting was scheduled for December 1992 at the National Academy of Sciences' Beckman Center, University of California, Irvine. The authored served on the planning committee.

First hand information was obtained by participating in these TRB programs and in access to primary documents. For example, the American Association of Port Authorities and the U.S. Maritime Administration conducted a special survey of ports on the access question. U.S. Department of Transportation officials (Federal Highway Administration, Maritime Administration and Urban Mass Transportation Administration) sent field teams to ten major urban port locations to examine local access problems and conduct hearings. In a separate function by the California Business, Transportation and Housing Agency, a **Conference on Intermodal Goods Movement** was conducted in Sacramento, June 8-10, 1992. The author served as moderator for a panel on "Constraints and Opportunities for Transportation Providers in National and International Trade."[10] These contacts included representatives of federal, state and local government, and rail, truck and ocean carriers, and shipper and broker interests. All in all, such formal and informal contact with many leading public and private senior executives provided a rich background of perspective and insight.

Research Questions

Previous research identified primary and secondary sets of issues regarding surface transportation access systems to seaports. In that work, urban transportation air quality was found to be a significant factor for current operational and future planning and investment decisions. Thus this research investigates the following critical elements:

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[9]Transportation Research Board, Proceedings for TRB Conference on Maritime Transportation Strategic Planning (TRB, June 5-7, 1991, Transportation Research Circular 392, March 1992).

[10]California Business, Transportation and Housing Agency, Intermodal Goods Movement Conference - Proceedings (Sacramento, October 1992).

1. what is the general context of air quality issues:

   - in the nation,

   - in California,

   - in Southern California?

2. what air quality issues relate to Southern California seaport surface transportation?

3. what policy stakeholders frame the issues?

4. what policy strategies appear more promising to improve access air quality problems?

Limitations and Constraints

Several points should be made about research limitations and constraints. This broad and conceptual policy oriented discussion is small in scale. It is not a detailed economic, engineering or environmental study. Second, public data are often limited, old, and closely held. Such a high visibility topic as air quality can be all too politically charged and misunderstood. Third, most officials preferred discussions without attribution. A promise of anonymity enhanced informal and insightful background discussions.

Organization of Study

The study is organized in the following chapters:

II -- Access Issues in Urban Areas

III -- Air Quality Regulations

IV -- Policy Stakeholders

V -- Policy Strategies

VI -- Appendix

VII -- Bibliography

Chapter II

ACCESS ISSUES IN URBAN AREAS

Introduction

Land access to seaports may be discussed at two levels: general access as with any other major surface cargo travel demand generator; and, isolated as special situation demand generators. Though seaport land access problems may appear little different than other urban cargo flows, they are distinct enough to warrant special investigation. This chapter will review the surface transportation system access issues in general terms for the nation and California. Chapter III will explore air quality regulations and how they relate to surface frieght access to seaports in Southern California.

The following section is excerpted from the earlier study of congestion.[1] To understand more fully the context in which air quality issues rise to the surface, it is important to review related access problems experienced by surface freight flows:

1. supply
2. demand
3. equipment
4. right of way
5. technology
6. environment
7. safety
8. permits
9. labor
10. management
11. funds

The list was formulated after close study of numerous source documents and the perspectives of many interests. At the federal level, at least seven organizations with many large subunits play important roles. National public interest/trade association groups number at least fifteen. In the case of California, state and local organizations exceed fifteen and public interest/trade association groups number at least eight. These are the major players. Other organizations have peripheral interests in that the problems they identify relate to their specific function.

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[1]Peter L. Shaw, Seaport-Surface Transportation Access and Urban Transportation Congestion (University of California University Transportation Center, 1992, UCTC 116), see Chapter III.

Supply

The general supply and condition of port land access infrastructure are to large degree functions of cargo and transport networks. First, the cargo type and volume historically passing through the ports already have influenced existing supply of transport. Port tradition and specialization set up the parameters, e.g., rail, trucking, pipeline, intermodal. Second, the transport network of the larger urban area also places upper limits on throughput capacity. Both factors become even more complex when combined into intermodal activities.[2]

Current trends in port administration[3] respond to such forces and in turn begin to influence them. For example, if a port goal is to increase cargo throughput, strategic planning may lead to port specialization rather than attempting to be everything.

The basic highway system providing port access, especially to the Interstate system,[4] is in place:

> Of the 163 major ports examined in the continental U.S., 16 with greater than 1 million tons handled per year are greater than 25 miles off the Interstate System and are not connected to the System by a divided highway with four or more lanes. Many of these are terminals for pipelines and other logistical systems that are not highway-dependent.
>
> Of the 204 intermodal facilities examined, only two are off the Interstate System by greater than 25 miles and are not connected to the System by a divided highway with four or more lanes.

---

[2]For a comprehensive overview of how these forces interrelate, see: U.S. National Council on Public Works Improvement, The Nation's Public Works: Report on Intermodal Transportation (Superintendent of Documents, May 1987).

[3] U.S. Department of Transportation, Maritime Administration, A Report to the Congress on the Status of the Public Ports of the United States, 1986-1987 (Superintendent of Documents, September 1988), pp. 5-15.

[4]U.S. Department of Transportation, Federal Highway Administration, The Future National Highway Program, 1991 and Beyond: Intercity and Interstate Travel and Network Connectivity (FHWA, Working Paper No. 11, April 1988), p. ES-3.

By deduction, according to the FHWA data, ports would be concerned more by the condition of the transportation infrastructure supply. In areas with considerable cargo throughput growth (Southern California), an additional concern is the sheer capacity of the existing system to handle both freight and passenger traffic.

The American Association of State Highway Officials (AASHTO) surveyed its member state organizations and determined[5] that water transportation goals cited were: preservation; funding; safety; and, access. "Intermodal connections between the water mode and other surface transportation modes should be preserved and enhanced where there is a clear public benefit." Furthermore, waterfront development pressures lead to problems of efficiency and capacity of existing port terminals and their inland connections.

Outside port urban areas, there was concern about the adequacy of the existing system. The Highway Users Federation[6] conducted forums throughout the nation. Witnesses at many of the 2020 state forums - including Alabama, Idaho, Maine, Maryland, Minnesota, Ohio, Oregon, Texas, and others - brought out the need "to improve highway and rail service from the areas of production to the ports of embarkation (sic)."

For California, growing interest in water port problems[7] focussed on the: state's role in port development; related access problems; and, role of ports in economic development.

More specific concern was identified by the California Legislature. A resolution,[8] submitted by State Senator John Garimendi, linked seaports with the state's economic health and the vitality of its ports. As a central factor in the landside access: "Many ports, in light of their current financial problems, cannot

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[5]American Association of State Highway and Transportation Officials, New Transportation Concepts for a New Century: AASHTO Policy Recommendations on the Direction of the Future Federal Surface Transportation Program and for a National Transportation Policy (AASHTO, July, 1989 Edition), pp. E-16 to E-18.

[6]Highway Users Federation, Advisory Committee on Highway Policy, 2020 Transportation Program, Beyond Gridlock: The Future of Mobility as the Public Sees It (HUF, June 1988), p. 25.

[7]California Economic Development Corporation, Vision: California 2010; A Special Report to the Governor (CEDC, March 1988), p. 38.

[8]California Senate, Senate Concurrent Resolution No. 96, Relative to Improving Transportation to Ports (Calif. Senate, SCR 96, Garamendi, Resolution Chapter 121, September 8, 1988), p. 1.

take on the additional burden of maintaining and improving surface access..." The resulting study presented two levels of problems; basic congestion in California and special port access problems.[9]

Basic congestion was already severe:

* Californians lose 400,000 hours per day due to congestion on freeways, and that delay is projected to increase 74 percent by 1995 and climb another 65 percent by 2005.

* Currently, 300 miles of the state freeway system suffer from recurring congestion, compared with an average of 30 miles of daily freeway congestion in 1963.

* On the Los Angeles and San Francisco freeways, congestion is increasing at annual rates of 15 and 27 percent, respectively.

Special California port access problems relate to highways and railroads.

Some ports in the state are served by state freeways, others by local streets and roads. "The degree to which ports are a major contributor to truck traffic and highway congestion can seriously impact the ability of a port to expand, with a resulting loss in economic benefits to the surrounding community."

Due to the increase in land-bridge type services, more cargo is directed to railroad container traffic. "On-dock" and "near-dock" facilities loading "double stack" container trains help to reduce truck highway usage. But "vertical clearances of key railroad tunnels" is a concern. "...the Port of Oakland has already participated; financially in tunnel improvements far outside the port area..." In Southern California, increased rail traffic now conflicts with local street grade-crossings. The rail network is inadequate for present uses.

Demand

In the major metropolitan areas of the nation, whether coastal or inland, surface transportation facilities are under stress. The facilities are overloaded for several reasons: rapid population growth, easier access to automobiles, more trucks carrying cargo,

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[9]California Transportation Commission, California Department of Transportation, California Association of Port Authorities, Improving Access to California's Ports (CTC, Feb. 1990), pp. 7-11.

aging highway/transit infrastructure, travel demand in areas not fully transportation developed, and low cost gasoline. These possible explanations for congestion appears to be constant in almost all large urban areas. Locations more affected are the newer urban areas, experiencing the most growth in the last two decades. They also indicate an intricate interrelationship of population, service demand, and aging and/or overused infrastructure. Many of these factors affect seaport access via surface transportation systems.[10]

In general terms, six trends shape the traffic congestion problem:[11] suburban development, economic, labor force, automobile use, truck traffic, and highway infrastructure.

The overall national picture is one of declining mobility in urban areas. The principal cause is the "work-trip", that is, commuting. Motor carrier trips are growing at a much slower rate. Automobiles represent the majority of vehicles at any given time in general on commuting routes. Still, there is a citizen perception of "too many trucks on the road at rush hour" and "too many big truck accidents." That leaves the unanswerable question of: what is too many? In effect, urban areas with congestion problems have experienced a worsening from 1982 to 1988.[12]

Los Angeles and many seaport urban areas rank highly for costs: recurring delay, incident delay, recurring fuel, incident fuel, delay and fuel cost, and insurance. The total valuation for Los Angeles is over $6.8 billion.

Such high levels of general congestion spill over to seaport areas. Fifty percent of the respondents to an American Association of Port Authorities survey considered congestion to be "usually or always" a concern. AASHTO emphasized highway linkage to other modes:[13] "A large part of transport costs and delays is produced by inadequate systems for getting goods and people to airports, seaports and intermodal terminals." The impact of trade and the heavy burden it places on the domestic transportation system was

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[10]U.S. Congress, Office of Technology Assessment, Delivering the Goods, Summary-Public Works Technologies, Management, and Financing (OTA-SET-478, April 1991), pp. 1-4.

[11]U.S. General Accounting Office, Traffic Congestion: Trends, Measures, and Effects (GAO/PEMD-90-1, November 1989), pp. 15-47.

[12]Texas Transportation Institute, Roadway Congestion in Major Urbanized Areas 1982 to 1988 (TTI, July 1990), pp. i-xv.

[13]American Association of State Highway and Transportation Officials, The Bottom Line: A Summary of Surface Transportation Investment Requirements, 1988-2020 (AASHTO, September 1988), p.7.

addressed:[14]

> Access to ports has a number of elements reflecting the extensive coastal and inland waterway port systems. A key concern is that over 40 percent of the terminals at deep-draft ports are located in cities of over 500,000 population, making expansion and access both difficult and expensive.
>
> ...in physical terms, lane mile requirements included 220 Interstate and 393 other lane miles in metropolitan areas, and 86 Interstate and 717 other lane miles in rural areas. Several states also identified rail access to ports as a crucial question, with needs for capital for improved rail access placed at about $720 million.[15]

Other organizations, concerned by port access, believed too that demand was increasing. Agricultural interests were particularly concerned:[16] "America's waterborne trade is totally dependent on rail and highway access for delivering outbound products from farms, ranches, and factories all over the U.S. to ports." Cities valued the economic nature of intermodal movement of goods in meeting municipal goals.[17]

Intermodalism is also influencing demand in general and modal allocation:[18]

> Although competition will always exist, traditional lines between modes are blurring in the face of shippers' desires to see goods moved swiftly, safely and economically.
>
> ***
>
> Intermodalism is not new to water transport users - literally all of their cargoes move intermodally.

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[14]Ibid., p. 41.

[15]Ibid., p. 42.

[16]American Farm Bureau Federation, George L. Berg, Jr., Statement of the American Farm Bureau Federation to the U.S. Department of Transportation Regarding Rural America Transportation Issues (AFBF, July 17, 1989), p. 2, pp.7-8.

[17]National League of Cities, National Municipal Policy (NLC, December 7, 1988), pp. 89-90.

[18]Hoel, Lester A. and Koltnow, Peter G. "Transportation--Coming Changes and Strategies," TR News (July-August 1988), pp. 3-4.

Shippers and service purchasers are mixing and matching transport services to effect greater efficiencies and cost advantages. In many cases, out-of-pocket transportation charges are secondary to measures of service. As shipping agents have become asset managers and transportation has come to be viewed as part of the production process, shippers have become increasingly sophisticated about purchased transportation and more willing to take full advantage of each mode.

Greater freedom of choice for the shipper has been mirrored by new attitudes on the part of carriers. Modal managers are becoming more attuned to the needs of their customers. There is a rapid expansion of service provision and customer interaction.

In California, cargo tonnage growth is expected to grow over three times:[19]

...During fiscal year 1988, over 166 million metric revenue tons of cargo flowed through California's ports. This volume is expected to grow to over 524 million metric revenue tons by 2020.

To keep pace with the burgeoning Pacific Rim trade, harbor facilities -- wharves, docks, etc., -- must expand. Expansion and modernization of harbor facilities are meaningless **without adequate highway and railroad access to move the cargo to and from the docks.** (Emphasis added.)

The projects necessary to meet anticipated demand include:[20]

* road access to regional arterial routes
* rail grade separations at crossings
* consolidation of rail lines
* improvements to both rail yards and main line trackage
* cargo traffic diversion to other modes or reducing traffic peaks.

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[19]California Transportation Commission, op. cit., p. 1.

[20]Ibid., p. 11.

The Southern California part of state-wide demand considerations has already moved into the action phase. The Southern California Association of Governments (SCAG) addressed port access in its regional transportation plan. The SCAG Mobility Plan emphasized:[21]

1. complete Ports Highway Demonstration Program (highway widening, interchange improvements and grade separations)

2. form JPA (Joint Powers Authority) for the Consolidated Railroad Corridor

3. conduct engineering, obtain financing and environmental clearances

4. begin construction of the Consolidated Railroad Corridor

5. initiate planning, engineering, and construction of new on-dock or additional near-dock container loading yards

In general, the effects of overall demand growth for urban travel has placed large strain on all elements of the system. Urban congestion in some areas almost overwhelms the transportation infrastructure. Seaport-surface freight access is very much caught up in the larger web of high demand and congestion.[22]

Equipment

The category of equipment differs from the next category, Right of Way, in that equipment is the actual vehicle of transport, e.g., a ship, truck, container, rail rolling stock and cargo transfer support facilities.

The basic dynamic of loading/unloading from one mode to another has remained the same, however the capacity and sophistication of the equipment have changed. In the last twenty

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[21]Southern California Association of Governments, Regional Mobility Plan (SCAG, February 1989), pp. V-41 to V-46.

[22]U.S.General Accounting Office, Transportation Infrastructure, Reshaping the Federal Role Poses Significant Challenge for Policy Makers (Superintendent of Documents, GAO/RCED-90-81A, December 1989), pp. 1-9.

years considerable change has occurred in the kind of equipment used, its capabilities and operating characteristics. The general trend is toward larger ships, longer trains, longer trucks, larger containers, etc. Often, standards are set by international carriers thus forcing domestic systems to readjust, if to stay competitive. Such costs are borne primarily by the private sector.

At some point, the design maximum capacity of support structures limits such increases. Ports, railroads and motor carriers have sizeable investments in capital equipment. Simply maintaining current stock is very expensive. In the intensely competitive era of deregulation, most railroads and motor carriers do not have the fiscal resources necessary to invest heavily in the newest equipment. For many, profit margins are so slim that equipment is rapidly deteriorating, especially trucking.

The Intermodal Container Transfer Facility in Southern California (Port of Los Angeles, Southern Pacific) illustrates frustrations with design assumptions. Double-stack container trains were originally envisioned to be no more than one mile long. Cargo growth has been so fast since opening in 1987 that already unit trains must be split into two sections in order to access the ICTF yard. The ultimate limit on unit train length is the length of the rail siding (for passing) on one track lines -- about 1.5 miles.

Right-of-Way

In the more populated urban areas, seaport land-access routes are limited. The majority of rights-of-way (ROW) were acquired and developed when the surrounding area was far less urban, if not rural. Now, such areas are faced with obtaining the maximum utilization of the ROW corridors. A related problem is the support area necessary for the main-line operations on the ROWs.

Whether ROW or support area, ownership may be private, public, or some combined form. One sector ownership is exemplified by rail ROWs (private rail carriers), pipelines (private petroleum/natural gas corporations) or highway ROWs (public agencies). The combined form is found in the railroad passenger or freight terminal operating authority, harbor belt lines or public utility operators (shares owned by private and public sector). A recent case is the Consolidated Transportation Corridor Joint Powers Authority in Southern California (two ports, three railroads and eight municipalities, two county units (Board, Transportation

Commission).[23]

Assuming continued trade growth and carrier and facility modernization, ROWs may be antiquated in capabilities or routing and affect railroads and trucking.[24]

In the Northeast rail track limitations, especially bridge and tunnel clearances affect

> ...many main and port access lines. Existing height, width, load limits and curve radii restrict the use of double-stack equipment in this region. These limits prevent rail and shipping operators from realizing the economies which this technology can yield.
>
> A second issue is the need to provide direct and efficient connections between main line routes and port container terminals.

And for trucking:

> While rail-marine access at ports is capturing more attention, the ability to move trucks to and from marine terminals quickly is of equal importance. Perhaps, in terms of volume and the unitary nature of trucks, it is more important. Direct access to major highways and interstate routes will be a critical concern for those U.S. ports experiencing major increases in the volume of container traffic.

In testimony to the National Transportation Policy outreach sessions, the American Association of Port Authorities believed stated that there was a need for intermodal corridors through urban port cities.[25] More specifically, AAPA advanced the idea that federal policy should take action: "Intermodal connections between ports and inland surface transportation networks are not adequate

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[23]Joint Powers Authority, Consolidated Transportation Corridor (JPA, May 1990), p. 3.

[24]U.S. Department of Transportation, Maritime Administration, A Report to the Congress on the Status of the Public Ports of the United States, 1986-1987 (Superintendent of Documents, September 1988), pp. 5-15.

[25] Schulz, John D. "'Experts' Opinions by Modes Emanate in Transportation Policy Comments," Traffic World (September 11, 1989), pp. 9-11.

to service current and projected needs."[26]

Technology

The concept of technology cuts across several spheres of interest: equipment, right-of-way and communications. All of these components are integrated by management and labor. As suggested earlier, the intermodal aspect of technology is the biggest change.

The centrality of intermodalism and its technology is explained by the National Council on Public Works Improvement:[27]

> ...intermodal transportation will be defined broadly as the movement of goods and/or persons by two or more modes of transportation between specific origins and destinations....
>
> Whatever the level of intermodality, for intermodal transportation to work efficiently, there must be a coordinated interface as freight or people transfer from one mode to the other. The intermodal transportation network comprises a mix of public and private sector operations, and, within the public sector, every level of government is involved. Intermodal freight involves a complex continuum of interchanges ranging from general to bulk to liquid cargo carried in a variety of packages, from bags to steel containers.
>
> ***
>
> Urban regions typically serve as "nodes" in which intracity, intercity, and international movements originate and/or terminate. Urbanized areas are also the primary location for most intermodal facilities and services. There are, of course, intermodal facilities located in more ruralized areas, particularly as they relate to specific commodities (such as agricultural or other bulk products). By and large however, major commodity interchanges most frequently occur in urbanized regions.

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[26]American Association of Port Authorities, National Transportation Policy -- Port Comments, Letter to U.S. DOT Secretary (AAPA, September 1, 1989), p. 7.

[27]U.S. National Council on Public Works Improvement, op. cit., p. 1.

In order to function smoothly, certain ingredients for a viable intermodal system are necessary:[28]

1. integrated and coordinated infrastructure
2. integrated and standardized facilities and equipment
3. coordinated communication
4. coordinated management administration
5. coordinated paperwork (documentation)
6. clarity of liability responsibility

When there is a mismatch, additional costs result. Competition for scarce urban space may result. Consequently, international logistical and economic imperatives begin to drive local urban arrangements and choices.

Bigger ships, to illustrate, carry more freight to transfer which stress surface logistics. Larger infrastructure then becomes necessary to handle larger international volumes.

If the nation is to remain competitive, it must conform to international changes especially as technology requires. If it does not, then the consumer ultimately will pay higher costs.

Environment

Increased trade through the seaports generates additional surface transportation activity. Environmental impacts may result from the seaport facility operation and expansion and from transportation access.

The more direct impacts are upon air quality, noise quality, energy needs and urban mobility. For Southern California, these are already of significance and being considered potential candidates for strong governmental regulatory involvement.

Increased cargo flows also create attendant negative spillovers in the port area:[29]

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[28] Ibid., p. i.

[29] U.S. Department of Transportation, Maritime Administration, op. cit., pp. 5-15.

* polluting air emissions directly from the ships and support equipment

* waterfront land use gentrification: mixed residential, commercial, recreational use

* displaced many traditional maritime functions

* waterfront land use - shipyard redeployment: switch over to cargo handling under same owner

Extensive California law comes into play when there may be environmental impacts. Three major state requirements for review of transportation-caused environmental impacts are:

* general plan guidelines for local government[30]

* environmental statutes[31]

* the Coastal Commission[32]

Others at the local level are illustrated by the South Coast Air Quality Management District's extraordinary powers to control transportation sources.[33]

Environmental considerations play an important role in the permitting process as well.

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[30]State of California, Governor's Office of Planning and Research, State of California General Plan Guidelines (OPR, June 1987), Chapters III, IV.

[31]State of California, Governor's Office of Planning and Research, Office of Permit Assistance, CEQA: California Environmental Quality Act (OPR, June 1986).

[32]State of California, California Coastal Act of 1976 (Public Resources Code Sections 30000 et. seq.).

[33]South Coast Air Quality Management District, Air Quality Plan (SCAQMD, March 1989).

Safety

The general condition of the highway and bridge system is not reassuring. Highways and water resources received grades of C+ and B, respectively.[34] The system is at that transition point where reinvestments are necessary to avoid the point-of-no-return.[35]

Despite headline grabbing news, rail safety has improved considerably from 1978-1988.[36] Some urban areas facing congestion might have more accidents if highway/rail traffic is not separated. As trade cargo grows, there may be further opportunity for accidents.

Pipeline safety has the potential to become more of a concern on account of greater petroleum and natural gas importation from abroad. Projections suggest that by the year 2010 about two-thirds of domestic U.S. will be imported. Failure of pipelines is caused by outside forces (40% - excavation, natural causes), corrosion (20%) and other reasons (40% - such as construction and material defects, equipment failures and incorrect operation). Overall, there is improvement in the failure rates of gas pipelines (substantial) and liquid pipelines (modest).[37] Of course, if the location is populated, there may be many more fatalities and injuries. Thus seaports in densely populated urban areas are particularly at risk as volume increases.

In summary, comparative data among the modes indicates that motor vehicles account for almost eighty percent of transportation fatalities, of which trucks cause about twenty percent.

Permits

As urban areas become more densely populated, congested, polluted and infrastructure stressed, the role of governmental permits take on a special meaning. All levels of government are involved.

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[34]U.S. National Council of Public Works Improvement, Fragile Foundations: A Report on America's Public Works (Superintendent of Documents, February 1988), p. 8.

[35]U.S. Department of Transportation, National Transportation Strategic Planning Study (Superintendent of Documents, March 1990), pp. 10-10 to 10-14.

[36]Ibid., p. 13-16.

[37]Ibid., pp. 15-10 to 15-12.

They now represent for many transportation projects a significant administrative hurdle. No matter how well meaning and designed, they add "costs" to proposed projects or activities possibly making their feasibility marginal.

Permitting processes generally relate to:

* environmental concerns as discussed above

* transportation carrier operational licenses

* safety controls (toxic/hazardous materials)

* dredging controls

Each kind of control has relevant federal, state and local laws and policies setting up the game rules. Each serves as a check point. If utilized effectively by opponents, each may prevent or substantially delay and alter proposals.

Some kind of decision ultimately will need to be made at a larger level of public policy than solely port-surface transportation projects. How should an urban area balance, <u>if it can</u>, environmental goals with port development/trade/economic goals? The dilemma is classic.

To the extent that the decision is not made, ports and transportation organizations developing new facilities and services will find themselves in a long-term process of contention, ambiguity and political values shifts. They will be lightning rods for such "tough" public policy decisions.

<u>Labor</u>

The significance of labor factors to surface transportation access to ports is not really at the problem stage, though some areas may be concerned.

For the most part, the major jurisdictional labor wars have been fought. The International Longshoremen's Worker Union (ILWU) has established its sphere of influence in the port environs for cargo handling, including adjacent support facilities. The Teamsters have influence over the motor and rail carrier operations. In the port, special trade unions (plumbers, electricians, pipefitters, welders and other ship building/repair/maintenance trades) are dominant.

Interesting variations do occur.

East Coast ports are impacted by the "50-mile rule returns." The International Longshoremen's Association (ILA) seeks work preservation. All vessels owned by Non-Vessel-Operating Common Carriers (NVOCCs) must have ILA crews stuff and strip containers at the marine terminals.[38]

The Intermodal Container Transfer Facility in Southern California is owned by a joint powers authority relationship, but operated by the ILWU under contract to a private management contract firm. The ICTF is offsite, that is, not in the port boundaries. It is served by independent private motor carriers and the Southern Pacific. Container handling equipment is staffed by the ILWU.

Very possibly, more important in the long run than labor jurisdictional matters is work force technical skills. As emphasized in the preceding discussion of technology, equipment and operational factors are changing quickly. Simply to stay current requires special training and skills. The Marlon Brando image of "On the Waterfront" is rarely accurate anymore. Originally, stevedores were known for brute strength. Now, their sons and daughters have advanced college degrees and operate complex, sophisticated machinery.

Technological automation hovers constantly on the horizon. As containers become larger and carry heavier cargo, productivity per labor hour would likely increase. The workload basis upon which many contracts are structured will be out-of-synch. Consequently, another classic tradeoff is in process -- productivity vs. jobs.

Management

The job of management is a very complex function. In earlier times, each segment of the port-surface transportation web had a relatively simpler, straight-forward perspective: port-carrier; carrier-customer; port-union (or, owner/operator-union).

Government has entered almost every part of the relationship. Federal, state and local laws affect them, especially for the development of new or expanded facilities.

On all fronts, management more and more will be acting as consensus builders for joint public-private activities. Even private managers (e.g., railroads) who are intensely competitive and proprietary must coordinate at some point. Negotiation skills

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[38]U.S. Department of Transportation, Maritime Administration, op. cit., pp. 5-15.

in such environments become highly valued.

But the bottom line is still based on competition. Larger forces do affect carrier executive decisions in a port's region. Some railroads serve several ports and may favor one over the other with advantageous cargo rates despite other pricing factors. The San Francisco Bay area and Southern California San Pedro Bay are served by the Southern Pacific. Long-haul rail cargo may be diverted given competitive position strategies.

The nexus for this complexity is port management. Its function is to pull things together and advance all interests supporting the seaport-surface transportation interface. At the same time, it must be the mediating device between private sector needs and public values and goals for the port. Furthermore, it must not sacrifice the port's competitive advantage, just as carrier executives should not.

Some of the new forms of public-private ventures (ICTF, Consolidated Corridor Authority) are outside port boundaries but affect port interests. Port, municipal, county and carrier management representatives have "seats" on the joint power agency boards. Nevertheless, it must seem like a diminution of power to join them.

Lastly, port management operate quasi-public authorities, or special districts. Management decision-making at the board-level is public. Even though ports may not be well covered by media and followed by citizens, public accountability is built into the system. Management must take into account such visibility and broader-level board decision-making.

With the above in mind, management itself is not a problem unless it does not have the requisite skills and perspective to handle increasing diversity and public-private sector involvement.

Funds

For transportation projects, estimated costs and financing are of concern.

As recognized by AASHTO, highway linkage to other modes is important:[39]

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[39]American Association of State Highway and Transportation Officials, op. cit., p.7.

> A crucial function of highways, and transit in some cases, is to provide access to other transportation modes. A large part of transport costs and delays is produced by inadequate systems for getting goods and people to airports, seaports and intermodal terminals.

Rail and water linkage costs approach $300 million annually for highway needs and in linkages to other modes.

Equally controversial is how to fund the large sums. "Linkage" costs are a significant but small element of the entire surface transportation funding legislative reauthorization debate. In a resource scarce public funding environment, especially at the federal level, seaport-surface transportation funding needs are a lower priority. How much lower depends upon the advocacy skills of the seaport-surface transportation community until reauthorization of the Surface Transportation Assistance Act.

Many of the public interest groups support increased funding in general. Some support funding enhancements only in broad language (National League of Cities[40]; U.S. Conference of Mayors[41]).

Tax treatment of port facility financing illustrates another complexity in financing. The Tax Reform Act of 1986 made minor changes on the use of Industrial Development Bonds (IDB).[42]

Some argue that a change in federal funding procedures of infrastructure improvements is necessary. It is feared any federal user fees on port customers will not go into port improvements; receipts instead will be commingled and lost in the trust fund account.[43]

The impression should not be left that there has been no

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[40]U.S. Conference of Mayors, Official Policy Resolutions (USCM, adopted June 16-21, 1989, 57th Annual Conference, Resolution No. 6), p. 16.

[41]U.S. Conference of Mayors, Solving City Transportation Problems (USCM, adopted January 21-23, 1987, Compilation of the Transportation Resolutions of the Fifty-First Through Fifty-Fourth Annual Conferences), p. 11.

[42]U.S. Department of Transportation, Maritime Administration, op. cit., pp. 5-15.

[43]Schulz, John D. "'Experts' Opinions by Modes Emanate in Transportation Policy Comments," Traffic World (September 11, 1989), pp. 9-11.

federal funding for seaport-surface transportation access projects. In Southern California, several projects received highway funds from earlier surface transportation legislation. The Consolidated Rail Corridor program received $58 million for Phase I (STAA, 1982) and $74 million for Phase II (STURAA, 1987: 80 percent federal, 20 percent ports and local government). At that time, total estimated consolidated rail corridor costs were $220 million.[44]

Conclusion

The nation is undergoing a major economic transformation. Most of the forces are generated by international competition and technological changes. Some are caused by domestic public policy.

The seaport-surface transportation sector is quickly responding to many of the dynamics and cross-currents now evident. ISTEA has provided significant hope in the federal capability to fund projects and permit decisionmaking flexibility at the state and local levels. But there is more stress on the system and a change in basic relationships is still likely. For example, the federal government will continue to move slowly away from support for waterways, dredging and navigation due to budget constraints. State and local governments and the private sector probably will be more responsible for land activities and possibly harbor water projects.

All in all, the problems discussed in this chapter are part of the larger difficulties of the surface transportation sector operating in a complex urban transportation system. In congested urban areas, these problems may be especially acute. The next chapter reviews air quality regulations. When air quality concerns are added to the preceding policy issues, institutional gridlock in the short-term is a quite possible scenario.

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[44]SCAG Mobility Plan, op. cit., pp. VII-13-14.

Chapter III

AIR QUALITY REGULATIONS -- 1992

Introduction

In this chapter the focus is upon air quality regulations and plans in Southern California. Of all the access issues discussed in Chapter II, air quality may well become the most important. The regulatory attempt to improve urban air quality is a multi-faceted approach relying on improvements from all emission sources. The seaport - surface freight access source is highly visible but very small in the total picture. However in the immediate seaport land areas and along heavily used, narrow travel corridors (freeway and rail), pollution may be far more concentrated. Federal, state, and local statutes and programs will be reviewed. The next chapter considers the policy stakeholders affected by attempts to improve air quality. The last chapter will discuss more effective possibilities and their implications.

Southern California Air Quality Dynamics

With the increased population of urban areas, the physical and natural environment experienced greater degradation. A variety of sources were believed to be the cause. It quickly became evident in the more densely populated growing areas that there seemed to be a link between one particular environmental problem and a single class of sources.

First identified in Southern California, "smog" represented a form of air pollution traceable to industrial and agricultural activities, and the internal combustion engine/ gasoline power source. Southern California, California then the nation (in that order) began to pass environmental legislation attempting to regulate such air pollution by setting standards for ambient levels of air quality. The earliest techniques were directed towards large, stationary sources (power plant and factory smoke stacks, open field fires in agricultural areas). Later, it was determined that standards were also necessary for controlling the pollutants in fuels and internal combustion engines and exhaust systems. The net effect was a web of complicated legislative controls to control internal combustion engine exhaust emissions.

The approach worked up to a point. By the mid-1980's the natural limitation of then state-of-the-art control technologies was encountered. It was not so much a theoretical constraint as a

practical one. Per unit of engine system controls seemed effective but in the aggregate were overwhelmed by the enormous increases in vehicle miles driven. More people in an urban area equated to more automobiles and trucks driven more miles. In some urban areas, especially Los Angeles, gains accomplished shrank, though progress was still obvious over a two decade span.

In consequence, impacted areas began to search for additional ways to improve air quality by "leaving no stone unburned." One such search led to more than a hope for technological salvation. Though technological gains were still possible, the attempt was to control the need for transportation and the necessity of relying upon automobiles and trucks. In effect, the single occupant (driver) vehicle and the surface freight industry (trucking) became visible control objectives. A subsequent objective was to control the demand (need) for such transportation. It is here that the connection with seaports is made. In coastal urban areas, seaports are a major generator of travel demand for carrying cargo by surface freight transportation in narrow freeway and rail corridors.

Federal Regulations

The Clean Air Act Amendments of 1990 (CAAA) advanced federal oversight of air quality by focusing on sources of air pollution (vehicles, fuels, industry, etc.) and governmental actions which rely on command and control techniques to change individual and organizational behavior.[1]

The Clean Air Act Amendments of 1990 (CAAA) represents an important response to relationship of travel demand and pollution controls discussed above. The Federal Highway Administrator, Thomas D. Larson, observed:[2]

> The CAAA may have a greater effect on the Nation's transportation over the next 20 to 30 years than any of the non-highway laws enacted since the 1960's. More than a decade in the making, the CAAA recast the planning function

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[1]Public Law 101-549, Clean Air Act Amendments of 1990 (Superintendent of Documents, November 15, 1990).

[2]U.S. Department of Transportation, Federal Highway Administration, A Summary - Transportation Programs and Provisions of the Clean Air Act Amendments of 1990 (Superintendent of Documents, October 1992), pp. 1-2.

> to ensure that, in areas experiencing air quality problems, transportation planning is geared to improved air quality as well as mobility. State and local officials have been challenged by the CAAA to find ways to reduce emissions from the vehicle fleet, to develop projects and programs that will alter driving patterns to reduce the number of single-occupant vehicles, and to make alternatives such as transit and bicycles an increasingly important part of the transportation network. For all nonattainment areas, **the CAAA, with the tough political decisions they force government to make** (emphasis added), are a strong incentive to expand efforts to reach attainment as expeditiously as possible.
>
> Fortunately, the CAAA were followed by the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). Under the ISTEA, our restructured surface transportation programs give State and local officials the tools to adapt their plans to the requirements of the CAAA. Together, the CAAA and the ISTEA provide us with the means to help achieve BOTH mobility and clean air.

The more relevant provisions are described in Table III-1[3]. See Appendix VI-1 for a nonattainment area targets.

Air Quality and ISTEA

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) became federal law almost one year after the CAAA. Although both bills were working their way through legislative review and amendment in the same relative time period, CAAA was approved earlier and became a "forcing action" or stimulus to the inclusion of air quality considerations in the renewal discussions of the Surface Transportation Assistance Act of 1987.

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[3] Ibid., pp. 7-24.

Table III-1

Clean Air Act Amendments of 1990 -- Key Transportation Provisions

Title I-Transportation Provisions for Attainment and Maintenance of the National Ambient Air Quality Standards

Pollution from three types of sources must be reduced:

mobile sources (motor vehicles, aircraft, seagoing vessels, and other transportation modes)

stationary sources (relatively large, fixed sources of emissions such as chemical process industries, petroleum refining and petrochemical operations or wood processing)

area sources (small stationary and non-transportation pollution sources that are too small and/or numerous to be included as stationary sources but may collectively contribute significantly to air pollution, i.e., dry cleaners)

The CAAA then mandates a series of actions to be taken if a nonattainment area fails to meet the target set for it by the schedule stipulation of the law. "Bumping up" to a more stringent category of actions would occur if the target was not made.

Transportation Provisions for Ozone Nonattainment Areas

Ozone is a colorless gas with a pungent odor and is associated with smog or haze conditions. Although the ozone in the upper atmosphere protects us from harmful ultra-violet rays, high ground-level concentrations of ozone produce an unhealthy environment.

Ozone is not a direct emission from transportation sources. It is a secondary pollutant formed when precursor emissions, HNC and Nox, react in the presence of sunlight. Because of these complex relationships, understanding and controlling ozone formulation requires understanding of HC and Nox emissions based on individual projects or facilities.

Transportation hydrocarbons constitute approximately 40% of man made sources. Those emitted from motor vehicles form a colorless, gaseous compound originating from evaporation and the incomplete combustion of fuels. Nitric oxide (NO) and nitrogen dioxide (NO2) are collective referred to as oxides of nitrogen (Nox). NO forms during high-temperature combustion processes. NO2 forms when NO further reacts in the atmosphere.

Table III-1 (con't)

Transportation Provisions for Carbon Monoxide Nonattainment Areas

Carbon monoxide is a colorless, odorless, tasteless gas formed in large part by incomplete combustion of fuel. Fuel combustion activities (i.e., transportation, industrial processes, space heating, etc.) are the ;major sources of CO. High concentrations of CO can develop near these combustion sources. Therefore, facility specific, or "hotspot" analysis is often used to identify potential CO problems.

Transportation Provisions for Small Particulate Matter Nonattainment Areas

Particulate matter (PM) is any material that exists as a solid or liquid in the atmosphere. It may be in the form of fly ash, soot, dust, fuels, etc. The sources of PM are still being defined; however, from a transportation standpoint, particulate matter can be caused by tailpipe emissions, and dust from paved and unpaved roads.

Conformity

Conformity is a determination made by metropolitan planning organizations (MPOs) and the U.S. DOT that transportation plans and programs in nonattainment areas meet the "purpose" of the SIP (state implementation plan for air quality), which is reducing pollutant emissions to meet the NAAQS (National Ambient Air Quality Standards).

Transportation Planning Procedures

The CAAA attempt to integrate transportation and air quality planning through the SIP. The SIP should be a realistic document, with input from those responsible for development as well as implementation.

Sanctions

Sanctions are measures the EPA can, and in some cases must, enforce upon portions of the State, or the entire State in some circumstances, to ensure that SIP creation and implementation follow requirements of the CAAA. This is important to the transportation sector because there not necessarily a direct causal relationship between the pollutant sources and the sanction that is applied. For example, highway sanctions can be applied for SIP deficiencies for stationary as well as mobile sources. (Sanctions are withholding of Federal highway funds, and two-to-one emissions offsets for major stationary sources.)

Table III-1 (con't)

Title II- Transportation Provisions for Mobile Source Emissions

Vehicle Emissions Standards

Tailpipe emission standards will become stricter, affecting 40% of new vehicles sold nationwide in 1994, increasing to 100% of new vehicles sold by 1996. (Applicable to cars and light-duty vehicles under 6,000 gross vehicle weight rating.)

The EPA may revise any existing standards concerning air pollutants emitted from heavy-duty vehicles, taking costs into account. In addition, for model year 1998 and after, Nox emissions may not exceed 4.0 grams per brake horse power hour.

At cold temperatures, tail pipe emissions of CO increase significantly. The CAAA identify measure automakers must take to reduce these emissions.

Phase I - The EPA is to promulgate regulations by November 15, 1991 to reduce emissions of CO from light-duty vehicles and light-duty trucks. This will be phased-in gradually for automobiles beginning in 1994.

Phase II - If, as of June 1, 1997, six or more nonattainment areas have a COL design value of 9.5 ppm or greater, e;missions for light-duty vehicles and light-duty trucks must be lowered further.

Fuel Requirements

Special regulations are to be implemented for improved fuels: reformulated gasoline, oxygenated gasoline, and low-sulfur diesel fuel.

Clean-Fuel and Vehicle Requirements

A clean fuel is defined as any fuel, such as reformulated gasoline, diesel, natural gas, or electricity, that meets the clean fuel requirements and standards.

The California Air Resources Board may, upon EPA approval, adopt more stringent tailpipe emission standards that can be adopted by other States nationwide.

The EPA must promulgate regulations; by November 15, 1992, establishing requirements for clean-fuel vehicles to be produced, sold, and distributed in California.

Each year, beginning in 1996, automakers must provide 150,000 clean-fuel vehicles for sale in California; by 1999, this number must rise to 300,000. The tighter emission limits can be met with any combination of vehicle technology and cleaner fuels.

Source: U.S. Department of Transportation, Federal Highway Administration, A Summary - Transportation Programs and Provisions of the Clean Air Act Amendments of 1990 (Superintendent of Documents, October 1992), pp. 7-24.

ISTEA expands national transportation policy:[4]

> It is the policy of the United States to develop a National Intermodal Transportation System that is economically efficient and environmentally sound, provides the foundation for the Nation to compete in the global economy, and will move people and goods in an energy efficient manner.
>
> The National Intermodal Transportation shall consist of all forms of transportation in a unified, interconnected manner, including the transportation systems of the future, to reduce energy consumption and air pollution while promoting economic development and support the Nation's preeminent position in international commerce.
>
> ***
>
> The National Intermodal Transportation System shall provide improved access to ports and airports, the Nation's link to world commerce.

For the first time in a major surface transportation law, specific connection with the environment was made in the legislative details. With this in mind, Administrator Thomas D. Larson said:[5]

> As we approach the 21st century, the transportation community is confronted by challenges as never before. Our mobility, which is essential to the Nation's economic and social well-being, is threatened by gridlock and the absence or inadequate condition of needed facilities. At the same time, legi-

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[4]U.S. Congress, Intermodal Surface Transportation Efficiency Act of 1991 (Superintendent of Documents, Conference Report to Accompany H.R. 2950; 102d Congress, 1st Session, Report 102-404; November 27, 1991), pp. 1-2.

[5]U.S. Department of Transportation, Federal Highway Administration, A Summary - Air Quality Programs and Provisions of the Intermodal Surface Transportation Efficiency Act of 1991 (August 1992), pp. 1-3.

timate environmental concerns about the impact of transportation improvements have made the already complicated task even more difficult.

This dual challenge is illustrated by the Clean Air Act Amendments of 1990 (CAAA) and the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). The CAAA, which the President signed on November 15, 1990, is essential to our effort to control air quality problems. Because emissions from motor vehicles contribute to air pollution, transportation officials must make a commitment to programs and projects that will help achieve national air quality goals. **Although the CAAA is vitally important, it did not provide significant funding to carry out these programs and projects.**

That's where the ISTEA comes in. The President signed it on December 18, 1991, launching their first major restructuring of the Nation's surface transportation programs (highways and transit) since the start of the Interstate era in 1956. State and local officials now have an unprecedented range of choices for meeting their transportation needs. **The ISTEA complements the CAAA by providing funding and the flexibility to use it in ways that will help us improve air quality through the development of a balanced, environmentally sound, intermodal transportation program.**
(Emphasis added.)

The principal components of ISTEA are the features that are designed, then, to facilitate air quality improvements:[6]

* funding flexibility

* increased funding levels

* strengthened planning process

* strengthened role of metropolitan planning organizations (MPO)

* new Congestion Mitigation and Air Quality Improvement Program (CMAQ)

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[6] Ibid., pp. 5-18.

Consider MPO powers. The emphasis upon planning and the transportation-air quality-land use linkage has been strengthened through the requirement of multi-modal considerations. Furthermore, in the past planning boundaries of MPO's were often based on outdated delineation of development; now, such boundaries must include that area likely to be developed in the next twenty years. Transportation Management Areas (TMA) are defined as urban areas of 200,000 or more population. TMA's must prepare Congestion Management Systems (CMS). Often, the TMA is also classified as an ozone and carbon monoxide nonattainment area. In the TMA, long-range transportation plans must be consistent with CAAA-mandate State Implementation Plans, and reinforced by the Transportation Improvement Program (TIP - every three years, ranking of project priorities). It is the TIP that in effect makes all plan real because it is the policy device by which funds are actually committed and (hopefully) later funded.

The above interplay of federal law, institutions, and plans is strengthen even more by an additional ISTEA requirement of the CMAQ. Essentially, the major statutory thrust is to support projects increasing vehicle occupancy, lessening single-occupant vehicles, and related efforts to reduce transportation caused air quality problems.

California Air Quality

California has a longer history of air pollution regulation than any other area of the nation and, concomitantly, the most advanced complex of rules than any the state and local government. The state Air Resources Board is required by state statute to identify pollutants and sets standards for them.[7]

Table III-2 shows ambient air quality standards set by state and federal law. In most key categories, California standards are stricter than federal standards: ozone; carbon monoxide; sulfur dioxide and suspended particulates. California standards often have a shorter period for observable measurement, i.e., period of intense pollution. To illustrate: and average based on an hour or twenty-four hour period is much more precise, and likely to be higher, than an average based on thirty days or a year.

In 1987 ARB estimated that heavy duty truck were a significant source of air pollution. Figure III-1 shows the amount by air basin and emission.

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[7]California Air Resources Board, California Air Quality: A Status Report (ARB, 1991), pp. 3-7.

Table III-2

Ambient Air Quality Standards

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6,6]	Method [7]
Ozone	1 Hour	0.09 ppm (180 ug/m3)	Ultraviolet Photometry	0.12 ppm (235 ug/m3)	Same as Primary Std	Ethylene Chemiluminescence
Carbon Monoxide	8 Hour	9.0 ppm (10 mg/m3)	Non dispersive Infrared Spectroscopy (NDIR)	9 ppm (10 mg/m3)		Non dispersive Infrared Spectroscopy (NDIR)
	1 Hour	20 ppm (23 mg/m3)		35 ppm (40 mg/m3)		
Nitrogen Dioxide	Annual Average	—	Gas Phase Chemiluminescence	0.053 ppm (100 ug/m3)	Same as Primary Std	Gas Phase Chemiluminescence
	1 Hour	0.25 ppm (470 ug/m3)		—		
Sulfur Dioxide	Annual Average	—	Ultraviolet Fluorescence	80 ug/m3 (0.03 ppm)	—	Pararosaniline
	24 Hour	0.05 ppm [8] (131 ug/m3)		365 ug/m3 (0.14 ppm)	—	
	3 Hour	—		—	1300 ug/m3 (0.5 ppm)	
	1 Hour	0.25 ppm (655 ug/m3)		—	—	
Suspended Particulate Matter (PM_{10})	Annual Geometric Mean	30 ug/m3	Size Selective Inlet High Volume Sampler and Gravimetric Analysis	—	—	Inertial Separation and Gravimetric Analysis
	24 Hour	50 ug/m3		150 ug/m3	Same as Primary Standard	
	Annual Arithmetic Mean	—		50 ug/m3		
Sulfates	24 Hour	25 ug/m3	Turbidimetric Barium Sulfate	—	—	—
Lead	30 Day Average	1.5 ug/m3	Atomic Absorption	—	—	Atomic Absorption
	Calendar Quarter	—		1.5 ug/m3	Same as Primary Std	
Hydrogen Sulfide	1 Hour	0.03 ppm (42 ug/m3)	Cadmium Hydroxide STRectan	—	—	—
Vinyl Chloride (chloroethene)	24 Hour	0.010 ppm (26 ug/m3)	Tedlar Bag Collection Gas Chromatography	—	—	—
Visibility Reducing Particles [9]	8 Hour (10 am to 6 pm PST)	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent. Measurement in accordance with ARB Method V		—	—	—
Applicable Only in the Lake Tahoe Air Basin						
Carbon Monoxide	8 Hour	6 ppm (7 mg/m3)	NDIR	—	—	—
Visibility Reducing Particles [10]	8 Hour (10 am to 6 pm, PST)	In sufficient amount to produce an extinction coefficient of 0.07 per kilometer due to particles when the relative humidity is less than 70 percent. Measurement in accordance with ARB Method V		—	—	—

(Footnotes on reverse side)

Table III-2 (con't)

facts about

NOTES

[1] California standards for ozone carbon monoxide (except Lake Tahoe) sulfur dioxide (1-hour) nitrogen dioxide suspended particulate matter—PM_{10} and visibility reducing particles are values that are not to be exceeded The sulfur dioxide (24-hour) sulfates Lake Tahoe carbon monoxide lead hydrogen sulfide and vinyl chloride standards are not to be equaled or exceeded

[2] National standards other than ozone and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one

[3] Concentration expressed first in units in which it was promulgated Equivalent units given in parentheses are based upon a reference temperature of 25° C and a reference pressure of 760 mm of mercury All measurements of air quality are to be corrected to a reference temperature of 25° C and a reference pressure of 760 mm of mercury (1,013 2 millibar), ppm in this table refers to ppm by volume or micromoles of pollutant per mole of gas.

[4] Any equivalent procedure which can be shown to the satisfaction of the Air Resources Board to give equivalent results at or near the level of the air quality standard may be used

[5] National Primary Standards The levels of air quality necessary with an adequate margin of safety to protect the public health Each state must attain the primary standards no later than three years after that state s implementation plan is approved by the Environmental Protection Agency

[6] National Secondary Standards The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant Each state must attain the secondary standards within a reasonable time after the implementation plan is approved by the EPA

[7] Reference method as described by the EPA An 'equivalent method" of measurement may be used but must have a 'consistent relationship to the reference method and must be approved by the EPA

[8] At locations where the state standards for ozone and/or total suspended particulate matter are violated National standards apply elsewhere

[9] This standard is intended to limit the frequency and severity of visibility impairment due to regional haze and is equivalent to a 10-mile nominal visual range when relative humidity is less than 70 percent.

[10] This standard is equivalent to a 30-mile nominal visual range when relative humidity is less than 70 percent.

Source: California Air Resources Board, Facts About California Air Quality (Sacramento, 1991), pp. 7-8.

Figure III-1

Estimated Emission Contribution of Heavy-Duty Trucks* to the Total 1987 Emission Inventory (by Air Basin)

	ROG	NOx	CO	PM10
South Coast Air Basin	4 2%	18 2%	12 0%	2 6%
San Diego Air Basin	3 7%	14 5%	9 3%	1 8%
Sacramento Valley Air Basin	4 2%	27 6%	6 9%	2 4%
San Francisco Bay Area Air Basin	3 4%	16 7%	8 8%	2 6%
San Joaquin Valley Air Basin	3 1%	23 9%	9 4%	1 9%
Statewide	3 7%	20 6%	8 2%	1 9%

x 8500 lbs GVWR or greater
Particulate matter less than 10 microns in diameter
* Excludes PM10 associated with resuspended road dust

ARB 1987 Emission Inventory

Source: California Air Resources Board, Air Review (Sacramento, February 1991), p. 15.

ARB regulations have been focusing also upon non-automotive mobile sources of air pollution. Two programs have been developed to control more tightly pollution from trucks and railroad locomotives.

Diesel truck (and bus) engines must meet stricter standards. Figures III-2,3 show requirements for new heavy-duty diesel engines and for diesel fuels.

Figure III-2

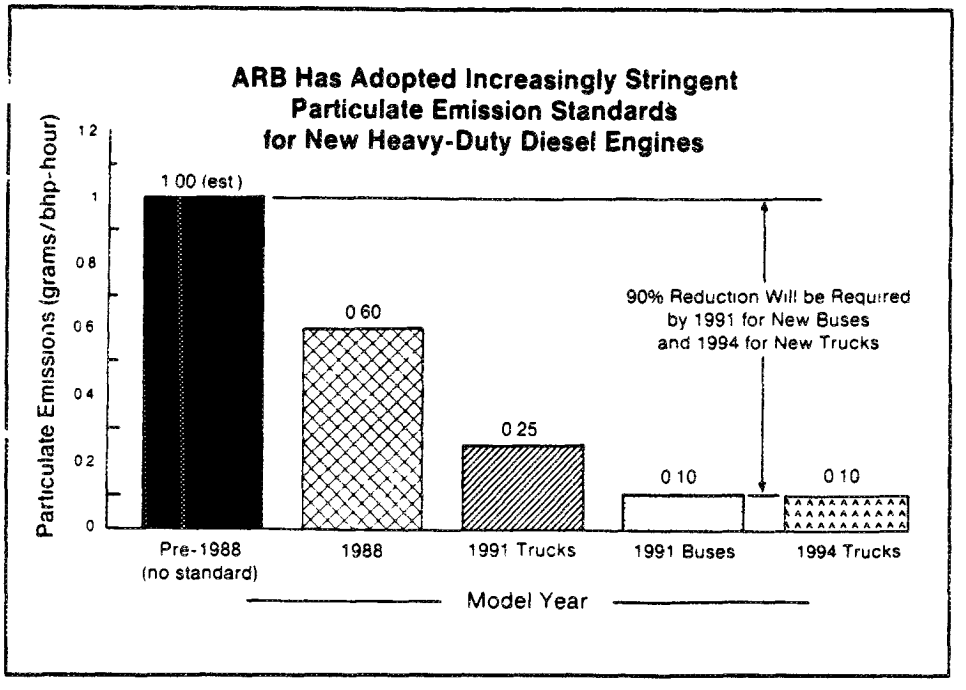
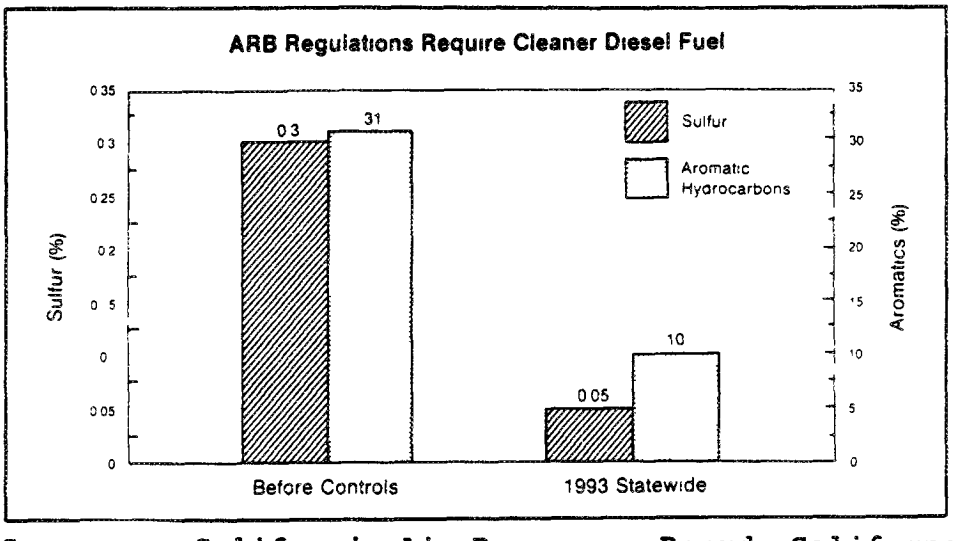


Figure III-3



Source: California Air Resources Board, California Air Quality: A Status Report (Sacramento, 1991), pp. 25-26.

The ARB has also developed[8]

> a broad plan aimed at reducing emissions from train locomotives up to 30 percent by 1997.
>
> While the plan is intended to reduce hydrocarbons, carbon monoxide and sulfur oxides, the greatest target is NOx, which represent about 90 percent of total emissions. Train locomotive emissions vary by region, accounting for 0.3 percent of mobile source Nox emissions in San Diego and 3.0 percent in the South Coast Air Basin, and up top 7 percent in the San Joaquin Valley and 10 percent in the Sacramento area.

Southern California Air Quality

The South Coast Air Quality Management District (AQMD) has broad, sweeping powers to control air pollution sources, require permits and issue fines.

Its relationship to other governmental programs is shown in Figure III-4.

AQMD standards, in contrast to state and federal standards is displayed in Table III-3.

The relationship between the pollutant, primary sources and effect is shown in Table III-4.

When the level of pollution exceeds allowable standards, then "smog episodes" are declared by their AQMD. Figure III-5 shows the episodic levels.

Lastly, the actual measured conditions in the South Coast Air Basin for 1991 are presented, by pollutant and observation area in Table III-5.

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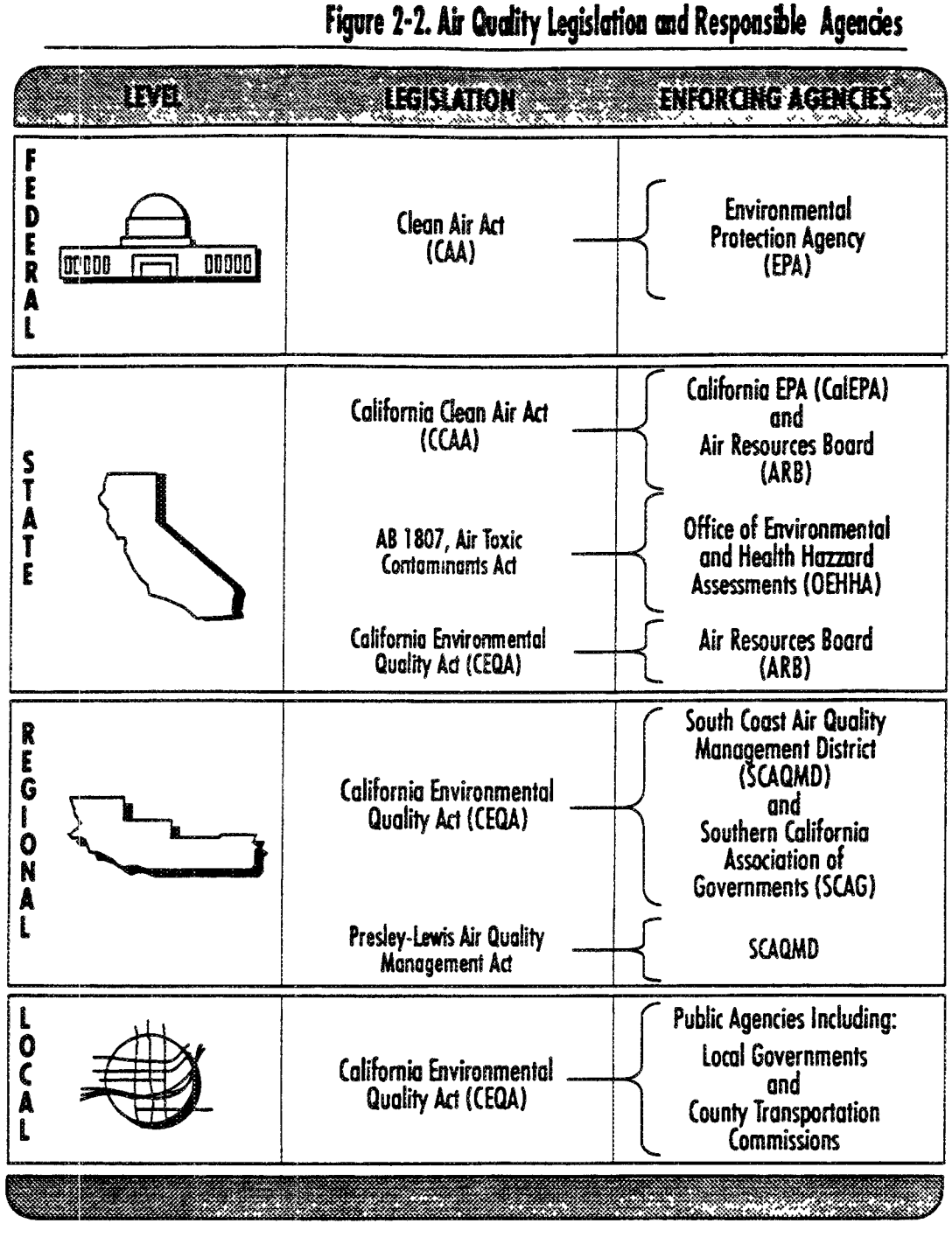
[8]California Air Resources Board, Air Review (ARB, September 1991), p. 7.

Figure III-4

Air Quality Legislation and Responsible Agencies



Source: South Coast Air Quality Management District, CEQA Air Quality Handbook (AQMD,May 1992, draft), p.2-3.

Table III-3

Criteria Pollutants of Concern in SCAB and Coachella Valley

Table 3-1. Criteria Pollutants of Concern in SCAB and Coachella Valley

Pollutants	National Standards	State Standards	Regional SCAB Maximum Levels	Coachella Valley Maximum Levels*
Lead (Pb)	1.5 ug/m^3 (calendar quarter)	1.5 ug/m^3 (30 day average)	0.14 ug/m^3 ✣ (no days exceeded)	No Monitoring
Sulfur Dioxide (SO_2)	0.14 ppm (24 hour)	0.25 ppm (1 hour) 0.05 ppm (24 hour)	.035 ppm (24 hour) (no days exceeded) .31 ppm (1 hour) (no days exceeded)	No Monitoring
Carbon Monoxide (CO)	9.0 ppm (8 hours) 35 ppm (1 hour)	9.0 ppm (8 hours) 20.0 ppm (1 hour)	16.8 ppm (8 hours) 42 days/federal 44 days/State 24 ppm (1 hour) (7 days/State)	No known monitored exceedance
Nitrogen Dioxide (NO_2)	0.053 ppm (annual average)	0.25 ppm (1 hour)	0.0555 ppm (annual average) 0.28 ppm (1 hour) 3 days/State	No known monitored exceedance
Ozone (O_3)	0.12 ppm (1 hour)	0.09 ppm (1 hour)	0.33 ppm (103 days/federal 144 days/State)	0.17 ppm 27 days/federal 43 days/State
Fine Particulate Matter (PM_{10})	150 ug/m^3 (24 hour)	50 ug/m^3 (24 hour)	475 ug/m^3 (24 hour) 7% days/federal 75% days/State	520 ug/m^3 4 days/federal 41 days/State
Sulfate	None	25 ug/m^3 (24 hour)	28.4 ug/m^3 2% days/State	No known monitored exceedance
Visibility	None	10 miles for hours w/humidity less than 70%	250 days	No Monitoring

* Coachella Valley Levels based on 1990 Air Quality Data: Days/federal = Number of days that federal standard was exceeded
Days/State = Number of days that State of California standard was exceeded

✣ Site Specific

Source: South Coast Air Quality Management District, CEQA Air Quality Handbook (AQMD,May 1992, draft), p.3-1.

Table III-4

Primary Sources and Effects of Criteria Pollutants

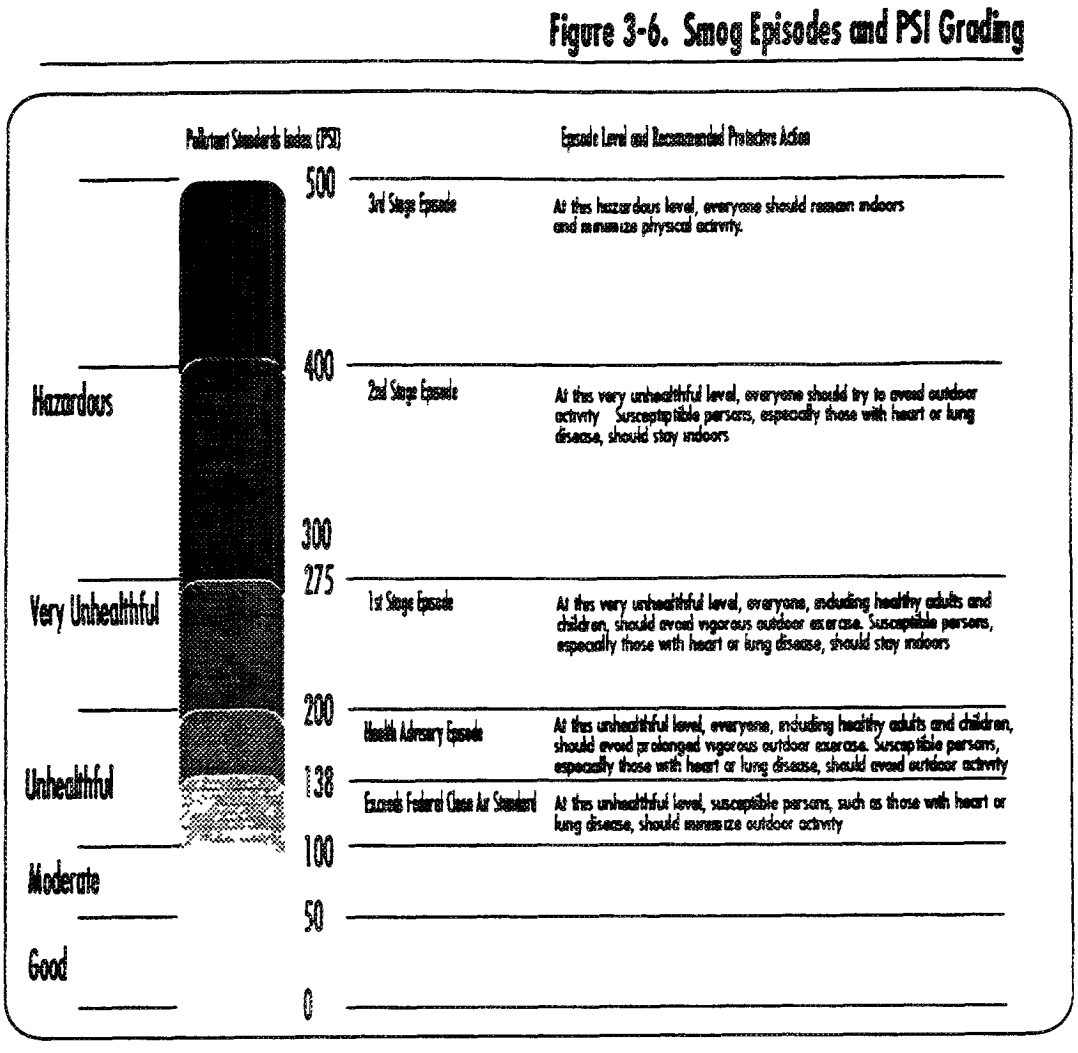
Table 3-2. Primary Sources and Effects of Criteria Pollutants

Pollutants	Primary Sources	Primary Effects
Lead (Pb)	Contaminated Soil	Impairment of blood function and nerve construction Behavioral and hearing problems in children
Sulfur Dioxide (SO_2)	Combustion of sulfur-containing fossil fuels Smelting of sulfur-bearing metal ores Industrial processes	Aggravation of respiratory diseases (asthma, emphysema) Reduced lung function Irritation of eyes Reduced visibility Plant injury Deterioration of metals, textiles, leather, finishes, coatings, etc.
Carbon Monoxide (CO)	Incomplete combustion of fuels and other carbon-containing substances, such as motor vehicle exhaust Natural events, such as decomposition of organic matter	Reduced tolerance for exercise Impairment of mental function Imparment of fetal development Death at high levels of exposure Aggravation of some heart diseases (angina)
Nitrogen Dioxide (NO_2)	Motor vehicle exhaust High temperature stationary combustion Atmospheric reactions	Aggravation of respiratory illness Reduced visibility Reduced plant growth Formation of acid rain
Ozone (O_3)	Atmospheric reaction of organic gases with nitrogen oxides in sunlight	Aggravation of respiratory and cardiovascular diseases Irritation of eyes Impairment of cardiopulmonary function Plant leaf injury
Fine Particulate Matter (PM_{10})	Stationary combustion of solid fuels Construction activities Industrial processes Atmospheric chemical reactions	Reduced lung function Aggravation of the effects of gaseous pollutants Aggravation of respiratory and cardio-respiratory diseases Increased cough and chest discomfort Soiling Reduced visibility

Source: South Coast Air Quality Management District, CEQA Air Quality Handbook (AQMD,May 1992, draft), p.3-3.

Figure III-5

Smog Episodes and PSI Grading



Source: South Coast Air Quality Management District, CEQA Air Quality Handbook (AQMD,May 1992, draft), p.3-5.

Table III-5

1991 Air Quality - Air Quality Management District

1991 AIR QUALITY

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Source/ Receptor Area	Location of Air Monitoring Station	Carbon Monoxide						Ozone			Nitrogen Dioxide				Sulfur Dioxide					Visibility	
				No Days Standard Exceeded					No Days Standard Exceeded			Average Compared to Federal Standard[a]		No Days Std Exc'd			Average Compared to Federal Standard[b]	No Days Std Exc'd[c]			
		Max Conc in ppm 1 Hour	Max Conc in ppm 8 Hour	Federal ≥ 9 5 ppm 8 Hr	Federal > 35 ppm 1 Hr	State ≥ 9 1 ppm 8 Hr	State > 20 ppm 1 Hr	Max Conc in ppm 1-Hour	Federal > 12 ppm 1-Hour	State > 09 ppm 1 Hour	Max Conc in ppm 1 Hour	AAM in ppm	% Above Std	State > 25 ppm 1 Hour	Max Conc in ppm 1 Hour	Max Conc in ppm 24 Hour	AAM in ppm	Federal > 14 ppm 24 Hr	State ≥ 05 ppm 1/24 Hr[d]	Location	Days not Meeting State Std[e]
1	Los Angeles	12	9 0	0	0	0	0	19	23	59	58	0493	0	5	02	012	0017	0	0/0	Los Angeles International	159
2	W Los Angeles	10	6 1	0	0	0	0	18	9	37	25	0278	0	0	MM	MM	MM	MM	MM		
3	Hawthorne	18	11 3	7	0	10	0	11	0	17	21*	0298*	0*	0*	12	019	0040	0	0/0		
4	Long Beach	16	9 3	0	0	1	0	11	0	4	28	0411	0	2	14	016	0043	0	0/0	Long Beach Airport	198
5	Whittier	13	7 5	0	0	0	0	19	23	59	22	0394	0	0	07	010	0016	0	0/0		
6	Reseda	16	13 5	7	0	8	0	22	53	100	17	0399	0	0	MM	MM	MM	MM	MM		
7	Burbank	13	10 6	8	0	12	0	22	55	101	29	0468	0	2	01	010	0009	0	0/0	Burbank Airport	195
8	Pasadena	14	9 5	2	0	2	0	23	70	112	32	0502	0	2	MM	MM	MM	MM	MM		
9	Azusa	8	5 9	0	0	0	0	28	73	111	25	0450	0	0	MM	MM	MM	MM	MM		
9	Glendora	MM	MM	MM	MM	MM	MM	32	91	134	23	0430	0	0	MM	MM	MM	MM	MM		
10	Pomona	11	7 1	0	0	0	0	24	60	97	22	0550	3 0	0	MM	MM	MM	MM	MM		
11	Pico Rivera	11	9 1	0	0	1	0	26	48	86	25	0469	0	0	MM	MM	MM	MM	MM		
12	Lynwood	30	17 4	36	0	41	4	16	1	20	26	0437	0	2	05	015	0030	0	0/0	William J Fox Airport (Lancaster)	9
13	Santa Clarita	9	5 1	0	0	0	0	24	65	118	17	0324	0	0	MM	MM	MM	MM	MM		
14	Lancaster	10	7 1	0	0	0	0	14	8	62	11	0145	0	0	MM	MM	MM	MM	MM		
16	La Habra	18	8 0	0	0	0	0	21	28	62	20	0426	0	0	04	012	0012	0	0/0		
17	Anaheim	21	8 6	0	0	0	1	25	11	41	20	0448	0	0	MM	MM	MM	MM	MM		
17	Los Alamitos	MM	MM	MM	MM	MM	MM	17	10	37	MM	MM	MM	MM	03	010	0011	0	0/0		
18	Costa Mesa	10	8 1	0	0	0	0	17	5	23	16	0260	0	0	04	010	0007	0	0/0		
19	El Toro	8	6 8	0	0	0	0	24	10	29	MM	MM	MM	MM	MM	MM	MM	MM	MM		
22	Norco	MM	MM	MM	MM	MM	MM	22	54	103	MM	MM	MM	MM	MM	MM	MM	MM	MM		
23	Rubidoux	8	7 4	0	0	0	0	24	79	139	16	0351	0	0	02	007	0002	0	0/0		
23	Riverside	16	6 9	0	0	0	0	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	March Field (Riverside)	247
24	Perris	MM	MM	MM	MM	MM	MM	20	71	128	MM	MM	MM	MM	MM	MM	MM	MM	MM		
25	Lake Elsinore	MM	MM	MM	MM	MM	MM	20	45	93	MM	MM	MM	MM	MM	MM	MM	MM	MM		
26	Temecula	5*	4 0*	0*	0*	0*	0*	17*	3*	18*	21*	0164*	0*	0*	MM	MM	MM	MM	MM		
28	Hemet	MM	MM	MM	MM	MM	MM	19	23	66	MM	MM	MM	MM	MM	MM	MM	MM	MM		
29	Banning	MM	MM	MM	MM	MM	MM	20	31	64	MM	MM	MM	MM	MM	MM	MM	MM	MM		
30	Palm Springs	5	2 5	0	0	0	0	18	22	72	09	0208	0	0	MM	MM	MM	MM	MM		
30	Indio	MM	MM	MM	MM	MM	MM	18	13	48	MM	MM	MM	MM	MM	MM	MM	MM	MM		
31	Blythe	MM	MM	MM	MM	MM	MM	09*	0*	0*	MM	MM	MM	MM	MM	MM	MM	MM	MM		
32	Upland	7*	4 6*	0*	0*	0*	0*	27	67	103	21	0425	0	0	MM	MM	MM	MM	MM		
33	Ontario	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	Ontario Airport	240
34	Fontana	6*	4 4*	0*	0*	0*	0*	29	74	120	19	0377	0	0	05	010	0005	0	0/0		
34	San Bernardino	8	7 0	0	0	0	0	25	79	127	16	0355	0	0	MM	MM	MM	MM	MM	Norton AFB (San Bernardino)	231
35	Badlands	MM	MM	MM	MM	MM	MM	25	91	145	MM	MM	MM	MM	MM	MM	MM	MM	MM		
37	Crestline	MM	MM	MM	MM	MM	MM	27	90	148	MM	MM	MM	MM	MM	MM	MM	MM	MM		

Parts per million parts of air, by volume
Annual Arithmetic Mean
Pollutant not monitored
Less than 12 full months of data May not be representative
The federal standard is annual arithmetic mean NO_2 greater than 0 0534 ppm
The federal standard is annual arithmetic mean SO_2 greater than 80 ug/m^3 (0 03 ppm) No location exceeded the standard in 1991
The other federal standards(3 hour avg SO_2 > 0 50 ppm and 24 hour avg SO_2 > 0 14 ppm) were not exceeded
One hour avg SO_2 > 25 ppm or twenty four hour average SO_2 ≥ 0 05 ppm with 1 hour ozone ≥ 0 10 ppm or 24 hour TSP _ 100 ug/m^3
Visibility data are comparable to previous state standard Standard is visibility less than 10 miles for hours with relative humidity less than 70% Monitoring using equipment required by current standard will begin in 1992

SOUTH COAST
AIR QUALITY MANAGEMENT DISTRICT
21865 East Copley Drive
Diamond Bar, CA 91765

Table III-5 (cont'd)

1991 AIR QUALITY
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Source/ Receptor Area No	Location of Air Monitoring Station	Suspended Particulates PM10[f]						Particulates TSP[g]			Lead[g]				Sulfate[g]	
				No (%) Samples Exceeding Standard		Annual Averages[h]							Quarters/Months Exceeding Standard[i]		No (%) Samples Exceeding Standard	
		Number of Samples	Max Conc in ug/m3 24 Hour	Federal >150 ug/m3 24 Hour	State >50 ug/m3 24 Hour	AAM Conc ug/m3	AGM Conc ug/m3	Number of Samples	Max Conc in ug/m3 24 Hr	AGM Conc ug/m3	Max Mo Conc ug/m3	Max Qtrly Conc ug/m3	Federal >1 5 ug/m3 Qrtly Avg	State ≥1 5 ug/m3 Mo Avg	Max Conc in ug/m3 24 Hr	State ≥25 ug/m3 24 Hr
1	Los Angeles	57	151	1(1 8)	31(54 4)	57 1	51 4	60	183	93 2	0 21	0 14	0	0	23 1	0
2	W Los Angeles	NM	NM	NM	NM	NM	NM	59	106	59 0	NM	NM	NM	NM	20 9	0
3	Hawthorne	60	79	0	14(23 3)	38 6	35 4	59	153	65 9	0 08	0 06	0	0	24 7	0
4	Long Beach	46*	92*	0*	11(23 9)*	40 0*	37 0*	60	197	65 1	0 08	0 07	0	0	19 9	0
5	Whittier	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
6	Reseda	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
7	Burbank	60	133	0	30(50 0)	54 9	49 1	56	184	88 2	0 10	0 07	0	0	18 6	0
8	Pasadena	NM	NM	NM	NM	NM	NM	56	141	71 2	NM	NM	NM	NM	20 1	0
9	Azusa	57	137	0	39(68 4)	66 3	59 7	59	211	94 3	NM	NM	NM	NM	19 2	0
9	Glendora	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
10	Pomona	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11	Pico Rivera	NM	NM	NM	NM	NM	NM	56	211	89 8	0 19	0 14	0	0	21 6	0
12	Lynwood	NM	NM	NM	NM	NM	NM	59	200	97 1	0 17	0 10	0	0	22 4	0
13	Santa Clarita	59	81	0	25(42 4)	46 5	42 6	NM	NM	NM	NM	NM	NM	NM	NM	NM
14	Lancaster	57	780	3(5 3)	11(19 3)	56 8	38 1	NM	NM	NM	NM	NM	NM	NM	NM	NM
16	La Habra	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
17	Anaheim	59	146	0	14(23 7)	45 2	40 0	59	187	77 2	0 08	0 06	0	0	20 6	0
17	Los Alamitos	NM	NM	NM	NM	NM	NM	60	176	79 6	NM	NM	NM	NM	16 9	0
18	Costa Mesa	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
19	El Toro	59	94	0	9(15.3)	36.6	33 6	NM	NM	NM	NM	NM	NM	NM	NM	NM
22	Norco	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
23	Rubidoux	60	179	2(3 3)	41(68 3)	76 0	65 4	60	271	111 2	0 06	0 05	0	0	14 8	0
23	Riverside	NM	NM	NM	NM	NM	NM	60	191	90 6	0 08	0 06	0	0	12 8	0
24	Perris	60	113	0	26(43 3)	48 8	43 0	NM	NM	NM	NM	NM	NM	NM	NM	NM
25	Lake Elsinore	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
26	Temecula	44*	66*	0*	9(20 5)*	36.6*	36 1*	NM	NM	NM	NM	NM	NM	NM	NM	NM
28	Hemet	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
29	Banning	57	87	0	17(29 8)	37 8	31 3	NM	NM	NM	NM	NM	NM	NM	NM	NM
30	Palm Springs	56	197	1(1 8)	14(25 0)	42 9	36 6	NM	NM	NM	NM	NM	NM	NM	NM	NM
30	Indio	59	340	3(5 1)	37(62 7)	69 9	59 8	NM	NM	NM	NM	NM	NM	NM	NM	NM
31	Blythe	30*	112*	0*	9(30.0)*	44.4*	40 8*	NM	NM	NM	NM	NM	NM	NM	NM	NM
32	Upland	NM	NM	NM	NM	NM	NM	60	182	79 7	0 08	0 07	0	0	19 0	0
33	Ontario	58	158	1(1 7)	39(67 2)	66 4	60 3	NM	NM	NM	NM	NM	NM	NM	NM	NM
34	Fontana	54	127	0	35(64.8)	63.1	57 7	59	537	109.3	NM	NM	NM	NM	20.2	0
34	San Bernardino	60	163	1(1 7)	41(68 3)	60 6	52 0	59	215	96 0	0 06	0 05	0	0	18 3	0
35	Redlands	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
37	Crestline	48*	105*	0*	6(12.5)*	39 3*	34 8*	NM	NM	NM	NM	NM	NM	NM	NM	NM

ug/m3 Micrograms per cubic meter of air
AAM Annual Arithmetic Mean AGM Annual Geometric Mean
* Less than 12 full months of data May not be representative
f) PM10 suspended particulate samples were collected every 6 days using the size selective inlet high volume sampler with quartz filter media (PM10 refers to fine particles with aerodynamic diameter of 10 micrometers or less)
g) Total suspended particulates lead and sulfate were determined from samples collected every 6 days by the high volume sampler method, on glass fiber filter media federal TSP standard superceded by PM10 standard, July 1, 1987
h) federal PM10 standard is AAM > 50 ug/m3 state standard is AGM > 30 ug/m3
i) As part of a special monitoring program the District initiated monitoring of lead concentrations in January 1991 at five sites immediately downwind of major secondary lead smelters The quarterly federal standard was exceeded at one location Commerce Sheila (3rd quarter) and the monthly state standard was exceeded at two locations Commerce Sheila (four exceedances) and Industry 7th St (one exceedance) Maximum concentrations were 3 66 ug/m3 monthly average and 2 31 ug/m3 quarterly average at Commerce Sheila

Source: South Coast Air Quality Management District, 1991 Air Quality Plan (AQMD, 1992), flyer.

Air Quality Management District Authority

The above discussion reviews the current problem of air quality in Southern California, its sources and history. Earlier sections summarized federal and state laws and regulations. What needs to addressed here is the actual power, granted by statute, and the range of actions considered by the AQMD.

State Senate Bill 151 (1987) reorganized the board of the South Coast Air Quality Management District (AQMD), provided at that time sweeping new powers to impose pollution controls on residents and business, and required new programs. The law required the AQMD to take certain actions:[9]

> Transportation Control Rules: Develop transportation control measures. In developing such regulations, the District is directed to consult with the Department of Transportation, the California Highway Patrol and the transportation commission of each county. Transportation control measures can include synchronization of traffic lights, carpool lanes on freeways, improved traffic flow through use of one-way streets, or freight delivery restrictions (time of day, route).
>
> Indirect Source Controls Rules: Develop rules for indirect source controls in areas where there are high pollutant concentrations or for new facilities that would have a significant air quality effect, and to incorporate them into the Air Quality Management Plan. Indirect sources are facilities such as shopping centers or stadiums which attract large number of vehicles, thereby increasing emissions in the area.
>
> Economic Incentive System: Prepare and submit to the Legislature and California Air Resources Board a draft plan for rules and regulations for a system of emission charges as an economic incentive system for reducing emissions and improving air quality.
>
> Rules on BACT and BARCT: Adopt rules requiring Best Available Control Technology (BACT) for new and modified sources and the use of Best Available Retrofit Control Technology (BARCT) for existing sources.

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[9]South Coast Air Quality Management District and Southern California Association of Governments, Air Quality Management Plan South Coast Air Basin (AQMD, March 1989), Executive Summary, pp. i-xvi.

Clean Fuel Vehicle Purchase for Fleets: The District can require operators of public and commercial fleet vehicles consisting of 15 or more vehicles to purchase vehicles capable of operating on methanol or other clean burning fuels.

Diesel Fuel Composition: After one year, the District Board is authorized to adopt rules that specify the composition of diesel fuel to be sold in the South Coast Air Basin. If the District exercises its authority,it could adopt rules requiring cleaner diesel fuel that has lower emission rates. These rules must be approved by the California Air Resources Board.

Curtailment of Heavy-Duty Truck Operation During Rush Hour: The District Board may adopt rules that prohibit or restrict most heavy-duty truck travel during hours of heaviest traffic on freeway and other high-traffic highways. This would result in improved traffic flow, thereby causing reduced emissions. The District is required to consult with transportation agencies in the development of these rules.

A lengthy and complex list of potential actions to implement the preceding powers was developed by the AQMD in cooperation with other agencies. The program had three tiers:

Tier I - Full implementation of known control technologies and management practices.

> Tier I controls are those that can be adopted within the next five years using currently available technological applications and management practices. Tier I control measures...are expected to be adopted by the appropriate implementing agency by 1993. Full implementation of some measures, such as new vehicle controls and transportation facility constructions, will not occur until 2007.

Tier II - Significant Advancement of today's tech-nolgocial applications and vigorous regulatory intervention.

> Tier II measures include already-demonstrated control technologies and "on-the-horizon" technologies that require advancements that can reasonably be expected to occur in the

near future. These advancements will be promoted through regulatory action, such as setting standards at levels that force the advancement of existing technology, or establishing a system of emission charges that provide an economic incentive to reduce emissions....Tier II measures mainly focus on transportation sources and the use of coatings and solvents.

Tier III - Development of New Technology

Tier III programs are designed to bring about major technological breakthroughs to further reduce emissions of reactive organic gases. Unlike the first two tiers, Tier III requires commitments to research, development, and widespread commercial application of technologies that may not exist yet, but may be reasonably expected given the rapid technological advances experienced over the past 20 years.

Although no specific control measures can be summarized for Tier III, the programs included in this tier are directed primarily at further reducing ROG emissions from solvents and coatings, and from motor vehicles.

Possible Tier III control strategies for solvents and coatings include further improvement in water-based products, ultraviolet-curable coatings, two-component coatings, and non-reactive solvents. These strategies, along with the prohibition of certain coasting processes, offer the promise of almost complete elimination of ROG from solvents and coatings.

With respect to low emitting vehicles, recent progress in fuel cells, solar cells, storage batteries, and superconductors offer the promise of eliminating combustion processes from motor vehicles almost entirely.

If sufficient technologies to achieve the standards are not identifiable by the mid-nineties, contingency measures, such as holding VMT to 1985 levels, emission charges and highway user fees will be pursued.

The control measures considered are shown in complete detail along with rankings, technology advancement and demonstration projects, and legislative needs in Appendix VI-2. Table III-6 summarizes Tier I and II Control Measures.

Table III-6

Summary of Tier I and II Control Measures

TABLE 3
SUMMARY OF TIER I CONTROL MEASURES

Controls on the use of coatings and solvents

Twenty-two control measures such as using low VOC paints and solvents higher transfer efficiency methods for applying coatings and controlling fumes from coating operations Also, reducing emissions from consumer products such as aerosol sprays and underarm deodorants

Controls on the production, refining, and distribution of petroleum and gas

Fifteen control measures to control emissions from refinery heaters and boilers, oil field steam generators, valves, pumps and compressors, and improve vapor recovery systems

Controls on industrial and commercial processes

Ten control measures such as reducing emissions from small sources which are exempt from existing rules, controlling emissions from boilers and internal combustion engines

Controls on residential equipment and public services

Ten control measures such as reducing nitrogen oxide emissions from water heaters and furnaces, controlling fugitive emissions from publicly-owned wastewater treatment plants, controlling dust from roads and parking lots, and transporting solid wastes out of the Basin for disposal

Controls on agricultural sources

Three control measures to reduce reactive emissions from pesticide applications, ammonia from livestock wastes, and fugitive dust from farming operations.

Controls on other stationary sources

Eleven control measure such as requiring use of Best Available Retrofit Control Technology for all existing sources, tightening requirements for New Source Review requiring low-emission materials for building construction, and phasing out use of fuel oil and coal by stationary sources.

Table III-6 (con't)

TABLE 3 (Continued)
SUMMARY OF TIER I CONTROL MEASURES

Controls on motor vehicles

Nineteen control measures such as requiring stricter emission control standards for new vehicles, clean fuels for fleet vehicles, improved inspection and maintenance programs and controls on diesel powered buses and trucks

Controls on transportation systems and land use

Twenty control measures to reduce vehicle use, improve traffic flow, improve public transit, and manage growth.

Control on other mobile sources

Thirteen control measures such as reducing emissions from aircraft, ships, locomotives, construction equipment, and off-road motorcycles.

TABLE 4

SUMMARY OF TIER II CONTROL MEASURES AND GOALS

40 percent of the passenger vehicles and 70 percent of the freight vehicles to be operated by low emitting vehicle technologies All diesel-powered transit buses switched to low emitting vehicles

Reducing the remaining emissions from other mobile sources (aircraft, ships, locomotives, construction equipment) by 50 percent.

Reducing the remaining ROG emissions from solvents and coating by 50 percent.

Reducing the remaining ROG emissions from consumer products by 50 percent.

Minimizing potential increases in emissions from existing and new stationary sources.

Source: South Coast Air Quality Management District and Southern California Association of Governments, Air Quality Management Plan South Coast Air Basin (AQMD, March 1989), pp. xv-xvi.

The control measures developed in the 1989 plan became the basic framework for all subsequent review, analysis, debate, and implementation. Many were hotly contested. Some were implemented quickly under the AQMD rule-making powers. Others were revised as the regional transportation planning process progressed and new federal and state legislation were passed. By 1990, the discussion was completely in the technical and public arenas.[10]

The 1991 plan[11] developed criteria for evaluating proposed control measures. Nine measures are described in Table III-7.

Table III-7
Criteria for Evaluating 1991 AQMP Control Measures

Cost-Effectiveness	The cost of a control measure to reduce air pollution by one ton [cost covers obtaining, installing, and operating the control measure]
Efficiency	The positive effects of a control measure compared to its negative effects
Emission Reduction Potential	The total amount of pollution that a control measure can actually reduce
Enforceability	The ability to force polluters to comply with a control measure
Equity	The fairness of the distribution of all the positive and negative effects among various socio-economic groups
Legal Authority	The possibility that local governments and agencies will cooperate to approve a control measure
Public Acceptability	The support the public gives to a control measure
Rate of Emission Reduction	The time it will take for a control measure to reduce air pollution
Technological Feasibility	The likelihood that the technology for a control measure will be available as anticipated

Source: South Coast Air Quality Management District and Southern California Association of Governments, Draft Final, 1991 Air Quality Management Plan South Coast Air Basin (Diamond Bar, CA, May 1991), pp. ES-10 - ES-11.

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[10]See: Southern California Association of Governments, Draft, 1991 AQMP Amendment to the 1989 Air Quality Management Plan (Transportation, Land Use and Energy Conservation Control Measures) (SCAG, July 5, 1990), Executive Summary.

[11]South Coast Air Quality Management District and Southern California Association of Governments, Draft Final, 1991 Air Quality Management Plan South Coast Air Basin (AQMD, May 1991), Executive Summary.

For the 1991 plan estimated impacts were calculated in terms of costs and benefits (dollars) and in jobs. Table III-8 shows initial analysis and the net benefit of 19,323 additional jobs added to the regional economy by the year 2010.

The regional economy changed dramatically between 1990-1992 and the AQMD had to review its assumptions about negative economic impact.[12] Considerable controversy continued through 1992.[13] There was also impact on the District's operating budget, as well as the way it viewed its purpose. Business was to be treated as a customer. Command and control approaches were turned to partnership strategies. The District reported:[14]

> But 1992 was also a troubled year for Southern California's economy and social fabric. The AQMD was not immune to this distress. As business activity declined, the AQMD's revenues fell, and the District reduced its staff by 6% and curtailed some activities. As Southern California's most visible and proactive environmental agency, the AQMD bore the brunt of criticism that environmental regulations were driving manufacturing jobs out of state. Our critics were unmoved by economists' findings that the primary causes of our sluggish economy were the national recession, the decline in defense spending and the high cost of workers compensation, health benefits, taxes, real estate and labor. But AQMD acknowledged that some criticism was right on target.
>
> We are pleased to report that in 1992 the AQMD responded positively and vigorously to these challenges. The AQMD was the only regulatory agency in California to make major, substantive changes to ease the burden on businesses, including a complete overhaul of AQMD's regulatory strategies.

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[12]South Coast Air Quality Management District, Special Commission on Air Quality and the Economy (AQMD, December 2, 1991), Board Agenda Item #36, pp. 1-2.

[13]Maura Dolan, "AQMD Panel Pushes Rules to Aid Economy," Los Angeles Times (July 8, 1992), p. A-1, p. A-13.

[14]South Coast Air Quality Management District, 1992 Annual Report (AQMD, December 1992), p. 2.

Table III-8

Impacts of 1991 AQMP

TABLE 4-10

Impacts of the 1991 AQMP

	AVERAGE ANNUAL*			YEAR 2010		
	COSTS (millions of 87 dollars)	BENEFITS	JOBS	COSTS (millions of 87 dollars)	BENEFITS	JOBS
QUANTIFIABLE (Part 1)						
Control Measures						
District (1992-2010)	1188		-27039	1479		-45381
ARB (1995-2010)	155		-8474	84		-17517
Subtotal [costs (1992-2010)]	1318		-34113	1563		-62783
Benefits (1991-2010)						
Visibility		1520	21327		2370	53014
Morbidity		1622	10688		3273	-14616
Mortality		2884	38844		5818	109794
Agriculture		36	731		88	1357
Materials		139	3838		236	9503
Subtotal (benefits)		6201	54956		11785	162926
SUBTOTAL [COSTS & BENEFITS (1991-2010)]			22478			99623
UNQUANTIFIABLE (Part 2)						
Control Measures						
Tier I	1210	-	-27500	1210	-	-27500
Tier II	1365	-	-31100	1365	-	-31100
Tier III	953	-	-21700	953	-	-21700
Subtotal	3528		-80300	3528		-80300
GRAND TOTAL	4846		-57822	5091		19323

*Average annual estimates were calculated with respect to the pertinent periods. Therefore, these estimates are additive if different analysis periods prevail. Moreover, average annual estimates of job impacts are not additive due to nonlinearity of the REMI model.

Source: South Coast Air Quality Management District and Southern California Association of Governments, Draft Final, 1991 Air Quality Management Plan South Coast Air Basin (Diamond Bar, CA, May 1991), p. 4-42.

Conclusion

Public law is moving forward quite quickly in an attempt to clean the air for the nation, California and Southern California region. At first, local law was the most advanced, then state law came more forcefully into effect. Recent federal legislation, CAAA of 1990 and ISTEA of 1991, advanced the set of regulatory approaches to a higher level of complexity and coordination. Federal program flexibility and funds work together, potentially, to improve dramatically air quality.

How these laws and their local implementation work in Southern California, as perceived by stakeholders, is the focus of Chapter IV. Major emphasis is upon the connection among intergovernmental air quality laws, regulations and programs for seaport surface freight access in the Southern California area. Chapter V will review viable policy strategies.

Chapter IV

POLICY STAKEHOLDERS

Introduction

Now, it is appropriate to discuss the perspectives of key stakeholders and the relationship to potential policies and impacts. Basic surface freight access points-of-contact with air quality issues are reviewed, then stakeholders and perspectives related. Chapter V will suggest more feasible policy strategies, given current information.

Surface Freight Access -- Air Quality Contact

In the early 1990's, most decisions were based upon earlier projects of substantial growth in terms of cargo handled by the ports, Southern California urban growth and national growth. Table IV-1 details a fundamental starting point for all subsequent projections, the then current 1987 conditions and the year 2010 forecasts. Note how population is projected to increase by 31%, VMT by 62% and vehicle trips by 37%, thereby suggesting the increase in mileage driven per vehicle. The estimates do not assume any air quality controls other than those in place in 1987.

Subsequent air quality conditions were derived from this socio-economic starting point. And, air quality models and controls rested upon the data. The AQMD 1991 plan based its control strategy scenarios (Tiers I, II, II) upon these initially Southern California Association of Governments (SCAG) projections.

The interdependence of the assumptions and forecasts requires exploration of how surface transportation to the seaports relates to regional air quality. Table IV-2 shows projected emissions by the year 2010. Surface freight, by itself, is a small source of the total pollutants generated. AQMD data indicated that emissions from (heavy trucks and railroads) equals less than one percent of daily estimated emissions of ROG by 2010. If goods movement strategies are fully implemented (off-peak shipments, diversion of truck to rail, on-dock, near-dock transfer yards, rerouting, etc.), then a daily tonnage reduction of ROG will be 9.78 tons against 1,065 total tons a day from all sources.[1]

---

[1]Southern California Association Governments, 1991 AQMP Amendment (SCAG, July 1990, draft), p. 117.

Table IV-1

Baseline Socio-economic Forecasts for the South Coast Air Basin

Socioeconomic Category	Year 1987	2000 (% Growth)	2010 (% Growth)
Population (Millions)	12.0	14.3 (+19)	15 7 (+31)
Housing Units (Millions)	4.4	5.5 (+25)	6.1 (+39)
Total Employment (Millions)	6.0	7.4 (+22)	8.2 (+36)
VMT (Millions Miles)	240 1	323.5 (+35)	387.6 (+62)
In Use Vehicles (Millions)	7.9	9.2 (+17)	10.3 (+31)
Vehicle Trips (Millions)	29.2	35.3 (+21)	40.0 (+37)

* No AQMP measures included

Source: South Coast Air Quality Management District and Southern California Association of Governments, 1991 Air Quality Management Plan (AQMD, May 1991, draft final), p. 3-11.

Table IV-2

Summary of Emissions
By Major Source Category 2010 Base Year
Average Annual Day (tons/day)

Source Category	ROG	NOx	CO	SOx	PM10
Stationary Sources					
Fuel Combustion	21	183	107	14	20
Waste Burning	1	2	6	0	2
Solvent Use	419	0	0	0	2
Petroleum Process, Storage & Transfer	93	7	7	20	3
Industrial Processes	42	10	7	6	48
Misc Processes*	83	1	8	0	1,424
Total Stationary Sources	659	203	135	40	1,499
Mobile Sources					
On-Road Vehicles	296	494	1,831	29	56
Off-Road Mobile	110	300	752	61	18
Total Mobile Sources	406	794	2,583	90	74
Total	1,065	997	2,718	130	1,573

* Travel-related road dust included

Source: South Coast Air Quality Management District and Southern California Association of Governments, 1991 Air Quality Management Plan (AQMD, May 1991, draft final), p. 3-13.

In certain locations, there is undoubtedly a higher level of transportation activity related to surface freight access to seaports. Such cases are best illustrated by seaports, freight consolidation/transhipment yards (rail or truck), transportation corridors (rail, highways), or high volume generators of shipments/ end destinations (offices-central business districts; stores-shopping centers; industry-large facilities). Representative locations would be the seaports, railroad classification yards in the port area, Interstates 10, 405, 5, 605, 510, Alameda Consolidated Transportation Corridor, City of Los Angeles Central Business District, and aerospace manufacturers.

AQMD control strategies under consideration, especially in the more stringent Tiers II and II levels relate to surface transportation access by focusing on a large collection of point and nonpoint sources of emissions. In the hope that by casting a broad net, emission reductions will be achieved by aggregating many small, modest changes. To be sure, some ideas under consideration (e.g., contingency measures beyond Tier III) relate directly to railroad and truck transportation. For the most part though, the relationship is more of a secondary nature rather than a large, primary source.

Further perspective is gained by looking at the case of the Alameda Consolidated Transportation Corridor. A major activity was proposed to reduce congestion in the main rail and trucking corridors to the Ports of Long Beach and Los Angeles. It was developed by the Alameda Corridor Joint Powers Authority (ACTA).[2] The goal of the twenty-two mile route from central Los Angeles to the ocean is: "...to facilitate truck and railroad access to the ports of Los Angeles and Long Beach -- the busiest harbor complex in the United States." A combination of projects will make the improvement possible. Anticipated benefits include:

* reduced freeway congestion/improved freeway safety

  (development of near-dock and on-dock rail systems)
  (diversion of freeway truck traffic to Alameda Street)

* reduced noise and traffic delays

  (50% reduction in train-related noise and vibration in residential areas)

  (90% reduction in train-related traffic delays, eliminating some 14,000 hours of delay by the year 2020, due to the rerouting of trains and elimination of grade crossings)

---

[2]Alameda Corridor Transportation Authority, Alameda Corridor Update (ACTA, March 1992), pp. 1-5.

* improved railroad operations

  (30% reduction in train operating hours, and a 75% reduction in the number of times trains have to stop for other trains to pass. Stopped trains cause severe traffic tie-ups on streets.

  (Train speeds will increase from 10-20 miles per hour to 30-40 miles per hour.)

* improved air quality

* increased economic activity

The entire program may cost $1.5 billion and be completed in 2000. In 1991, "...about 19,000 truck trips and 25 train movements per day..." were generated. "By the year 2020, truck traffic is projected to increase to 49,000 daily trips and 90 daily train movements." By 2020 projected cargo tonnage through both ports is at 210.5 million metric tons, up from 92.3 million metric tons in 1989. Container cargo will reach thirty-seven percent of the tonnage total.[3]

Another proxy measure is the emission reductions from a large on-dock project for direct transfer of containers from ship to rail. Nox produced by one container unit train equal 29.6 lbs. per day, while the equivalent 274 container truck trips would produce 259.7 lbs. a day. A net reduction of 230.1 Nox lbs. per day is small in the regional tonnage totals, but highly visible within the immediate port yards and rail or freeway corridors. Even more telling is the reduction of trucks on the freeways and the more favorable public perception to the fact that one train equal 274 truck trips.[4]

With this comparative information in mind, discussion may now turn to stakeholders and their perspectives.

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[3]Alameda Corridor Transportation Authority, The Alameda Corridor: A National Priority (ACTA, October 1991), pp.7-9.

[4]Port of Long Beach, Maersk On-Dock Railyard, Final Environmental Impact Report (Port of Long Beach, February 5, 1992), p. 38.

Stakeholder Perspectives

At first glance, it would seem crystal clear who or what are the stakeholders, i.e., individuals, organizations, or groups. However in an issue such as air quality, several other more abstract and diffuse "public interest" stakeholders are involved.They often are described as those affecting the commonweal and raised to a higher level of generality.

For example, specific examples of stakeholders directly related to the cargo flow logistics are:

1. ocean carriers
2. seaports
3. land carriers (truck/rail)
4. shippers

A second set of stakeholders relate to cargo flow impacts:

5. economic
   - -workers
   - -local government tax revenue
   - -consumers
6. air quality
   - -public health (people, animals, plants)
   - -technological R&D
7. public policy

Put another way, all seven stakeholder categories ultimately converge into three fundamental public policy goals:

1. seaport/surface transportation system operation and development
2. economic stability and growth (region, state, nation)
3. public health (air quality)

Ocean carriers, seaports, land carriers, and shippers have separate interests. Sometimes, interests converge and lead to competitive coalitions. For initial clarity, assume they are individual actors. Tables IV-3,4 show current plan strategies under consideration, and those that are targeted for implementation. Each set of stakeholders may look at the strategies and implementation schedules rather differently.

Table IV-3

Control Strategies Relevant to Surface Freight Access to Seaports

Tier	Source Category	Control Method
	Point-Source Emissions	
I	Other Point Sources	Phase-Out Fuel Oil/Solid Fossil Fuels Emission Minimization Mgmt. Plan Marketable Permits Program
II	Other Stationary Sources (50% Reduction Beyond Tier I)	Application of BARCT Emission Charges
III	Other Stationary Sources (75% Reduction Beyond Tier II)	Application of BARCT Emission Charges
	Area-Source Emissions	
I	Petroleum and Gas Recovery Systems	Phase I/II Vapor Production Improved Vapor Recovery Systems Utility Engine Refueling Ops. Improved Fuel Shut-Off Mechanism
I	Industrial and Commercial Processes	Combustion Modification Alternative Fuels Add-On Controls Process Improvements Commercial Energy Conservation
I	Other Area Sources	BARCT Low-Emitting Construction Methods and Materials Watering At Construction Sites Windbreaks
II	Paved Roads Dust (20% Reduction Beyond Tier I)	Require Paving at the Areas Adjacent to Roadways Early Paving at Construction Sites Install Liners on Truck Beds

Table IV-3 (con't)

Tier	Source Category	Control Method
II	Other Stationary Sources (50% Reduction Beyond Tier I)	BARCT Emission Charges
III	Other Stationary Sources (75% Reduction Beyond Tier II)	BARCT Emission Charges
	On-Road Motor Vehicle Emissions	
I (ARB and AQMD)	Passenger Cars/ Light-Duty Trucks Medium-Duty Vehs.	Reductions of In-Use Emissions More Stringent Standards Use of Clean Fuels and Low Emission Vehicles
	Heavy-Duty Vehicles	-----
	Urban Buses	-----
I (SCAG)	Passenger Cars Light-Duty Trucks Medium-Duty Vehicles	Mitigation Measures Trip and VMT Reduction Truck Programs
	Heavy-Duty Vehicles	-----
	Off-Road Mobile Source Emissions	
I	Utility Engines Construction and Farm Equipment	More Stringent Standards Operational Modifications
	Marine Vessels Off-Road Motorcycles Locomotives Off-Highway Vehicles Aircraft	Low In-Use Emissions Alternative Fuels
II	Locomotives Non-Farm Equipment	Control Equipment Alternative Fuels
	Urban Buses	-----

Source: South Coast Air Quality Management District and Southern California Association of Governments, 1991 Air Quality Management Plan (AQMD, May 1991), excerpted from Tables 7-1 to 7-8.

Table IV-4

Related Control Measures Implementation

Tier	Title	Agency	Date
	(Federal)		
I	Oxygenated Fuels Program	EPA/ARB	1992
	Control of Emissions	AQMD/EPA/ARB	1994-1997
	Marine Vessels Tanks	Ports/Coast Guard	
	Railroad Electrification (All Pollutants)	EPA/FRA	2000
	(ARB, State, AQMD, Local Govts.)		
I	Revised Emission Stands. and Test Procedures for Medium-Duty Vehicles and Light Heavy-Duty Engines	ARB	1995-1998
	Improved Certification Requirement for Alternative Fuel Retrofit Systems	ARB	1992-1994
	Low Emission Vehicles And Clean Fuels Program	ARB	1994-2003
	New Gasoline Specs., Phase 2 Reformulated	ARB	1996
	Low Emission Vehicle Stands. for Heavy-Duty Engines	ARB	1996-2007
	Fleet Average Stands. for Post-2003 Model Years (Pass. Cars, Light-Duty Trucks, and Medium-Duty Vehicles)	ARB	2004-2010
	Retrofit/Operational Requirements for Locomotives	ARB	1992-1997
	Emission Stands. for Marine Vessels	ARB	1997-1999

Table IV-4 (con't)

Tier	Title	Agency	Date
	Control of Emissions from Marine Vessel Tanks	AQMD/EPA/ARB Ports/Cost.Grd.	1994-1997
	Truck Dispatching, Rescheduling and Rerouting	Local Govts. AQMD/SCAG Caltrans/CHP	1994
	Rail Consolidation to Reduce Grade Crossings	Caltrans Alameda Corridor	1997
	High Speed Rail	SCAG/Local Govts. Caltrans	1997
	Diverting Port-Related Truck Traffic To Rail	Ports/Railroads	1994
	Growth Management	SCAG/Local Govts.	1994

Source: South Coast Air Quality Management District and Southern California Association of Governments, 1991 Air Quality Management Plan (AQMD, May 1991), excerpted from Tables 7-1 to 7-8.

The implementation target dates will lead, if everything works together in the plan, to expected compliance years (Table IV-5) when pollutant standards will be met. Depending upon the pollutant and standard, compliance will occur after the year 2000.

Furthermore, plan projections that by 2010 VMT for heavy-duty vehicles will rely on alternate fuels, and diesel, while locomotives will be primarily electric driven (Table IV-6). New vehicle sales penetration, including heavy-duty vehicles, also show a significant reliance on alternate fuels.

Logistic Pipeline

To a large degree, it is the ocean carrier that is the bellwether in the implementation process. Each carrier operates in an intensely competitive transportation sector, in which many of the major markets are served by alternative carriers, routings, and cost structures. For example, a foreign carrier heavily supported

Table IV-5

Expected Year for Attainment of the State and Federal Standards for the Four Criteria Pollutants

TABLE 5-1
Expected Year for Attainment of the State and Federal
Standards for the Four Criteria Pollutants

Pollutant	Standard	Concentration Level	Control Requirement (Tier)	Expected Compliance Year
Ozone	Federal 1-hour	12 pphm	I, II, III	2010
	State 1-hour	10 pphm	I, II, III	beyond 2010
PM10	Federal Annual	50 $\mu g/m^3$	I, II	2006
	Federal 24-hour	150 $\mu g/m^3$	I, II	2000
	State Annual	30 $\mu g/m^3$	I, II, III	beyond 2010
	State 24-hour	50 $\mu g/m^3$	I, II, III	beyond 2010
CO	Federal 8-hour	9 5 ppm	I	2000
	Federal 1-hour	35 ppm	--	1990
	State 8-hour	9 ppm	I, II, III	2005
	State 1-hour	20 ppm	I	2000
NO_2	Federal Annual	5 pphm	I	2000
	State 1-hour	25 pphm	I	2000

* The compliance year is calculated based on the highest concentrations observed during a three year period. ARB's recommended guidelines on design day calculation allow the elimination of extreme concentrations, and the ARB and the District will further review the data to determine if the design values should be adjusted based on this consideration. If lower concentrations are used in the analysis, the Basin will be in compliance of all CO and NO_2 standards before 2000

Source: South Coast Air Quality Management District and Southern California Association of Governments, 1991 Air Quality Management Plan (AQMD, May 1991), p. 5-5.

Table IV-6

Motor Vehicle VMT Penetration Assumptions

TABLE ES-2A

Motor Vehicle VMT Penetration Assumptions for 2010
(percent of all miles driven)

Vehicle Class	Electric	Alternate Fuels*	Gasoline	Diesel
Passenger Cars	17	33	50	0
Light-Duty Vehicles	9	38	53	0
Medium-Duty Vehicles	0	40	57	3
Heavy-Duty Vehicles	0	24	29	47
Urban Buses	30	70	0	0
Locomotives	90	0	0	10

*Alternative fuels under consideration include methanol, LPG, and natural gas.

TABLE ES-2B

Estimated Percent of New Vehicle Sales for 2010

Vehicle Class	Electric*	Alternate Fuels**	Gasoline	Diesel
Passenger Cars	50	25	25	0
Light-Duty Vehicles	35	32.5	32.5	0
Medium-Duty Vehicles	0	50	50	
Heavy-Duty Vehicles	0	50	50	
Urban Buses	30	70	0	0

*Includes dedicated electric and hybrid electric vehicles.

**Alternative fuels under consideration include methanol, LPG, and natural gas.

ES 9 May 1991

Source: South Coast Air Quality Management District and Southern California Association of Governments, 1991 Air Quality Management Plan (AQMD, May 1991), p. ES-9.

by its national government or its parent company may undercut pricing of those carriers relatively less fortunate. In a theoretical even playing field, all have equal opportunity to compete. But in reality, the competitive market is imperfect and additional costs (perceived or real) connected to the flow of cargo into or from a seaport may make a significant difference. The carrier might not be able to offer good value for similar service, or, the shipper might decide that total transportation costs have become too high and seek other alternatives. In sum, air quality controls in Southern California at this point appeared to have affected ocean carriers less than land carriers.

In this logistic pipeline, seaports make the system work. Their function is to provide opportunity for a "smooth" or "seamless" transfer of cargo. On seaport property, or nearby private property, various cargo handling and processing functions are necessary. Each of these activities may impact air quality directly and indirectly. An illustration would be the handling of cargo from ship to land carrier. If the transfer is made to "final" land carrier equipment adjacent to the ship, then there are fewer intermediate steps necessary. More traditionally, land area is scarce and the transfer steps require several intermediate moves: ship to rail/truck to storage/processing to rail/truck for local delivery or through shipment. Until the Intermodal Container Transfer Facility yard was completed near the ports (three miles from wharves), container cargo had to be carrier by truck over thirty miles north to central Los Angeles rail container transfer facilities. Now, it is carrier by rail to the ICTF, thus shortening the trip by truck and causing less air pollution.

Land carriers (truck/rail) experience the most direct relationship with air quality concerns. As the highly visible transportation providers, truck and rail equipment have been identified as a mobile source of air pollution. Carrier equipment has been regulated at the point of manufacture. In the aggregate, if both mobile sources are large enough (and they appear to be), stringent controls may be implemented in addition to technology. Trucks may be limited in terms of operational times and areas. Railroads might be prohibited from operating diesel engines in the urban area and forced to use electric engines. Other alternative fuels may be encouraged too. As with the ocean carriers, there may be routing flexibility. For through cargo that does not originate or end in the Southern California area, other ports might become more preferable. Already there has been diversion of through cargo to Mexican ports, and other ports to the north (California, Oregon, Washington, Canada).

The ultimate logistic decisionmaker is the shipper. If the shipper's product(s) can no longer be sold at a profit, other means will be sought to improve profit margins. An obvious approach would be to seek less costly logistical pipelines. As above, land carriers would well anticipate shippers's needs and seek other

routes to hold costs down. At some point in the cost decision calculus, it becomes obvious to the shipper that the area should be bypassed altogether for through shipments. Local markets more likely will continue to pay increased costs but in an inverse relationship -- less will be sold while at a higher price. Overall, shipper profits based on sales volume will significantly deteriorate. Here too, the shipper may decide to forget the Southern California market for sales, or if a producer, move to lower cost areas outside the region. The latter is already happening for a multitude of reasons, including air quality control costs.

When the logistical stakeholders form coalitions, certain routings and trade patterns may be more firmly imbedded than apparent. It would appear that each would respond in its own best interests. However to hold the competitive edge via an established coalition, some stakeholder may absorb losses to hold market share.

Nevertheless, from the independently made, but interrelated, decisions of ocean carriers, seaports, land carriers, and shippers, impacts are generated. These cargo flow impacts are in broad terms associated with economic, air quality, and public policy forces.

Economic Interests

Economic stakeholders included business owners and workers, consumers (business, individuals), and local governments (economic base and tax revenues). For the business owner, bottom line results are clearly impacted by increased transport costs, due to air quality regulations. If the impact is severe, ultimately, workers would be forced to accept lower wages, fewer hours of employment or even loss of jobs. Likewise, consumers would pay higher prices, which would in turn possibly lead to a lower standard of living. Lastly, governments would receive lower revenues based on sales and income taxes, and business licenses. If allowed to run its course, businesses would begin to leave Southern California or not locate here if operating costs were perceived to be too high. There is indication that has already begun to occur as well. For the most part, other forces account for these locations (labor, housing, congestion, taxes, workers' compensation, health and food costs). Then, if present air quality regulation costs and future perceived costs are included, the locational decision becomes easier -- leave or avoid Southern California.

There are two major stakeholder components to air quality impacts. Public health concerns are real, significant, and getting worse. As noted in Chapter II, long-term cumulative effects appear to very harmful. People, animals, and plants suffer. The

agricultural industry has already experienced a decline in crop quality and quantity. As an important offshoot of the attempt to control air pollutant sources, industry has developed more effective technology to control, reduce or eliminate pollution. For some fuels, it has been a time of growth and a bright long-term prospect of sales. Natural gas and electricity, for instance, are strong candidates to replace petroleum based power sources and therefore pollutants. If done on a widespread basis, major improvements are highly likely, given projected population and industrial activity.

At the beginning of this discussion, it was suggested that the shipper is in a key position to influence the course of events. Similarly, public policy, representing the sometimes more abstract commonweal, will determine by its action or nonaction the direction and speed of the events. If the sum of public policy decisions is to allow air quality to worsen, with no additional improvements, while population grows, then major public health impacts will be suffered. Many businesses and citizens will still relocate or bypass Southern California because of the reputation of harmful air quality. On the other hand, if public policy attempts to clean the air are too stringent (*read* -- expensive), then the same result might well occur for different reasons - no employment. That is quite a Hobsonian choice for public policy makers. It is the precise dilemma with which air quality officials must contend. The public policy debate has reached the point of sloganeering -- jobs vs. air quality/public health.

Conclusion

The stakeholders have, from their individual perspective, valid points-of-view. In this case, the sum of the parts is greater than the whole. The puzzle may not easily, if at all, fit together. The clash of their needs becomes more evident when considering the AQMD strategies relating to surface freight access to seaports.

The next chapter reviews how the goal of air quality interacts with the stakeholders needs. The more promising strategies will be discussed.

Chapter V

AIR QUALITY AND SURFACE FREIGHT POLICY STRATEGIES

Introduction

There is a temptation to view the relationship of air quality strategies and surface freight access strategies as a game of public-private "brinkmanship" or "chicken." Which stakeholder or coalition of stakeholders will "blink" first?

The issue has not quite been posed in such terms, yet institutional actions, over time, appear to have a similar, cumulative net effect. Simply put, the basic perspectives of stakeholders would seem to be:

clean air versus the economy

Of course, the basics are more complex and neither "side" wants a zero-sum game. (Theoretically, a "win-win" conclusion is possible.) This chapter, therefore, will consider in broad terms the relationships of the stakeholders and how various strategies affect the basic goals to clean the air and have keep the cargo moving.

Control Strategies Affecting Surface Freight

With air pollution from many different sources, the AQMD determined the best way to clean the air was to address all the sources. The list of strategies developed by AQMD was described in Chapter IV. The wide range of approaches to be employed represent a mixture required by federal, state and local laws governing air quality.

Table V-1 describes the strategies more relevant to the relationship of surface freight to seaports and air quality. The principal areas of emphasis are: Point Sources (Tiers I, II, III); Area Sources (Tiers I, II, III); On-road Mobile Source Emissions; and, Off-road Mobile Source Emissions.

Notice how far reaching the controls are. Surface freight carried by rail and truck is fully involved. So long as about sixty percent of the cargo through the seaports is regionally originated or destined in the Southern California market, surface freight carriers will stay in the "game" and ultimately participate in control strategy implementation.

Table V-1

Control Strategies Relevant to Surface Freight Access to Seaports
(Excerpted)

Point-Source Emissions

Tier	Source Category	Control Method
I	Other Point Sources	Phase-Out of Fuel Oil and Solid Fossil Fuels Emission Minimization Mgmt. Plan Marketable Permits Program
II	Other Stationary Sources (50% Reduction Beyond Tier I)	Application of BARCT Emission Charges
III	Other Stationary Sources (75% Reduction Beyond Tier II)	Application of BARCT Emission Charges

Area-Source Emissions

I	Petroleum and Gas	Phase I/II Vapor Production Recovery Systems Improved Vapor Recovery Systems Utility Engine Refueling Opers. Improved Fuel Shut-Off Mechanism
I	Industrial and Commercial Processes	Combustion Modification Alternative Fuels Add-On Controls Process Improvements Commercial Energy Conservation
I	Other Area Sources	BARCT Low-Emitting Construction Methods and Materials Watering At Construction Sites Windbreaks
II	Paved Roads Dust (20% Reduction Beyond Tier I)	Require Paving at the Areas Adjacent to Roadways Early Paving at Const. Sites Install Liners on Truck Beds
II	Other Station. Sources (50% Reduct. Beyond Tier I)	BARCT Emission Charges
III	Other Stationary Sources (75% Reduct. Beyond Tier II)	BARCT Emission Charges

Table V-1 (con't)

Tier	Source Category	Control Method
	On-Road Motor Vehicle Emissions	
I	Passenger Cars	Reductions of In-Use Emissions
	Light-Duty Trucks	More Stringent Standards
	Medium-Duty Vehicles	Use of Clean Fuels and Low Emission Vehicles
	Heavy-Duty Vehicles	-----
	Urban Buses	-----
I	Passenger Cars	Mitigation Measures
	Light-Duty Trucks	Trip and VMT Reduction
	Medium-Duty Vehicles	Truck Programs
	Heavy-Duty Vehicles	-----
	Off-Road Mobile Source Emissions	
I	Utility Engines	More Stringent Standards
	Construction and Farm Equipment	Operational Modifications
	Marine Vessels	
	Off-Road Motorcycles	Low In-Use Emissions
	Locomotives	
	Off-Highway Vehicles	Alternative Fuels
	Aircraft	
II	Locomotives	Control Equipment
	Non-Farm Equipment	Alternative Fuels
	Urban Buses	-----

Source: South Coast Air Quality Management District and Southern California Association of Governments, 1991 Air Quality Management Plan (AQMD, May 1991), excerpted from Tables 7-1 to 7-8.

Which strategies appear more likely to be implemented are reviewed in Table V-2. These more relevant control strategies are identified by source and tier.

Reviewing both tables of control strategies, it is evident that the AQMD plan is premised upon finding improvements from almost every source possible. Research indicates that the more effective approach is to control, at this stage of regulatory history, many sources in aggregate. In other words, though a single source may not be large, when combined over the Southern California region or a particular geographic area or corridor, its impact may be substantial. The "easy" gains have been made, in that large point sources and mobile sources have been controlled substantially in theory. Smokestacks have abatement equipment added. Mobile sources have engine/exhaust abatement equipment. Fuels no longer have lead and are oxygenated.

Surface freight to seaports is one of the many "smaller" source categories encompassed by the larger regulatory net, which the AQMD is required to cast out over all sources.

Stakeholder Interest Continuum

In Chapter IV the perspectives of stakeholders were discussed:

cargo flow logistics:

1. ocean carriers
2. seaports
3. land carriers (truck/rail)
4. shippers

cargo flow impacts:

5. economic
   - -workers
   - -local government tax revenue
   - -consumers
6. air quality
   - -public health (people, animals, plants, environment)
   - -technology R&D
7. public policy

Table V-2

Related Control Measures Implementation
(Excerpted)

Tier	Title	Implementing Agency	Date
	(Federal)		
I	Oxygenated Fuels Program	EPA/ARB	1992
	Control of Emissions from Marine Vessels Tanks	AQMD/EPA/ARB Ports/Coast Guard	1994-1997
	Railroad Electrification (All Pollutants)	EPA/FRA	2000
	(ARB, State, AQMD, Local Govts.)		
I	Revised Emission Stands. and Test Procedures for Medium-Duty Vehicles and Light Heavy-Duty Engines	ARB	1995-1998
	Improved Certification Requirement for Alternative Fuel Retrofit Systems	ARB	1992-1994
	Low Emission Vehicles And Clean Fuels Program	ARB	1994-2003
	New Gasoline Specs., Phase 2 Reformulated	ARB	1996
	Low Emission Vehicle Stands. for Heavy-Duty Engines	ARB	1996-2007
	Fleet Average Stands. for Post-2003 Model Years (Pass. Cars, Light-Duty Trucks, and Medium-Duty Vehicles)	ARB	2004-2010
	Retrofit/Operational Requirements for Locomotives	ARB	1992-1997
	Emission Stands. for Marine Vessels	ARB	1997-1999
	Control of Emissions from Marine Vessel Tanks	AQMD/EPA/ARB Ports/Cost.Grd.	1994-1997
	Truck Dispatching, Rescheduling and Rerouting	Local Govts. AQMD/SCAG/Caltrans/CHP	1994

Table V-2 (con't)

Tier	Title	Implementing Agency	Date
	Rail Consolidation to Reduce Grade Crossings	Caltrans Alameda Corridor	1997
	High Speed Rail	SCAG/Local Govts. Caltrans	1997
	Diverting Port-Related Truck Traffic To Rail	Ports/Railroads	1994
	Growth Management	SCAG/Local Govts.	1994

Source: Excerpted from Table V-1.

Essentially, stakeholders providing the logistical function of cargo flow are a collection of private sector ocean and land carriers, shippers, and seaports. In Table V-3 they are identified as **surface freight stakeholders.**

The stakeholders affected by cargo flow impacts, economic, air quality and public policy are identified as **governmental stakeholders.**

A third set of stakeholders concerned by many of the factors concerning government, but more focused, is **air quality stakeholders.**

All three categories are not entirely mutually exclusive. Seaports, for example, are part of the surface freight and governmental coalitions. Governmental agencies, federal, state, and local, are also part of the air quality grouping.

For the air quality stakeholders, the strategies of the principal agency (AQMD) may be refined into the following set, insofar as surface freight is concerned:

1. fuels: Oxygenated Fuels Program

   Improved Certification Requirement for Alternative Fuel Retrofit Systems

   New Gasoline Specs., Phase 2 Reformulated

   Railroad Electrification (All Pollutants)

2. emissions:

Revised Emission Stands./Test Procedures for Medium-Duty Vehicles/Light Heavy-Duty Engines

Low Emission Vehicles And Clean Fuels Program

Low Emission Vehicle Stands. for Heavy-Duty Engines

Fleet Average Standards for Post-2003 Model Years (Pass. Cars, Light-Duty Trucks/Medium-Duty Vehicles)

Retrofit/Operational Requirements for Locomotives

3. other approaches:

Truck Dispatching, Rescheduling and Rerouting

Rail Consolidation to Reduce Grade Crossings Alameda Corridor

High Speed Rail

Diverting Port-Related Truck Traffic To Rail

Growth Management

Stakeholder interests in relationship to the most relevant AQMD strategies are described in Table V-3. The strategies will be discussed from the perspective of surface freight, government and air quality stakeholders.

Surface Freight Stakeholder

Attempts to reduce the pollutants caused by fuels powering trucks and trains are part of the larger federal and state policy to developing and using "clean" fuels. Oxygenated fuels are now available in some regions. Alternative fuels (natural gas, gasoline hybrids - methanol, ethanol) will benefit from improved certification programs and retrofit systems. By 1996 reformulated gasoline specifications may be in effect.

Electrification of the railroads is a serious consideration that carriers are reluctantly reviewing. Public agencies initially studied the possibility for commuter rail operation, but were dissuaded by conversion costs. If installed, the additional power

Table V-3

Stakeholder Interest Continuum

Stakeholder: Surface Freight	Government	Air Quality
ocean carriers	AQMD/ARB EPA	AQMD/ARB EPA
seaports	SCAG/Caltrans PUC/DOT	public health
land carriers	LACTC/PUC	citizens
shippers	cities/counties	---
economic	seaports economic development	---
**********	**********	**********
Primary Goal:		
low cost freight transportation	consensus balance of interests	low/zero emiss. surf.frgt.
**********	**********	**********
Objectives:		
meet customer needs	incremental change	control sources: direct/indirect point/area
least cargo damage	safety	improve air
fastest service	more jobs	better technology
lowest cost	tax revenue	fines/fees
larger market share	stability	stability
develop technology at low cost	cost-share/ cost-shift	cost-share/ cost-shift
maximize earnings	more tax rev.	more fines/fees

Table V-3 (con't)

Surface Freight	Government	Air Quality
raise prices	lower taxes	implement stds.
slower service	delay regulatory dates	delay stds.
divert cargo to lower cost routes outside S.C.	fund more R&D (grants, tax credits)	change standards
compliance by:		
technology	subsidize	phase in regs.
reduced VMT		
shared facilities shared corridors	support stds.	negotiate compliance
on-dock rail transfer	fast-track permit approvals	

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Examples:

use cleaner alt. fuels	tax credits	lower fees/fines
operate at speeds less polluting	encourage	lower fees/fines
invest in new tech.	fund R&D	electric car
buy "clean" power	preserve jobs	support S.C. mfg.
bypass S.C. through cargo import/export	reevaluate standards/lower carrier compliance costs	
consolidate shipments to lower VMT	provide tax incentives	
shared intermodal facilities:	fast-track permits/licenses	

Intermodal Container Transfer Facility

Alameda Consolidated Transportation Corridor

Maersk On-Dock Railyard, Port of Long Beach

necessary might well generate more power plant point-source emissions in lieu of locomotive mobile sources. From a carrier point-of-view, conversion to electric power would be a public requirement and thus cost, not a private cost.[1] Should electrification occur, some believe that urban transportation congestion would lead to a container modal shift from trucks to rail within the region. Major transfer facilities would be constructed at selected regional rail gateways far out in the desert.

Whichever mode carries surface freight, efficiencies, thus less air pollution, would be possible by consolidating shipments and facilities.

For the most part, surface freight interests would be tempted to pass any increased cost of "clean" fuel (alternative fuels) onto the customer. More efficient operational speeds may be stressed to help economize. Governmental regulations requiring such fuels would be industry-wide, so theoretically all parties would be affected equally. Some carriers may be operating close to or at "break-even" levels. For them, potential increased fuel costs might force closing down.

Theoretically, emission control programs would be slowly installed and incremental in impact. "Grandfather" clauses are implied but not stated. For example, changes in emission standards for medium-duty vehicles and heavy-duty engines, fleet average standards for post-2003 models years (light-duty trucks and medium-duty vehicles) could prove to be very expensive when aging trucks need to be replaced. Purchasing new equipment meeting the standards could well place less financially strong carriers at risk. Some might closely consider buying the last model year before standards changes take effect, just to avoid paying the probable higher price of the technology change-over.

Retrofitting and strengthening operational requirements for locomotives hold promise. By 1997 this approach could be accomplished. Again, the question of additional cost to the carrier and if it is passed on to the customer is relevant.

Other approaches include operational changes, modal changes, and growth control.

As noted in the study on congestion,[2] increased difficulty in

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[1]Southern California Regional Rail Authority, Southern California Accelerated Rail Electrification Program (Los Angeles: SCRA, Draft Executive Summary, February 10, 1992).

[2]Shaw, Congestion, op. cit., discussion is from Chapter V.

shipping cargo through Southern California forces reconsideration of many options formerly considered as beyond the pale.

Carriers and shippers have embraced the Japanese concept of JIT (Just-in-Time)." The new practice has helped to balance the customarily uneven relationship by lowering shipper inventory and warehousing costs. Assuming the JIT shipment is reliably on time, smaller reserves of key resources or parts are necessary. For example, JIT shifts private sector shipper warehousing costs to publicly funded transportation systems. In effect, some argue, seaports, freeways and other publicly funded resources have become "moving warehouses."

JIT is in no small degree a function of the value of time. The placement of rail intermodal facilities only five miles from the San Pedro Bay Ports represents one response to the imperatives of time. The Intermodal Container Transfer Facility (ICTF) represents large private sector investment. The facility owner and operator, Southern Pacific Corporation believed a "near-dock" facility was in the mid-1980's a better choice than "on-dock" facilities. The ICTF was two-thirds full upon opening and is now in need of expansion. In fact, container unit trains are longer than the original design allows (5000 feet) and must be split in two.[3]

Another response is the development of on-dock rail facilities. The Port of Long Beach has an on-dock facility in the planning stage. It is the next step in closing the gap between rail/truck yard facilities and direct shipside service.[4]

If customer service and time value are ineffective disciplines upon transportation carriers and public agencies, then the threat of cargo diversion is the ultimate enforcer. Cargo can "walk" away, especially if it is discretionary in its port of exit or entry. Diversion is the source of two kinds of threats to the dominance of Southern California seaports.

The domestic threat is from other ports better able to exploit market niches and/or actually handle substantial volumes with good surface transportation networks. The niche markets, for example, could be served by Port Hueneme, California. Favorable freight

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[3]Southern Pacific Corporation, Intermodal Container Transportation Facility Brochure (SPC, 1989), pp. 1-3.

[4]Port of Long Beach, Maersk On-Dock Container Transfer Facility Environmental Impact Statement (Port of Long Beach, Final Environmental Impact Statement, February 5, 1992).

rates offered by port shipping affiliates can be tempting.[5] Larger volumes might be handled by San Diego, Oakland, Seattle/Tacoma if low rail/trucking rates offset the potential cost of distance from the Southern California markets. A second threat is from foreign ports. The U.S.- Mexican border industrial zone, "Maquiladoras" has grown so quickly that U.S. jobs and cargo are heading south.[6] Vancouver, Canada is a more distant threat to through cargo shipments not destined to or starting in Southern California. Transshipment of current cargo to Mexico-bound stack trains is growing. "About 10 percent of Mexico's total trade now flows through the U.S. gateways of Los Angeles and Long Beach, with a significant portion entering through the Port of Houston." On the other hand, Mexican national policy is to increase the efficiency and competitiveness of its ports. Pacific ports given national priority are Manzanillo and Lazaro Cardenas.[7]

Closer competition may come from the Port of Ensenada, Baja California, Mexico. Local volume is growing.[8] At some point, it may become an extremely attractive alternative altogether as a "satellite" port in the Southern California extended region (about 150 miles from Los Angeles). Mexican officials state that Ensenada will serve only its regional zone. The requisite rail and highway infrastructure are not in place to serve adequately the border industrial zone or Southern California.[9]

Carriers are using technology to gain competitive advantage against intense competition for a shrinking customer base. Consequently, there have been important innovative carrier approaches to packaging[10] and containers.[11] Some railroads are

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[5]Gary Taylor, "The Port Less Traveled Might Harbor a Bonus," International Business (June 1992), pp. 24-25.

[6]"Detroit South; Mexico's Auto Boom: Who Wins, Who Loses," Business Week (March 16, 1992, Cover Story).

[7]Valerie Drogus, "Mexico's drive to improve ports may give U.S. harbors competition," Traffic World (Special Section on Port Access, March 9, 1992), pp. 34-35.

[8]Robert P. James, "Hanjin becomes newest player in U.S.-Mexico intermodal market," Traffic World (November 11, 1991), p. 23.

[9]Fernando Castillo, Port Director, General Manager, Port of Ensenada, Port of Ensenada Plans (Long Beach/Los Angeles Propeller Club Conference, March 5, 1992, speech), p. 3.

[10]"Special Report-Freight Packaging; Globalization, new products, technology improve packing methods, containers," Traffic World (August 26, 1991), pp. 38-44.

experimenting with new equipment in the container mode. For example, the Burlington Northern has developed a rack frame to carry automobiles and light trucks within a standard container.[12] Already in use are plastic liners to increase the use of containers for dry and liquid bulk. Others are using a container size rack for liquid/gaseous cargo tanks.

Electronic information flows promise development of a "seamless" transportation pipeline. Kinks can be smoothed out and customer service improved. Apparently, progress is so swift that more and more shippers are switching traffic from highway to intermodal. Of all shippers in 1991, 34% switched. Of firms $ 1 billion or greater annual revenue, 52% switched. These are by any standard very impressive numbers.[13] A related technology is the "tagging" of containers. Used in conjunction with satellites or wayside scanners placed along railroad rights of way, automatic equipment identification tags are growing in use. Santa Fe will use them first on locomotives.[14]

Such high-tech innovations make the use of "time slots" more practical. In the basic concept, ocean carriers plan land-side requirements at least forty-eight hours in advance for imports. To the extent that export cargo has the same problems, similar arrangements might be appropriate. Time slots have great appeal. As with JIT, sophisticated coordination would be valued highly. All assets would be used to their highest level of productivity. If working as designed, the concept would have tremendous positive spill-over effects to the issues of regional mobility, congestion and air quality. Fewer trucks would be necessary on the surface transportation system. Each transport asset ship/truck/container/ train) would be fully loaded and utilized (no "empties on backhaul). Closing the high-tech loop, the concept ultimately would be fully integrated with IVHS and smartcars and trucks. Lockheed and AT&T foresee a market of "$200 billion over the next 20 years

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[11]"Truckload carriers push development of second-generation containers," Traffic World (Special Section on Intermodal Outlook 92, April 27, 1992), pp. 22-23; "Globalization, new products, technology improve packing methods, containers," Traffic World (Special Report: Freight Packaging, August 26, 1991), pp. 38-44.

[12]Burlington Northern Intermodal, BN Innovative Intermodal Service (St. Louis: St. Louis Hub Center, undated).

[13]Lisa Harrington, "Advances in information technology smooth intermodal freight flows," Ibid., pp. 31-33.

[14]"Santa Fe mounting 75,000 AEI tags," Railway Age (February 1992), p. 13.

in the United States."[15] These technologies hold great promise for air quality improvements

As part of the movement to control growth, the City of Los Angeles started to consider bans on trucks in the downtown central business district in the mid-1980's when the economy was growing and truck-caused congestion, accidents and air pollution were increasing. After many draft municipal code revisions and a downturn in the regional economy, the concept was tabled. It has not yet been reconsidered.

Growth management has been typically the most difficult to consider. The public policy tools are in place but not used very much. The surface freight stakeholders are proxies for the larger questions of regional population and transportation service to the rest of the nation. About sixty percent of the cargo is destined to or generated in Southern California. In effect, the air quality problem is homegrown: that is, it is a natural by-product from the life-support of a population approaching eighteen million residents. If growth management were applied to new economic development location, function, and required support facilities and services, surface freight stakeholders would be directly affected.

Regardless of which approach (or all three) is employed, surface freight stakeholders may find it more profitable to avoid Southern California. The carriers and the regional economy would be at a comparative disadvantage to other regional economies on the west coast, including Canada and Mexico. For cargo with an origin/destination in Southern California, costs would be higher. For through cargo, costs could be held lower by using other west coast regions if the surface freight infrastructure can support the increased volume. Even if it cannot, it may be cheaper to build it than to ship through Southern California.

Government Stakeholders

Strategies under consideration were developed, for the most part, when the Southern California regional, state and national economies were stronger. Growing economies can more easily absorb air pollution control costs. A weak economy, especially one as stressed as Southern California's, may not be able to support initial controls and timelines under consideration.

Fuel and emission controls are broad based and mandated by the federal government and State of California. They affect all

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[15]"Lockheed, AT&T Unveil 'Smart Highway' Plans," Los Angeles Times (April 13, 1992), pp. D-1, 10.

carriers relatively equally depending upon carrier fleet mix. One such mandate, the California electric car may be transferrable to light duty trucks and vehicles.

Some approaches may be localized and far more specific in impact, e.g., railroad electrification. Other approaches would be more based on government attempts to direct economic activity and transportation functions as the most effective way to less air pollution from surface freight.

Caught in the middle of the governmental stakeholders vis-a-vis surface freight stakeholders are seaports and transportation agencies. Their collective responsibility is to facilitate the movement of people and freight. General government, as well, has a two fold task to represent the public interests which may be contradictory: clean the air -- protect jobs -- eliminate congestion -- maintain tax and fee income.

Ultimately, hard choices would have to be made. So far, the governmental stakeholders' strategies have been to study potentially drastic measures. Incremental and easier to implement approaches have been worked into the public policy fabric. Since 1987, it was clear that tougher approaches had to be considered. Trucking bans, diverting trucks to rail, consolidating facilities, shortening the cargo move from ship to truck and/or rail, rail electrification all represent the degree to which novel approaches are under review.

The most volatile approach from a Southern California public official perspective is that of growth control. The ultimate control on population is when an essential basics are no longer available (jobs, food, shelter, water). To date, the most effective limitation has been fewer jobs. The final long-term control is most likely water supply.

Thus in the next five to ten years, it would seem likely that general governmental stakeholders will attempt to soften, or ameliorate the negative impacts of AQMD strategies in order to balance the competing public policy needs and interests. Slow transition, delay, research, development all will be obvious tools. When that variety is no longer useful and hard choices must be made, the governments may opt for tax credits, reduced fees, cost-sharing, or direct subsidy and grants to effectuate a somewhat easier transition for the economy and the surface freight stakeholders.

Air Quality Stakeholders

Until 1992 air quality stakeholders were developing their ideas and strategies with a general (and more abstract) awareness of economic issues. As the national economy deteriorated, there has been no let up in schedules or requirements. At the State of California level, more sensitivity has been shown but no significant changes. At the AQMD level, where the Southern California economy was in a deep recession, considerable more pressure was brought to bear by non-air quality stakeholders. Slower implementation has been seriously considered and business opposition has been strong. AQMD officials understand the economy was sounder and the full force of the recession and aerospace layoffs had not been felt. Now, they too became more sensitive to competing public goals as did the governmental stakeholders.

An approach gaining support is to let the federal air quality stakeholders proceed with fuel, emission and other controls. That set should be diffused enough at the national level to permit less harmful transition of the economy. As more effective technology is developed and installed, accomplishments will grow.

At the California and Southern California levels, perhaps implementation of measures directed toward the surface freight community can be slowed until the economy is stronger. Recall that in Chapter IV it was noted that the AQMD was studying its effect on the economy and also lowering fees.

Some would argue, anyway, that surface freight-caused air pollution is a small component of the total sources in the region. Nevertheless, in industrial areas or transportation corridors, pollution will be more concentrated and perhaps operational adaptations will be positive -- consolidated carrier shipments, non-rush hour schedules, and evening deliveries only in restricted congested areas. Stressing the purchase of "clean" motive power will go a long way towards cutting emissions. Full utilization of facilities (ICTF, Alameda Corridor, on-dock rail) offers real accomplishments.

The most practical way to limit polluted emissions is to accomplish two tasks: reduce them to as little as possible (fuels, engines); and, limit VMT. The former relies on technology. The latter on personal/cultural change. Politically, VMT reduction is almost impossible to achieve without strong governmental or marketplace incentives and disincentives. Until the AQMD was empowered and state and federal laws strengthen, technology was the main source of air quality improvements.

All stakeholders do understand: **control of VMT is a surrogate for life-style constraints in Southern California.** Air quality stakeholders are very sensitive to that underlying dynamic.

Decision-makers know how volatile public opinion is regarding freedom of mobility. Accordingly, in the Southern California frame-of-reference, VMT control is cautiously examined.

Perhaps the ultimate regulator is growth control, whether by government or the economy. Public policy may choose to limit the size, location, and kind of development, which soon leads to a ceiling on allowable population. In the short-term, the private sector has begun to reach the same end product. A weak economy causes greater unemployment and less travel and consumption. If sustained long enough, people and jobs begin to move from the region. The net population and job loss would be a nongovernmental control, in effect, indirectly at first leading to better air quality, so long as population reduction was not offset by immigration.

Conclusion

In summary, surface freight transportation is a minor (yet, high-profile) discernible source of air pollution in the region. Surface freight stakeholders must respond to a broad policy designed for all sources of air pollution. The cost of doing so, though societally worthwhile for air quality stakeholders, may be just enough to drive discretionary cargo flows away from the Southern California complex.

Shippers and carriers maximize profits. In the absolute worst scenario, which is highly unlikely, as much as forty percent of total cargo might be diverted. Regional jobs and tax revenue would disappear. How much? No studies have been made of such an extreme possibility. In fact, most transportation plans are premised on more growth. For the cargo origin/destination that would remain in the region, the main concern of shippers and carriers would be: how do the air quality-related changes occur -- voluntarily or forcibly? Could they still operate at a profit, even though transport charges, in the worst case, could push ultimate consumer costs so high that sales would begin to decline?

At some point in the equation, the question posed at the beginning of the chapter moves to center stage: clean air versus the economy. To forestall that possibility, a more gradualist approach to air quality improvement and control strategies will be necessary. Indications are that has already begun to happen.

APPENDIX 1 - Nonattainment Areas, Clean Air Act Amendments, 1990

OZONE NONATTAINMENT AREAS
REQUIREMENTS FOR DEFINING OZONE EMISSIONS PROBLEM

MARGINAL

Ozone Emissions Inventory

Submit a 1990 emissions inventory by November 15, 1992 of all hydrocarbon sources, including mobile, stationary, and area sources, and revise every three years thereafter until attainment.

MODERATE

Ozone Emissions Reduction Targets

After the 1990 baseline emissions inventory is submitted in 1992, the State has 1 year, until November 15, 1993, to revise the SIP to show the control strategies that will reduce hydrocarbon baseline emissions 15% over the first 6 years following enactment (1990-1996). This reduction, referred to as reasonable further progress (RFP), should come from mobile, stationary and area sources by using a mixture of control strategies for all sources.

Emissions reductions from the following measures are not creditable toward the 15% reductions:

- EPA regulations related to vehicle exhaust or evaporative emissions control systems promulgated by January 1, 1990;
- EPA regulations related to controls on *Reid Vapor Pressure (RVP)*, a measure of fuel volatility, prior to enactment or required by the CAAA;
- measures to correct deficiencies in existing SIPs and *inspection and maintenance programs (I/M)*.

The 15% reduction must accommodate any population growth resulting in vehicle miles traveled (VMT) growth in the region, and can only be based on measures that go beyond those noted above, thus eliminating credit for the most effective control strategies. States can take credit for new CAAA measures, such as *reformulated gasoline*, new vehicle exhaust standards or evaporative controls. The latter two, however, may not reduce emissions significantly by 1996. State and local officials must be willing to go beyond current controls to achieve emission credit or reduce emission-producing activities. Achieving the 15% reductions without counting the above control strategies will be most challenging.

SERIOUS; SEVERE 1 & 2; EXTREME

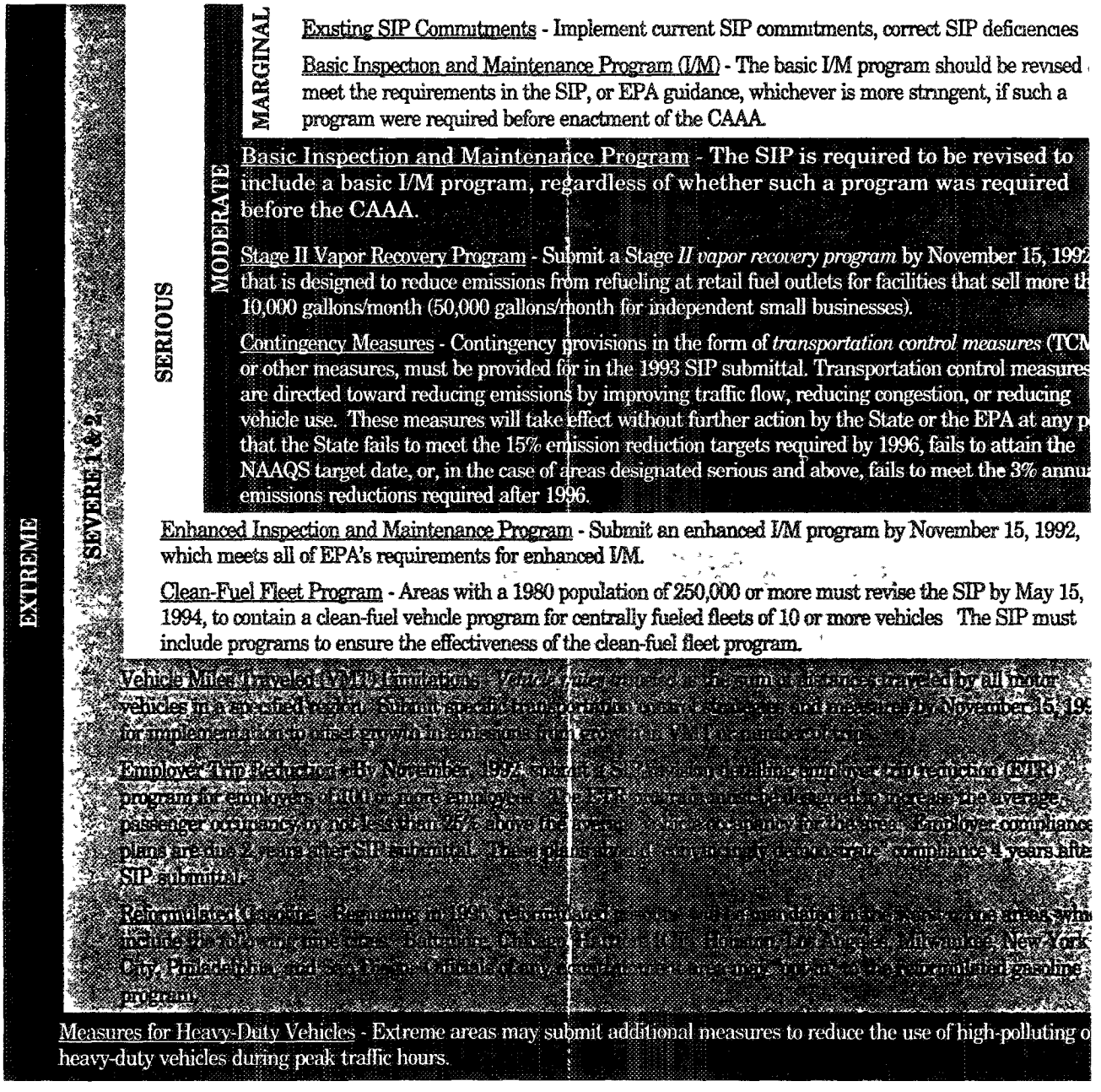
By November 15, 1994, demonstrate a reduction of 3% on average each year after 1996 until attainment under the selected control strategies. In addition to the demonstration, the State must make an air quality attainment demonstration using photochemical dispersion modeling or any other analytical method approved by the EPA.

By November 15, 1996, and every third year thereafter, show that the current aggregate vehicle milage, aggregate vehicle emissions, and congestion levels are consistent with those projections used for the area's demonstration of attainment. If current levels exceed projected levels, the State must submit a SIP revision within 18 months that includes strategies to reduce emissions to the original projected levels.

Note Requirements are cumulative For example, Moderate areas must also fulfill Marginal area requirements

Source: U.S. Department of Transportation, Federal Highway Administration, A Summary - Transportation Programs and Provisions of the Clean Air Act Amendments of 1990 (Superintendent of Documents, October 92), pp. T-1 to T-4.

Table III
OZONE NONATTAINMENT AREAS
REQUIREMENTS FOR REDUCING OZONE EMISSIONS



Note Requirements are cumulative For example, Moderate areas must also fulfill Marginal area requirements

Table V

CO NONATTAINMENT AREAS

REQUIREMENTS FOR DEFINING CO EMISSIONS PROBLEM

SERIOUS	MODERATE ≥ 12.7 ppm	[illegible] Inventory [illegible] control plan by November 15, 1992, [illegible] of all CO emissions, including mobile, stationary, and area sources, and [illegible] revise every three years thereafter until attainment **Carbon Monoxide Emission Reduction Targets** Attainment Demonstration - By November 15, 1992, demonstrate that attainment will be reached by the December 31, 1995 deadline. Also, provide provisions in the SIP for annual emission reductions necessary for reaching attainment.
	MODERATE < 12.7 ppm	Attainment Demonstration - By November 15, 1992, demonstrate that attainment will be reached by the December 31, 2000 deadline. Also provide provisions in the SIP for annual emission reductions necessary for reaching attainment.

Table VI

CO NONATTAINMENT AREAS

REQUIREMENTS FOR REDUCING CO EMISSIONS

SERIOUS	MODERATE ≥ 12.7 ppm	Oxygenated Gasoline - Areas with [illegible] ppm or above must submit a revision [illegible] By November 15, 1992, [illegible] Oxygen with not less than 2.7% oxygen content in the [illegible] [illegible] to be revised to [illegible] [illegible] requirement. Enhanced Inspection and Maintenance Program - Submit provisions for an enhanced I/M program by November 15, 1992, which meet all of EPA's requirements for such a program. VMT Forecast - Revise the SIP by November 15, 1992, to include an annual VMT forecast until attainment. Reports shall contain annual updates of the VMT forecasts and estimates of actual VMT levels. Contingency Measures - Contingency provisions in the form of TCMs or other measures must be identified in the 1992 SIP submittal to implement specific measures if any estimate of VMT exceeds predicted levels or the area fails to attain the NAAQS. These measures take effect without further action by the State or the EPA. Clean-Fuel Fleet Program - Areas having a design value at or above 16 ppm and a 1980 population of 250,000 or more must revise the SIP by May 15, 1994, to contain a clean-fuel vehicle program for centrally fueled fleets of 10 or more vehicles. The SIP must include provisions to ensure the effectiveness of the program.
	MODERATE < 12.7 ppm	Vehicle Miles Traveled Limitations - Submit specific transportation control strategies by November 15, 1992 for implementation to offset growth in emissions from growth in VMT or number of trips

Note: Requirements are cumulative. For example, Moderate (≥ 12.7 ppm) areas must also meet requirements for Moderate (< 12.7 ppm) areas.

Table VII

PM NONATTAINMENT AREAS

MODERATE	SIP Submittal - Submit a SIP by November 15, 1991, demonstrating attainment of the NAAQS by December 31, 1994. Milestones - Meet quantitative milestones in the SIP which are to be achieved every 3 years.
SERIOUS	SIP Submittal - Submit a SIP no later than 4 years after reclassification of the area to serious The SIP must demonstrate attainment of the NAAQS by no later than the 10th calendar year after the area s reclassification

Note Requirements are cumulative Serious areas must also fulfill Moderate area requirements

TABLE 7-1[1]
Federal Government - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
B-5	Control of Emissions from OCS Exploration, Development and Production [All Pollutants]	DOI/EPA/ SCAQMD	1992	1996	IV-A
G-12	Oxygenated Fuels Program [CO]	EPA/ARB	1991	1992	IV-C
I-2	Control of Emissions from Jet Aircraft [ROG, CO, NOx]	EPA	1992	1996-2000	IV-C
I-3	Control of Emissions from Marine Vessel Tanks [ROG]	SCAQMD/EPA/ARB/ Ports of L.A. & L.B./U S. Coast Guard	1991	1994-1997	IV-C
I-8	Low Emissions from Military Aircraft [ROG, CO, NOx]	DOD	1993	2000-2005	IV-C
I-8	Emission Standards for Construction and Farm Equipment [ROG, NOx, CO, PM10] (175 HP and less)	EPA	1993	1997	IV-C
	Replacement of High Emitting Aircraft [All Pollutants]	L.A. Dept. of Airports/FAA	1/91	1/94	IV-E
	Railroad Electrification [All Pollutants]	EPA/FRA	1995	2000	IV-E

New control measures are shaded.

Source: South Coast Air Quality Management District and Southern California Association of Governments, Air Quality Management Plan South Coast Air Basin (AQMD, March 1989), Sections 6 and 7.

TABLE 7-2[1]
ARB and Other State Agencies - Tier I Control Measures

AQMP Measure No	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No
ARB-1	Revised Emission Standards and Test Procedures for Medium-Duty Vehicles and Light Heavy-Duty Engines [ROG, CO, NOx, PM10][2]	ARB	6/90	1995-1998	IV-F
ARB-2	Heavy-Duty Bus Particulate Trap Retrofit [PM10]	ARB	1993	(3)	IV-F
ARB-3	Revised Evaporative Emission Test Procedure [ROG][2]	ARB	8/90	1995-1998	IV-F
ARB-4	Improved Certification Requirement for Alternative Fuel Retrofit Systems [ROG,CO,NOx]	ARB	1991	1992-1994	IV-F
ARB-5	Low Emission Vehicles And Clean Fuels Program [ROG, CO, NOx, PM10][2]	ARB	9/90	1994-2003	IV-F
ARB-6	New Gasoline Specifications, Phase 2 Reformulated Gasoline [ROG]	ARB	9/91	1996	IV-F
ARB-7	Low Emission Vehicle Standards for Heavy-Duty Engines [All Pollutants]	ARB	1992	1998-2007	IV-F
ARB-8	Fleet Average Standards for Post-2003 Model Years (Passenger, Cars, Light-Duty Trucks, and Medium-Duty Vehicles) [All Pollutants]	ARB	1995	2004-2010	IV-F
ARB-9	Enhancements to Smog Check [ROG, NOx, CO]	ARB	1993	(3)	IV-F
ARB-10	I/M for Light-Duty Diesel Vehicles [NOx, PM10]	ARB	1992	(3)	IV-F

(1) New control measures are shaded (2) This control measure has been adopted by the ARB (3) To be determined by ARB

TABLE 7-2 (Continued)[1]
ARB and Other State Agencies - Tier I Control Measures

AQMP Measure No	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No
ARB-11	Inspections of Fleet Heavy-Duty Trucks [ROG, NOx,CO,PM10]	ARB	1992	(2)	IV-F
ARB-12	Control of Off-Cycle Emissions [HC, CO, NOx,, PM10]	ARB	1993	(2)	IV-F
ARB-13	Emissions Standards for Utility Engines [ROG, CO, NOx]	ARB	12/90	1994-1999	IV-F
ARB-14	Emission Standards for Construction and Farm Equipment [ROG, NOx, CO, PM10] (more than 175 HP)	ARB	9/91	1995-2000	IV-F
ARB-15	Emission Standards for Off-Road Motorcycles [ROG, CO, NOx]	ARB	5/91	1995	IV-F
ARB-16	Retrofit/Operational Requirements for Locomotives [All Pollutants]	ARB	1992	1992-1997	IV-F
ARB-17	Emission Standards for Marine Vessels [All Pollutants]	ARB	10/91	1997-1999	IV-F
ARB-18	Emission Standards for Off-Highway Vehicles [ROG, NOx, CO, PM10]	ARB	10/91	1995-2000	IV-F
A-A-3	Control of Emissions from Domestic Products [ROG]	ARB/SCAQMD	1991	2000	IV-B
A-B-7	Control of Emissions from Over-Filling of Vehicle Fuel Tanks [ROG]	SCAQMD/ARB	1993	1996	IV-B
A-E-1	Control of Emissions from Pesticide Application [ROG]	SCAQMD/CDFA	1993	1996	IV-B

(1) New Control Measures are shaded

(2) To be determined by ARB

TABLE 7-2 (Continued)[1]
ARB and Other State Agencies - Tier I Control Measures

AQMP Measure No	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No
M-G-11	Inspection and Maintenance Program Enhancement [ROG, CO, NOx]	SCAQMD/BAR	1993	1994	IV-C
M-G-12	Oxygenated Fuels Program [CO]	EPA/ARB	1991	1992	IV-C
M-I-3	Control of Emissions from Marine Vessel Tanks [ROG]	SCAQMD/EPA/ARB Ports of L.A. & L.B./U.S. Coast Guard	1991	1994-1997	IV-C
2f	HOV Facilities [ROG, NOx, CO]	CALTRANS/CTC/ Local Gov't	(2)	(2)	IV-E
2g	Transit Improvements [ROG, NOx, CO]	CTC/UMTA/ Local Gov't/ CALTRANS/Public Transit Providers	(2)	(2)	IV-E
3a	Truck Dispatching, Rescheduling and Rerouting [ROG, NOx, CO]	Local Gov't/ SCAQMD/SCAG/ CALTRANS/CHP	1/92	1994	IV-E
4	Traffic Flow Improvements [ROG, NOx, CO]	CALTRANS/ Local Gov't/ CTC/SCAG	1991	1991	IV-E
5	Nonrecurrent Congestion [ROG, NOx, CO]	CALTRANS/CHP/ SCAG/SCAQMD/ CTC/Local Gov't	1991	1994	IV-E

(1) New control measures are shaded

(2) To be determined by ARB

TABLE 7-2 (Continued)
ARB and Other State Agencies - Tier I Control Measures

AQMP Measure No	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No
11	Rail Consolidation to Reduce Grade Crossings [ROG, NOx, CO]	CALTRANS/Alameda Corridor Transp Authority	1992	1/97	IV-E
12a	Paved Roads [PM10]	SCAQMD/ARB/ Local Gov't/ CALTRANS/ Sanitation & Flood Districts	5/91	1994	IV-E
12b	Unpaved Roads [PM10]	ARB/CALTRANS/ Local Gov't	7/94	1994	IV-E
13	Freeway & Highway Capacity Enhancements [ROG, NOx, CO]	CALTRANS/SCAG/ CTC/FHWA/DMV/BAR	(1)	(1)	IV-E
16	High Speed Rail [ROG, NOx]	SCAG/Local Gov't/ CALTRANS/	7/91	1/97	IV-E
E-D-1a	Residential Sector - Electricity Savings [NO_X]	SCAQMD/CEC/ Local Gov't/PUC	1994	2007	IV-D

(1) To be determined by the implementing agencies

TABLE 7-2 (Continued)[1]
ARB and Other State Agencies - Tier I Control Measures

AQMP Measure No	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No
E-D-1b	Residential Sector - Natural Gas Savings [All Pollutants]	SCAQMD/ CEC/ Local Gov't/PUC	1993	2008	IV-D
E-C-1a	Commercial Sector - Electricity Savings [NO_X]	SCAQMD/CEC/ Local Gov't/PUC	1993	2008	IV-D
E-C-1b	Commercial Sector - Natural Gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1994	2009	IV-D
E-C-2a	Industrial Sector - Electricity Savings [NO_X]	SCAQMD/CEC/ Local Gov't/PUC	1994	2008	IV-D
E-C-2b	Industrial Sector - Natural Gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1995	2009	IV-D
E-C-2c	Industrial Sector - Glass Recycling [NO_X]	SCAQMD/CEC/ Local Gov't	1991	1998	IV-D
E-C-2d	Industrial Sector - Paper Recycling [NO_X]	SCAQMD/CEC/ Local Gov't	1994	2001	IV-D
E-C-3	Local Government Sector - Electricity and Natural gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1995	2010	IV-D

(1) New control measures are shaded.

TABLE 7-3(1)
District - Tier I Control Measures

AQMP Measure No	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No
P-A-1	Further Emission Reductions from Wood Flatstock Coating [ROG](2)	SCAQMD	1991	1994	IV-A
P-A-2	Further Emission Reductions from Automobile Assembly Coating [ROG]	SCAQMD	1994	1997	IV-A
P-A-3	Further Emission Reductions from Paper, Fabric and Film Coating [ROG]	SCAQMD	1991	1994	IV-A
P-A-4	Further Emission Reductions from Metal Cleaning and Degreasing [ROG](2)	SCAQMD	1991	1992	IV-A
P-A-5	Further Emission Reductions from Perchloroethylene Dry Cleaning Operations [ROG]	SCAQMD	1993	1996	IV-A
P-A-6	Control of Emissions from Electronic Components Manufacturing [ROG]	SCAQMD	1994	1998	IV-A
P-B-1	Control of Emissions from Petroleum Refinery Fluid Catalytic Cracking (FCC) Units [SOx]	SCAQMD	1991	1995	IV-A
P-B-2	Control of Emissions from Petroleum Refinery Fluid Catalytic Cracking (FCC) Units [NOx]	SCAQMD	1994	1998	IV-A
P-B-3	Control of Emissions from Gas Fired Petroleum Refinery Process Heaters [PM10]	SCAQMD	1994	1997	IV-A

(1) New control measures are shaded

(2) This control measure has been adopted as a rule.

TABLE 7-3 (Continued)[1]
District - Tier I Control Measures

AQMP Measure No	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No
P-B-4	Improved Control of Emissions from Petroleum Refinery Fluid Catalytic Cracking (FCC) Units [PM10]	SCAQMD	1991	1995	IV-A
P-B-5	Control of Emissions from OCS Exploration, Development and Production [All Pollutants]	DOI/EPA/ SCAQMD	1992	1996	IV-A
P-B-6	Control of Emissions from Petroleum Refinery Flares [All Pollutants]	SCAQMD	1994	1996	IV-A
P-B-7	Further Control of Emissions from Bulk Terminals [ROG]	SCAQMD	1993	1996	IV-A
P-C-1	Further Emission Reductions from Rubber Products Manufacturing [ROG, PM10]	SCAQMD	1991	1994	IV-A
P-C-2	Control of Emissions from Afterburners [NOx]	SCAQMD	1991	1995	IV-A
P-C-3	Control of Emissions from Woodworking Operations [PM10]	SCAQMD	1993	1996	IV-A
P-C-4	Control of Emissions from Small Boilers and Process Heaters [NOx]	SCAQMD	1992	1996	IV-A
P-C-5	Control of Emissions from Metal Melting Furnaces [NOx]	SCAQMD	1994	1997	IV-A
P-C-6	Control of Emissions from Curing and Drying Ovens [NOx]	SCAQMD	1994	1997	IV-A
P-C-7	Further Control of Emissions from Glass Melting Furnaces [NOx]	SCAQMD	1994	1996	IV-A

(1) New control measures are shaded

TABLE 7-3 (Continued)[1]
District - Tier I Control Measures

AQMP Measure No	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No
P-C-8	Further Control of Emissions from Cement Kilns [NOx]	SCAQMD	1992	1995	IV-A
P-D-1	Control of Fugitive Emissions From Publicly Owned Treatment Works [ROG]	SCAQMD	1991	1995	IV-A
P-F-1	Phase-Out Stationary Source Fuel Oil and Solid Fossil Fuel Use [NOx, SOx, PM10]	SCAQMD	1991	1997	IV-A
P-F-2	Emission Minimization Management Plan [All Pollutants]	SCAQMD	1994	1999	IV-A
P-F-3	Marketable Permits Program [ROG, NOx]	SCAQMD	(2)	(2)	IV-A
A-A-1	Control of Emissions from Architectural Coatings [ROG][3]	SCAQMD	1993	1993	IV-B
A-A-2	Substitute Solvents Used for Clean-up of Surface Coating [ROG]	SCAQMD	1991	1993	IV-B
A-A-3	Control of Emissions from Domestic Products [ROG]	ARB/SCAQMD	1991	2000	IV-B
A-A-4	Control of Emissions from Solvent Waste [ROG]	SCAQMD	1991	1993	IV-B
A-B-1	Control of Emissions from Gasoline Transfer Fail-Safe Phase-I Vapor Recovery Systems [ROG]	SCAQMD	1994	1996	IV-B

(1) New control measures are shaded.
(2) This program is an alternative for the AQMP control measures
(3) The SCAQMD will require legal authority to implement this control measure

TABLE 7-3 (Continued)[1]
District - Tier I Control Measures

AQMP Measure No	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
A-B-2	Control of Emissions from Gasoline Transfer Improved Installation and Repair of Phase-II Vapor Recovery Systems [ROG]	SCAQMD	1991	1993	IV-B
A-B-3	Control of Emissions from Pleasure Boat Fueling Operations [ROG]	SCAQMD	1994	1997	IV-B
A-B-4	Control of Emissions from Organic Liquid Transfer [ROG]	SCAQMD	1994	1996	IV-B
A-B-5	Further Control of Emissions from Gasoline Dispensing Facilities [ROG]	SCAQMD	1992	1994	IV-B
A-B-6	Control of Emissions from Utility Engine Refueling Operations [ROG]	SCAQMD	1992	1994	IV-B
A-B-7	Control of Emissions from Over-Filling of Vehicle Fuel Tanks [ROG]	SCAQMD/ARB	1993	1996	IV-B
A-B-8	Control of Fugitive Methane Emissions from Natural Gas Transmission/Distribution Pipelines [CH_4][2]	SCAQMD	1993	1995	IV-B
A-B-9	Control of Emissions from Active Draining of Liquid Products [ROG]	SCAQMD	1993	1995	IV-B

(1) New control measures are shaded

(2) This measure is not subject to prioritization process

TABLE 7-3 (Continued)[1]
District - Tier I Control Measures

AQMP Measure No	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
A-C-1	Control of Emissions from Large Commercial Bakeries [ROG][2]	SCAQMD	1991	1994	IV-B
A-C-2	Control of Emissions From Commercial Charbroiling [ROG, PM10]	SCAQMD	1991	1994	IV-B
A-C-3	Control of Emissions from Laboratory Fume Hoods [ROG]	SCAQMD	1994	1997	IV-B
A-C-4	Control of Emissions from Deep Fat Frying [ROG, PM10]	SCAQMD	1993	1997	IV-B
A-C-5	Control of Emissions from Miscellaneous Combustion Sources [NOx]	SCAQMD	1993	1996	IV-B
A-C-6	Further Control of Emissions from Internal Combustion Engines [NO_x]	SCAQMD	1995	1998	IV-B
A-D-1	Out-of-Basin Transport of Biodegradable Solid Waste [All Pollutants]	SCAQMD/SCAG/ Sanitation Dist	1993	1997	IV-B
A-D-2	Control of Emissions from Swimming Pool Water Heating [NOx]	SCAQMD/ Local Gov't	1992	1999	IV-B
A-D-3	Control of Emissions from Residential & Commercial Water Heating [NOx]	SCAQMD/ Local Gov't	1992	2006	IV-B
A-E-1	Control of Emissions from Pesticide Application [ROG]	SCAQMD/CDFA	1993	1996	IV-B

(1) New control measures are shaded

(2) This control measure has been adopted as a rule.

TABLE 7-3 (Continued)(1)
District - Tier I Control Measures

AQMP Measure No	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No
A-E-2	Control of Emissions from Livestock Waste [ROG, PM10, Ammonia]	SCAQMD	1992	1996	IV-B
A-F-1	Installation of Best Available Retrofit Control Technology on Miscellaneous Sources [All Pollutants]	SCAQMD	1992	1995	IV-B
A-F-2	Control of Emissions from Construction and Demolition Activities, and Onsite Vehicular Flow [PM10]	SCAQMD/ Local Gov't	1992	1994	IV-B
A-F-3	Control of Ammonia Emissions from Stationary Sources by Permits and Fees [Ammonia]	SCAQMD	1995	1996	IV-B
A-F-5	Control of Dust Emissions from Wind Erosion [PM10]	SCAQMD/ Local Gov't	1992	1997	IV-B
M-G-1	Zero-Emission Urban Bus Implementation [All Pollutants]	SCAQMD	1993	1994-2000	IV-C
M-G-2	Low Emission Retrofit of Transit Buses [NOx, SOx, PM10]	SCAQMD	1992	1994-1996	IV-C
M-G-3	Use of Radial Tires on Light Duty Motor Vehicles [PM10]	SCAQMD	1991	1993-1995	IV-C
M-G-4	Low-Emission New Fleet Vehicles [All Pollutants]	SCAQMD	1991	1993-2000	IV-C
M-G-5	Motor Vehicle Buyback Program [ROG, CO, NOx]	SCAQMD	1993	1993-1997	IV-C
M-G-6	Eliminate Excessive Car Dealership Cold Starts [ROG, CO, NOx]	SCAQMD/ Local Gov't	1994	1994	IV-C

(1) New control measures are shaded

TABLE 7-3 (Continued)[1]
District - Tier I Control Measures

AQMP Measure No	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
M-G-7	Eliminate Excessive Curb Idling [ROG, CO]	SCAQMD/ Local Gov't	1993	1994	IV-C
M-G-8	Aerodynamic Devices for Trucks [All Pollutants]	SCAQMD	1992	1993	IV-C
M-G-9	Eliminate Emissions from Advertising Vehicles [All Pollutants]	SCAQMD/ Local Gov't	1994	1995	IV-C
M-G-10	Eliminate CFC Based Transport Refrigeration Systems [CFC]	SCAQMD	1992	1993-1996	IV-C
M-G-11	Inspection and Maintenance Program Enhancement [ROG, CO, NOx]	SCAQMD/ BAR	1993	1994	IV-C
M-H-1	Environmental Review Program [ROG, CO, NOx]	SCAQMD/ Local Gov't	1991	1992	IV-C
M-H-2	Trip Reduction for Schools [ROG, CO, NOx]	SCAQMD/ Local Gov't	1992	1993	V-C
M-H-4	Special Activity Centers [ROG, CO, NOx]	SCAQMD/ Local Gov't	1993	1994	IV-C
M-H-5	Enhanced Regulation XV [ROG, CO, NOx, PM10]	SCAQMD/ Local Gov't	1992	1993	IV-C

(1) New control measures are shaded.

TABLE 7-3 (Continued)[1]
District - Tier I Control Measures

AQMP Measure No	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
M-I-6	Truck Programs [ROG, CO, NOx]	SCAQMD/ Local Gov't	1992	1993	IV-C
M-I-7	Registration Program	SCAQMD/ Local Gov't	1991	1992	IV-C
M-I-9	Sensitive Receptor Review [Toxic Air Contaminants]	SCAQMD	1991	1992	IV-C
M-I-1 VII 18	Control of Emissions from Ship Berthing Facilities [NOx]	SCAQMD/Ports of L.A. & L.B	1993	1995-2010	IV-C
M-I-3	Control of Emissions from Marine Vessel Tanks [ROG]	SCAQMD/ EPA/ARB/Ports of L.A. & L.B / U.S Coast Guard	1991	1994-1997	IV-C
M-I-4	Control of Emissions from Marine Diesel Operations [NOx]	SCAQMD	1992	1993	IV-C
M-I-5	Limit Sulfur Content of Marine Fuel Oils [SOx]	SCAQMD	1992	1994	IV-C
M-I-7	Eliminate Leaf Blowers [All Pollutants]	SCAQMD/ Local Gov't	1993	1994	IV-C
E-D-1a	Residential Sector - Electricity Savings [NO_x]	SCAQMD/CEC/ Local Gov't/PUC	1994	2007	IV-D

(1) New control measures are shaded

TABLE 7-3 (Continued)[1]
District - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
E-D-1b	Residential Sector - Natural Gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1993	2006	IV-D
E-C-1a	Commercial Sector - Electricity Savings [NO_X]	SCAQMD/CEC/ Local Gov't/PUC	1993	2006	IV-D
E-C-1b	Commercial Sector - Natural Gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1994	2009	IV-D
E-C-2a	Industrial Sector - Electricity Savings [NO_X]	SCAQMD/CEC/ Local Gov't/PUC	1994	2006	IV-D
E-C-2b	Industrial Sector - Natural Gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1995	2009	IV-D
E-C-2c	Industrial Sector - Glass Recycling [NO_X]	SCAQMD/CEC/ Local Gov't	1991	1998	IV-D
E-C-2d	Industrial Sector - Paper Recycling [NO_X]	SCAQMD/CEC/ Local Gov't	1994	2001	IV-D
E-C-3	Local Government Sector - Electricity and Natural Gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1995	2010	IV-D
1a	Person Work Trip Reduction [ROG, NOx, CO]	Local Gov't/SCAG/ CTS/SCAQMD	7/92	7/99	IV-E

(1) New control measures are shaded.

TABLE 7-3 (Continued)[1]
District - Tier I Control Measures

AQMP Measure No	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No
1b	Non-Motorized Transportation [ROG, NOx, CO]	Local Gov't/ SCAG/SCAQMD	7/92	7/99	IV-E
2a	Employer Rideshare and Transit Incentives [ROG, NOx, CO]	Local Gov't/ SCAQMD/SCAG/ CTS	7/92	1994	IV-E
2c	Parking Management [ROG, NOx, CO]	Local Gov't/ SCAQMD	1/92	1994	IV-E
2d	Merchant Transportation Incentives [ROG, NOx, CO]	Local Gov't/ SCAQMD	7/92	1994	IV-E
2e	Auto Use Restrictions [ROG, NOx, CO]	Local Gov't/ SCAQMD	1/92	1994	IV-E
3a	Truck Dispatching, Rescheduling and Rerouting [ROG, NOx, CO]	Local Gov't/ SCAQMD/SCAG/ CALTRANS/CHP	1/92	1994	IV-E
5	Nonrecurrent Congestion [ROG, NOx, CO]	CALTRANS/CHP/ SCAG/SCAQMD/ CTC/Local Gov't	1991	1994	IV-E

(1) New control measures are shaded

TABLE 7-3 (Continued)
District - Tier I Control Measures

AQMP Measure No	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No
6	Aircraft and Ground Service Vehicles [ROG, NOx, CO]	SCAQMD/ Airlines/ Airport Operators	7/92	1/94	IV-E
7	Centralized Ground Power Systems [ROG, NOx]	SCAQMD/ Airlines/ Airport Operators	1/92	1/94	IV-E
8	Airport Ground Access [ROG, NOx, CO]	SCAQMD/ Airport Operators/ Local Gov't	7/92	1/94	IV-E
10	General Aviation Vapor Recovery [ROG]	SCAQMD/ Airport Operators/	8/91	1/94	IV-E
12a	Paved Roads [PM10]	SCAQMD/ARB/ Local Gov't/ CALTRANS/Sanitation & Flood Districts	5/91	1994	IV-E

TABLE 7-4(1)
Local Governments - Tier I Control Measures

AQMP Measure No	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No
A-D-2	Control of Emissions from Swimming Pool Water Heating [NOx]	SCAQMD/ Local Gov't	1992	1999	IV-B
A-D-3	Control of Emissions from Residential & Commercial Water Heating [NOx]	SCAQMD/ Local Gov't	1992	2006	IV-B
A-E-3	Control of Dust Emissions from Agricultural Tilling [PM10]	Local Gov't	1994	1996	IV-B
A-F-2	Control of Emissions from Construction and Demolition Activities and Onsite Vehicular Flow [PM10]	SCAQMD/ Local Gov't	1992	1994	IV-B
A-F-4	Low Emission Methods and Materials for Building Construction [ROG, PM10]	Local Gov't	1994	1998	IV-B
A-F-5	Control of Dust Emissions from Wind Erosion [PM10]	SCAQMD/ Local Gov't	1992	1997	IV-B
M-G-6	Eliminate Excessive Car Dealership Cold Starts [ROG, CO, NOx]	SCAQMD/ Local Gov't	1994	1994	IV-C
M-G-7	Eliminate Excessive Curb Idling [ROG, CO]	SCAQMD/ Local Gov't	1993	1994	IV-C
M-G-9	Eliminate Emissions from Advertising Vehicles [All Pollutants]	SCAQMD/ Local Gov't	1994	1995	IV-C
M-H-1	Environmental Review Program [ROG, NOx, CO](2)	SCAQMD/ Local Gov't	1991	1992	IV-C

(1) New control measures are shaded

(2) District's Indirect Source Control Measure

TABLE 7-4 (Continued)[1]
Local Governments - Tier I Control Measures

AQMP Measure No	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No
M-H-2	Trip Reduction for Schools [ROG, NOx, CO][2]	SCAQMD/ Local Gov't	1992	1993	IV-C
M-H-3	Supplement Development Standards [ROG, NOx, CO][2]	Local Gov't	1993	1993	IV-C
M-H-4	Special Activity Centers [ROG, NOx, CO][2]	SCAQMD/ Local Gov't	1993	1994	IV-C
M-H-5	Enhanced Regulation XV [ROG, NOx, CO][2]	SCAQMD/ Local Gov't	1992	1993	IV-C
M-H-6	Truck Programs [ROG, NOx, CO][2]	SCAQMD/ Local Gov't	1992	1993	IV-C
M-H-7	Registration Program[2]	SCAQMD/ Local Gov't	1991	1992	IV-C
M-I-1	Control of Emissions from Ship Berthing Facilities [NOx]	SCAQMD/Ports of L A. & L B	1993	1995-2010	IV-C
M-I-3	Control of Emissions from Marine Vessel Tanks [ROG]	SCAQMD/EPA/ ARB/Ports of L A & L B /U S Coast Guard	1991	1994-1997	IV-C
M-I-7	Eliminate Leaf Blowers [All Pollutants]	SCAQMD/ Local Gov't	1993	1994	IV-C

(1) New control measures are shaded

(2) District's Indirect Source Control Measure

TABLE 7-4 (continued)[1]
Local Governments - Tier I Control Measures

AQMP Measure No	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No
1a	Person Work Trip Reduction [ROG, NOx, CO]	Local Gov't/SCAG/ CTS/SCAQMD	7/92	7/99	IV-E
1b	Non-Motorized Transportation [ROG, NOx, CO]	Local Gov't/ SGAG/SCAQMD	7/92	7/99	IV-E
2a	Employer Rideshare and Transit Incentives [ROG, NOx, CO]	Local Gov't/ SCAQMD/SCAG/ CTS	7/92	1994	IV-E
2c	Parking Management [ROG, NOx, CO]	Local Gov't/ SCAQMD	1/92	1994	IV-E
2d	Merchant Transportation Incentives [ROG, NOx, CO]	Local Gov't/ SCAQMD	7/92	1994	IV-E
2e	Auto Use Restrictions [ROG, NOx, CO]	Local Gov't/ SCAQMD	1/92	1994	IV-E
2f	HOV Facilities [ROG, NOx, CO]	CALTRANS/ CTC/Local Gov't	(2)	(2)	IV-E
2g	Transit Improvements [ROG, NOx, CO]	CTC/UMTA/ CALTRANS/ Local Gov't/ Public Transit Providers	(2)	(2)	IV-E

(1) New control measures are shaded

(2) To be determined by the implementing agencies

TABLE 7-4 (Continued)
Local Governments - Tier I Control Measures

AQMP Measure No	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No
3a	Truck Dispatching, Rescheduling and Rerouting [ROG, NOx, CO]	Local Gov't/ SCAQMD/SCAG/ CALTRANS/CHP	1/92	1994	IV-E
3b	Diverting Port-Related Truck Traffic to Rail [ROG, NOx, CO]	Ports of L.A. & L.B / Railraods	1991	1994	IV-E
4	Traffic Flow Improvements [ROG, NOx, CO]	CALTRANS/ Local Gov't/ CTC/SCAG	1991	1991	IV-E
5	Nonrecurrent Congestion [ROG, NOx, CO]	CALTRANS/CHP/ SCAG/SCAQMD/ CTC/Local Gov't	1991	1994	IV-E
6	Aircraft and Ground Service Vehicles [ROG, NOx, CO]	SCAQMD/ Airlines/ Airport Operators	7/92	1/94	IV-E
7	Centralized Ground Power Systems [ROG, NOx]	SCAQMD/Airlines/ Airport Operators	1/92	1/94	IV-E
8	Airport Ground Access [ROG, NOx, CO]	SCAQMD/ Airport Operators/ Local Gov't	7/92	1/94	IV-E

TABLE 7-4 (Continued)
Local Governments - Tier I Control Measures

AQMP Measure No	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No
9	Replacement of High Emitting Aircraft [All Pollutants]	L.A. Dept of Airports/FAA	1/91	1/94	IV-E
10	General Aviation Vapor Recovery [ROG]	SCAQMD/ Airport Operators/	8/91	1/94	IV-E
11	Rail Consolidation to Reduce Grade Crossings [ROG, NOx, CO]	CALTRANS/ Alameda Corridor Transp Authority	1992	1/97	IV-E
12a	Paved Roads [PM10]	SCAQMD/ARB/ Local Gov't/ CALTRANS/Sanitation & Flood Districts	5/91	1994	IV-E
12b	Unpaved Roads [PM10]	ARB/CALTRANS/ Local Gov't	7/94	1994	IV-E
13	Freeway & Highway Capacity Enhancements [ROG, NOx, CO]	CALTRANS/ SCAG/CTC/FHWA DMV/BAR	(1)	(1)	IV-E
16	High Speed Rail [ROG, NOx]	SCAG/ Local Gov't/ CALTRANS	7/91	1/97	IV-E
17	Growth Management [ROG, NOx, CO][2]	SCAG/ Local Gov't	1/92	1/94	IV-E

(1) To be determined by the implementing agencies

(2) VMT targets are included as an implementation option to the job/housing ratio for this control measure

TABLE 7-4 (Continued)[1]
Local Governments - Tier I Control Measures

AQMP Measure No	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No
E-D-1a	Residential Sector - Electricity Savings [NO_X]	SCAQMD/CEC/ Local Gov't/PUC	1994	2007	IV-D
E-D-1b	Residential Sector - Natural Gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1993	2006	IV-D
E-C-1a	Commercial Sector - Electricity Savings [NO_X]	SCAQMD/CEC/ Local Gov't/PUC	1993	2008	IV-D
E-C-1b	Commercial Sector - Natural Gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1994	2009	IV-D
E-C-2a	Industrial Sector - Electricity Savings [NO_X]	SCAQMD/CEC/ Local Gov't/PUC	1994	2008	IV-D
E-C-2b	Industrial Sector - Natural Gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1995	2009	IV-D
E-C-2c	Industrial Sector - Glass Recycling [NO_X]	SCAQMD/CEC/ Local Gov't	1991	1998	IV-D
E-C-2d	Industrial Sector - Paper Recycling [NO_X]	SCAQMD/CEC/ Local Gov't	1994	2001	IV-D
E-C-3	Local Government Sector - Electricity and Natural Gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1995	2010	IV-D

(1) New control measures are shaded

Table 6-3

Ranking of Control Measures

AQMP No	Title	Dollars/Ton (1987 Dollars)	Ranking By Cost-Effectiveness	Ranking By Implementation
M-G-8	Aerodynamic Device for Trucks [ROG, NO_X, CO, PM10]	($6,800)	1	12
M-G-2	Low-Emission Retrofit of Transit Buses [NO_X, PM10, SO_X]	Savings	2	16
M-I-7	Eliminate Leaf Blowers [All Pollutants]	Savings	3	24
M-G-9	Eliminate Emissions from Advertising Vehicles [All Pollutants]	Savings	4	47
M-I-8	Emission Standards for Construction and Farm Equipment [ROG, NO_X, PM10]	$100	5	7
A-B-2	Control of Emissions from Gasoline Transfer, Phase-II [ROG]	$130	6	*
M-G-10	Eliminate CFC-Based Transport Refrigeration Systems [All Pollutants]	$200	7	8
P-A-4	Further Emission Reductions from Metal Cleaning and Degreasing [ROG]	$220	8	**
A-B-1	Further Control of Emissions from Gasoline Dispensing Facilities [ROG]	$230	9	15
A-A-2	Substitute Solvents Used for Clean-up of Surface Coating [ROG]	$300	10	*
A-E-3	Control of Dust Emissions from Agricultural Tilling [PM10]	$550	11	50
M-H-1	Environmental Review Program [ROG, NO_X, CO]	$640	12	*
A-F-5	Control of Dust Emissions from Wind Erosion [PM10]	$720	13	2
A-E-2	Control of Emissions from Livestock Waste [ROG, PM10, NH_3]	$960	14	5
M-G-12	Oxygenated Fuels Program [CO]	$1,000	15	1
A-B-6	Control of Emissions from Utility Engine Refueling Operations [ROG]	$1,100	16	9
A-B-3	Control of Emissions from Pleasure Boat Fueling Operations [ROG]	$1,200	17	44
M-H-2	Trip Reductions for Schools [ROG, NO_X, CO]	$1,300	18	*
P-C-8	Further Emission Reductions from Cement Kilns [NO_X]	$1,300	19	14
A-E-1	Control of Emissions from Pesticide Application [ROG]	$1,300	20	30
M-H-3	Supplemental Development Standards [ROG, NO_X, CO]	$1,700	21	18
P-B-7	Further Control of Emissions from Bulk Terminals [ROG]	$2,100	22	23
A-B-9	Control of Emissions from Active Draining [ROG]	$2,260	23	28
M-G-5	Motor Vehicle Buyback Program [ROG, NO_X, CO]	$3,300	24	36

* - Under current rule adoption schedule

** Has been adopted as a rule

Table 6-3

Ranking of Control Measures
(Continued)

AQMP No	Title	Dollars/Ton (1987 Dollars)	Ranking By Cost-Effectiveness	Ranking By Implementation
A-C-1	Control of Emissions from Large Commercial Bakeries [ROG]	$3,500	25	**
M-I-3	Control of Emissions from Marine Vessel Tanks [ROG]	$3,800	26	*
A-F-2	Control of Emissions from Construction, Demolition, and Onsite Vehicular Flow [PM10]	$4,650	27	3
A-C-2	Control of Emissions from Commercial Charbroiling [ROG, PM10]	$4,700	28	*
P-C-1	Further Emission Reductions from Rubber Products Manufacturing [ROG, PM10]	$4,900	29	*
P-A-3	Further Emission Reductions from Paper, Fabric, and Film Coating [ROG]	$5,000	30	*
M-I-5	Limit Sulfur Content of Marine Fuel Oils [SO_X]	$5,200	31	6
M-I-4	Control of Emissions from Marine Diesel Operations [NO_X]	$5,400	32	17
P-A-5	Further Emission Reductions from Perchloroethylene Dry Cleaning Operations [ROG]	$7,200	33	27
P-C-5	Control of Emissions from Metal Melting Furnaces [NO_X]	$7,500	34	48
P-B-5	Control of Emissions from OCS Exploration, Development, and Production [All Pollutants]	$9,200	35	11
P-C-6	Control of Emissions from Curing and Drying Ovens [NO_X]	$9,300	36	45
P-F-1	Phase-Out Stationary Sources Fuel Oil and Solid Fossil Fuel Use [ROG]	$11,300	37	*
P-C-3	Control of Emissions from Woodworking Operations [PM10]	$12,000	38	19
P-B-3	Control of Emissions from Gas Fired Petroleum Refinery Process Heaters [PM10]	$12,000	39	46
P-C-4	Control of Emissions from Small Boilers and Process Heaters [NO_X]	$12,900	40	*
P-C-7	Further Emission Reductions from Glass Melting Furnaces [NO_X]	$18,400	41	42
P-A-2	Further Emission Reductions from Automobile Assembly Coating [ROG]	$19,000	42	54
M-G-11	Inspection and Maintenance Program Enhancement [ROG, NO_X, CO]	$20,000	43	20
A-F-1	Installation of BARCT on Miscellaneous Sources [All Pollutants]	$23,000	44	13
M-I-1	Control of Emissions from Ship Berthing Facilities [NO_X]	$25,300	45	31
P-B-4	Improved Control of Emissions from Petroleum FCC Units [PM10]	$29,300	46	*
P-B-1	Control of Emissions from Petroleum FCC Units [SO_X]	$30,000	47	*
M-G-1	Zero-emission Urban Bus Implementation [ROG, NO_X, CO, PM10]	$30,000	48	34
P-C-2	Control of Emissions from Afterburners [NO_X]	$62,200	49	*

* - Under current rule adoption schedule

** - Has been adopted as a rule

TABLE 7-8

Technology Advancement Projects

Subject	Agency	Expected Duration
Reformulation Of Solvents & Coatings	District	1988-2000
Alternative Solvent Application Methods (e g , Robotic, UV)	District	1988-2000
Nonrecurrent Congestion Relief	SCAG	1988-1989
Export Fees	District	1988-1995
Emissions From Refinery Flares	District	1990-1992
Industrial Electrification Projects	District	1990-2000
Electric Vehicles (e g , Battery powered, Fuel cell-powered)	District/CEC/ ARB/Utility	1988-2005
Alternative Fueled Vehicles in Light-, Medium-, and Heavy-Duty Vehicles	District/ARB	1988-1998
BARCT for Medium to Small Stationary Sources	District	1990-2000
Electrical Energy Supply and Distribution	District /CEC/Utility	1989-1998
Alternative Fuels in Refinery Heaters	District	1989-1995
Fuel Cells (>100 MW)	District	1989-2000
Electric Vehicle Battery	District/CEC	1989-1995
PM10 Fugitive Emission Controls	District	1990-1995
Phase-I Vapor Recovery Systems	District/ARB	1990-1992
Economic and Environmental Impacts of Source Substitution	District	1990-1992
Railroad Electrification Feasibility Study	District/SCAG	1991-1992
Solar Engine Systems	District	1990-2000
Low-NOx Combustion for Residential, Commercial, and Industrial Applications	District	1990-1997
Low-Emitting Off-Road Vehicles	District/ARB	1990-1995

TABLE 7-9

Demonstration Projects

Project	Responsible Agency	Date
Electric Vehicles	District/CEC/ ARB/Utility	1988-1998
Alternative Fuels in Light-, Medium-, and Heavy-Duty Vehicles	District/ARB	1988-1998
Alternative Fuels in Refinery Heaters	District	1990-1995
Highway Electrification and Automation	District/Caltrans	1990-1998
Fuel Cells (11 MW)	District	1990-2000
Robotic Coating Operations	District	1990-1995
Phase-I Vapor Recovery System	District/ARB	1991-1992
Building Materials/Methods Study	District	1991-1992
Solar Engine Systems	District	1990-2000
Low-NOx Combustion for Residential, Commercial, and Industrial Applications	District	1990-1997

TABLE 7-10

Legislative Needs

Subject	Agency	Secured By
Funding For Transportation Infrastructure	Caltrans/SCAG/ CTC'S	1991-2000
Emission Charges	District/ARB	1995
Export Fees	District	1995

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