

1998

Clean Air Plan

Appendix C

*Transportation Control Measures
On-Road Mobile Source Emissions Analysis*

FINAL

December 1998



Santa Barbara County
Air Pollution Control District

Santa Barbara County
ASSOCIATION OF
GOVERNMENTS

FINAL

**SANTA BARBARA COUNTY
1998 CLEAN AIR PLAN**

APPENDIX C

**TRANSPORTATION CONTROL MEASURES
&
ON-ROAD MOBILE SOURCE EMISSIONS ANALYSIS**

DECEMBER 1998

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TABLE OF CONTENTS

C.1 BACKGROUND..... C - 1

C.2 TRANSPORTATION CONTROL EFFICIENCY CALCULATIONS

 T-1 TRIP REDUCTION ORDINANCE

 T-2 EMPLOYER-BASED TRANSPORTATION DEMAND MANAGEMENT PROGRAMS..... C - 9

 T-3. WORK SCHEDULE CHANGES..... C - 10

 T-4 AREAWIDE RIDESHARING C - 10

 T-5 IMPROVE COMMUTER PUBLIC TRANSIT SERVICE..... C - 10

 T-7 TRAFFIC FLOW IMPROVEMENTS..... C - 12

 T-8 PARKING MANAGEMENT..... C - 12

 T-9 PARK & RIDE AND FRINGE PARKING C - 13

 T-10 BICYCLING..... C - 14

 T-13 ACCELERATED RETIREMENT OF VEHICLES..... C - 15

 T-17 TELECOMMUNICATIONS C - 17

 T-18 ALTERNATE FUELS C - 17

 T-19 PUBLIC EDUCATION PROGRAM..... C - 18

C.3 MEASURES PROPOSED FOR FURTHER STUDY

 T-6 HIGH OCCUPANCY VEHICLE LANES C - 19

 T-12 VEHICLE USE LIMITATIONS/RESTRICTIONS..... C - 19

 T-14 ACTIVITY CENTERS C - 19

 T-15 EXTENDED VEHICLE IDLING C - 19

 T-20 PARKING MANAGEMENT TO REDUCE NON-COMMUTE SINGLE OCCUPANT VEHICLE ACTIVITY C - 19

C.4 MEASURES REJECTED

 T-11 SPECIAL EVENTS C - 19

 T-16 EXTREME LOW TEMPERATURE COLD STARTS..... C - 20

C.5 MEASURES PROPOSED FOR CONTINGENCY MEASURES

 T-21 ENHANCED INSPECTION AND MAINTENANCE PROGRAM..... C - 20

 T-22 COUNTY-WIDE IMPLEMENTATION OF CITY/COUNTY TDM ORDINANCE..... C - 21

C.6 ON-ROAD MOBILE SOURCE EMISSIONS ANALYSIS C - 22

C.7 EMISSIONS RESULTS..... C - 30

LIST OF TABLES AND FIGURES

TABLES

TABLE 1 1994 Clean Air Plan, On Road Mobile Source Control Measures C - 4

TABLE 2 1998 Clean Air Plan, On Road Mobile Source Control Measures C - 5

TABLE 3 1998 Clean Air Plan, Transportation Control Measures C - 7

TABLE 4 Vehicle Miles Traveled and Vehicle Trip Reductions C - 25

TABLE 5 VMT and Vehicle Trip Reduction by Time Period C - 28

TABLE 6 Direct Emission Reduction Calculation C - 28

TABLE 7 AQAP Tracking of On-Road Mobile Source Emission Forecasts C - 33

FIGURES

FIGURE C-1 On-Road Mobile Source ROG Emission Reduction C - 36

FIGURE C-2 Tracking Daily Vehicle Miles of Travel in Santa Barbara County C - 37

FIGURE C-3 Changes to the 1996 On-Road Mobile Source Emission Inventory..... C - 38

GLOSSARY OF COMMONLY USED ACRONYMS AND TERMS

ADT	Average Daily Travel - The average number of vehicles which traverse a given segment of roadway over a 24-hour period.
AADT	Annual Average Daily Travel - The average number of vehicles which traverse a given segment of roadway over a 24-hour period averaged over 365 days.
AQAP	Air Quality Attainment Plan - The comprehensive document, which is required under the 1977 Federal Clean Air Act (FCAA) and the 1987 California Clean Air Act (CCAA). The document details the programs and control measures needed to sufficiently reduce emissions to meet the National Ambient Air Quality Standards and the state standards respectively.
AVO	Average Vehicle Occupancy - The average number of people per vehicle.
AVR	Average Vehicle Ridership - The total number of employees working at a work site relative to the total number of motor vehicles used by the workforce (includes telecommuters).
MVEI7G	Model developed by the California Air Resources Board to develop on-road mobile source emission inventories.
Caltrans	California Department of Transportation - Agency responsible for state-wide transportation programs in California.
CAP	Clean Air Plan - Santa Barbara County's federal ozone standard attainment demonstration plan. This State Implementation Plan submittal is required of Santa Barbara County by the 1990 Clean Air Act.
CARB	California Air Resources Board - Agency responsible for state-wide air quality programs in California.
CCAA	California Clean Air Act - A California law passed in 1988 which provides the basis for state air quality planning and regulation (independent of federal regulations). This Act directs local Air Pollution Control Districts (APCDs) which are non-attainment for the California Ambient Air Quality Standards, to achieve attainment of these standards by the earliest feasible date.
CNG	Compressed Natural Gas - An alternative fuel currently being demonstrated in Santa Barbara County.

CMA	Congestion Management Agency - SBCAG has been designated by the cities and the county as the agency responsible for the development and implementation of the countywide Congestion Management Program (CMP) required by Section 65088 of the California Government Code. SBCAG is responsible, in cooperation with local and state agencies for identifying and resolving traffic congestion problems within the county pursuant to specific legislative requirements.
CMAQ	Congestion Mitigation and Air Quality Program - A new program created by the Intermodal Surface Transportation and Efficiency Act (ISTEA) which provides funds for areas classified as being nonattainment of the National Ambient Air Quality Standards (NAAQS). CMAQ-funded projects must contribute to the attainment of air quality standards by demonstrating a reduction in vehicular emissions.
CMP	Congestion Management Program - The CMP is a comprehensive program designed to reduce auto-related congestion through provision of roadway improvements, travel demand management, and coordinated land use planning among all local jurisdictions. The program is required of every county in California with an urbanized area of at least 50,000 people. The CMP is updated biennially.
EMFAC	Model developed by the California Air Resources Board to derive on-road mobile source emission factors for all on-road mobile source criteria pollutants (EMFAC7G is the most current model in the EMFAC series).
EPA	Environmental Protection Agency - The United States agency charged with setting policies and guidelines, and carrying out legal mandates for the protection of national interests in environmental resources.
FCAA/CAAA	Federal Clean Air Act (Amendments) - Federal legislation that sets national air quality standards and requires each state with areas that have not met federal air quality standards to prepare a State Implementation Plan (SIP). The 1990 FCAA amendments established new air quality requirements for the development of metropolitan transportation plans and programs.
FHWA	Federal Highway Administration - As an agency under the U.S. Department of Transportation (U.S.DOT), FHWA is responsible for all federal highway programs.
FTA	Federal Transit Administration - Formally known as the Urban Mass Transportation Administration (UMTA), FTA is an agency under the U.S. Department of Transportation (U.S.DOT) responsible for all federal programs related to mass transit.

FTIP	Federal Transportation Improvement Program - The FTIP is a multi-year program of transportation projects that are funded from primarily federal sources. The FTIP is developed and adopted by the Metropolitan Planning Organization (SBCAG) on a biennial basis. Once adopted, the FTIP is submitted to the California Transportation Commission (CTC) and the federal funding agencies.
HCM	Highway Capacity Manual (FHWA, 1995) - Describes the relationships between roadway capacity and travel/flow characteristics.
HCS	Highway Capacity Software (FHWA, 1995) - Computer software developed to analyze changes in travel/flow characteristics associated with changes in roadway capacity.
HOV	High Occupancy Vehicle - A vehicle which is transporting more than one person. HOV lanes are segments of roadway which are restricted to HOV vehicles.
ISTEA	Intermodal Surface Transportation and Efficiency Act - Federal legislation signed into law in December 1991, which proposes broad changes to the way transportation funding decisions are made. It emphasizes diversity, balance of modes, and the preservation of existing systems. ISTEA authorizes the expenditure of \$151 billion over its six-year life.
LOS	Level of Service - A measure of congestion on a highway facility or intersection based primarily on the comparison between the facility's capacity and its traffic volume. Increasing levels of congestion are designated along a scale from A to F.
Measure D	A 1/2 cent sales tax referendum approved by the voters in 1989 to fund transportation facility maintenance and improvements in Santa Barbara County over the next 20 years.
NAAQS	National Ambient Air Quality Standards - Standards set by the federal Environmental Protection Agency (EPA) for the maximum levels of air pollutants which can exist in the outdoor air without unacceptable effects on human health or the public welfare.
ROP	Rate of Progress (Plan) - The 1990 CAAA requires moderate and above nonattainment areas to show progress towards attainment by demonstrating a 15 percent reduction in reactive organic gas emissions below 1990 levels. Santa Barbara County submitted its 1993 ROP Plan to EPA in November 1993 fulfilling this requirement.

RTIP	Regional Transportation Improvement Program - Prepared and adopted biennially by Regional Transportation Planning Agency (SBCAG), the RTIP includes projects from the Regional Transportation Plan (RTP) Action Element nominated for state Flexible Congestion Relief Funds. The RTIP when adopted is submitted to the California Transportation Commission (CTC) for inclusion in the State Transportation Improvement Program (STIP).
RTP	Regional Transportation Plan - The RTP is a long range plan to improve our region's state highways; local streets, roads, and bikeways; airports and marine facilities; transit, paratransit, and passenger rail services. A guide for the development of these facilities, the RTP describes the priorities for making investments in our region's transportation system.
SBAPCD	Santa Barbara Air Pollution Control District - The local agency which governs air quality issues: proposes and adopts local air pollution rules, enforces those rules, responds to air pollution related complaints, issues permits to polluting sources, and inventories sources of air pollution emissions.
SBCAG	Santa Barbara County Association of Governments - SBCAG is a voluntary council of governments formed under a joint powers agreement executed by each of the general purpose local governments in Santa Barbara County. SBCAG is an independent entity governed by a twelve-member board consisting of a city council representative from each of the seven cities in the county and the five members of the county board of supervisors. The city representatives are appointed by their respective city councils. SBCAG is the designated Regional Transportation Planning Agency (state planning mandate), the Metropolitan Planning Organization (federal planning mandate), the local Transportation Authority, and the Congestion Management Agency for Santa Barbara County.
SBMTD	Santa Barbara Metropolitan Transit District - SBMTD is the provider of public transit services on the South Coast. SBMTD's fleet consists of heavy duty diesel buses and electric shuttle buses. Transit service consists of a combination of fixed route, express, and demand responsive service.
SIP	State Implementation Plan - A document prepared by each state, with input from local Air Pollution Control Districts, describing the existing air quality conditions and measures which will be taken to attain and maintain national ambient air quality standards (NAAQS).
SMAT	Santa Maria Area Transit - SMAT is the fixed route transit service provider in the Santa Maria/Orcutt Area.
SRTP	Short Range Transit Plan - SRTP is a five-year comprehensive plan required of all public transit operators by federal and regional transportation funding agencies.

STP	Surface Transportation Program - A new program created by the Intermodal Surface Transportation and Efficiency Act (ISTEA) which provides greater flexibility in how federal highway funds are spent. Many types of alternative transportation projects are eligible under this program.
TAZ	Traffic Analysis Zone - A geographical area delineated for the purpose of transportation modeling. TAZs are the major units of transportation modeling analysis and are delimited on the basis of socio-economic, topographic, political, and transportation facilities information.
TCM	Transportation Control Measure - Any strategy to reduce vehicle trips, vehicle use, vehicle miles traveled, vehicle idling, or traffic congestion for the purpose of reducing motor vehicle emissions.
TDA	Transportation Development Act - As contained in Section 99200 of the Public Utilities Code, the TDA provides two major sources of funding for public transportation through regional planning and programming agencies: the county Local Transportation Fund (LTF), which is derived from 1/4 cent of the 6 cent retail sales tax collected statewide; and the State Transit Assistance (STA) funds, which are for transportation planning and mass transportation purposes as specified by the legislature.
TDM	Transportation Demand Management - The implementation of measures which encourage people to change their mode of travel, or not to make a trip at all e.g., ridesharing, pricing incentives, parking management and telecommuting.
VMT	Vehicle Miles Traveled - VMT is the sum of miles traveled by all vehicles during a fixed period of time on a fixed expanse of highways.
VMT-SCD	VMT By Speed Class Distribution - A breakdown of regional VMT into 13 speed classes ranging between 0 - 65 mph in five mile increments produced by Caltrans and the California Air Resources Board. The VMT-SCD is an input to the on-road mobile source emissions model MVEI7G.

C.1 BACKGROUND

In June 1993, the boards of Santa Barbara County Association of Governments (SBCAG) and the Santa Barbara County Air Pollution Control District (APCD) jointly approved a Memorandum of Understanding (MOU) which effectively placed the responsibility for developing the transportation elements of the air quality plans with SBCAG. This MOU allows SBCAG to assist the APCD in a cooperative effort towards meeting the District's responsibilities for developing the transportation elements of its state and federal air quality plans. Under the MOU, SBCAG is responsible for the development and analysis of the 1998 Clean Air Plan (CAP) transportation control measures (TCMs). SBCAG also provides the APCD with socio-economic projections, which formed the basis for many of the stationary and area source growth factor forecasts for the 1998 CAP.

TCMs are programs or activities that states and localities can implement to encourage the travelling public to rely less on the automobile or to use the automobile more efficiently. TCMs reduce emissions from on-road motor vehicles and trucks by: improving the existing transportation system to allow motor vehicles to operate more efficiently; inducing people to change their travel behavior to less polluting modes; or, ensuring emission control technology improvements in the motor vehicle fleet are fully and expeditiously realized. In addition, TCMs can have benefits beyond emissions reductions and can assist in reducing congestion and improving energy efficiency.

During the public participation process for the 1994 CAP, representatives of the business community emphasized the need for a broad emission control strategy that addresses stationary, area, and mobile sources (on-road and off-road) of pollution. Since on-road mobile sources comprise 49 percent, 55 percent, and 79 percent of total ROG, NO_x, and CO emissions in Santa Barbara County respectively, vehicle emission controls and TCMs need to be seriously considered. TCMs address the need for the travelling public to: 1) carefully consider the implications of continued reliance on the single occupant vehicle as the major source of commute trips; 2) the need to provide and promote alternatives to single occupant vehicle travel; and, 3)

the need to consider regulating those factors which promote single occupant vehicle travel. While motor vehicle emission controls established by federal and state laws obtain the greatest emission reductions, TCMs should also be considered as they can help meet multiple objectives (i.e., congestion relief, energy efficiency, etc.).

In August, September, and December of 1997, SBCAG staff briefed its Technical Transportation Advisory Committee on the role of TCMs and attempted to solicit new candidate projects or programs for inclusion in the 1998 CAP. SBCAG initiated this process to ensure the timely development and incorporation of new TCMs in the 1998 CAP. With the very short SIP planning horizon of three years (1996-1999), combined with the uncertainty over when the federal transportation legislation would be reauthorized and what the program funding levels would be, development of new TCMs was limited. After careful consideration, staff concluded that the feasibility of having "new" or previously unprogrammed projects implemented by 1999 was questionable. Therefore, in order to achieve some emission reduction credit from on-road mobile sources in the SIP, SBCAG and the APCD chose to select previously programmed projects for inclusion in the plan.

Hence, differences between the on-road mobile source controls in the 1994 Clean Air Plan and the 1998 CAP are not the TCMs per say, but the specific projects relied upon to reduce emissions and promote the implementation of the established list of TCMs. Table 1 lists the thirteen TCM categories adopted as part of the 1994 CAP and the specific projects relied upon to implement the TCMs. The 1998 CAP will rely on the same TCMs but a new set of programmed projects and/or the continuation of existing programs (e.g., county rideshare program, city/county TDM program) for each measure. The 1998 CAP TCM projects are listed in Table 2.

As required by the Clean Air Act, nonattainment areas must include as part of their air quality plans a list of contingency measures that can be implemented if attainment does not occur by the mandated milestone date. An Enhanced Inspection and Maintenance Program (T-21) was adopted as a contingency measure in the 1994 CAP. Given implementation delays at the state level, this program is being retained as a contingency measure in the 1998 CAP. In addition, if by November 1999, Santa Barbara County still has not attained the federal 1-hour ozone standard,

EPA will be forced to "bump up" the area's nonattainment designation to "severe". This designation will trigger additional mandatory controls for Santa Barbara County, one of which is a mandatory employer trip reduction program. This measure requires all employers within the county with 100 employees or more to implement an employee trip reduction program consistent with the federal Employee Commute Option (ECO) requirements described in section 182 (d)(1)(B) of the Clean Air Act. In December 1995, Congress amended the ECO requirements of the Clean Air Act to allow affected employers to implement alternative measures that will achieve equivalent or greater emission reductions anticipated from the implementation of a ECO program. If pursued by affected employers, alternative emission reduction plans will be evaluated on a case by case basis. State law prohibiting government agencies from imposing employer trip reduction programs is superseded by this federal mandate. This 1998 Clean Air Plan contingency measure is scheduled for implementation in 1999 with full implementation by 2000 if the county does not attain the federal 1-hour ozone standard by November 1999.

Section 108(f) of the CAAA lists sixteen TCM categories advocated by EPA for controlling on-road mobile sources of pollution. These 16 TCMs are listed below.

- 1 Trip Reduction Ordinances
- 2 Employer-Based Transportation Demand Management Programs
- 3 Work Schedule Changes
- 4 Area-Wide Rideshare Incentives
- 5 Improve Public Transit
- 6 High Occupancy Vehicle Lanes
- 7 Traffic Flow Improvements
- 8 Parking Management
- 9 Park-n-Ride/Fringe Parking
- 10 Bicycle and Pedestrian Programs
- 11 Special Events
- 12 Vehicle Use Limitations/Restrictions
- 13 Accelerated Retirement of Vehicles
- 14 Activity Centers
- 15 Extended Vehicle Idling
- 16 Extreme Low-Temperature Cold Starts.

The CAAA recognizes that given varying local conditions, all sixteen TCM types may not be appropriate for every nonattainment area. The CAAA also acknowledges that the Section 108(f) list of TCMs is not an exhaustive list and allows areas to develop and implement other measures,

which control on-road mobile sources of pollution.

TABLE 1
1994 CLEAN AIR PLAN - ON ROAD MOBILE SOURCE CONTROL MEASURES

TCM	Description	Project Sponsor	Project/Program Description	Implementation Status	SIP Analysis
1-4	Travel Demand Management	Traffic Solutions	City-County TDM Program	Program On-Going	Yes
	Areawide Ridesharing Work Schedule Changes	Traffic Solutions	County Rideshare Program	Program On-Going	Yes
		Traffic Solutions/Business	Flexibie Work Hours	Program On-Going	No
5	Public Transportation	SBMTD	Isla Vista - SBCC Express Service	Service On-Going	Yes
		SBMTD	Downtown Waterfront Shuttle Expansion	Service On-Going	Yes
		APCD	Clean Air Express Expansion	Service On-Going	Yes
		City of Santa Maria	SMAT Expansion - 1 30 foot bus	Service On-Going	Yes
		City of Lompoc	Lompoc Transit Expansion - 2 buses & farebox system	Service On-Going	Yes
		City of Solvang	SYVT Expansion - 1 van to establish fixed route service	Service On-Going	Yes
		AMTRAK	Service Expansion from 2 to 4 train stops per day	Service On-Going	Yes
7	Traffic Flow Improvements	Caltrans	Crosstown Freeway Project	Completed	Yes
		County/Caltrans	Rte. 101/ Patterson Avenue I/C	Completed	Yes
		SBCAG/Caltrans	Rte. 101 / La Cumbre Road I/C	Completed	Yes
		SBCAG/Caltrans	Rte. 101 / Storke Road I/C	Completed	Yes
		SBCAG/Caltrans	Rte. 101/ Betteravia Road I/C	Completed	Yes
		County/Caltrans	Rte. 101/Fairview Avenue I/C	Under Development	Yes
		City of Santa Maria	Rte. 135/Betteravia Road Intersection	Completed	Yes
		County of Santa Barbara	Hollister Avenue/Fairview Avenue	Completed	Yes
		City of Santa Barbara	Castillo Street/Montecito Street	Completed	Yes
		County of Santa Barbara	Signal Synchronization – Hollister Avenue	Completed	Yes
8	Parking Management	City of Santa Barbara	Residential Parking Program	On-going	No
9	Park-n-Ride Lots	N/A	N/A	N/A	No
10	Bicycle/Pedestrian	City of Santa Maria	Santa Maria Valley Railroad Bikeway	Partially Completed	Yes
		City of Santa Maria	Battles Road Bicycle and Pedestrian Project	Completed	Yes
		City of Solvang	Alamo Pintado Creek Bikeway/Pedestrian Bridge	Partially Completed	Yes
		City of Santa Barbara	SBCC - East Campus Bicycle and Pedestrian Project	Completed	Yes
		City of Santa Barbara	Crosstown East - West Bikelane Couplet	Completed	No
		City of Santa Barbara	Shoreline Drive/Cabrillo Blvd. Bikeway	Completed	No
		County of Santa Barbara	Fairview Avenue Bicycle Lane	Under Development	Yes
		County of Santa Barbara	Bradley Road Bikeway	Completed	Yes
		County of Santa Barbara	El Capitan Ranch Bikeway	Under Development	No
13	Old Car Buyback	Parsons Inc. - APCD	Vehicle Buyback Program	Completed 1993-96	Yes
17	Telecommunication	County of SB - Probation	Expansion of Video Conferencing Network	Completed	Yes
18	Alternative Fuel Program	APCD	ITG Program	On-Going	Yes
		APCD	Clean Air Express Expansion	Completed - On-Going	Yes -T-5
		SBMTD	Waterfront Shuttle Service Expansion	Completed - On-Going	Yes -T-5
		SBMTD	Easy Lift Conversion of 5 vans to CNG	Completed - On-Going	Yes
		SBMTD	Gillig Bus Refurbishment	Completed - On-Going	Yes
		SBMTD	AMG Bus Refurbishment	Completed - On-Going	Yes
19	Public Education	APCD	Overall Work Program	On-going	No
		SBCAG	Overall Work Program	On-going	No
CONTINGENCY PLAN - FY 1997					
21	Enhanced I/M Program	BAR	Enhanced I/M Program	Delayed by State-2000	Yes

TABLE 2
1998 CLEAN AIR PLAN - ON ROAD MOBILE SOURCE CONTROL MEASURES

TCM	Description	Project Sponsor	Project/Program Description	Funding
1-4	Travel Demand Management	Traffic Solutions	City-County TDM Program	CMAQ
	Areawide Ridesharing	Traffic Solutions	County Rideshare Program	State
	Work Schedule Changes	Traffic Solutions/Business	Flexible Work Hours - Guaranteed Ride Home	(see above)
5	Public Transportation	City of Santa Maria	CNG Transit Bus, expanded service to Guadalupe	CMAQ
		County of Santa Barbara	Goleta Rail Platform - San Diegan Extension	DMV
			Surf Rail Platform - San Diegan Extension	State
		City of Guadalupe	Guadalupe Rail Platform - San Diegan Extension	State
7	Traffic Flow Improvements	N/A	N/A	N/A
8	Parking Management	City of Santa Barbara	Residential Parking Program	N/A
9	Park-n-Ride Lots	County of Santa Barbara	Lompoc Park-n-Ride Lot - Ocean Ave/7th Ave	CMAQ
		County of Santa Barbara	Santa Maria Park-n-Ride Lot - Clark/HWY101	CMAQ
10	Bicycle/Pedestrian	City of Santa Maria	1 Bike Locker	DMV
		County of Santa Barbara	Class II Bikeway in Santa Ynez - Alamo Pintado Rd.	DMV
		County of Santa Barbara	Rufugio Road Class II Bikeway-Samantha Dr-SR246	CMAQ
		County of Santa Barbara	Phelps Road Class II Bikelane	CMAQ
		County of Santa Barbara	Via Real Class II Bikeway - Cravens Lane to Padaro	RSTP
		County of Santa Barbara	Maria Ygnacia Creek Class I Bikeway	RSTP
13	Old Car Buyback	Parsons Inc. - APCD	Vehicle Buyback Program	ITG/DMV
17	Telecommunication	County of SB - Probation	Expansion of Video Conferencing Network	DMV
18	Alternative Fuel Program	UCSB	2 CNG Truck Conversions/fuel maker	DMV
		City of Lompoc	CNG Garbage Truck, roll-off bins, compactors	DMV
		City of Santa Maria	Charging 1 CNG Bus	DMV
		City of Santa Maria	Purchase Dual Fuel Van	CMAQ
19	Public Education	SB Bike Coalition	Bicycle Video	DMV
		County of Santa Barbara	Local Regulations for Electric Vehicles	DMV
		APCD	On-going Efforts	APCD
		SBCAG	On-going Efforts (98-99 OWP)	APCD
CONTINGENCY PLAN - FY 2000				
21		BAR	Enhanced I/M Program	Pending
22		Local Businesses+APCD+	Countywide Employer-Based	Pending
		Traffic Solutions	Trip Reduction Ordinance 100+EMPLOYEES	

Table 3 summarizes the implementation characteristics of all currently adopted TCMs in the county. Identified are: the type of TCM; the adopting agency/agencies; the agency/agencies responsible for implementing the TCM; the formal agreements between the adopting and implementing agencies; and, how TCM implementation will be monitored and by whom. All currently adopted TCMs except for T-13 (Accelerated Vehicle Retirement) and T-18 (Alternative Fuels) are listed as TCMs by EPA in Section 108(f) of the CAAA. All 1998 CAP TCMs must be implemented in an expeditious manner or federal transportation funds programmed for new road capacity could be withheld. The mechanism by which expeditious implementation of TCMs is demonstrated is through the federal conformity regulation. All future transportation plans and programs for Santa Barbara County are subject to the conformity provisions of the CAAA which ensures that they are consistent with the 1998 CAP (SIP).

In addition, SBCAG also evaluated all TCMs considered to be reasonably available control measures (RACM). All the RACM TCMs evaluated for the CAP were classified as either being:

- Currently Adopted
- Proposed for Further Study
- Proposed for Rejection
- Contingency Measures

All TCM's evaluated as part of the 1994 CAP and this 1998 CAP are listed below.

Currently Adopted

T-1	Trip Reduction Ordinance
T-2	Employer Based Transportation Demand Management Programs
T-3	Work Schedule Changes
T-4	Area-wide Ridesharing Incentives
T-5	Improve Commuter Public Transit Service
T-7	Traffic Flow Improvements
T-8	Parking Management
T-9	Park-and-Ride / Fringe Parking
T-10	Bicycle and Pedestrian Programs
T-13	Accelerated Retirement of Vehicles
T-17	Telecommunications
T-18	Alternative Fuels
T-19	Public Education

TABLE 3
1998 CLEAN AIR PLAN TRANSPORTATION CONTROL MEASURES

TCM #	TCM Designation	Type of TCM	Adopting Agency(ies)	Implementing Agency(ies)	Commitments	Monitoring Mechanism (Agency)
T-1	Trip Reduction Ordinance	Voluntary;	Tier 1: Guadalupe; Buellton; Solvang; County, SYV;	Tier 1 (County/ Cities)	Tiers 1 & 2: Resolution of Commitments from Affected jurisdictions;	CMP Conformity (SBCAG)
T-2	Employer-Based TDM Ordinance	TDM Ordinance; State AQAP	Tier 2: Lompoc; Santa Maria; County Unincorporated; Carpinteria; Tier 3: Santa Barbara; County, Goleta	Tier 2 (County/Cities) Tier 3 (County/Cities)	Tier 3: City and County TDM Ordinance City of Santa Barbara and Goleta area	SIP Conformity (SBCAG)
T-3	Work Schedule Changes	Voluntary	County and Cities	County and Cities; Private Sector	Adopted Policy, County, 1988	Not Applicable (TDM)
T-4	Area Wide Ridesharing	Voluntary	County and Cities	SBCAG	Interagency Agreement	SIP Conformity (SBCAG)
T-5	Public Transportation	Programmed	County and Cities	SBMTD; SMAT; SBCAG; APCD; Lompoc Transit; Santa Ynez Valley Transit;	FTIP and RTIP; SRTP, TDP	List of Programmed Projects Implemented by 1999 (SBCAG); SIP Conformity (SBCAG)
T-7	Traffic Flow Improvement	Programmed	County and Cities	County and Cities; Caltrans; SBMTD; SBCAG	FTIP and RTIP	List of Programmed Projects Implemented by 1999 (SBCAG); SIP Conformity (SBCAG)
T-8	Parking Management	Parking Ordinance	City of Santa Barbara	City of Santa Barbara	Not Applicable	City of Santa Barbara Parking Task Force; SIP Conformity (SBCAG)
T-9	Park-and-Ride Fringe Parking	Voluntary; Programmed	County and Cities	County and Cities Caltrans	FTIP and RTIP	Caltrans, District 5; List of Programmed Projects Implemented by 1999 (SBCAG); SIP Conformity (SBCAG)
T-10	Bicycle/Pedestrian	Programmed	County and Cities	County and Cities; Caltrans; SBCAG	FTIP and RTIP; General Bikeway Elements; Bikeway Master Plans	List of Programmed Projects Implemented by 1999 (SBCAG); SIP Conformity (SBCAG)
T-13	Accelerated Retirement of Vehicle	Voluntary	APCD	APCD	Contract APCD/Engineering	APCD; SIP Conformity (SBCAG)
T-17	Telecommunication	Voluntary	County and Cities	County and Cities Private Sector	Not Applicable	Not Applicable (TDM)
T-18	Alternative Fuel Program	Voluntary	APCD	APCD County and Cities	Interagency Agreements Unnecessary	APCD; SIP Conformity (SBCAG)
T-19	Public Education	Committal; Voluntary	County and Cities APCD SBCAG	County and Cities APCD SBCAG	Interagency Agreements Unnecessary	Not Applicable; CMP Conformance (SBCAG); SIP Conformity (SBCAG);

Proposed For Further Study

- T-6 High Occupancy Vehicle Lanes
- T-12 Vehicle Use Limitations/Restrictions
- T-14 Activity Centers (i.e., Indirect Source Review – Land use measures)
- T-15 Extended Vehicle Idling
- T-20 Parking Management to Reduce Non-commute Single Occupant Vehicle Use

Proposed For Rejection

- T-11 Special Events
- T-16 Extremely Low-Temperature Cold Starts

Proposed As Contingency Measures

- T-21 Enhanced Inspection and Maintenance Program
- T-22 County-wide TDM Ordinance Affecting All Employers with > 100 Employees

Currently adopted TCMs are discussed in Section C.2. Measures proposed for further study and those not considered appropriate for Santa Barbara County are listed in Sections C.3 and C.4 respectively. These measures are described in detail in Appendix C of the 1994 Clean Air Plan. Section C.5 discusses TCMs that are to be "reserved" as contingency measures. Contingency measures are to be implemented in the event Santa Barbara County fails to meet the National Ambient Air Quality Standard (NAAQS) by November 15, 1999. Sections C.6 and C.7 document information used to calculate the TCM VMT and trip reductions and emission reductions respectively.

C.2 TRANSPORTATION CONTROL EFFICIENCY CALCULATIONS

In order to compute the 1998 CAP TCM efficiencies, estimated changes to vehicle miles traveled, vehicle trips, and in some instances, direct tailpipe emissions were required. Various methods were used to analyze these variables including: the Santa Barbara Travel Model and various accounting procedures. For more detailed information on analysis procedures, refer to Appendix C of the 1994 CAP.

T-1 TRIP REDUCTION PROGRAM

T-2 EMPLOYER-BASED TDM PROGRAMS

Estimating VMT and trip reductions resulting from the voluntary Santa Barbara City/County TDM Program is based on the incremental improvement in average vehicle ridership (AVR) in the South Coast area between 1996 and 1999 and between 1999 and 2005.

All assumptions and parameter values used to analyze the effectiveness of the City/County TDM Program are described below.

- The TDM Program effectiveness is based on only home based work commute trips whose destination lies within the South Coast Market Area as defined in Forecast 94 (SBCAG). This does not include those north county employers who are now participating in the program since it became voluntary.
- Total jobs forecasted for the South Coast Market Area in 1999 and 2005 is 95,639 and 101,048 respectively (Source: Forecast 94, SBCAG).
- 90 percent of commute trips are made by vehicles (Source TDM Program 1993 Year End Report, Traffic Solutions).
- TDM Commuter AVR for base year 1996 is 1.3 (estimated as a 6 percent increase from 1990 base year AVR of 1.23: Source: TDM Program 1993 Year End Report, Traffic Solutions) and estimated to be 1.395 in 1999 (surveyed 1997 AVR = 1.395).
- The average work trip to and within the South Coast Market Area is 12.5 miles (Source: South Coast Commuter Survey, 1989).
- 66 percent of South Coast employees work at places which employ over 20 employees (TDM, Report on Implementation Issues and Options, SBCAG).
- Voluntary program is 70 percent as effective as the mandatory program.

The following equations were used to compute the VMT and trip reductions anticipated from the TDM Program.

$$\text{Base 1996} = (\text{HBW} * \% \text{TDM} * \% \text{Auto} * \text{AVRTDM} * \text{TLen}) + (\text{HBW} * \% \text{NONTDM} * \% \text{Auto} * \text{AVR} * \text{TLen}) +$$

$$1999 = (\text{HBW} * \% \text{TDM} * \% \text{Auto} * \text{AVRTDM} * \text{TLen}) + (\text{HBW} * \% \text{NONTDM} * \% \text{Auto} * \text{AVR} * \text{TLen}) +$$

$$\text{VMT Reduction} = \text{Base} - 1999 * .70$$

$$\text{Trip Reduction} = \text{Base} - 1999 (\text{excluding TLen}) * .70$$

where:

- HBW = Jobs in the South Coast Market Area in 1999 (95,639) in 2005 (101,048)
- %TDM = Percentage of Employees subject to TDM (.66)
- %NONTDM = Percentage of Employees not subject to TDM (.34)
- %Auto = Percentage of Commute Auto Trips (.90)
- AVR = Average Vehicle Ridership of NonTDM Trips: = 1.23 (.813)
- AVRTDM = Average Vehicle Ridership of TDM Trips: 1996 Base = 1.3 (.769); 1999 and 2005 = 1.395 (.717).
- TLen = Average HBW Trip Length (12.5).

Applying the above parameter values yields the following VMT and vehicle trip reductions:

T-1,2 1996 DAILY VMT REDUCTION	= 25,848
T-1,2 1996 DAILY VEHICLE TRIP REDUCTION	= 2,068
T-1,2 2005 DAILY VMT REDUCTION	= 30,525
T-1,2 2005 DAILY VEHICLE TRIP REDUCTION	= 2,442.

T-3. WORK SCHEDULE CHANGES

Control Efficiency Not Quantified.

T-4 AREAWIDE RIDESHARING

Control Efficiency Not Quantified.

T-5 IMPROVE PUBLIC TRANSIT

The following short range transit expansion projects have been implemented between 1996 and 1999:

SMAT New Fixed Route Line Service
Santa Barbara Rail Service Expansion.

Daily VMT and vehicle trip reductions estimated from these projects are based on the most recent service and ridership information available.

Santa Maria Area Transit Expansion

1 Additional CNG SMAT Bus for new fixed route service (Service to Guadalupe)
Projected ridership = 20 persons/per trip (SMAT)
5-Trip per Day Service Schedule (SMAT)
Percent of Non-Transit Captive Ridership = 50 percent (SMAT)
Avg. Person Trip Length = 12.5 miles (both trip ends)

$20 * 5 * .5 * 2 * 12.5 = 1,250 \text{ VMT/Day}$
 $20 * 5 * .5 * 2 = 100 \text{ Trips/Day}$

Santa Barbara Rail Service Expansion

Installation of rail platforms in Surf, Guadalupe, and Goleta. Stops at these locations will be included as part of the San Diegan service between San Diego and San Luis Obispo.

Location	Estimated* Monthly Ridership	Daily Trip Reduction	Intra-County Miles	VMT Reduction
Goleta Platform	600	20	23	460
Guadalupe Platform	450	15	80	1,200
Surf Platform	300	10	60	600
Total	1350	45		2,260

* Source: Caltrans, Division of Rail

T-5 1996 DAILY VMT REDUCTION = 3,510
T-5 1996 DAILY VEHICLE TRIP REDUCTION = 145

T-7 TRAFFIC FLOW IMPROVEMENTS

Although no infrastructure improvements are identified as TCM projects as part of this Clean Air Plan, the following infrastructure improvements, completed between 1996 and 1999, were considered regionally significant, and were therefore analyzed as to their emission impacts:

Roadway Improvements

Rte. 1; from Rte. 246 to El Jaro Creek - construct passing lanes

Garden Street extension from Yannoli Street to Cabrillo Blvd.

Salsipuedes Street extension from Cacique Street to Cabrillo Blvd.

Blosser Road between Betteravia Rd. and Stowell Rd. - widen to four lanes

Blosser Road between Main Street and Alvin Ave - widen to four lanes

Miller Street Signal Interconnect - 12 existing signals - conduit/cable connection to City Hall

Rte. 246 between Buellton and Solvang - add continuous shared left turn lane.

Intersection/Interchange Improvements

Rte. 101/Rte. 154 South Interchange - reconstruct interchange & re-align ramps

Rte. 101/Rte. 166 - revise interchange, reconstruct NB ramps

Rte. 101/Betteravia Rd. - replace and widen overcrossing; re-align ramps & frontage roads

Rte. 101NB/Earl Warren/Calle Real - add left turn lane to EB Calle Real.

The above improvements were coded on the Santa Barbara Travel Model network as part of the 1999 travel forecast (improvements completed between 1990 and 1996 were codified on to the model network as part of the 1994 CAP analysis, see Appendix C of the 1994 CAP). The resulting impact on trip diversion (i.e., VMT) and speeds are captured by extracting the model's VMT by speed class distribution. The model's VMT by speed class distribution is a direct input to the MVEI7G emission model (see On-Road Mobile Source Emissions Analysis section).

T-8 PARKING MANAGEMENT

Control Efficiency Not Quantified.

T-9 PARK & RIDE AND FRINGE PARKING

The reductions in VMT resulting from new park-and-ride lots constructed between 1996 and 1999 and between 1999 and 2005 are computed using the following equation:

$$VMT = d(n - n * c)$$

where:

d = average two-way distance
n = total number of vehicles using the lot
c = average vehicle occupancy of carpools (inverse).

Values for d, n, and c are as follows:

- d = 140 miles (Ocean Ave./7th Ave. serving Santa Maria/Orcutt area)
- d = 110 miles (Rte.101/Clark Ave. serving Lompoc and VAFB area)
 (serves north county commutes to south coast jobs)
- n = capacity * utilization (difference between 1996 and 1999 & 1999 and 2005)
- c = 2.95 (.339)

Location	Capacity	1999 % Utilization	2005 % Utilization	1999 Utiziation	2005 Utilization
Ocean Ave/7 th Ave.	165	0.50	0.70	82	115
Clark Ave/Rte. 101	100	0.50	0.70	50	70

Using the same equation as described in the previous section and accounting for TDM double counting at Rte.101/Clarke Ave and Ocean Ave/7th Ave lots (34 percent of total reduction), the following VMT reduction was computed.

Daily VMT Reduction 1996-1999 = 3,628
Daily VMT Reduction 1999-2005 = 5,032

T-9 1999 DAILY VMT REDUCTION = 3,628
T-9 1999 DAILY VEHICLE TRIP REDUCTION = 0

T-9 2005 DAILY VMT REDUCTION = 5,032
T-9 2005 DAILY VEHICLE TRIP REDUCTION = 0

T-10 BICYCLING

Several bikeway improvements occurred between 1996 and 1999. These improvements primarily entailed connecting missing links of the designated regional bike systems as defined in the Regional Bikeway Study for Santa Barbara County.

The number of person trip reductions resulting from a bikeway project was estimated by taking .1 percent of all "affected" person interzonal trip productions as reported in the local jurisdiction's travel demand model or the regional Santa Barbara Travel Model. Intrazonal trip productions, if reported, were also assessed. Given the short distances of intrazonal trips, it was assumed that these trips would be more responsive to new bikeway facilities. A .2 percent shift was assumed for these trips. For special generators such as schools, a .3 percent diversion was assumed. If trip productions were reported as vehicle trips, .1 percent of all "affected" trip productions was used. In this context, "affected" trip productions are those model trip productions which originate or end in traffic analysis zones (TAZ) which are traversed by the new bikeway facility. The vehicle trip and VMT reductions resulting from bikeway projects are shown below.

1999 Bikeway Project VMT and Trip Reductions

Bikeway Projects	Model or Source	TAZs	Daily Trip Production	Trip Diversion	Trip Length	VMT/Trips
Alamo Pintado Rd. Class II County of Santa Barbara	SBCAG	2	5,941 Inter 757 Intra	.001 .01	3.0	42 VMT 14 Trips
Refugio Road Class II County of Santa Barbara	SBCAG	3	14,025 Inter 2,165 Intra	.001 .01	3.0	108 VMT 36 Trips
Phelps Road Class II County of Santa Barbara	SBCAG	5	16,259 Inter 429 Intra	.001 .01	3.0	60 VMT 20 Trips
Via Real Bikeway County of Santa Barbara	SBCAG	6	20,210 Inter 1,945 Intra	.001 .01	3.0	117 VMT 39 Trips
Maria Ygnacia Creek Bikeway County of Santa Barbara	SBCAG	4	26,829 Inter 739 Intra	.001 .01	3.0	99 VMT 33 Trips

2005 Bikeway Project VMT and Trip Reductions

Bikeway Projects	Model or Source	TAZs	Daily Trip Production	Trip Diversion	Trip Length	VMT/Trips
Alamo Pintado Rd. Class II County of Santa Barbara	SBCAG	2	6,164 Inter 781 Intra	.001 .01	3.0	42 VMT 14 Trips
Refugio Road Class II County of Santa Barbara	SBCAG	3	14,647 Inter 2,235 Intra	.001 .01	3.0	111 VMT 37 Trips
Phelps Road Class II County of Santa Barbara	SBCAG	5	16,841 Inter 390 Intra	.001 .01	3.0	63 VMT 21 Trips
Via Real Bikeway County of Santa Barbara	SBCAG	6	20,828 Inter 2,011 Intra	.001 .01	3.0	123 VMT 41 Trips
Maria Ygnacia Creek Bikeway County of Santa Barbara	SBCAG	4	26,518 Inter 707 Intra	.001 .01	3.0	102 VMT 34 Trips

T-10 1999 DAILY VMT REDUCTION = 426
T-10 1999 DAILY VEHICLE TRIP REDUCTION = 142
T-10 2005 DAILY VMT REDUCTION = 441
T-10 2005 DAILY VEHICLE TRIP REDUCTION = 147

T-13 ACCELERATED RETIREMENT OF VEHICLES

Given that the average remaining life of a removed car is assumed to be 3 years (ARB), this 1999 forecast analysis credits the last year of the 1993-1996 vehicle buyback program (see 1994 CAP TCMs) and the first year of the re-established vehicle buyback program which will run from 1999 to 2001. No credit is taken for this program as part of the 2005 emissions forecast.

Accelerated Retirement of Vehicles

Program Funding (1999-2002) = \$250,000
Vehicle Reimbursement+Administration Costs = \$800
Total Number of Vehicles = 313
Vehicles Credited (385/3) = 104

Total Vehicle Buybacks between 1993-1996 = 1,200
Vehicles Credited = 325

Total Vehicles Credited = 429

Assumed Number of Pre-1972 Vehicles in 1999 = 242
Assumed Number of 1972-1974 Vehicles in 1999 = 187

Average Emission Rates and Mileage for Different Model Years*

Model Year Goup	ROG Exhaust Grams/mile	ROG Evap Grams/mile	NOx Exhaust Grams/mile	Daily Vehicle Miles
Pre-1972	9.6	2.8	4.0	13.5
1972-1974	7.6	2.1	3.8	14.5
1975-1981	2.6	1.3	3.0	17.5
Fleet Average	1.0	0.4	1.2	27.67

* Source: ARB, Mobile Source Emission Reduction Credits Document

Using ARB’s emission factor and vehicle use data above with the following equations yields the expected emission reduction anticipated from Santa Barbara County’s Old Vehicle Buyback Program in 1999.

ROG Calculation

$$[Pre-72_{exhaust} + Pre-72_{evap} - (FleetAve_{exhaust} + (FleetAve_{evap} * FleetAve_{mileage}/Pre-72_{mileage}))] * [Pre-72_{mileage} * 1_{yrs} * (1/453.6) / 2,000]$$

- 242 vehicles

$$[72-74_{exhaust} + 72-74_{evap} - (FleetAve_{exhaust} + (FleetAve_{evap} * FleetAve_{mileage}/72-74_{mileage}))] * [72-74_{mileage} * 1_{yrs} * (1/453.6) / 2,000]$$

- * 187 vehicles

$$[12.4 - (1.0 + (.4 * (27.67/13.5)))] * 13.5 * 1 * 0.002203 / 2,000 = 0.0001565 * 242 = 0.04 \text{ tons/day}$$
$$[9.7 - (1.0 + (.4 * (27.67/14.5)))] * 14.5 * 1 * 0.002203 / 2,000 = 0.0000159 * 187 = 0.024 \text{ tons/day}$$

NOx Calculation

$$(Pre-72_{exhaust} - FleetAve_{exhaust}) * (Pre-72_{mileage} * 1_{yrs} * (1/453.6) / 2,000)$$

- 242 vehicles

$$(72-74_{exhaust} - FleetAve_{exhaust}) * (72-74_{mileage} * 1_{yrs} * (1/453.6) / 2,000)$$

- * 187 vehicles

$$(4.0 - 1.2) * 13.5 * 1 * 0.002205 / 2,000 = 0.0000414 * 242 = 0.011$$
$$(3.8 - 1.2) * 14.5 * 1 * 0.002205 / 2,000 = 0.0000413 * 187 = 0.008$$

T-13 1999 DAILY ROG EMISSION REDUCTION = 0.06 Tons/Day)
T-13 1999 DAILY NOx EMISSION REDUCTION = 0.02 Tons/Day)

T-17 TELECOMMUNICATIONS

Video Communications, County of Santa Barbara

This project augments the current video communication system currently in place within the County Probation and Public Defender’s Office. Two additional terminals will be purchased and installed at the Santa Maria, Lompoc, and Santa Barbara enforcement offices. The vehicle trips and VMT reduction estimates below are based on current workload and demand between the Probation and Public Defender’s Offices.

Location	Daily Vehicle Trips Reduced	Trip Length (miles)	VMT Reduction
Santa Maria	20	69	1,380
Lompoc	20	54	1,080
Santa Barbara	20	15	300

T-17 1999 & 2005 DAILY VMT REDUCTION = 2,760
T-17 1999 & 2005 DAILY VEHICLE TRIP REDUCTION = 60

T-18 ALTERNATE FUELS

The following alternative fuel transit projects were implemented in Santa Barbara County between 1996 and 1999:

- 1) 2 CNG Light Duty Truck Conversions and 1 Fuel Maker (UCSB)
- 2) 1 CNG Garbage Truck – Roll-Off Bins and Compactor (City of Lompoc)
- 3) Purchase 1 Dual Fual Van (City of Santa Maria)
- 4) Purchase 1 CNG Slow Fill Fuel Maker (City of Santa Maria)
- 5) Purchase 1 CNG Replacement Bus (City of Santa Maria)

For projects scheduled to be implemented between 1996 and 1999, service characteristics were assumed to remain constant. Direct tailpipe ROG and NOx emissions were computed from differences in ROG and NOx emission rates among the different vehicle technology groups. No emission benefits were credited towards new fueling facilities or equipment.

CNG Light Duty Truck Conversions (UCSB)

Number of Vehicles = 2

Avg. Daily VMT per Vehicle = 24 miles

Model Year of Vehicles to be Replaced = 1984 and 1987

ROG Emission Rate of Replaced Vehicles + Evap. Emissions = .9 g/mile

ROG Emission Rate of Converted Vehicles = .075

NOx Emission Rate of Replaced Vehicles = .9 g/mile

NOx Emission Rate of Converted Vehicles = .2 g/mile

$$(2 * 24 * .9) - (2 * 24 * .075) = 40 \text{ grams ROG/Day}$$

$$(2 * 24 * .9) - (2 * 24 * .2) = 34 \text{ grams NOx/Day}$$

CNG Garbage Truck

Number of Vehicles = 1

Avg. Daily VMT = 40 miles

Reduction in Running ROG Emission Rate CNG vs. Diesel = 3.37 g/mile

Reduction in Running NOx Emission Rate CNG vs. Diesel = 35.3 g/mile

$$(1 * 40 * 3.37) = 135 \text{ grams of ROG/Day}$$

$$(1 * 40 * 35.3) = 1,412 \text{ grams of NOx/Day}$$

1 Dual Fuel Van (City of Santa Maria)

No Replacement of Vehicle – Emissions Not Quantified.

1 CNG Replacement Bus (City of Santa Maria)

Refer to T-5, Direct Emissions Not Quantified

T-18 1999 & 2005 DAILY ROG EMISSION REDUCTION = 175 grams (0.0003 Tons/Day)

T-18 1999 & 2005 DAILY NO_x EMISSION REDUCTION = 1,446 grams (0.002 Tons/Day)

T-19 PUBLIC EDUCATION

Control Efficiency Not Quantified.

C.3 MEASURES PROPOSED FOR FURTHER STUDY

Control efficiencies for the following measures were not computed given that these measures are still being investigated for their potential effectiveness and/or applicability in Santa Barbara County. For a description of these measures refer to Appendix C of the 1994 CAP.

T-6 HIGH OCCUPANCY VEHICLE LANES

Control Efficiency Not Quantified.

T-12 VEHICLE USE LIMITATIONS/RESTRICTIONS

Control Efficiency Not Quantified.

T-14 ACTIVITY CENTERS

(Land Use Measures - Indirect Source Review Program – See Chapter 8)

Control Efficiency Not Quantified.

T-15 EXTENDED VEHICLE IDLING

Control Efficiency Not Quantified.

T-20 PARKING MANAGEMENT TO REDUCE NON-COMMUTE SINGLE OCCUPANT VEHICLE ACTIVITY

Control Efficiency Not Quantified.

C.4 MEASURES PROPOSED FOR REJECTION

Control efficiencies for the following measures were not computed given that these measures are not considered effective and/or applicable for Santa Barbara County. For a description of these measures refer to Appendix C of the 1994 CAP.

T-11 SPECIAL EVENTS

Control Efficiency Not Quantified.

T-16 EXTREME LOW TEMPERATURE COLD STARTS

Control Efficiency Not Quantified.

C.5 MEASURES PROPOSED AS CONTINGENCY MEASURES

Control efficiencies for the following measures were computed given that these measures may be relied upon in the event that Santa Barbara County does not attain the federal 1-hour ozone standard by November 1999.

T-21 ENHANCED INSPECTION AND MAINTENANCE PROGRAM

Emission reduction estimates from this measure were generated for Santa Barbara County directly with the MVEI7G model which does not reflect recent legislative changes to the Enhanced I/M Program. Some of the more substantive changes to the Enhanced I/M bill are as follows:

- 1) Eliminated the annual test requirement and unlimited repair costs for gross polluters;
- 2) Exempts vehicles from smog check for the first four model years;
- 3) Established a low-income repair assistance program and its funding;
- 4) Changes the existing exemption for vehicles from smog check from 1965 model year to 1973 model year vehicles;
- 5) Starting in 2003, vehicles 30 years or older will be exempt from smog check;
- 6) Requires that the emissions lost due to these changes must be “made up” from regulations on a source other than motor vehicles.

Given that the above changes represent a relaxation of the original program, the estimated reductions below should be considered optimistic.

Emission reduction estimates from this measure were generated for Santa Barbara County directly with the MVEI7G model which does not reflect recent legislative changes to the Enhanced I/M Program. Given that several elements of the Enhanced I/M Program have been relaxed, the estimated reductions below should be considered overly optimistic.

T-21 2005 DAILY ROG EMISSION REDUCTION = 4.29 Tons/Day

T-21 2005 DAILY NO_x EMISSION REDUCTION = 3.07 Ton/Day

T-22 COUNTY-WIDE IMPLEMENTATION OF TIER III TDM PROGRAM

Approximately 47-53 additional establishments and 12,312 employees will be subject to this TCM, mostly located in northern Santa Barbara County. The following assumptions were made in order to estimate the efficiency of this measure.

$(TDM * \%Auto * AVO * TLen) - (TDM * \%Auto * AVO * TLEN)$

Number of Employees subject to TDM (TDM)

1999: 12,312

2000: 12,312

Mode Choice (%Auto):

1999: 85 percent of workers will commute by car (1990 Census)

2000: 85 percent of workers will commute by car

Average Vehicle Occupancy (AVO)

1999: 1.12 (.893) 1990 Census for Santa Barbara County

2000: 1.38 (.725) Expected TDM Effectiveness

Average Trip Length (TLen)

1999: 10 miles (both trip ends)

2000: 10 miles (both trip ends)

The following VMT and vehicle trip reductions were computed for the year 2000:

T-22 2000 DAILY VMT REDUCTION = 30,840

T-22 2000 DAILY VEHICLE TRIP REDUCTION = 5,140.

C.6 ON-ROAD MOBILE SOURCE EMISSIONS ANALYSIS

For the 1998 CAP, adjustments were made to the 1999 on-road mobile source activity data to reflect the estimated impact of each TCM on vehicle miles of travel (VMT) and vehicle trips. Changes in the county's VMT by speed class distribution between 1996 and 1999 were derived directly from the Santa Barbara Travel Model. The adjusted activity data was input into the regional emissions model to generate a with-controls on-road mobile source emissions forecast. By taking the difference in total on-road mobile source emissions between the without-controls forecast and the with-controls forecast, the net emissions reduction expected in 1999 from Santa Barbara County's TCMs could be ascertained. For informational purposes, the same set TCMs were also analyzed as part of a 2005 emission forecast.

Control measure efficiencies for TCMs have traditionally been based on a TCMs estimated emissions reduction. However, using the methodology described above, control efficiencies based on emission reductions would require a separate regional emissions estimate for each individual TCM. The latter approach would be unwieldy, and for many TCMs whose emission reduction potential is small, beyond the sensitivity of the emissions model (MVEI7G reports emissions in tons per day). Control measure efficiencies were therefore based on the VMT and/or trip reduction of each TCM rather than an estimate of emission reductions.

Attainment Demonstration Analysis

Based on photochemical modeling, the comprehensive control strategy of the 1998 CAP, of which on-road mobile source controls are a part, will enable Santa Barbara County to attain the federal 1-hour ozone standard by 1999. For a complete description of the attainment demonstration analysis, see Chapter 7 or Appendix D.

Regional Emissions Analysis

The on-road mobile source emissions estimates for the 1999 CAP were produced with the MVEI7G emission inventory model. MVEI7G calculates emission factors which are used as input to the activity module to produce an on-road mobile source emissions inventory. MVEI7G uses inputs on the types of vehicles in use, vehicle speeds, vehicle operating conditions (e.g., cold starts, hot starts, hot stabilized running etc.) and temperature corrections (for diurnal and hot soak evaporative processes) to generate on-road vehicle emission factors. These emission factors are applied to the appropriate on-road activity data (e.g., VMT, VMT by speed class, and number of trips for each vehicle type and technology group) stratified by time of day (to account for diurnal ambient temperature variations) to produce an on-road mobile source emissions inventory.

On-Road Activity Data Inputs

On-road activity data inputs (county-wide VMT, vehicle trips, and VMT by speed class distribution (SCD) were generated using the Santa Barbara Travel Model¹. These inputs were then revised to reflect the results of the micro-scale and sketch planning analyses. These revised activity inputs were apportioned to the various vehicle types, technology groups, and speed groups based on ARB forecasts of vehicle fleet mix and speed class distribution characteristics for Santa Barbara County. For purposes of emissions modeling, all on-road activity data was stratified into six time periods: 12am - 6am; 6am - 9am; 9am - 12; 12pm - 3pm; 3pm - 6pm; and, 6pm - 12. Summer ozone temperatures for each MVEI7G time period were derived from the 10 worst episodic days monitored in Santa Barbara County.

MVEI7G will compute the emissions associated with the following emitting:

- 1) running exhaust emissions based on VMT;

¹ In response to the need to update and continuously improve the performance of the Santa Barbara Travel Model, SBCAG completed a full recalibration of its regional model in 1997. The recalibration effort involved a review of the entire model structure, network, socioeconomic inputs, an update of the 1990 base year model, and the development of a new 1996 base year model (the 1994 CAP was based on the previous 1990 base year travel model). Validation of the 1990 and 1996 base year models met all federal and state criteria for assessing an acceptable level of accuracy for the use of transportation model data as input to developing emission inventory estimates. Approval to use the recalibrated models for such purposes was received by Caltrans', Regional Travel Forecasting Branch in February 1998. SBCAG's model update effort is fully described in the document entitled: 1990 and 1996 Recalibration of the SBCAB Travel Demand Model.

- 2) cold start incremental emissions and hot start incremental emissions based on the number of trips as a function of time after engine shutoff;
- 3) diurnal emissions based on numbers of vehicles;
- 4) hot soak emissions based on total numbers of trips;
- 5) evaporative running losses based on VMT; and,
- 6) resting loss emissions based on numbers of vehicles.

Depending on the activity data used, MVEI7G will produce two types of inventories, an annual average inventory or a planning inventory. As required by the CAAA for ozone non-attainment areas, the 1998 CAP for Santa Barbara County is based on a summer ozone season (June to October) average daily emissions planning inventory. The latter is based on meteorological and activity conditions which exist during peak episodic conditions for a given pollutant.

The percentage distribution of VMT into the six time periods were based on the hourly traffic count summary developed as part of the Santa Barbara Travel Model data collection effort. The hourly summary was derived from 24-hour traffic counts taken at 147 locations countywide in 1992-93. This data was aggregated into the six MVEI7G time periods and were used to distribute VMT for input into the MVEI7G model. ARB distributions were used to allocate vehicle trips by time period.

To compute running emissions, each time period's VMT total was stratified into 13 speed classes (0 - 65 in 5 mile increments). Hence, there are six VMT by Speed Class Distributions (SCD), one for each MVEI7G time period.

The emissions associated with vehicle starts are accounted for in the MVEI7G model based on the distribution of these trips by vehicle classification, vehicle technology class, and operating mode. This allows the model to compute emissions associated with vehicle starts and evaporative processes (for ROG). MVEI7G adds these emissions to running emissions to compute total on-road mobile source emissions.

As required by the MVEI7G model, vehicle trips were stratified into the following vehicle classifications: Light Duty Auto (LDA); Light Duty Truck (LDT); Medium Duty Truck (MDT); Urban Bus Diesel (UBD); Heavy Duty Gas Truck (HDG); Heavy Duty Diesel Truck (HDD); and, Motorcycle (MCY). The distribution of each vehicle by age (model year), operating mode (e.g.,

cold start, hot start), and technology class (e.g. catalytic, non-catalytic, diesel) was based on the most recent ARB distributions for Santa Barbara County. Vehicle age distributions for LDA and LDT were based on 1996 vehicle registration data for Santa Barbara County.

The MVEI7G activity data summaries are provided on the following pages.

1999 With Controls

To compute the ROG and NOx emission reductions resulting from the CAP TCMs, the TCM VMT, vehicle trip and vehicle speed change efficiencies were used to adjust the activity data inputs of the MVEI7G emissions model. [Table 4](#) below shows the VMT and vehicle trip reductions estimates for each TCM evaluated for the 1998 CAP.

Table 4
Vehicle Miles Traveled and Vehicle Trip Reductions

TCM	1999 VMT Reduction	1999 Trip Reduction	2005 VMT Reduction	2005 Trip Reduction
T-1,2	25,848	2,068	30,525	2,442
T-3	N/Q	N/Q	N/Q	N/Q
T-4	N/Q	N/Q	N/Q	N/Q
T-5	3,510	145	3,510	145
T-7	N/A	N/A	N/A	N/A
T-8	N/Q	N/Q	N/Q	N/Q
T-9	3,628	0	5,032	0
T-10	396	132	441	147
T-13	D/E	D/E	D/E	D/E
T-17	2,760	60	2,760	60
T-18	D/E	D/E	D/E	D/E
T-19	N/Q	N/Q	N/Q	N/Q
Total	36,142	2,405	42,268	2,794
Contingency TCMs				
T-21	D/E	D/E	D/E	D/E
T-22	30,840	5,140	30,840	5,140

N/A = not applicable; N/Q = not quantified; D/E = Direct Emissions

MVEI7G1.0c ACTIVITY DATA INPUTS (1996 Baseline)

1996 Baseline

	Vehicles	VMT	Trips	Avg. Trip Length	Trip-Start Factor	Starts
LDA	190596	5605868	821443	6.82	1.668	1370167
LDT	83775	2464248	361096	6.82	1.766	637696
MDT	10980	323042	47351	6.82	1.63	77182
UBD	85	10405	0	0	1	0
HDGT	4901	237660	43864	5.42	1	43864
HDDT	6644	395353	0	0	1	0
MCY	9913	63424	7446	8.52	1	7446
Total	306894	9100000	1281200			2136355

Time Period Distribution

Period	12-6am	6-9am	9-12noon	12-3pm	2-6pm	6-12mid
VMT	3.62	13.03	18.03	21.28	23.47	20.57
Starts	1.2	15.37	19.99	22.01	25.01	16.42

VMT by Speed Class Distribution

1996 Baseline

	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65
12-6	0	0	0	0	3.4483	8.7451	17.9374	14.7868	22.309	3.8004	11.0608	5.9329	11.9794
6-9	0.6727	1.0851	26.7583	1.9733	3.7178	7.7116	14.034	5.6089	6.0902	13.6839	9.2182	1.1169	8.3292
9-12	0.476	0.5102	12.3681	2.8101	6.9828	8.4031	14.034	5.6089	19.1859	14.1074	4.6919	1.468	9.3537
12-3	0.0924	0.5489	9.0342	0.9999	3.9547	5.2139	6.1044	11.7963	5.722	14.8496	10.0884	5.3216	26.2737
2-6	0.8656	0.7455	19.0906	1.4356	4.6955	1.7544	13.6904	9.5302	17.0187	16.963	3.9465	5.6703	4.5936
6-12	0	0	0	0	3.6962	8.745	7.7805	14.883	5.3913	14.2357	8.6145	5.8076	30.8462

MVEI7G1.0c ACTIVITY DATA INPUTS (1999 and 2005)
WITHOUT CONTROLS

1999						
	Vehicles	VMT	Trips	Avg. Trip Length	Trip-Start Factor	Starts
LDA	197937	5847105	852461	6.86	1.668	1421905
LDT	87858	2570292	374731	6.86	1.766	661775
MDT	13496	336943	49139	6.86	1.63	80097
UBD	85	10405	0	0	1	0
HDGT	5141	243356	46012	5.29	1	46012
HDDT	7407	421764	0	0	1	0
MCY	9913	66155	7727	8.56	1	7727
TOTAL	321837	9496020	1330070			2217516

2005						
	Vehicles	VMT	Trips	Avg. Trip Length	Trip-Start Factor	Starts
LDA	207582	6271036	896244	7	1.668	1494935
LDT	96032	2756646	393977	7	1.766	695763
MDT	17397	361372	51663	6.99	1.63	84211
UBD	85	10405	0	0	1	0
HDGT	5622	250863	50317	4.99	1	50317
HDDT	8930	452343	0	0	1	0
MCY	9913	70951	8124	8.73	1	8124
TOTAL	345561	10173616	1400325			2333350

Time Period Distribution

Period	12-6am	6-9am	9-12noon	12-3pm	3-6pm	6-12mid
VMT	3.56	13.54	17.74	21.12	23.81	20.23
Starts	1.2	15.37	19.99	22.01	25.01	16.42

VMT by Speed Class Distributions (1999/2005)

1999	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65
12-6	0	0	0	0	3.4482	9.1333	14.5909	19.2818	20.7724	3.8005	6.3279	10.6656	11.9793
6-9	0.6774	1.0030	27.1672	2.4313	3.5096	7.8138	6.1951	13.1682	7.5551	11.8149	6.1072	4.2279	8.3292
9-12	0.4760	0.4510	12.6804	3.1597	6.8238	8.4812	11.1490	13.8315	14.7529	7.9319	7.0663	3.8425	9.3538
12-3	0.0924	0.4993	9.2963	1.2936	3.8212	5.2794	5.6661	12.0554	6.6612	13.6514	9.8117	8.8200	23.0519
3-6	0.8683	0.6988	19.3233	1.6961	4.5771	1.8125	9.2325	16.5862	14.0317	16.9630	3.9465	5.6703	4.5936
6-12	0	0	0	0	3.6962	8.8134	5.1191	17.7463	6.3718	8.7865	12.8128	5.8076	30.8462
2005	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65
12-6	0	0	0	0	3.1722	9.1333	14.8671	17.1334	20.7724	3.7376	6.3278	7.2143	17.6420
6-9	0.4293	1.0030	27.4197	2.1789	3.1466	7.8138	6.5867	11.7163	8.8636	11.8149	6.4702	4.3428	8.2143
9-12	0.3098	0.4510	12.6804	3.1574	5.6613	8.9300	11.5921	12.6466	16.0231	6.5468	7.4201	3.5654	11.0160
12-3	0.0924	0.4295	9.2963	1.2935	3.1231	5.7215	5.8988	10.9243	7.1872	11.5571	10.5098	8.5873	25.3789
3-6	0.4555	0.6010	19.4669	1.5524	4.2468	1.8125	9.6184	15.7606	14.4867	16.5502	4.7722	5.6703	5.0064
6-12	0	0	0	0	3.4047	8.8134	5.3621	16.2887	6.4205	7.0373	14.2218	5.0788	33.3728

The VMT and vehicle trip reductions were subtracted from the appropriate time periods of the 1999 and 2005 scenarios respectively. For each affected period, the VMT reductions were distributed among the 13 speed classes based on the current 1999 and 2005 speed class distributions. Hence, it was assumed that the speeds associated with the VMT reductions would mirror the original speed class distribution. The affected time period's VMT and trip reductions for each scenario are shown in [Table 5](#) below. The VMT and trip reductions were applied exclusively to the LDA and LDT vehicle classes.

Table 5. VMT and Vehicle Trip Reduction by Time Period

Time Period	1999 Forecast VMT	1999 Forecast Trips	2005 Forecast VMT	2005 Forecast Trips
12am-6am	0	0	0	0
6am-9am	16,400	1,100	19,456	1,300
9am-12	1,671	103	1, 678	97
12pm-3pm	1,671	102	1,678	97
3pm-6pm	16,400	1,100	19,456	1,300
6pm-12	0	0	0	0

The MVEI7G activity data summaries for the 1999 and 2005 with control forecasts are provided on the following page.

The direct ROG and NOx emission reduction estimates for the Old Vehicle Buy-Back Program and the clean fuel vehicle conversion projects are shown in [Table 6](#) below.

Table 6. Direct Emission Reduction Calculation

Program	1999 Forecast ROG Reduction (tons/day)	1999 Forecast NOx Reduction (tons/day)	2005 Forecast ROG Reduction (tons/day)	2005 Forecast NOx Reduction (tons/day)
Old Vehicle Buyback	0.06	0.02	N/A	N/A
Vehicle Conversion	0.0002	0.002	0.0002	0.002

MVEI7G1.0c ACTIVITY DATA INPUTS (1999 and 2005)
WITH CONTROLS

1999				Avg. Trip	Trip-Start	
	Vehicles	VMT	Trips	Length	Factor	Starts
LDA	197937	5822146	850794	6.84	1.668	1419124
LDT	87858	2559079	373983	6.84	1.766	660453
MDT	13496	336943	49139	6.86	1.63	80097
UBD	85	10405	0	0	1	0
HDGT	5141	243356	46012	5.29	1	46012
HDDT	7407	421764	0	0	1	0
MCY	9913	66155	7727	8.56	1	7727
TOTAL	321837	9459848	1327665			2213431

2005				Avg. Trip	Trip-Start	
	Vehicles	VMT	Trips	Length	Factor	Starts
LDA	207582	6241871	894316	6.98	1.668	1491719
LDT	96032	2743543	393111	6.98	1.766	694234
MDT	17397	361372	51663	6.99	1.63	84211
UBD	85	10405	0	0	1	0
HDGT	5622	250863	50317	4.99	1	50317
HDDT	8930	452343	0	0	1	0
MCY	9913	70951	8124	8.73	1	8124
TOTAL	345561	10131348	1397531			2328605

Time Period Distribution

Period	12-6am	6-9am	9-12noon	12-3pm	3-6pm	6-12mid		
1999 VMT	3.57	13.42	17.79	21.18	23.73	20.31	Starts	No Change
2005 VMT	3.57	13.4	17.8	21.19	23.72	20.31	Starts	No Change

VMT by Speed Class Distributions (1999/2005)

1999	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65
12-6	0.0000	0.0000	0.0000	0.0000	3.4482	9.1333	14.5909	19.2818	20.7724	3.8005	6.3279	10.6656	11.9793
6-9	0.6774	1.0030	27.1672	2.4313	3.5096	7.8138	6.1951	13.1682	7.5551	11.8149	6.1072	4.2279	8.3292
9-12	0.4760	0.4510	12.6804	3.1597	6.8238	8.4812	11.1490	13.8315	14.7529	7.9319	7.0663	3.8425	9.3538
12-3	0.0924	0.4993	9.2963	1.2936	3.8212	5.2794	5.6661	12.0554	6.6612	13.6514	9.8117	8.8200	23.0519
3-6	0.8683	0.6988	19.3233	1.6961	4.5771	1.8125	9.2325	16.5862	14.0317	16.9630	3.9465	5.6703	4.5936
6-12	0.0000	0.0000	0.0000	0.0000	3.6962	8.8134	5.1191	17.7463	6.3718	8.7865	12.8128	5.8076	30.8462
2005	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65
12-6	0.0000	0.0000	0.0000	0.0000	3.1722	9.1333	14.8671	17.1334	20.7724	3.7376	6.3278	7.2143	17.6420
6-9	0.4293	1.0030	27.4197	2.1789	3.1466	7.8138	6.5867	11.7163	8.8636	11.8149	6.4702	4.3428	8.2143
9-12	0.3098	0.4510	12.6804	3.1574	5.6613	8.9300	11.5921	12.6466	16.0231	6.5468	7.4201	3.5654	11.0160
12-3	0.0924	0.4295	9.2963	1.2935	3.1231	5.7215	5.8988	10.9243	7.1872	11.5571	10.5098	8.5873	25.3789
3-6	0.4555	0.6010	19.4669	1.5524	4.2468	1.8125	9.6184	15.7606	14.4867	16.5502	4.7722	5.6703	5.0064
6-12	0.0000	0.0000	0.0000	0.0000	3.4047	8.8134	5.3621	16.2887	6.4205	7.0373	14.2218	5.0788	33.3728

C.7.1 EMISSION RESULTS

In the calculation of emission reductions from the TCMs, all but two were analyzed, in aggregate, using the MVEI7G emissions model. The emissions reduction from measures T-13 (Old Vehicle Buyback) and T-18 (Alternative Fuels) were computed directly and subtracted from the MVEI7G results to yield the total 1999 and 2005 on-road mobile source emissions estimate.

The net ROG emission reduction from the 1996 base year is:

1996 ROG	20.38 tons/day
1999 ROG (with TCMs)	<u>17.42 tons/day</u>
Total On-Road Mobile Source	2.96 tons/day
ROG Emissions Reduction	

The total 1999 ROG emissions reduction resulting from TCMs is as follows:

1999 ROG (without TCMs)	17.52 tons/day
1999 ROG (with TCMs)	<u>17.42 tons/day</u>
Total ROG Reduction	0.10 tons/day
From CAP TCMs	

The net NOx emission reduction from the 1999 baseyear is:

1996 NOx	25.24 tons/day
1999 NOx (with TCMs)	<u>22.07 tons/day</u>
Total On-Road Mobile Source	3.17 tons/day
Nox Emissions Reduction	

The total 1999 NOx emissions reduction resulting from TCMs is as follows:

1999 NOx (without TCMs)	22.16 tons/day
1999 NOx (with TCMs)	<u>22.07 tons/day</u>
Total NOx Reduction	0.09 tons/day
From CAP TCMs	

The net ROG emission reduction in 2005 is:

1996 ROG	20.38 tons/day
2005 ROG (with TCMs)	<u>11.64 tons/day</u>
Total On-Road Mobile Source	8.74 tons/day
ROG Emissions Reduction	

The total 2005 ROG emissions reduction resulting from TCMs is as follows:

2005 ROG (without TCMs)	11.68 tons/day
2005 ROG (with TCMs)	<u>11.64 tons/day</u>
Total ROG Reduction	.04 tons/day
From CAP TCMs	

The net NOx emission reduction from the 2005 base year is:

1996 NOx	25.24 tons/day
2005 NOx (with TCMs)	<u>16.64 tons/day</u>
Total On-Road Mobile Source	8.60 tons/day
Nox Emissions Reduction	

The total 2005 NOx emissions reduction resulting from TCMs is as follows:

2005 NOx (without TCMs)	16.68 tons/day
2005 NOx (with TCMs)	<u>16.64 tons/day</u>
Total NOx Reduction	.04 tons/day
From CAP TCMs	

An implication of the cleaner fleet is that the relative emission reduction contribution from those TCMs designed to reduce VMT and trips will decrease with time. Conversely, if growth in vehicle trips and vehicle miles of travel occurs too quickly, the anticipated benefits from vehicle emission control technology improvements will be "outpaced" possibly offsetting progress towards attainment.

Creditable ROG Emission Reduction

Figure 1 illustrates the on-road mobile source emissions reduction resulting from the 1998 CAP Plan TCMs for ROG. A large percentage (76 percent) of the on-road mobile source ROG emission reduction is attributable to federal controls for which the county is not allowed to credit

towards the CAAA 15% ROG emission reduction requirement. The CAP was allowed to take credit for emissions reductions associated with "traditional" TCMs (e.g., transportation demand management strategies and transportation system management strategies), "non-traditional" TCMs such as Accelerated Retirement of Vehicles (T-13) and Alternative Fuels (T-18) (listed as Local Tailpipe), and emission reductions associated with the more stringent California motor vehicle controls (listed as State Tailpipe). The latter constitutes the greatest "creditable" ROG emission reduction with a contribution 85 percent (0.60 tons/day).

Emission Budgets

The ROG emission estimate of 17.41 tons/day and the NOx emission estimate of 22.07 tons/day establish the emissions budgets for these two ozone precursors. These budgets act as a "ceiling" for future on-road mobile source emissions. Exceeding either one of these emission budgets will jeopardize federal funding for transportation improvements and greatly restrict what transportation improvements may be pursued within the county. As required by the 1990 CAAA, a comparison of regional on-road mobile source emissions to these budgets will occur during updates of federal and state regional transportation plans and programs for Santa Barbara County.

Monitoring

To ensure that the emission reductions identified in the 1998 CAP Plan are realized, TCM effectiveness will be tracked by monitoring the implementation of projects and programs identified in the Federal Transportation Improvement Program (FTIP) and the Regional Transportation Improvement Program (RTIP) from which this TCM effectiveness analysis was based. Expeditionary implementation of all 1998 CAP TCMs (and TCM related projects) will be determined during updates of Santa Barbara County's Regional Transportation Plan, the RTIP, and the FTIP as required by the 1990 CAAA transportation conformity provisions.

To ensure that the on-road activity data used to generate the 1999 on-road mobile source emissions forecast remains accurate, "ground truth" VMT data from Caltrans' Office of Travel Forecasting (OTF) will be annually monitored/tracked. VMT tracking is necessary to protect the integrity of the 1998 CAP emission forecasts. Figure 2 illustrates the VMT growth ceiling

between actual VMT as measured by Caltrans and SBCAG's 1999 VMT forecast. If actual VMT exceeds this VMT ceiling, a revised 1999 forecast may be warranted (i.e., SIP revision).

Table 7 compares the 1998 CAP on-road mobile source emissions estimates and forecasts to emissions forecasts prepared in past air quality attainment plans for Santa Barbara County.

TABLE 7
AQAP TRACKING OF ON-ROAD MOBILE SOURCE EMISSIONS FORECASTS

Baseline Year	1979	1987	1987	1990	1990	1996
Emission Factor Model	EMFAC6C	EMFAC7D	EMFAC7D	EMFAC7F	EMFAC7F1.1	MVEI7G1.0c
Baseline VMT	5,372,000	7,437,000	7,437,000	8,464,000*	8,269,000	9,100,000
1990 VMT Forecast	7,237,000	8,019,000	8,019,000	8,464,000**	8,531,000**	9,085,500**
1996 VMT Forecast	8,150,000	8,899,000	8,899,000	8,915,000 8,586,000 TCM	8,345,000 8,208,000 TCM	9,100,000**
1999 VMT Forecast	N/A	N/A	N/A	N/A	N/A	9,460,000
1990 ROG Emissions Forecast	10.64 t/d	16.58 t/d 16.25 t/d TCM	16.58 t/d 16.25 t/d TCM	18.39 t/d	20.34 t/d	43.82 t/d
1996 ROG Emissions Forecast	10.67 t/d	9.36 t/d 9.09 t/d TCM	9.36 t/d 9.09 t/d TCM	10.30 t/d 9.81 t/d TCM	11.15 t/d 10.87 t/d TCM	20.38 t/d
1990 NOx Emission Forecast	19.38 t/d	21.48 t/d 21.41 t/d TCM	21.48 t/d 21.41 t/d TCM	22.90 t/d	24.53 t/d	38.64 t/d
1996 NOx Emission Forecast	20.04 t/d	15.75 t/d 15.21 t/d TCM	15.75 t/d 15.21 t/d TCM	15.44 t/d	16.14 t/d 15.95 t/d TCM	25.24 t/d
1999 ROG Emission Forecast	N/A	N/A	N/A	N/A	N/A	17.52 t/d 17.41 t/d TCM
1999 NOx Emission Forecast	N/A	N/A	N/A	N/A	N/A	22.16 t/d 22.07 t/d TCM

* 1990 Baseline VMT Estimate was a forecast based on the 1987 Baseline

** Baseline VMT Estimate (not a forecast).
TCM Analysis Results Provided if Documented

The disparate ROG and NOx on-road mobile source emission estimates between the 1998 CAP and prior air quality plans can be attributed to the following model enhancements²:

Model Enhancement	Effect of Emissions (tons/day)	
	ROG	NOx
1) New ARB Emissions Model (MVEI7G1.0c)	3.04	3.34

2 For a more detailed description of these modeling enhancements and their impact on the 1996 planning emission inventory see 1996 On-Road Emission Inventory Sensitivity Analysis, SBCAG, March 4th 1998.

In 1996/97, ARB updated its motor vehicle emission inventory model. MVEI7G1.0c included many state and federal control programs that were not accounted for in the previous model (e.g., reformulated gasoline, new heavy duty vehicle NOx standards, to name a few) as well as several model enhancements including: adjustments for high emitting vehicles; incorporation of real-world driving cycles; modified vehicle starts methodology for variable soak times (i.e., redefined cold and hot starts); and, incorporated an adjustment to convert vehicle trip ends to vehicle starts, to name just a few. EPA approved the use of MVEI7G1.0c for use in California in 1997.

<u>Model Enhancement</u>	<u>Effect of Emissions (tons per day)</u>	
	ROG	NOx
2) New SBCAG On-Road Activity Estimates (VMT & Trips)	0.78	1.36

SBCAG completed a full recalibration of its regional model in 1997. The recalibration effort involved a review of the entire model structure, network, socioeconomic inputs, an update of the 1990 base year model, and the development of a new 1996 base year model (the 1994 CAP was based on the previous 1990 base year travel model). Validation of the 1990 and 1996 base year models met all federal and state criteria for assessing an acceptable level of accuracy for the use of transportation model data as input to developing emission inventory estimates. Approval to use the recalibrated models for such purposes was received by Caltrans', Regional Travel Forecasting Branch in February 1998. Consequently, the revised 1996 base year model resulted in higher levels of vehicle activity (i.e., vehicle miles of travel) resulting in the above emission increases in ROG and NOx.

<u>Model Enhancement</u>	<u>Effect of Emissions (tons/day)</u>	
	ROG	NOx
3) Use of Model VMT by Speed Class Distribution vs. ARB Default	1.31	1.58

Prior to the 1998 Clean Air Plan, SBCAG had relied on ARB’s default VMT by speed class distribution for Santa Barbara County and made adjustments based on specific traffic flow improvement project analysis. This approach was limited given that ARB’s distribution was well over 15 years old, and more importantly, there was just one “static” distribution for all forecasts. This essentially precluded the effects of growth (i.e., vehicle growth due to increases in population and employment) from being reflected in future year speed class distributions. This was remedied by extracting data (vehicle trips, link speeds, link distances) from SBCAG’s travel model to generate a unique VMT by speed class distribution for each forecast.

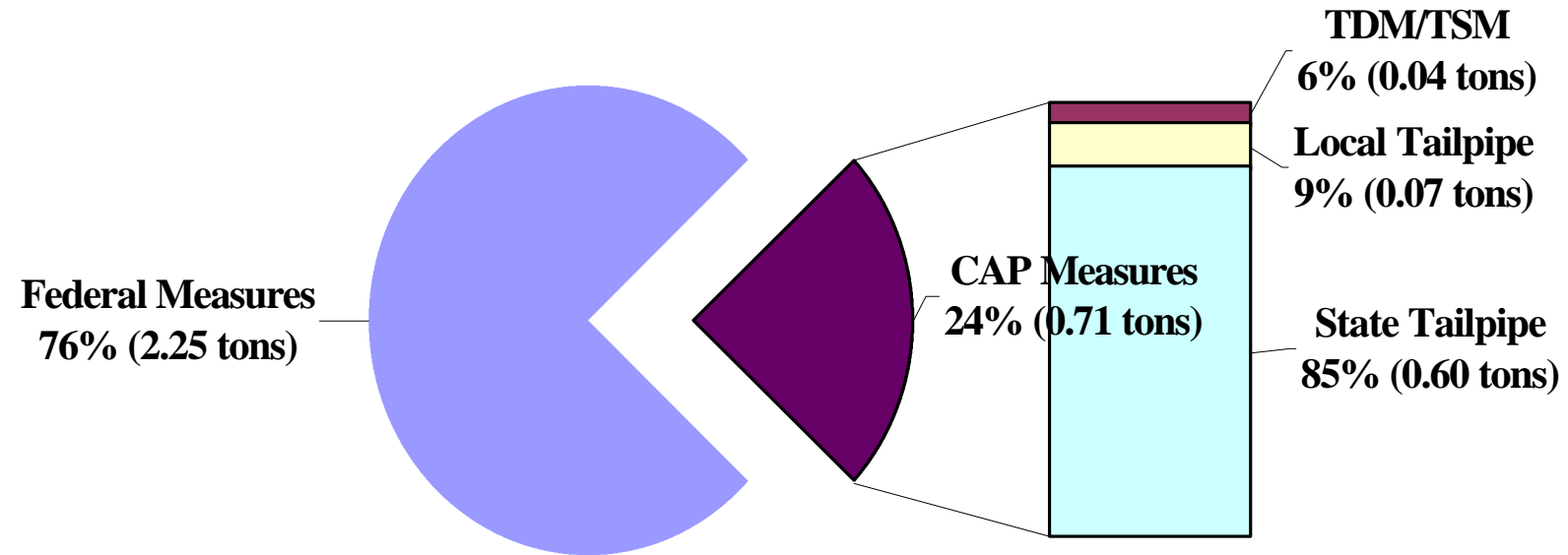
<u>Model Enhancement</u>	<u>Effect of Emissions (tons/day)</u>	
	ROG	NOx
4) Use of Santa Barbara County specific Vehicle Fleet Age Distribution	4.10	2.82

ARB last updated its demographic profiles for the state’s light-duty vehicles (autos and trucks) in 1992/93 using vehicle registration data acquired from the Department of Motor Vehicles (DMV). For each air district in California, ARB used one statewide average distribution. For future years, ARB uses data from past statewide vehicle sales and assumptions on the natural attrition of older vehicles to forecast how the base year distribution will change (i.e., fleet turn over). Hence, the 1996 demographic profile used in the 1994 Clean Air Plan was an estimated fleet-mix applied to a statewide average. In 1997, SBCAG acquired the county’s 1996 vehicle registration data from the DMV to gauge the accuracy of ARB’s light-duty vehicle distribution. Analysis of this data revealed that ARB had over-estimated the market penetration of new “cleaner” vehicles in the county’s vehicle fleet, and had underestimated the number of older more polluting vehicles still being registered within the county. Upon request from the APCD and SBCAG, ARB authorized the use of Santa Barbara County’s specific vehicle age distribution for light-duty autos and trucks as part of this SIP update. ARB will be providing county specific vehicle age distributions in each air district as part of the next update to MVEI7G1.0c scheduled for release in 1999.

Changes to the 1996 on-road mobile source emission inventory resulting from these model improvements are graphically shown in Figure C-3.

Figure C-1

**On-Road Mobile Source ROG Emission Reductions
Tons Per Day**

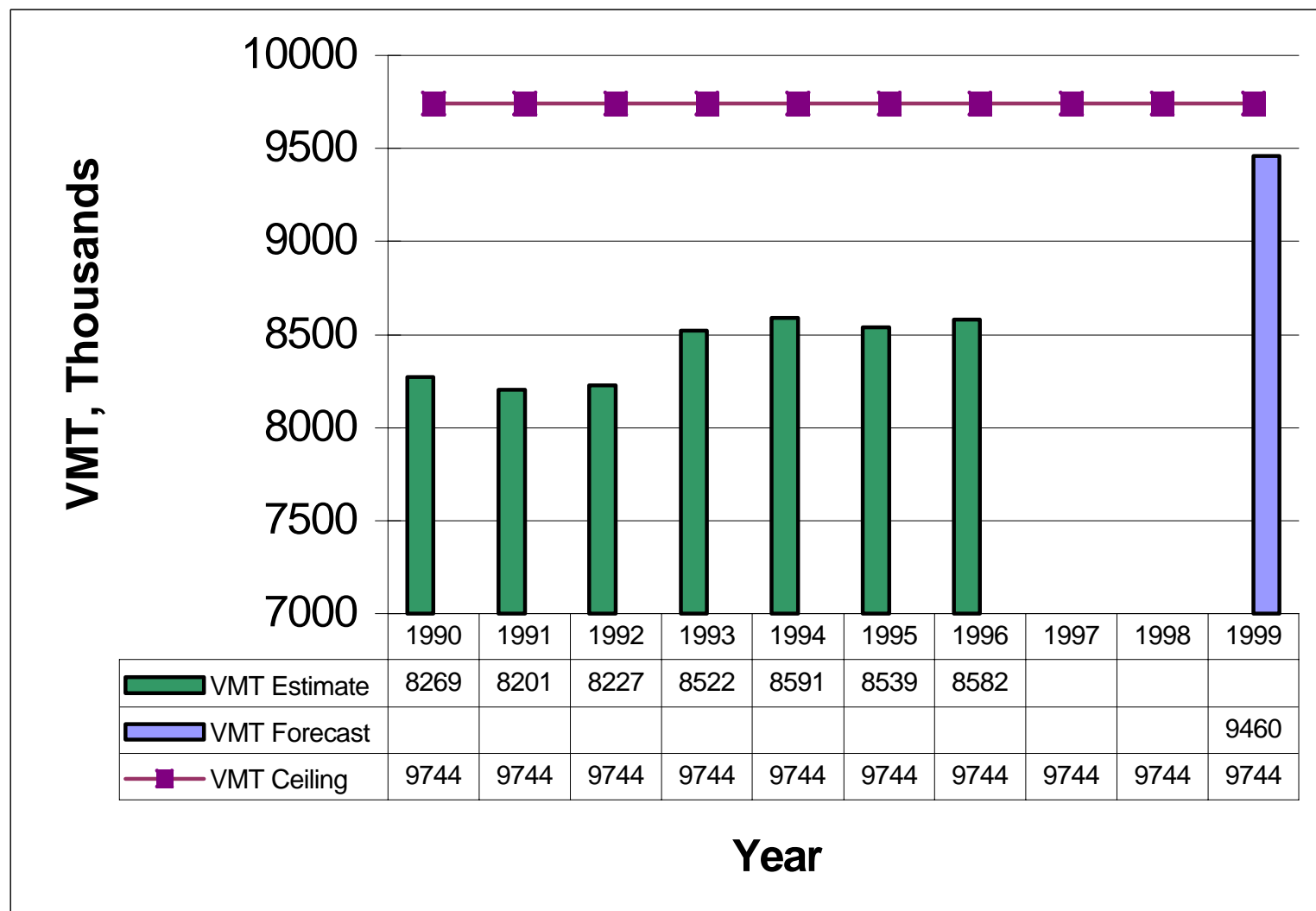


Total ROG Emission Reduction = 2.96 tons per day

1999 Emission Forecast

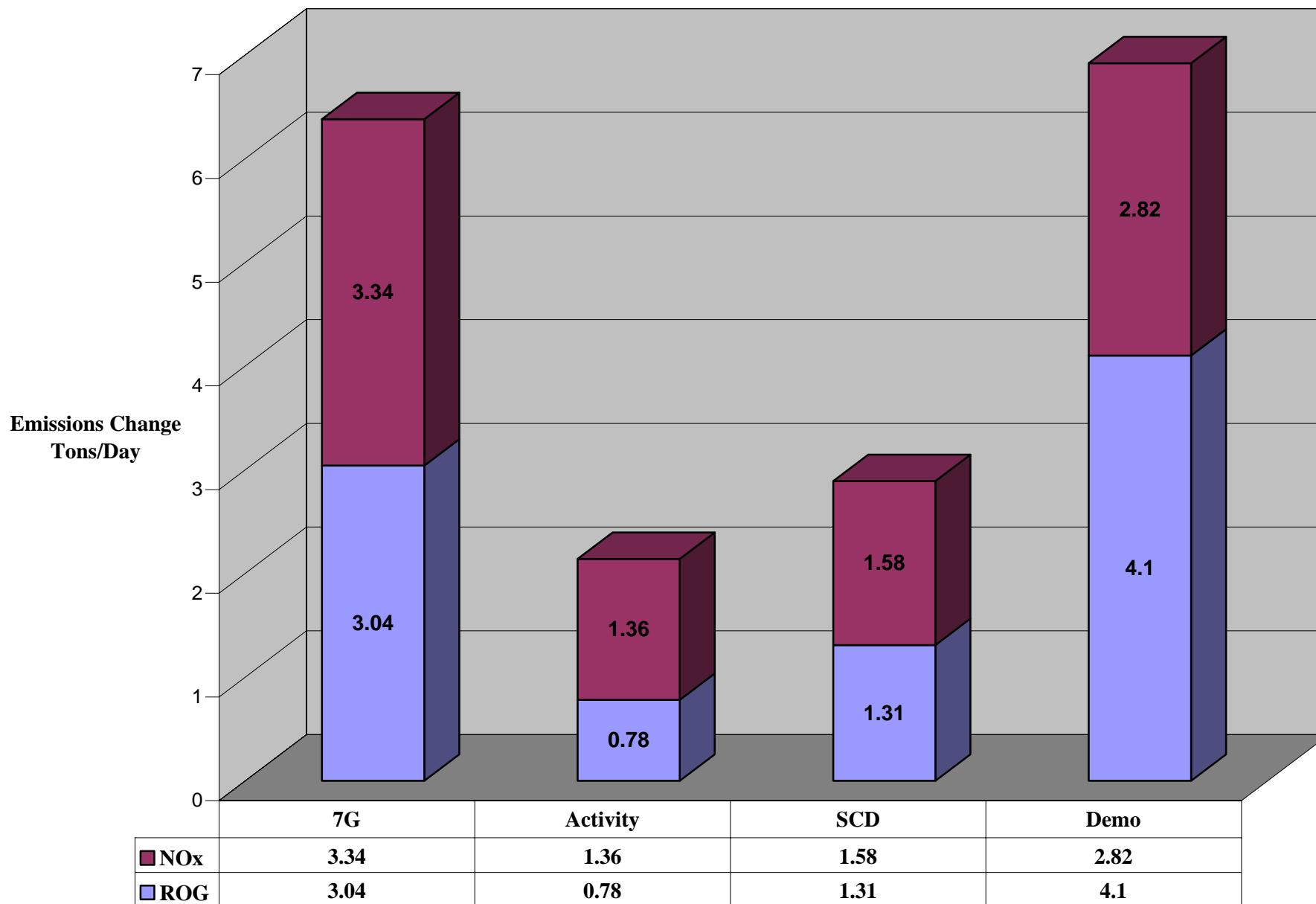
Figure C – 2

Tracking Daily Vehicle Miles of Travel
Santa Barbara County – Santa Barbara Travel Model



VMT Estimate: Office of Travel Forecasting (HPMS, Caltrans)
VMT Ceiling: Error Tolerance: 3%

Figure C-3.
Changes to the 1996 On-Road Mobile Source Emission Inventory



1998 CAP Enhancements