CHAPTER 6

EMISSION FORECASTING

6. EMISSION FORECASTING

6.1 INTRODUCTION

This chapter presents the four emission inventory forecasts used in the development of this 2004 Plan. These inventories are the 2005, 2010, 2015 and 2020 Planning Emission Inventory forecasts of reactive organic compounds (ROC) and oxides of nitrogen (NO_x) emissions in Santa Barbara County and the Outer Continental Shelf (OCS), offshore of Santa Barbara County.

The 2005, 2010, 2015 and 2020 Planning Emission Inventory forecasts are based on the 2000 Planning Emission Inventory, which is described in Chapter 3, Emission Inventory. This 2000 Planning Emission Inventory is the base year for emission forecasting and was developed by modifying the 2000 Annual Emission Inventory, (also described in Chapter 3). A Planning Emission Inventory is essentially a modified subset of an Annual Emission Inventory and differs from an Annual Emission Inventory in three ways. First, the creation of the Planning Emission Inventory involves adjusting the Annual Emission Inventory to account for seasonal variation because most exceedances of the state and federal 1-hour ozone standards occur during the April to October ozone season. This is commonly referred to as a summer seasonal inventory. Second, the emissions from natural sources such as biogenics, oil seeps and gas seeps, and wildfires are excluded from the Planning Emission Inventory since they are not regulated or controlled through implementation of emission control measures. Finally, the annual emissions in the Annual Emission Inventory are converted to daily emissions in the Planning Emission Inventory.

6.2 EMISSION FORECAST

The 2000 Planning Emission Inventory is used to forecast emissions in order to determine whether the emission control measures described in Chapters 4 and 5 of the 2004 Plan will reduce enough emissions in order to attain the State 1-hour ozone standard, while accounting for the growth that is

expected in the county. The inventory approach to assessing progress assumes that if forecasted inventories are below base level values, then the reductions will be sufficient enough to meet air quality goals, particularly if an area is close to meeting the standard. It should be noted, however, that there are uncertainties with regard to using the emission inventory approach since there is not always a direct correlation between ozone precursor emissions and monitored ozone values. Important factors such as weather conditions and the transport of pollution from other areas can significantly influence local air quality and ozone concentrations. Photochemical modeling is often used in lieu of the inventory approach; however, due to resource limitations the APCD is not able to provide modeling analyses for this 2004 Plan.

To forecast future year emissions, estimates of the changes in the level of pollution producing activities, known as "activity indicators", are used to grow the 2000 Planning Emission Inventory. In addition, emission reductions resulting from local control rules adopted by the APCD Board of Directors and from statewide regulations adopted by the California Air Resources Board (ARB) are estimated and accounted for in the future year forecasts.

Since we are using a 2000 emission inventory base year, future year forecasted emission inventories must be adjusted to account for the most recent emission reduction credits (ERCs) that were in the APCD Source Register during the 2nd quarter of 2004. ERC's are previous reductions in emissions that can be credited to allow increased emissions from a new or modified stationary source. USEPA policy mandates that ERC's must be treated as potential growth in forecast years. Total available ERC's in the Source Register for Santa Barbara County as of the 2nd quarter of 2004, were 0.2504 tons per day of ROC and 0.4191 tons per day of NO_x. These total ERC values are included in the emission forecast tables presented at the end of this chapter. A detailed list of each source that owns these ERC's are listed in Table 6-1.

TABLE 6 - 1

SANTA BARBARA COUNTY SOURCE REGISTER ERC's (As of 2nd Quarter 2004) (Tons per day)		
	ROC	**NOx**
Arguello, Inc.	0.1039	0.0011
Chevron-Texaco	0.0194	0.0000
Nuevo Energy Company	0.0525	0.0140
POPCO	0.0004	0.0005
Southern California Gas Company	0.0301	0.0003
US Air Force – VAFB*	0.0441	0.4031
TOTAL SOURCE REGISTER ERC's	**0.2504**	**0.4191**

6.2.1 ACTIVITY INDICATORS

Forecasting quantities of pollution in future years is accomplished by assuming that the amount of pollution is related to activity levels of selected ***activity indicators***. Examples of activity indicators include population, housing, employment, oil production, number of producing oil wells, daily vehicle miles traveled, and daily vehicle starts. The Santa Barbara County Association of Governments (SBCAG) is the source for several of the activity indicator estimates. The ARB and other state and local agencies also contributed activity data. These data represent the best available estimates of future activity levels for the county. The ***activity factor*** is the ratio of the 2005, 2010, 2015 and 2020 forecast levels of activity to the 2000 level of activity. An activity factor of greater than one indicates an increase in growth, while an activity factor of less than one indicates a decline in activity relative to the 2000 value. Table 6-7 provides the 2000 level of activity, the predicted 2005, 2010, 2015 and 2020 levels of activity, the activity factors, and the source of the forecast for each of the activity indicators.

* ERC's for the US Air Force – VAFB are only allowed to be used for projects at Vandenberg Air Force Base.

Note that the activity indicator for OCS Oil and Gas Production has been set to 1.0 or "no-growth." The recommendation to use a no-growth activity factor came from the Santa Barbara County Air Pollution Control District Community Advisory Council after deliberation of what the future projection of the OCS Production should be. The Community Advisory Council considered potential OCS growth scenarios identified in the federal Minerals Management Service's California Offshore Oil and Gas Energy Resources (COOGER) study. The COOGER study presents several scenarios of future growth for the OCS, including a "future baseline" scenario that projects existing OCS platforms to decline steeply in production over the next fifteen years. The COOGER study also presents scenarios that project substantial growth and development of future platforms from existing undeveloped leases. The Council noted that, since any future oil and gas production on the OCS will be required to be permitted under New Source Review/Prevention of Significant Deterioration process, any potential increase in emissions must be offset to provide a net emission benefit from the new OCS production activity. This would also ensure consistency of these future projects with this Plan. Therefore, the Council recommended that the activity indicator for OCS Production should be set to no-growth as a reasonable assumption of future oil and gas production emissions on the OCS.

An activity indicator was assigned to each Stationary Source and Area-Wide Source category described in Chapter 3, with the exception of categories of On-Road Motor Vehicles and Other Mobile Sources, Consumer Products and Architectural Coatings, which are derived from ARB's EMFAC2000 and OFFROAD Models, respectively. The ARB has provided the APCD with emission forecasts for all of these source categories.

6.2.2 CONTROL MEASURES

The next step in forecasting future year emissions is to account for regulations and control measures that have been previously implemented or that are scheduled for implementation. Emission reductions are achieved through implementation of federal, state and local controls on a variety of pollution sources, including Stationary Sources, Area-Wide Sources, and Mobile Sources.

The emissions from each source were reduced according to the expected efficiency of any control measures that apply to that source, taking into account any existing level of control. Estimated efficiencies take into account equipment (design) efficiencies, exemptions, phased implementations, and expected rates of compliance (assumed to be a default 80%, as recommended in USEPA guidelines). The resulting emissions after the application of control measures represent a seasonally adjusted emission inventory forecast.

6.2.3 VANDENBERG AFB AIRBORNE LASER MISSION GROWTH ALLOWANCE

During the preparation of the 2001 Plan, Vandenberg Air Force Base (VAFB) requested that the APCD include a General Conformity growth allowance into the 2001 Plan to account for an Airborne Laser (ABL) Mission that may potentially come to VAFB. On November 15, 2001, the APCD Board of Directors approved this request, with the condition that a portion of the emissions from the ABL Mission be offset by withdrawing Emission Reduction Credits (ERC's) from the VAFB Source Register. Although General Conformity is not directly applicable to this 2004 Plan as this Plan addresses only State planning requirements, projected ABL emissions are presented in this Plan so that the inventory for VAFB is consistent with the 2001 Plan. Table 6-2 shows the emissions from the ABL Mission estimated by VAFB, and the ERC's required from VAFB required to offset the ABL Mission. The remaining emissions from the ABL Mission are included as line items in Tables 6-3 and 6-5.

TABLE 6 - 2

VANDENBERG AIR FORCE BASE (VAFB) AIRBORNE LASER (ABL) MISSION*		
	ROC	**NOx**
	(Tons per day)	***(Tons per day)***
Projected 2005 Emissions for the ABL Mission by VAFB	0.0552	0.0634
Projected 2010 Emissions for the ABL Mission by VAFB	0.0656	0.4867
Projected 2015 Emissions for the ABL Mission by VAFB	0.0656	0.4867
Projected 2020 Emissions for the ABL Mission by VAFB	0.0656	0.4867
Source Register ERC's required to offset the ABL Mission	0.0000	0.1265
2005 Emissions added to the 2004 Plan for the ABL	0.0552	0.0000
2010 Emissions added to the 2004 Plan for the ABL	0.0656	0.3602
2015 Emissions added to the 2004 Plan for the ABL	0.0656	0.3602
2020 Emissions added to the 2004 Plan for the ABL	0.0656	0.3602

*According to EPA's April 30, 2004 Phase 1 Implementation Rule, general conformity requirements would not apply to Santa Barbara County once the federal 1-hour ozone standard is revoked.

6.3 FORECASTED EMISSION INVENTORIES

Planning emission inventory forecasts for 2005, 2010, 2015 and 2020 for both Santa Barbara County and the OCS are presented in Tables 6-3 through 6-6 and Figures 6-1 through 6-12, located at the end of the chapter. Tables 6-3 through 6-6 provide a detailed summary of both ROC and NOx emissions for each emission source category and for each forecast year. These tables also include base year (2000) estimates for each source category for ease of comparison with forecasted emissions. Table 6-7 presents activity data that were utilized to grow base year emissions data. Figures 6-1 and 6-2 present a graphical time series representation of ROC and NOx emissions for both Santa Barbara County and the OCS. Figures 6-3 through 6-10 categorize Santa Barbara County and OCS emissions for both ROC and NOx by major emission category (stationary, area and mobile sources). Figure 6-11 shows total NOx emissions from both Santa Barbara County and the OCS, while Figure 6-12 shows combined Santa Barbara County and OCS NOx emissions, but does not include emissions from marine shipping.

The bar graph presented in Figure 6-1 shows that Santa Barbara County onshore NOx and ROC emissions are expected to decrease continually through 2020. Total onshore ROC emissions are forecasted to decrease from 41.84 tons per day in 2000 to 29.69 tons per day in 2020 representing a 29 percent decrease in emissions. Total onshore NOx emissions are projected to decrease from 43.89 tons per day in 2000 to 21.66 tons per day by 2020, about a 51 percent decrease in emissions.

On a source category basis, ROC emissions from onshore stationary sources are forecasted to increase from 10.06 tons per day in 2000 to 11.49 tons per day in 2020 while NOx emissions from onshore stationary sources are expected to increase from 5.57 tons per day in 2000 to 6.74 tons per day in 2020. ROC emissions from area-wide sources are forecasted to increase from 7.94 tons per day in 2000 to 10.16 tons per day in 2020. Area-wide NOx emissions are predicted to increase from 0.48 tons per day in 2000 to 1.23 tons per day by 2020.

The largest decreases in both onshore NOx and ROC emissions are attributable to decreased emissions from on-road mobile sources. ROC emissions from onshore mobile sources are projected to decrease from 23.85 tons per day in 2000 to 8.03 tons per day in 2020 (66 percent decrease), while NOx emissions from on-road mobile sources are expected to decrease to13.69 tons per day by 2020 from 37.83 tons per day in 2000 (64 percent decrease).

Figure 6-2 presents forecasts for OCS ROC and NOx emissions. The figure shows that total offshore ROC emissions are predicted to increase from 2.92 tons per day in 2000 to 3.36 tons per day in 2020. Total offshore NOx emissions are anticipated to increase from 33.37 tons per day in 2000 to 65.59 tons per day in 2020. Mobile sources on the OCS, predominately marine shipping, account for all of the anticipated growth in OCS ROC and NOx emissions. ROC emissions from OCS mobile sources are expected to increase from 1.77 tons per day in 2000 to 2.22 tons per day in 2020, while OCS mobile source NOx emissions are forecasted to increase from 32.55 tons per day in 2000 to 64.77 tons per day in 2020.

As shown in Figure 6-3, mobile sources (on-road and other mobile sources) are forecasted to account for 50 percent of total onshore ROC emissions and 81 percent of the onshore NOx emissions in 2005. By 2020, mobile sources are predicted to account for 30 percent of the onshore ROC emissions and 63 percent of the onshore NOx emissions as presented in Figure 6-9.

Although total onshore emissions of ROC and NOx from stationary and area sources increase only slightly from 2005 to 2020, their relative contributions to overall onshore emissions increase considerably due to significant reductions of both ROG and NOx emissions from on-road mobile sources through the planning horizon. As displayed in figures 6-3 and 6-9, the relative percentage of total ROC emissions from onshore stationary sources increases from 23 percent in 2005 to 31 percent in 2020, while NOx emissions from onshore stationary sources increases from 16 percent in 2005 to 31 percent of overall onshore inventory in 2020. Area wide ROC emissions are forecasted to increase from 27 percent of total onshore emissions in 2005 to 39 percent of the total onshore inventory by 2020. The projected contribution from area-wide NOx emissions increases from 3 percent in 2005 to 6 percent of the NOx inventory by 2020.

6.4 IMPACTS OF MARINE SHIPPING EMISSIONS

As discussed in the previous section, onshore Santa Barbara County emissions of ROC and NOx are expected to decrease significantly by 2020, primarily from reductions in on-road mobile emissions and through the implementation of the State Act's every feasible measure requirements. While Santa Barbara County onshore emissions are forecasted to substantially decrease during the planning horizon, OCS NOx emissions are expected to dramatically increase from base year levels. These increases in NOx emissions are the result of projected growth in marine shipping activities, which are estimated to double from 2000 levels by 2020.

Figure 6-11 presents combined OCS and onshore NOx forecasts out to 2020. This figure clearly illustrates that increases in NOx emissions from marine vessels will overwhelm stationary source NOx reductions that will be achieved by implementing every feasible measure strategies and by significant decreases in NOx from on-road mobile sources. Combined NOx emissions from onshore

and OCS sources are anticipated to grow from 77.25 tons per day in 2000 to 78.49 tons per day by 2005. By 2020, combined NOx emissions are anticipated to increase to 87.14 tons per day, about 13 percent higher than base year estimates.

NOx emissions from marine shipping alone (excluding commercial and recreational boats) are expected to grow to 38.1 tons per day by 2005 from base year estimates of 32.1 tons per day, about a 19 percent increase. By 2020, marine vessel NOx emissions are forecasted to reach 64.2 tons per day, representing a two-fold increase from base year levels. At these growth rates, marine vessel NOx emissions will account for about 48 percent of the overall (onshore and OCS) NOx inventory by 2005, increasing to approximately 74 percent of the total NOx inventory by 2020.

Figure 6-12 presents total onshore and OCS NOx emissions but excludes the marine shipping contribution. This figure shows that existing and proposed emission reduction strategies on all sources other than marine shipping are anticipated to be successful at reducing future NOx emissions below baseline levels. Excluding marine shipping emissions, total onshore and OCS NOx emissions are predicted to be reduced from 44.4 tons per day in 2000 to 22.2 tons per day by 2020, which represents a 50 percent decrease in NOx emissions over the planning horizon. These data are presented because while onshore control strategies provide significant reductions in NOx emissions through the planning period, marine shipping emissions will negate any gains realized through these strategies. With increased difficulty in obtaining added reductions from onshore sources, further reductions will need to come from controlling marine shipping activities in order to meet air quality goals. This clearly indicates that additional action from the federal government, USEPA and ARB is required to reduce emissions from both American and foreign-flagged marine vessels traversing our coastline. Otherwise, the burden of attaining or maintaining air quality improvement goals may fall disproportionately on onshore sources.

It is important to note that increases in NOx emissions from marine shipping activities may not directly correlate to increases in ozone levels in Santa Barbara County since potential impacts are highly dependent on meteorological conditions. In fact, air quality has been improving in Santa Barbara County while marine vessel transits and emissions have been increasing over the last several

years. To fully understand the impacts of marine vessel emissions on county-wide ozone levels, however, would require the use of photochemical modeling techniques. This would allow for an evaluation of potential impacts from all sources of ozone precursors (ROC and NOx), both onshore and offshore, and would also provide an assessment of the relative contribution of impacts from marine vessel emissions on ozone concentrations. Since the resources and expertise required to perform photochemical modeling are beyond our capabilities, we must defer the need for such an exercise to the discretion of the ARB.

6.5 CONCLUSIONS

This chapter presents the 2005, 2010, 2015 and 2020 Planning Emission Inventory Forecasts. The 2000 Planning Emission Inventory is used as the basis to calculate the 2005, 2010, 2015 and 2020 forecasts.

ROC emissions from onshore stationary and area-wide sources are forecasted to increase over base year levels by about 1.43 and 2.22 tons per day, respectively, by 2020. NOx emissions from onshore stationary sources are anticipated to increase from base year levels by 1.17 tons per day by 2020, while NOx increases over base year estimates are expected to be about 0.75 tons per day by 2020 for onshore area-wide sources.

These small increases in ROC and NOx emissions from onshore stationary and area-wide sources are significantly offset by emission reductions from onshore mobile sources. Baseline ROC emissions from onshore mobile sources are predicted to decrease by nearly 16 tons per day by 2020, while baseline NOx emissions are anticipated to decrease by about 24 tons per day by 2020. Mobile sources account for the highest percentage of overall onshore ROC emissions until 2015, when area-wide sources comprise the largest percentage contribution to the overall ROC onshore inventory. Although there are substantial reductions of NOx emissions from mobile sources through 2020, mobile sources are anticipated to comprise the largest portion of the total onshore NOx inventory for each of the planning years.

While reductions of onshore ROC and NOx emissions are forecasted to occur through the planning period due to existing and proposed emission reduction strategies, emissions from OCS sources are predicted to increase dramatically over the same time horizon. These increases in NOx and ROC emissions in the OCS are exclusively from significant growth that is forecasted for marine shipping. Marine shipping NOx emissions are expected to double between 2000 and 2020. The increases in marine vessel NOx emissions that are expected to occur will eliminate anticipated NOx emission reductions from onshore sources. Without the contributions from this large uncontrolled source of emissions, air quality in Santa Barbara County would clearly be improving. Further action from the federal government, USEPA and the ARB will be required to reduce emissions from marine shipping.

TABLE 6 – 3

ROC Emission Inventory - Santa Barbara County

	(Tons per day)	2000	2005	2010	2015	2020
STATIONARY SOURCES						
010	Electric Utilities	0.0109	0.0109	0.0109	0.0109	0.0109
020	Cogeneration	0.0349	0.0312	0.0290	0.0267	0.0246
030	Oil and Gas Production (Combustion)	0.5085	0.6348	0.5878	0.5402	0.4973
040	Petroleum Refining (Combustion)	0.0024	0.0034	0.0032	0.0029	0.0027
050	Manufacturing and Industrial	0.0999	0.1196	0.1348	0.1499	0.1650
052	Food and Agricultural Processing	0.1113	0.1063	0.1042	0.1020	0.0999
060	Service and Commercial	0.0427	0.1108	0.1143	0.1179	0.1211
099	Other (Fuel Combustion)	0.0000	0.0000	0.0000	0.0000	0.0000
	FUEL COMBUSTION TOTAL	**0.8106**	**1.0171**	**0.9841**	**0.9505**	**0.9216**
WASTE DISPOSAL						
110	Sewage Treatment	0.0003	0.0003	0.0003	0.0003	0.0003
120	Landfills	0.8450	0.5532	0.6219	0.6970	0.7527
130	Incinerators	0.0013	0.0014	0.0015	0.0015	0.0015
140	Soil Remediation	0.0000	0.0000	0.0000	0.0000	0.0000
199	Other (Waste Disposal)	0.0000	0.0000	0.0000	0.0000	0.0000
	WASTE DISPOSAL TOTAL	**0.8466**	**0.5549**	**0.6237**	**0.6988**	**0.7545**
CLEANING AND SURFACE COATINGS						
210	Laundering	0.0015	0.0442	0.0468	0.0495	0.0512
220	Degreasing	2.4343	2.5071	2.7814	3.0474	3.3134
230	Coatings and Related Process Solvents	1.5949	1.8494	2.0272	2.2422	2.4574
240	Printing	0.4376	0.4778	0.4680	0.4943	0.5116
250	Adhesives and Sealants	0.8042	0.9436	1.0630	1.1822	1.3016
299	Other (Cleaning and Surface Coatings)	0.0901	0.1057	0.1103	0.1266	0.1350
	CLEANING AND SURFACE COATINGS TOTAL	**5.3626**	**5.9278**	**6.4967**	**7.1383**	**7.7702**
PETROLEUM PRODUCTION AND MARKETING						
310	Oil and Gas Production	2.2796	1.8964	1.5766	1.2270	0.8854
320	Petroleum Refining	0.0451	0.0403	0.0374	0.0344	0.0317
330	Petroleum Marketing	0.5202	0.5419	0.5680	0.5941	0.6117
	PETROLEUM PRODUCTION AND MARKETING TOTAL	**2.8449**	**2.4786**	**2.1821**	**1.8555**	**1.5289**

TABLE 6 – 3

ROC Emission Inventory - Santa Barbara County

	(Tons per day)	2000	2005	2010	2015	2020
INDUSTRIAL PROCESSES						
410	Chemical	0.0183	0.0205	0.0231	0.0257	0.0283
420	Food and Agriculture	0.1210	0.1298	0.1385	0.1473	0.1561
430	Mineral Processes	0.0087	0.0102	0.0115	0.0128	0.0141
440	Metal Processes	NA	NA	NA	NA	NA
450	Wood and Paper	NA	NA	NA	NA	NA
470	Electronics	0.0001	0.0002	0.0003	0.0002	0.0002
499	Other (Industrial Processes)	0.0423	0.0489	0.1147	0.0681	0.0681
	INDUSTRIAL PROCESSES TOTAL	**0.1904**	**0.2096**	**0.2881**	**0.2540**	**0.2667**
	STATIONARY SOURCES TOTAL	**10.0551**	**10.1880**	**10.6884**	**10.8972**	**11.2418**
AREA-WIDE SOURCES						
SOLVENT EVAPORATION						
510	Consumer Products	3.7150	3.4570	3.6970	3.9630	4.3060
520	Architectural Coatings and Related Process Solvents	1.8100	1.6530	1.7030	1.7570	1.8100
530	Pesticides/Fertilizers	1.9710	1.8839	1.8479	1.8113	1.7756
540	Asphalt Paving/Roofing	0.2337	0.2742	0.3089	0.3436	0.3783
	SOLVENT EVAPORATION TOTAL	**7.7297**	**7.2682**	**7.5568**	**7.8749**	**8.2698**
MISCELLANEOUS						
610	Residential Fuel Combustion	0.1242	0.1334	0.1401	0.1462	0.1497
620	Farming Operations	0.0000	0.0000	0.0000	0.0000	0.0000
630	Construction and Demolition	0.0000	0.0000	0.0000	0.0000	0.0000
640	Paved Road Dust	0.0000	0.0000	0.0000	0.0000	0.0000
645	Unpaved Road Dust	0.0000	0.0000	0.0000	0.0000	0.0000
650	Fugitive Windblown Dust	0.0000	0.0000	0.0000	0.0000	0.0000
660	Fires	0.0034	0.0036	0.0038	0.0040	0.0041
670	Waste Burning and Disposal	0.0478	1.7000	1.6996	1.6992	1.6988
690	Cooking	0.0317	0.0340	0.0363	0.0386	0.0409
699	Other (Miscellaneous Processes)	0.0000	0.0000	0.0000	0.0000	0.0000
	MISCELLANEOUS TOTAL	**0.2071**	**1.8710**	**1.8799**	**1.8880**	**1.8936**
	AREA-WIDE SOURCES TOTAL	**7.9368**	**9.1392**	**9.4367**	**9.7629**	**10.1634**

TABLE 6 – 3

ROC Emission Inventory - Santa Barbara County

	(Tons per day)	2000	2005	2010	2015	2020
MOBILE SOURCES						
ON-ROAD MOTOR VEHICLES						
710	Light Duty Passenger (LDA)	7.8343	4.9529	2.9669	1.8468	1.2223
722	Light Duty Trucks - 1 (LDT1)	2.9786	2.2504	1.6098	1.1755	0.8422
723	Light Duty Trucks - 2 (LDT2)	2.1553	1.7817	1.4321	1.0777	0.8063
724	Medium Duty Trucks (MDV)	1.1997	0.9784	0.7882	0.6171	0.4632
732	Light Heavy Duty Gas Trucks - 1 (LHDV1)	0.6420	0.2449	0.1589	0.1499	0.1654
733	Light Heavy Duty Gas Trucks - 2 (LHDV2)	0.1179	0.1035	0.0903	0.0278	0.0571
734	Medium Heavy Duty Gas Trucks (MHDV)	0.5031	0.3591	0.2516	0.1723	0.1173
736	Heavy Heavy Duty Gas Trucks (HHDV)	0.4154	0.3698	0.2694	0.1795	0.1282
742	Light Heavy Duty Diesel Trucks - 1 (LHDV1)	0.0090	0.0200	0.0190	0.0150	0.0120
743	Light Heavy Duty Diesel Trucks- 2 (LHDV1)	0.0160	0.0190	0.0170	0.0130	0.0100
744	Medium Heavy Duty Diesel Trucks (MHDV)	0.0500	0.0530	0.0480	0.0410	0.0350
746	Heavy Heavy Duty Diesel Trucks (HHDV)	0.2520	0.2310	0.1910	0.1470	0.1250
750	Motorcycles (MCY)	0.3197	0.2990	0.2593	0.2366	0.2272
760	Heavy Duty Diesel Urban Buses (UB)	0.0240	0.0250	0.0250	0.0230	0.0210
762	Heavy Duty Gas Urban Buses (UB)	0.1006	0.0973	0.0896	0.8097	0.0897
770	School Buses (SB)	0.0279	0.0240	0.0210	0.0204	0.0205
780	Motor Homes (MH)	0.1265	0.1011	0.0561	0.0283	0.0120
	ON-ROAD MOTOR VEHICLES TOTAL	**16.7720**	**11.9101**	**8.2933**	**5.9057**	**4.3545**
OTHER MOBILE SOURCES						
810	Aircraft	0.6996	0.7603	0.8208	0.8805	0.9400
820	Trains	0.0738	0.0984	0.1230	0.1275	0.1320
830	Ships and Commercial Boats	0.1122	0.1195	0.1267	0.1339	0.1411
840	Recreational Boats	0.6845	0.5065	0.3300	0.2115	0.1635
850	Off-Road Recreational Vehicles	0.4734	0.3967	0.4037	0.4117	0.4187
860	Off-Road Equipment	3.3080	2.3430	1.7410	1.4840	1.2860
870	Farm Equipment	0.6290	0.5410	0.4210	0.2960	0.2150
890	Fuel Storage and Handling	1.0940	0.3600	0.3010	0.3090	0.3170
	OTHER MOBILE SOURCES TOTAL	**7.0745**	**5.1254**	**4.2672**	**3.8540**	**3.6132**
	MOBILE SOURCES TOTAL	**23.8465**	**17.0355**	**12.5605**	**9.7597**	**7.9677**
	Vandenberg Air Force Airborne Laser (ABL) Mission	**NA**	**0.0552**	**0.0656**	**0.0656**	**0.0656**
	Source Register Emission Reduction Credits	**NA**	**0.2504**	**0.2504**	**0.2504**	**0.2504**
SANTA BARBARA COUNTY ROC EMISSION INVENTORY TOTAL		**41.8384**	**36.6653**	**33.0016**	**30.7358**	**29.6890**

TABLE 6 – 4

ROC Emission Inventory
Outer Continental Shelf
(Tons per day)

	2000	2005	2010	2015	2020
STATIONARY SOURCES					
FUEL COMBUSTION					
030 Oil and Gas Production (Combustion)	0.0898	0.0907	0.0908	0.0908	0.0908
FUEL COMBUSTION TOTAL	**0.0898**	**0.0907**	**0.0908**	**0.0908**	**0.0908**
CLEANING AND SURFACE COATINGS					
230 Coatings and Related Process Solvents	0.1004	0.1004	0.0990	0.0990	0.0990
CLEANING AND SURFACE COATINGS TOTAL	**0.1004**	**0.1004**	**0.0990**	**0.0990**	**0.0990**
PETROLEUM PRODUCTION AND MARKETING					
310 Oil and Gas Production	0.9511	0.9511	0.9511	0.9511	0.9511
PETROLEUM PRODUCTION AND MARKETING TOTAL	**0.9511**	**0.9511**	**0.9511**	**0.9511**	**0.9511**
INDUSTRIAL PROCESSES					
430 Mineral Processes	0.0000	0.0000	0.0000	0.0000	0.0000
INDUSTRIAL PROCESSES TOTAL	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**
STATIONARY SOURCES TOTAL	**1.1413**	**1.1422**	**1.1409**	**1.1409**	**1.1409**
MOBILE SOURCES					
OTHER MOBILE SOURCES					
810 Aircraft	0.0203	0.0203	0.0203	0.0203	0.0203
830 Ships and Commercial Boats	1.0678	1.2493	1.4227	1.7208	2.0319
840 Recreational Boats	0.6845	0.5065	0.3300	0.2115	0.1635
OTHER MOBILE SOURCES TOTAL	**1.7726**	**1.7761**	**1.7730**	**1.9526**	**2.2157**
MOBILE SOURCES TOTAL	**1.7726**	**1.7761**	**1.7730**	**1.9526**	**2.2157**
OUTER CONTINENTAL SHELF ROC EMISSION INVENTORY TOTAL	**2.9139**	**2.9183**	**2.9139**	**3.0935**	**3.3565**

TABLE 6 – 5

NOx Emission Inventory – Santa Barbara County

(Tons per day)

		2000	2005	2010	2015	2020
STATIONARY SOURCES						
010	Electric Utilities	0.0269	0.0269	0.0269	0.0269	0.0269
020	Cogeneration	0.1113	0.1000	0.0932	0.0862	0.0799
030	Oil and Gas Production (Combustion)	2.0129	1.4679	1.3335	1.2202	1.1179
040	Petroleum Refining (Combustion)	0.0498	0.0455	0.0422	0.0380	0.0343
050	Manufacturing and Industrial	1.3889	2.0356	2.2900	2.5464	2.8025
052	Food and Agricultural Processing	1.2516	1.1953	1.1715	1.1476	1.1238
060	Service and Commercial	0.4918	0.7124	0.7390	0.7655	0.7880
099	Other (Fuel Combustion)	0.0000	0.0000	0.0000	0.0000	0.0000
	FUEL COMBUSTION TOTAL	**5.3332**	**5.5835**	**5.6963**	**5.8307**	**5.9732**
WASTE DISPOSAL						
110	Sewage Treatment	0.0093	0.0098	0.0101	0.0104	0.0107
120	Landfills	0.0152	0.0177	0.0199	0.0223	0.0241
130	Incinerators	0.0126	0.0132	0.0135	0.0138	0.0141
140	Soil Remediation	0.0000	0.0000	0.0000	0.0000	0.0000
199	Other (Waste Disposal)	0.0000	0.0000	0.0000	0.0000	0.0000
	WASTE DISPOSAL TOTAL	**0.0371**	**0.0407**	**0.0435**	**0.0465**	**0.0489**
CLEANING AND SURFACE COATINGS						
210	Laundering	0.0000	0.0000	0.0000	0.0000	0.0000
220	Degreasing	0.0000	0.0000	0.0000	0.0000	0.0000
230	Coatings and Related Process Solvents	0.0000	0.0000	0.0000	0.0000	0.0000
240	Printing	0.0000	0.0000	0.0000	0.0000	0.0000
250	Adhesives and Sealants	0.0000	0.0000	0.0000	0.0000	0.0000
299	Other (Cleaning and Surface Coatings)	0.0000	0.0000	0.0000	0.0000	0.0000
	CLEANING AND SURFACE COATINGS TOTAL	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**
PETROLEUM PRODUCTION AND MARKETING						
310	Oil and Gas Production	0.0614	0.0508	0.0425	0.0335	0.0247
320	Petroleum Refining	0.0001	0.0001	0.0001	0.0001	0.0001
330	Petroleum Marketing	0.0005	0.0006	0.0006	0.0006	0.0007
	PETROLEUM PRODUCTION AND MARKETING TOTAL	**0.0620**	**0.0514**	**0.0432**	**0.0342**	**0.0255**

TABLE 6 – 5

NOx Emission Inventory – Santa Barbara County

(Tons per day)

		2000	2005	2010	2015	2020
INDUSTRIAL PROCESSES						
410	Chemical	0.0000	0.0000	0.0000	0.0000	0.0000
420	Food and Agriculture	0.0000	0.0000	0.0000	0.0000	0.0000
430	Mineral Processes	0.0532	0.0624	0.0703	0.0782	0.0861
440	Metal Processes	NA	NA	NA	NA	NA
450	Wood and Paper	NA	NA	NA	NA	NA
470	Electronics	0.0000	0.0000	0.0000	0.0000	0.0000
499	Other (Industrial Processes)	0.0839	0.1612	0.2740	0.1918	0.1918
	INDUSTRIAL PROCESSES TOTAL	**0.1371**	**0.2236**	**0.3444**	**0.2700**	**0.2779**
	STATIONARY SOURCES TOTAL	**5.5694**	**5.8992**	**6.1273**	**6.1815**	**6.3256**
AREA-WIDE SOURCES						
SOLVENT EVAPORATION						
510	Consumer Products	0.0000	0.0000	0.0000	0.0000	0.0000
520	Architectural Coatings and Related Process Solvents	0.0000	0.0000	0.0000	0.0000	0.0000
530	Pesticides/Fertilizers	0.0000	0.0000	0.0000	0.0000	0.0000
540	Asphalt Paving/Roofing	0.0000	0.0000	0.0000	0.0000	0.0000
	SOLVENT EVAPORATION TOTAL	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**
MISCELLANEOUS						
610	Residential Fuel Combustion	0.4675	0.5099	0.5373	0.5529	0.5417
620	Farming Operations	0.0000	0.0000	0.0000	0.0000	0.0000
630	Construction and Demolition	0.0000	0.0000	0.0000	0.0000	0.0000
640	Paved Road Dust	0.0000	0.0000	0.0000	0.0000	0.0000
645	Unpaved Road Dust	0.0000	0.0000	0.0000	0.0000	0.0000
650	Fugitive Windblown Dust	0.0000	0.0000	0.0000	0.0000	0.0000
660	Fires	0.0012	0.0012	0.0013	0.0014	0.0014
670	Waste Burning and Disposal	0.0130	0.6877	0.6877	0.6877	0.6877
690	Cooking	0.0000	0.0000	0.0000	0.0000	0.0000
699	Other (Miscellaneous Processes)	0.0000	0.0000	0.0000	0.0000	0.0000
	MISCELLANEOUS TOTAL	**0.4817**	**1.1988**	**1.2263**	**1.2420**	**1.2308**
	AREA-WIDE SOURCES TOTAL	**0.4817**	**1.1988**	**1.2263**	**1.2420**	**1.2308**

TABLE 6 – 5

NOx Emission Inventory – Santa Barbara County

(Tons per day)

		2000	2005	2010	2015	2020
MOBILE SOURCES						
ON-ROAD MOTOR VEHICLES						
710	Light Duty Passenger (LDA)	6.4570	4.2820	2.6600	1.6150	0.9820
722	Light Duty Trucks - 1 (LDT1)	3.1080	2.2650	1.5650	1.0730	0.7130
723	Light Duty Trucks - 2 (LDT2)	3.0690	2.4780	1.9180	1.3420	0.9050
724	Medium Duty Trucks (MDV)	1.8080	1.4750	1.1660	0.8520	0.5840
732	Light Heavy Duty Gas Trucks - 1 (LHDV1)	0.3490	0.2610	0.2930	0.2920	0.2800
733	Light Heavy Duty Gas Trucks - 2 (LHDV2)	0.1410	0.1110	0.0970	0.0810	0.0670
734	Medium Heavy Duty Gas Trucks (MHDV)	0.3640	0.2900	0.2160	0.1470	0.0970
736	Heavy Heavy Duty Gas Trucks (HHDV)	1.2410	0.9230	0.5540	0.2920	0.1620
742	Light Heavy Duty Diesel Trucks - 1 (LHDV1)	0.1880	0.3000	0.2220	0.1400	0.0960
743	Light Heavy Duty Diesel Trucks- 2 (LHDV1)	0.2300	0.2230	0.1720	0.1130	0.0720
744	Medium Heavy Duty Diesel Trucks (MHDV)	1.5790	1.5200	1.1770	0.7650	0.4870
746	Heavy Heavy Duty Diesel Trucks (HHDV)	4.6470	4.2910	3.3090	2.0450	1.3350
750	Motorcycles (MCY)	0.0690	0.0830	0.0890	0.0900	0.0930
760	Heavy Duty Diesel Urban Buses (UB)	0.4930	0.4980	0.4840	0.4520	0.4040
762	Heavy Duty Gas Urban Buses (UB)	0.1160	0.1200	0.1200	0.1240	0.1230
770	School Buses (SB)	0.2040	0.2230	0.2240	0.2150	0.1940
780	Motor Homes (MH)	0.2940	0.2540	0.1840	0.1210	0.0750
	ON-ROAD MOTOR VEHICLES TOTAL	**24.3570**	**19.5970**	**14.4500**	**9.7590**	**6.6690**
OTHER MOBILE SOURCES						
810	Aircraft	0.0833	0.0945	0.1016	0.1086	0.1155
820	Trains	2.2083	2.1345	2.1788	1.4151	1.4647
830	Ships and Commercial Boats	0.6622	0.6997	0.7370	0.7745	0.8119
840	Recreational Boats	0.0375	0.0800	0.0850	0.0745	0.0690
850	Off-Road Recreational Vehicles	0.0509	0.0529	0.0559	0.0579	0.0599
860	Off-Road Equipment	6.3700	5.5430	4.2730	3.1320	2.5830
870	Farm Equipment	4.0650	3.3830	2.7170	2.0140	1.5550
890	Fuel Storage and Handling	0.0000	0.0000	0.0000	0.0000	0.0000
	OTHER MOBILE SOURCES TOTAL	**13.4772**	**11.9875**	**10.1483**	**7.5764**	**6.6590**
	MOBILE SOURCES TOTAL	**37.8342**	**31.5845**	**24.5983**	**17.3354**	**13.3280**
	Vandenberg Air Force Airborne Laser (ABL) Mission	**NA**	**0.0000**	**0.3602**	**0.3602**	**0.3602**
	Source Register Emission Reduction Credits	**NA**	**0.4191**	**0.4191**	**0.4191**	**0.4191**
SANTA BARBARA COUNTY NOx EMISSION INVENTORY TOTAL		**43.8853**	**39.1017**	**32.7311**	**25.5382**	**21.6637**

TABLE 6 – 6

NOx Emission Inventory
Outer Continental Shelf
(Tons per day)

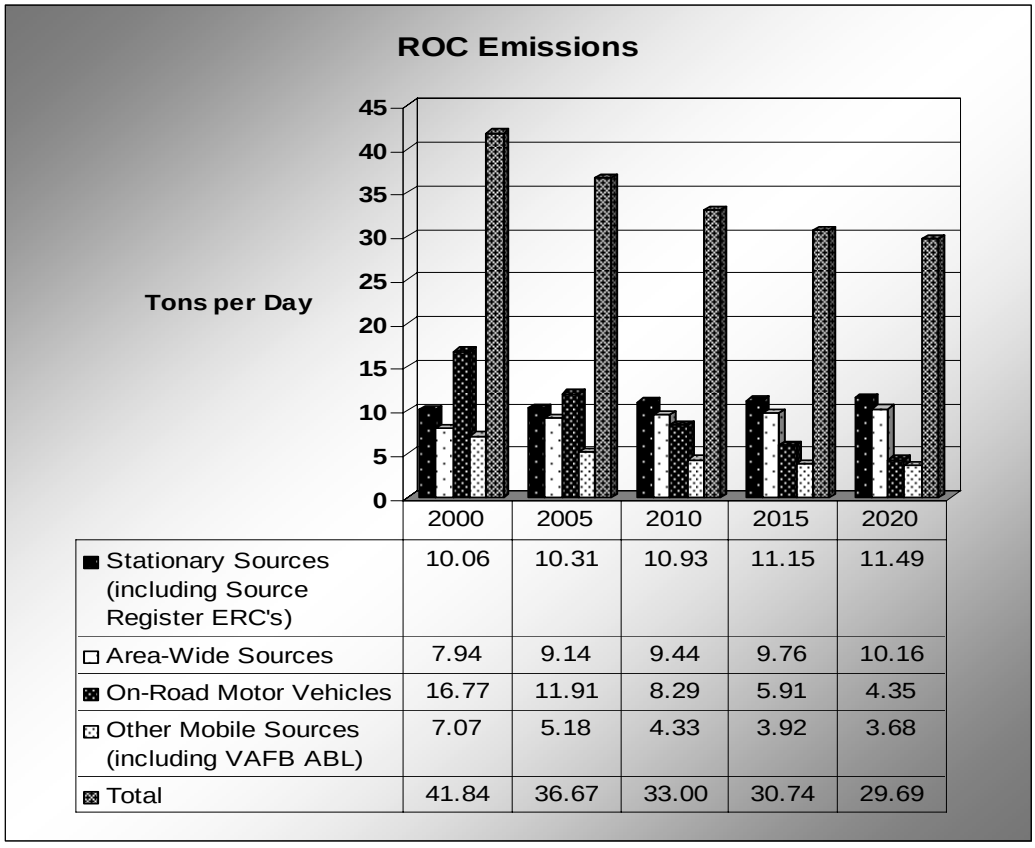
	2000	2005	2010	2015	2020
STATIONARY SOURCES					
FUEL COMBUSTION					
030 Oil and Gas Production (Combustion)	0.7896	0.7901	0.7894	0.7894	0.7893
FUEL COMBUSTION TOTAL	**0.7896**	**0.7901**	**0.7894**	**0.7894**	**0.7893**
CLEANING AND SURFACE COATINGS					
230 Coatings and Related Process Solvents	0.0000	0.0000	0.0000	0.0000	0.0000
CLEANING AND SURFACE COATINGS TOTAL	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**
PETROLEUM PRODUCTION AND MARKETING					
310 Oil and Gas Production	0.0278	0.0278	0.0278	0.0278	0.0278
PETROLEUM PRODUCTION AND MARKETING TOTAL	**0.0278**	**0.0278**	**0.0278**	**0.0278**	**0.0278**
INDUSTRIAL PROCESSES					
430 Mineral Processes	0.0000	0.0000	0.0000	0.0000	0.0000
INDUSTRIAL PROCESSES TOTAL	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**
STATIONARY SOURCES TOTAL	**0.8174**	**0.8179**	**0.8172**	**0.8172**	**0.8172**
MOBILE SOURCES					
OTHER MOBILE SOURCES					
810 Aircraft	0.0189	0.0189	0.0189	0.0189	0.0189
830 Ships and Commercial Boats	32.4936	38.5523	44.3429	54.2967	64.6826
840 Recreational Boats	0.0375	0.0800	0.0850	0.0745	0.0690
OTHER MOBILE SOURCES TOTAL	**32.5500**	**38.6512**	**44.4468**	**54.3901**	**64.7705**
MOBILE SOURCES TOTAL	**32.5500**	**38.6512**	**44.4468**	**54.3901**	**64.7705**
OUTER CONTINENTAL SHELF NOx EMISSION INVENTORY TOTAL	**33.3674**	**39.4691**	**45.2640**	**55.2073**	**65.5877**

TABLE 6 – 7

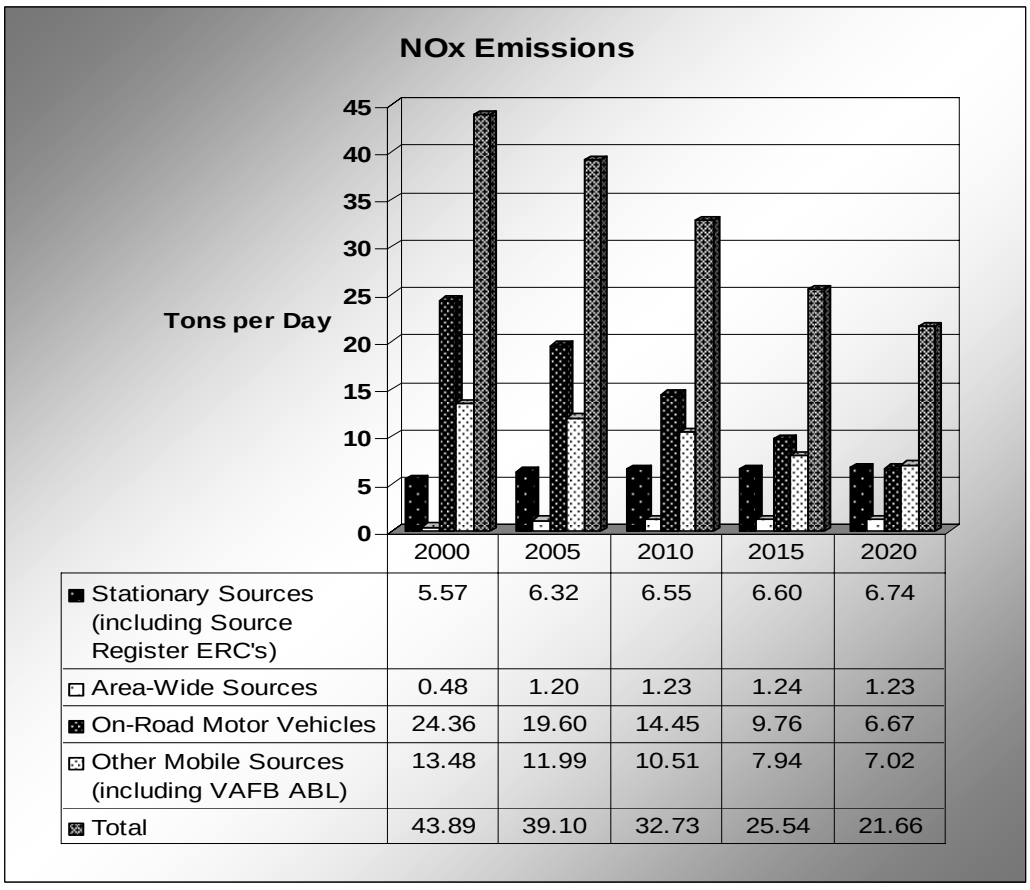
2004 CLEAN AIR PLAN ACTIVITY INDICATORS AND FACTORS FOR 2005, 2010, 2015 and 2020

ACTIVITY INDICATOR	UNITS	VALUE					FACTOR				INFORMATION SOURCE
		2000	2005	2010	2015	2020	2005	2010	2015	2020	
Agricultural Acres	Acres	124,840	119,227	116,849	114,472	112,094	0.955	0.936	0.917	0.898	Agricultural Commissioner's Crop Reports
Aircraft Operations	Operations	309,019	355,900	385,300	414,200	443,100	1.152	247	1.340	1.434	Airport Master Plans / SBCAG (Santa Barbara County Association of Governments)
Daily Vehicle Miles	1,000 Miles Traveled	9,575	10,148	10,718	11,288	11,683	1.060	1.119	1.179	1.220	SBCAG Travel Model
EMP. - Commercial	Employees	89,700	96,200	102,700	109,200	115,700	1.072	1.145	1.217	1.290	SBCAG 2002 Regional Growth Forecast
EMP. Industrial	Employees	27,100	31,800	35,820	39,840	43,860	1.173	1.322	1.470	1.618	SBCAG 2002 Regional Growth Forecast
EMP. - Public Services	Employees	38,600	40,800	42,000	43,200	44,400	1.057	1.088	1.119	1.150	SBCAG 2002 Regional Growth Forecast
Housing	Households	136,622	146,663	154,053	160,724	164,641	1.073	1.128	1.176	1.205	SBCAG 2002 Regional Growth Forecast
Landfills	1,000 Tons in Place	15,995	18,638	20,983	23,545	25,443	1.165	1.312	1.472	1.591	Local Solid Waste Agencies
Locomotives	Annual Train Passages	6,023	8,030	10,038	10,403	10,768	1.333	1.667	1.727	1.788	CalTrans / AMTRAK / Union Pacific
No Growth	No Units	1	1	1	1	1	1.000	1.000	1.000	1.000	Santa Barbara County Air Pollution Control District
OCS Production	No Units	1	1	1	1	1	1.000	1.000	1.000	1.000	SBCAPCD Community Advisory Council
Pesticide Use (Structural)	Tons Pesticide Applied	61	63	66	68	72	1.033	1.082	1.115	1.180	CA Air Resources Board
Petroleum Production	1,000 Barrels Oil	3,843	3,435	3,187	2,932	2,702	0.894	0.829	0.763	0.703	CA Division of Oil & Gas
Petroleum Wells	Producing & Inactive Wells	2,404	1,967	1,621	1,244	875	0.818	0.674	0.517	0.364	CA Division of Oil & Gas
Population	Residents	399,300	436,000	462,000	488,000	505,000	1.092	1.157	1.222	1.265	SBCAG 2002 Regional Growth Forecast
Prescribed Fires	Acres	100	6,250	6,250	6,250	6,250	62.500	62.500	62.500	62.500	U.S. Forest Service
Ship Activity	Vessel Transits	6,460	7,701	8,887	10,926	13,053	1.192	1.376	1.691	2.021	Marine Exchange of Port of Los Angeles / Long Beach

Figure 6-1
Santa Barbara County Onshore ROC & NOx Emissions

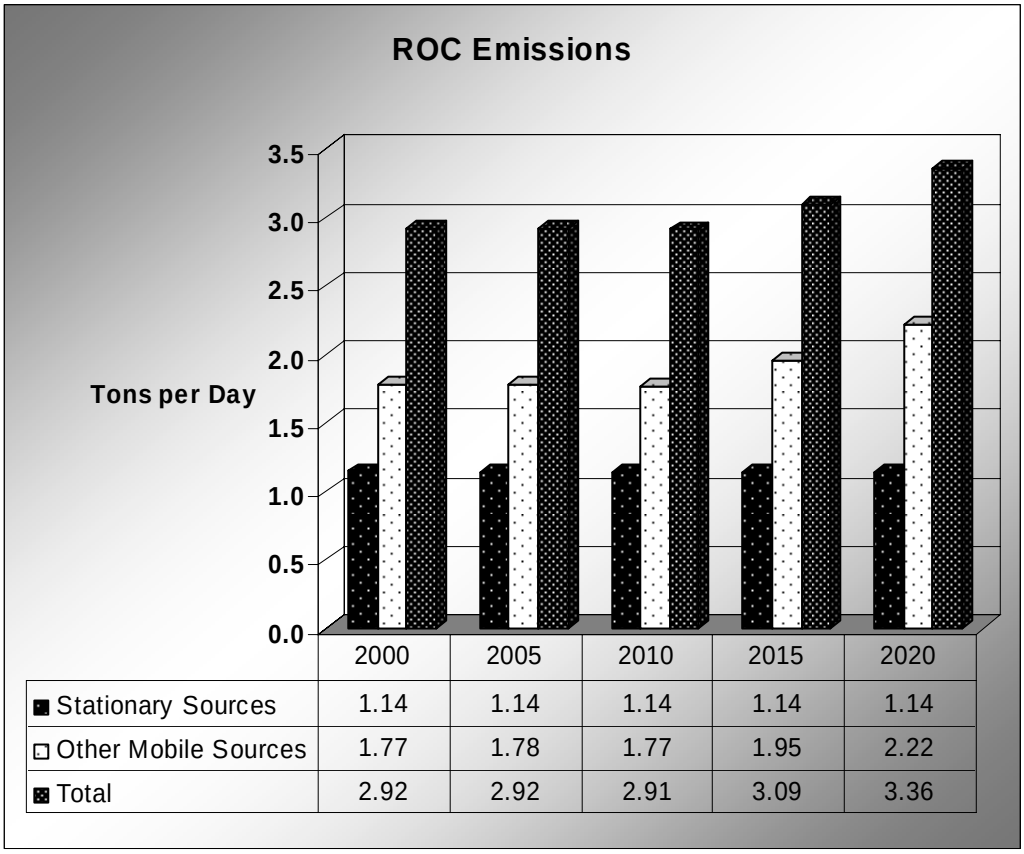


	2000	2005	2010	2015	2020
Stationary Sources (including Source Register ERC's)	10.06	10.31	10.93	11.15	11.49
Area-Wide Sources	7.94	9.14	9.44	9.76	10.16
On-Road Motor Vehicles	16.77	11.91	8.29	5.91	4.35
Other Mobile Sources (including VAFB ABL)	7.07	5.18	4.33	3.92	3.68
Total	41.84	36.67	33.00	30.74	29.69

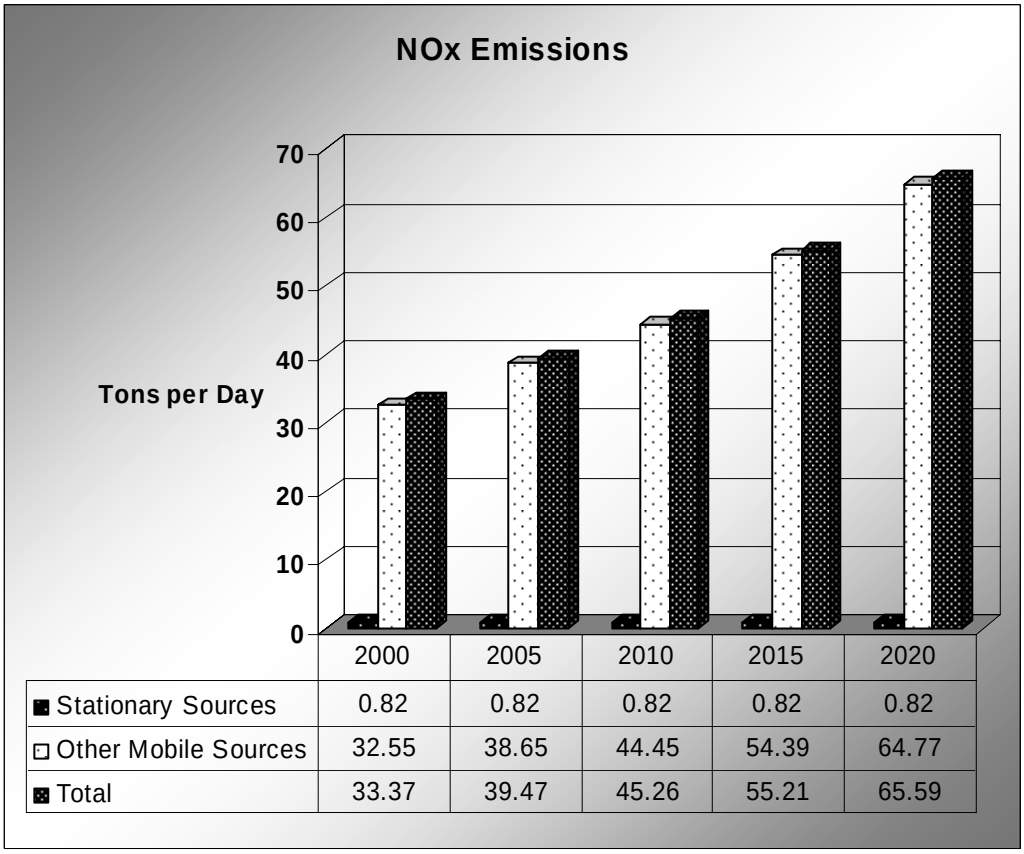


	2000	2005	2010	2015	2020
Stationary Sources (including Source Register ERC's)	5.57	6.32	6.55	6.60	6.74
Area-Wide Sources	0.48	1.20	1.23	1.24	1.23
On-Road Motor Vehicles	24.36	19.60	14.45	9.76	6.67
Other Mobile Sources (including VAFB ABL)	13.48	11.99	10.51	7.94	7.02
Total	43.89	39.10	32.73	25.54	21.66

Figure 6-2
OCS ROC & NOx Emissions



	2000	2005	2010	2015	2020
Stationary Sources	1.14	1.14	1.14	1.14	1.14
Other Mobile Sources	1.77	1.78	1.77	1.95	2.22
Total	2.92	2.92	2.91	3.09	3.36

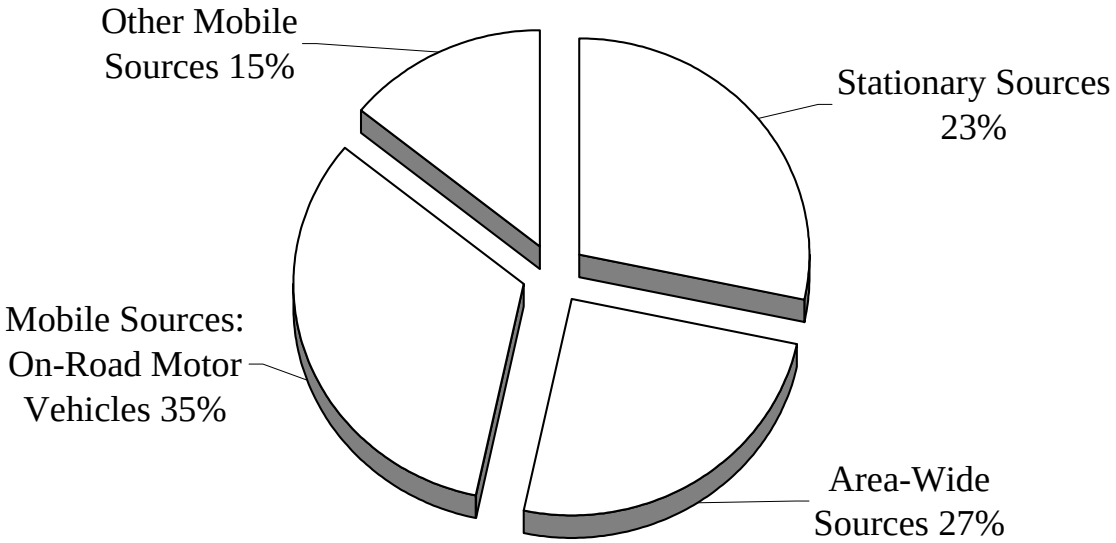


	2000	2005	2010	2015	2020
Stationary Sources	0.82	0.82	0.82	0.82	0.82
Other Mobile Sources	32.55	38.65	44.45	54.39	64.77
Total	33.37	39.47	45.26	55.21	65.59

Figure 6-3

2005 Santa Barbara County Planning Emission Inventory

ROC: 36.67 tons per day



NOx: 39.10 tons per day

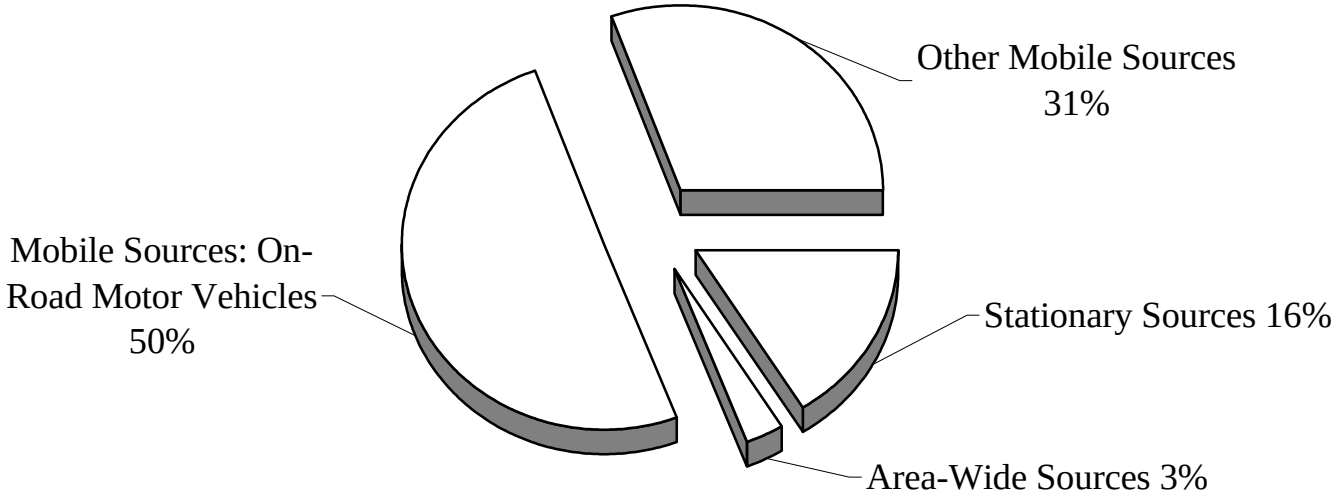
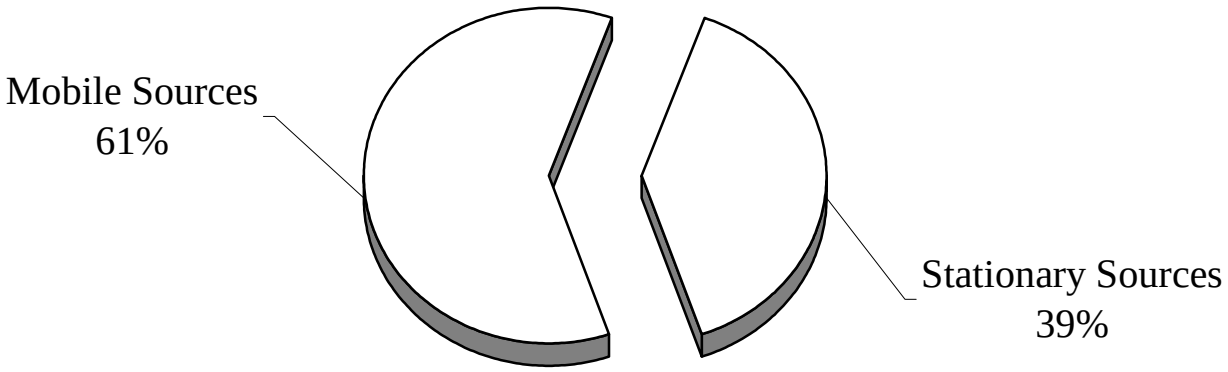


Figure 6-4

2005 OCS Planning Emission Inventory

ROC: 2.92 tons per day



NOx: 39.47 tons per day

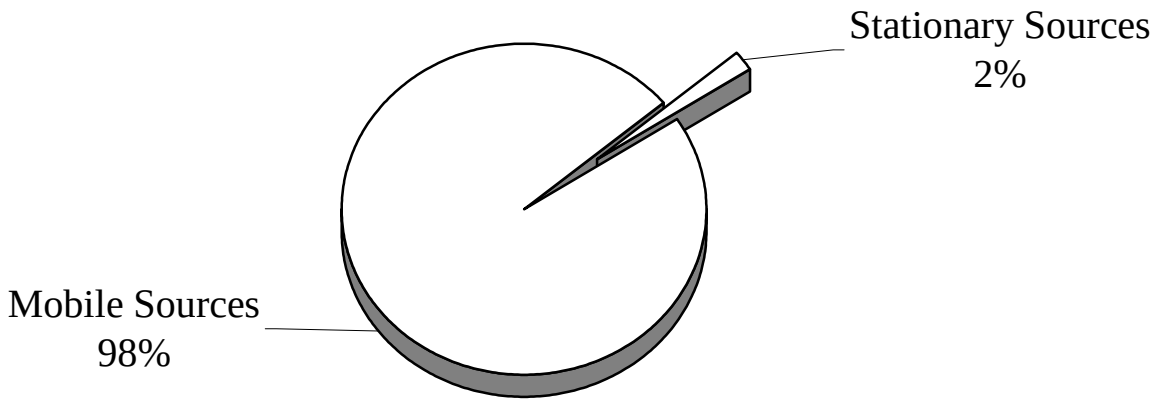
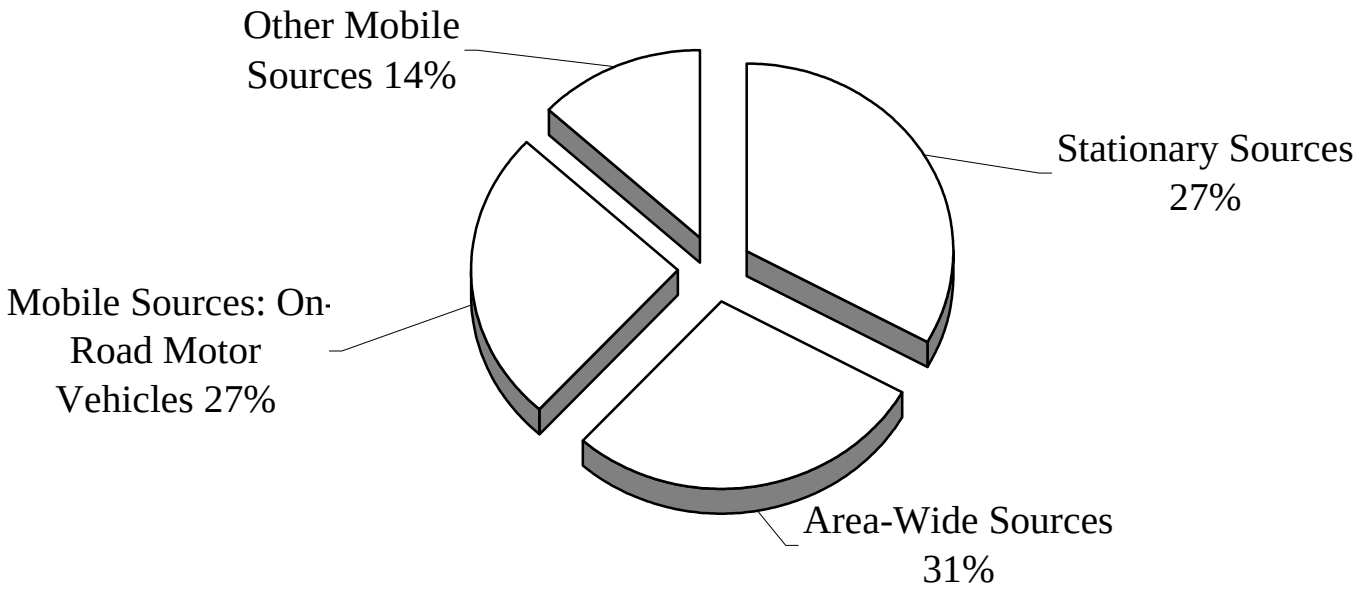


Figure 6-5

2010 Santa Barbara County Planning Emission Inventory

ROC: 33.00 tons per day



NOx: 32.73 tons per day

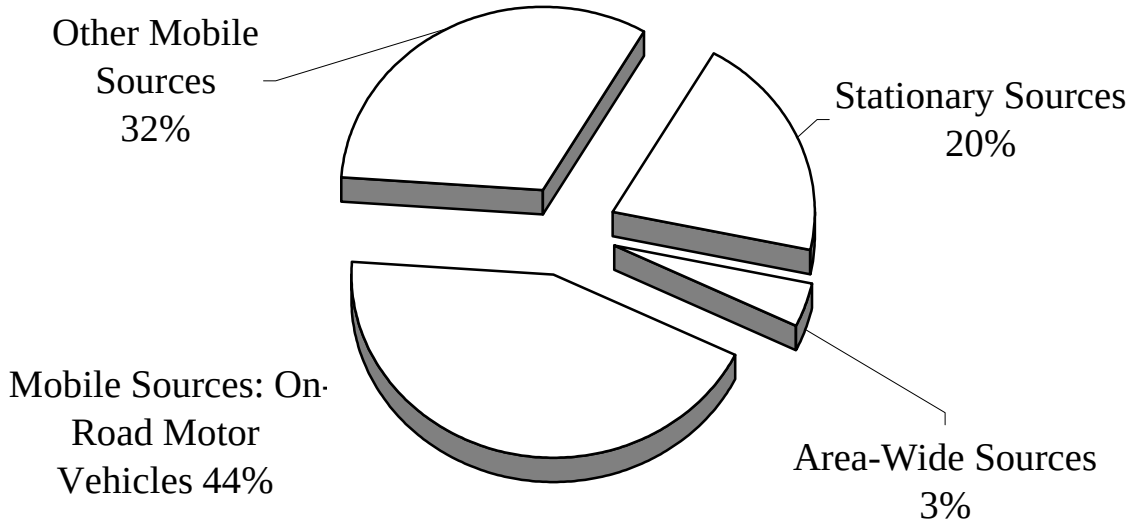
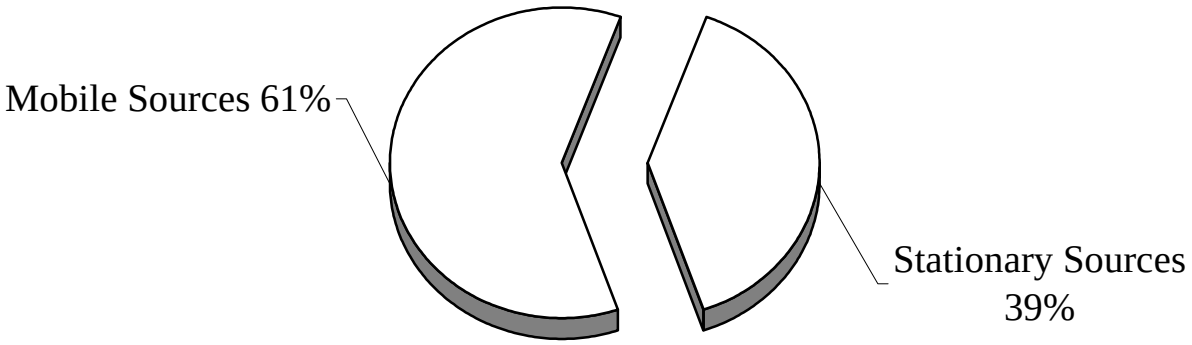


Figure 6-6

2010 OCS Planning Emission Inventory

ROC: 2.91 tons per day



NOx: 45.26 tons per day

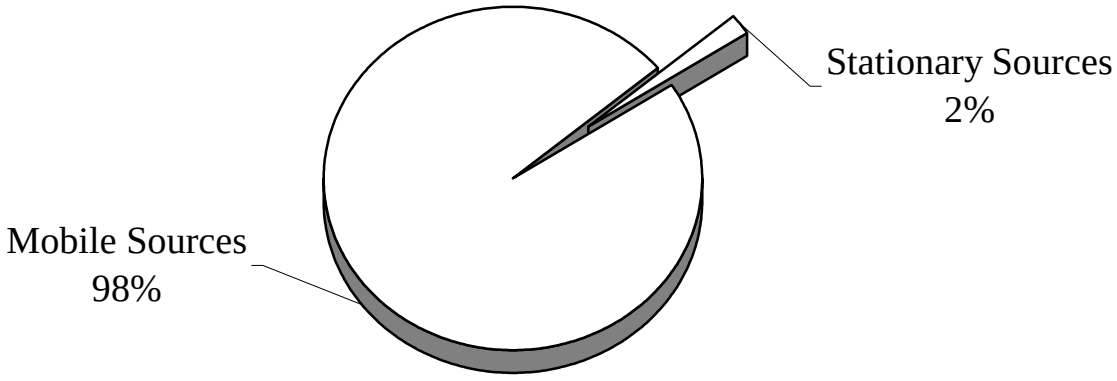
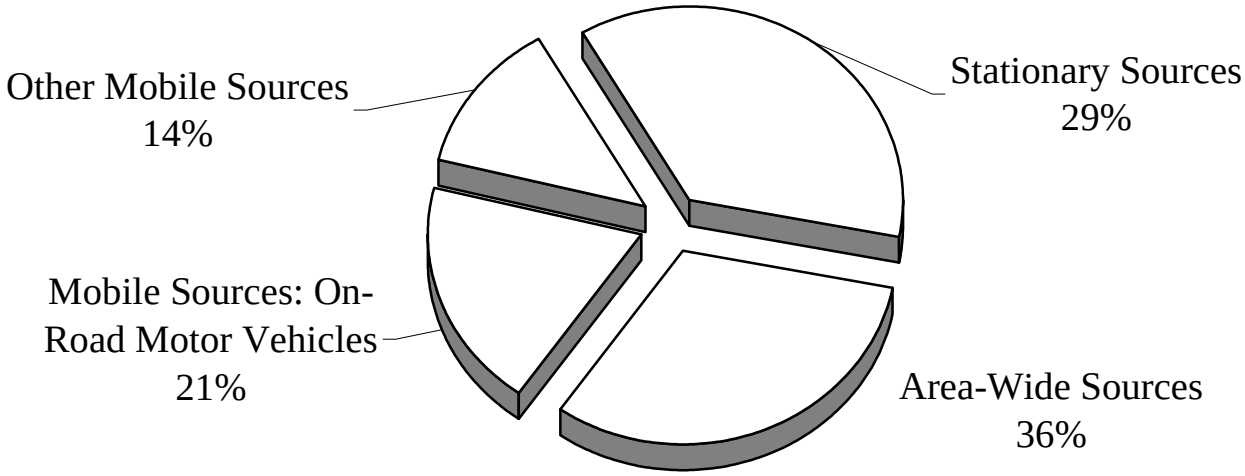


Figure 6-7

2015 Santa Barbara County Planning Emission Inventory

ROC: 30.74 tons per day



NOx: 25.54 tons per day

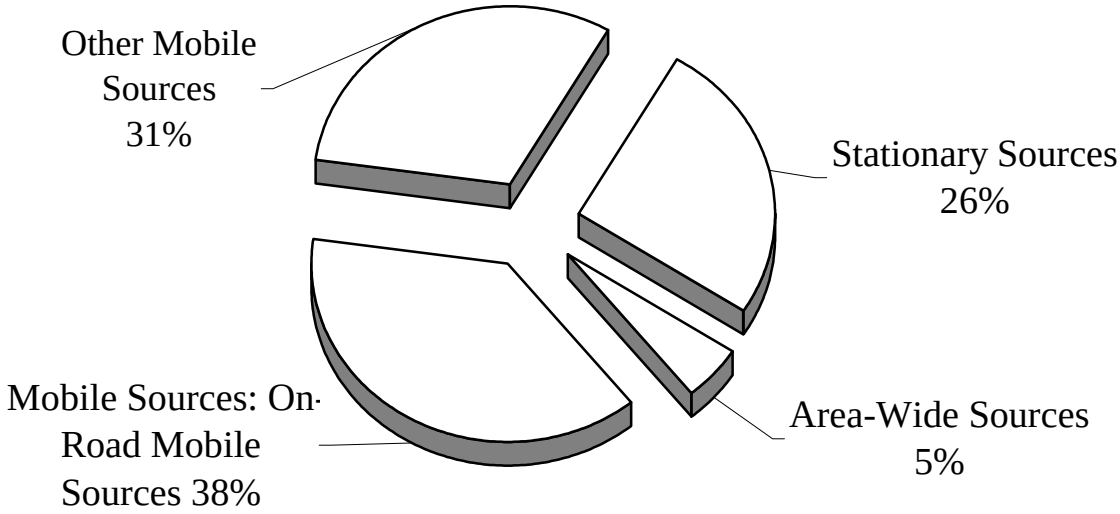
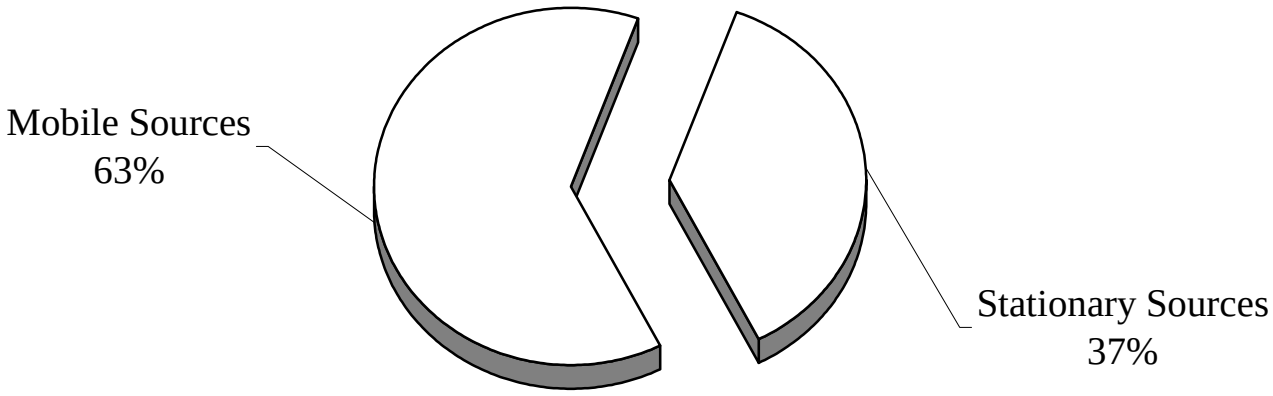


Figure 6-8

2015 OCS Planning Emission Inventory

ROC: 3.09 tons per day



NOx: 55.21 tons per day

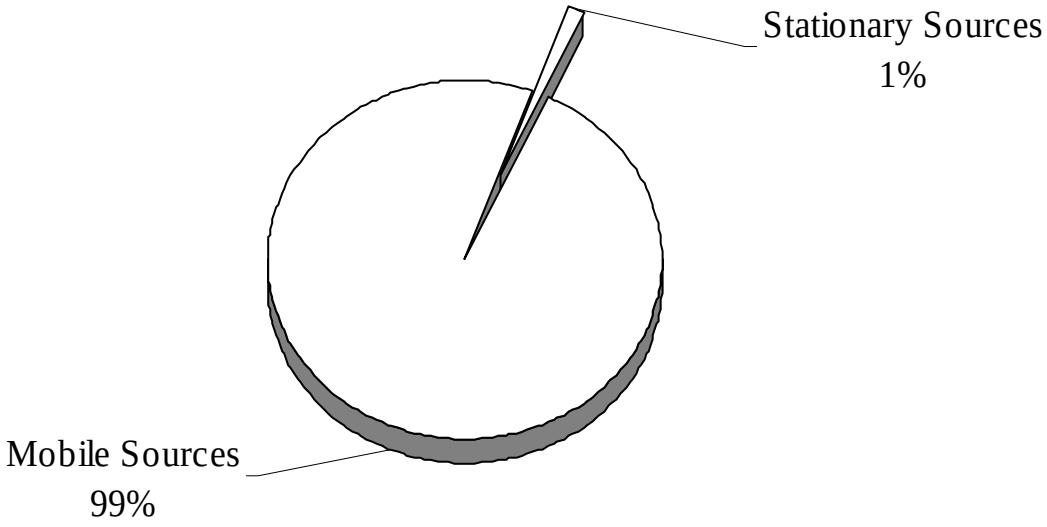
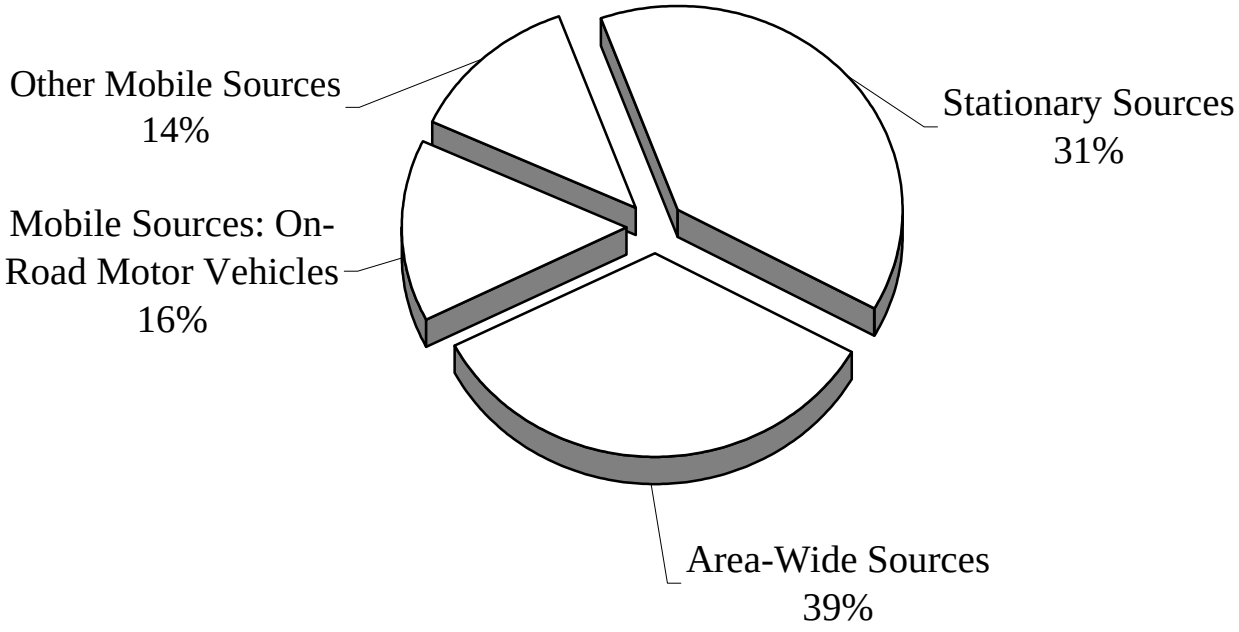


Figure 6-9

2020 Santa Barbara County Planning Emission Inventory

ROC: 29.69 tons per day



NOx: 21.66 tons per day

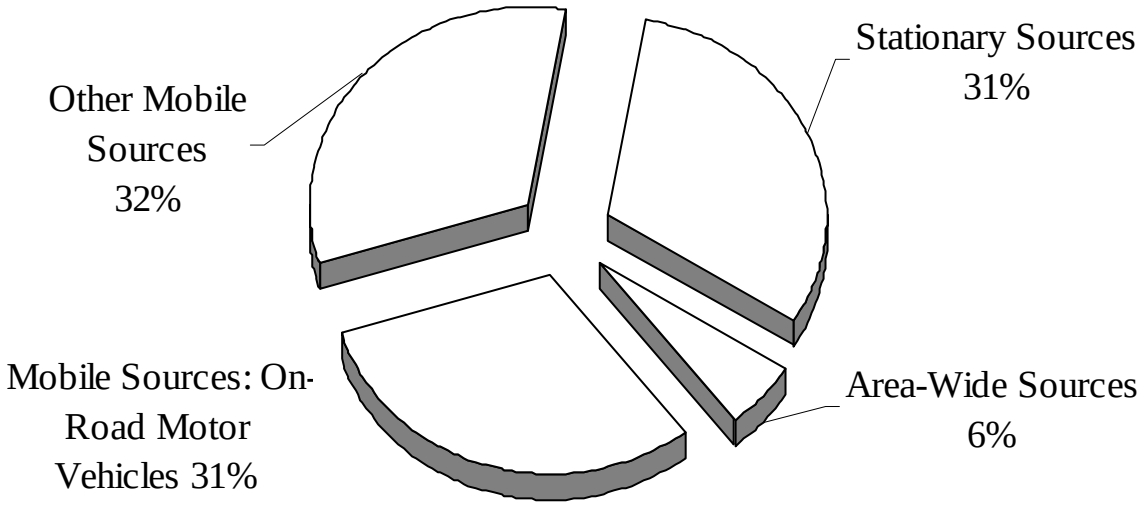
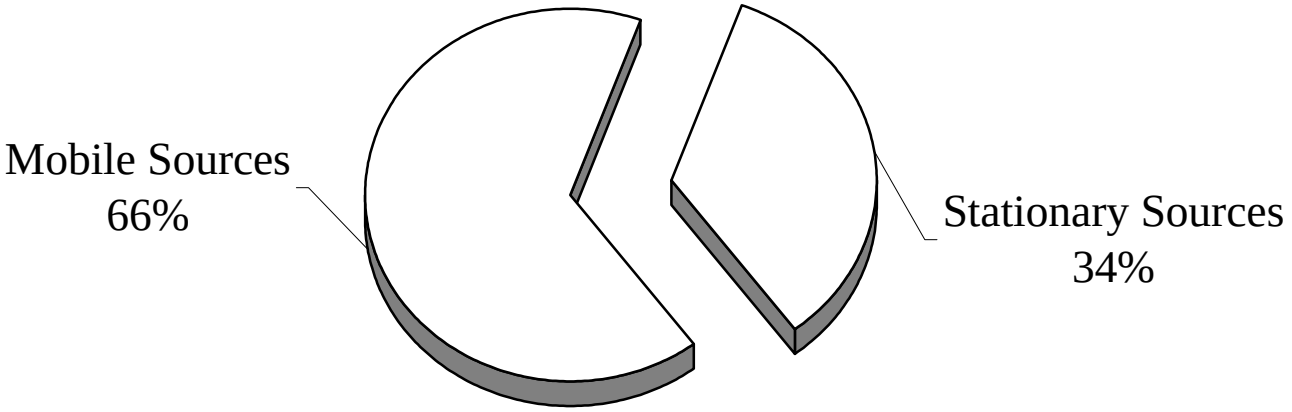


Figure 6-10
2020 OCS Planning Emission Inventory

ROC: 3.36 tons per day



NOx: 65.59 tons per day

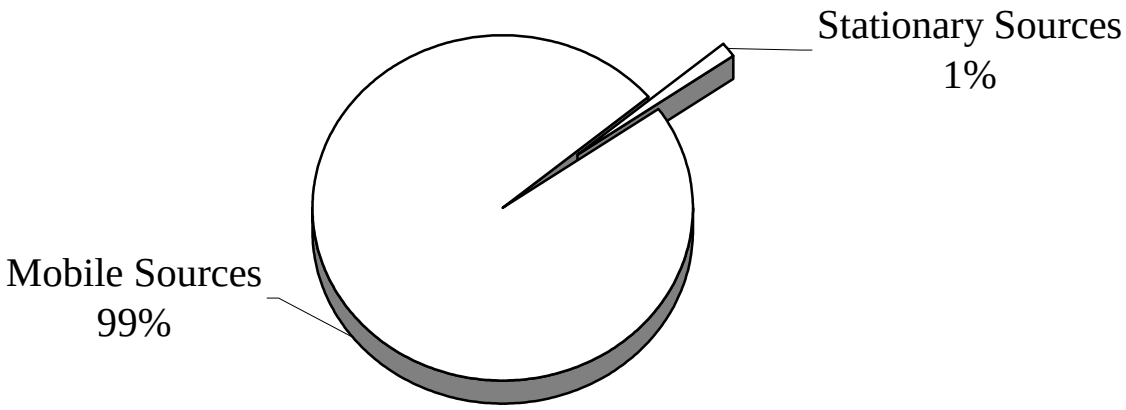
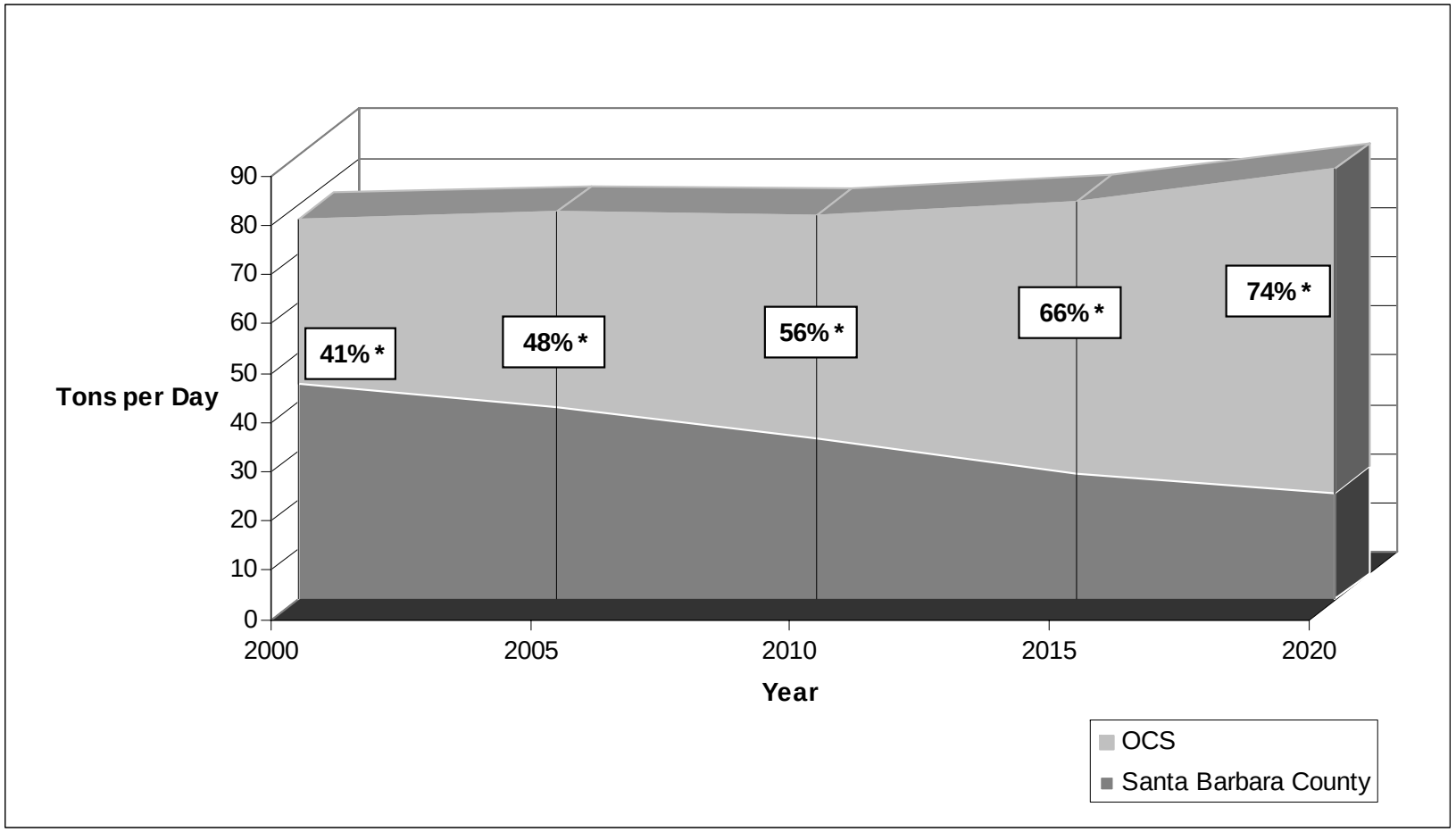


Figure 6-11
Santa Barbara County and OCS NOx Emissions Forecast
Including Marine Vessels



*** Percentage of total emissions from Other Mobile Sources – Foreign and US Ships-in-Transit.**

Figure 6-12
Santa Barbara County and OCS NOx Emissions Forecast
Marine Vessels Excluded