CHAPTER 6

EMISSION FORECASTING

- INTRODUCTION
- EMISSION FORECAST
- EMISSION INVENTORIES
- IMPACTS OF MARINE SHIPPING EMISSIONS
- CONCLUSION

6. EMISSION FORECASTING

6.1 INTRODUCTION

Chapter 6 presents ~~the three~~ two emission inventory forecasts used in the development of this ~~2007~~ 2010 Plan. These inventories are the ~~2010~~2020~~,~~ and ~~2015~~2030 ~~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 ~~2010~~2020~~,~~ and ~~2015~~2030 ~~and 2020~~ Planning Emission Inventory forecasts are based on the ~~2002~~2007 Planning Emission Inventory, which is described in *Chapter 3, Emission Inventory*. This ~~2002~~2007 Planning Emission Inventory is the base year for emission forecasting and was developed by modifying the ~~2002~~2007 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 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 ~~2002~~2007 Planning Emission Inventory is used to forecast emissions in order to determine whether the emission control measures described in *Chapter 4* and *Chapter 5* of the ~~2007~~ 2010 Plan will reduce enough emissions in order to attain the state ~~1-hour and~~ 8-hour ozone standard~~s, and maintain the federal 8-hour ozone standard~~ while accounting for the growth that is expected to occur 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 Santa Barbara County Air Pollution Control District (~~APCD~~District) is not able to provide modeling analyses for this ~~2007~~ 2010 Plan.

To forecast future year emissions, the estimate of the changes in the level of pollution producing activities, known as "activity indicators", is used to grow the ~~2002~~2007 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 ~~2002~~2007 emission inventory base year, future year forecasted emission inventories must be adjusted to account for the most recent Emission Reduction Credits (ERC~~s~~)

that were in the APCD Source Register ~~during the 3rd quarter of 2006~~ as of April 23, 2010. 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 ~~3rd quarter of 2006~~ April 23, 2010, were ~~0.3740~~0.3077 tons per day of ROC and ~~0.4377~~0.6212 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 3rd Quarter 2006) (Tons per day)**~~

	~~NO_x~~	~~ROC~~
~~Arguello, Inc.~~	~~0.0011~~	~~0.1037~~
~~Boeing~~	~~0.0098~~	~~0.0020~~
~~BreitBurn Energy Company~~	~~0.0007~~	~~0.0010~~
~~Chevron~~	~~0.0000~~	~~0.0194~~
~~Dos Cuadros Offshore Resources, L.L.C~~	~~0.0000~~	~~0.0001~~
~~E&B Resource Management~~	~~0.0098~~	~~0.1074~~
~~ExxonMobil Production Company~~	~~0.0000~~	~~0.0025~~
~~GTC/Shell~~	~~0.0020~~	~~0.0076~~
~~Lockheed Martin Corporation~~	~~0.0057~~	~~0.0076~~
~~Plains Exploration and Production~~	~~0.0140~~	~~0.0483~~
~~Southern California Gas Company~~	~~0.0003~~	~~0.0301~~
~~Space X~~	~~0.0000~~	~~0.0053~~
~~US Air Force—VAFB*~~	~~0.3943~~	~~0.0390~~
~~TOTAL SOURCE REGISTER ERC's~~	~~0.4377~~	~~0.3740~~

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

TABLE 6 – 1

SANTA BARBARA COUNTY SOURCE REGISTER ERC's (As of April 23, 2010) (Tons per day)		
	NO_x	ROC
BKS Energy	0.0540	0.0008
BreitBurn Energy Company	0.0669	0.0010
E&B Resource Management	0.0098	0.1063
ExxonMobil Production Company	0.0127	0.0000
Plains Exploration and Production	0.0162	0.1497
Point Arguello Companies	0.0709	0.0000
Space X	0.0000	0.0053
The Okonite Company	0.0579	0.0000
United Launch Alliance	0.0134	0.0086
US Air Force – VAFB*	0.3091	0.0361
Wm. Bolthouse Farms	0.0103	0.0000
TOTAL SOURCE REGISTER ERC's	**0.6212**	**0.3077**

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 ~~2010~~ 2020 and~~,~~ ~~2015~~2030 ~~and 2020~~ forecast levels of activity to the ~~2002~~ 2007 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 ~~2002~~2007 value. While activity indicators and factors have been determined for the milestone years of ~~2010~~ 2020 and~~,~~ ~~2015~~ 2030~~ and 2020~~, the indicators for any intermediate year can be estimated through simple linear interpolation. It is not expected that the activity data for the intermediate years will "spike" resulting in non-linear trends in the data. **Table 6-5** provides the ~~2002~~ 2007 level of activity, the predicted ~~2010~~ 2020 and~~,~~ ~~2015~~ 2030 ~~and 2020~~ levels of activity, the activity factors, and the source of the forecast for each of the activity indicators.

Activity indicators are assigned to each Stationary Source and Area-Wide Source category described in *Chapter 3*. The categories of On-Road Motor Vehicles and Other Mobile Sources are derived from ARB's EMFAC2000 and OFFROAD Model, respectively. The ARB also provided the APCD emission forecasts for Consumer Products and Architectural Coatings.

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

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 are 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 2007 Plan since Santa Barbara County is in attainment for the federal 8-hour ozone standard, projected ABL emissions are presented in this Plan at the request of VAFB (see Chapter 10, Section 10.4). **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 **Table 6-3**.~~

~~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 20102020 Emissions for the ABL Mission by VAFB**~~	~~0.0656~~	~~0.4867~~
~~**Projected 20152030 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~~
~~**20102020 Emissions added to the 2004 Plan for the ABL**~~	~~0.0656~~	~~0.3602~~
~~**20152030 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 EMISSION INVENTORIES

Planning emission inventory forecasts for ~~2010~~2020~~,~~ and ~~2015~~2030 ~~and 2020~~ for both Santa Barbara County and the OCS are presented in **Tables 6-3** and **6-4** and **Figures 6-**1 through **6-4**, located at the end of the chapter. **Tables 6-3** and **6-4** provide a detailed summary of both ROC and NO_x emissions for each emission source category and for each forecast year. These tables also include base year (~~2002~~2007) estimates for each source category for ease of comparison with forecasted emissions. Table 6-5 presents activity data that are utilized to grow base year emissions data. **Figures 6-1** and **6-2** present a graphical time series representation of ROC and NO_x emissions for both Santa Barbara County and the OCS. **Figure 6-3** shows total NO_x emissions from both Santa Barbara County and the OCS, while **Figure 6-4** shows combined Santa Barbara County and OCS NO_x emissions, but does not include emissions from marine shipping.

The bar graph presented in **Figure 6-1** shows that Santa Barbara County onshore NO_x and ROC emissions are expected to decrease continually through 2020. Total onshore ROC emissions are forecasted to decrease from ~~40.84~~ 31.83 tons per day in ~~2002~~2007 to ~~34.51~~ 26.55 tons per day in ~~2020~~ 2030 representing about a ~~15~~ 17 percent decrease in emissions. Total onshore NO_x emissions are projected to decrease from ~~41.21~~ 38.79 tons per day in ~~2002~~2007 to ~~23.12~~18.45 tons per day by ~~2020~~ 2030, about a ~~44~~ 52 percent decrease in emissions.

On a source category basis, ROC emissions from onshore stationary sources are forecasted to increase from ~~9.31~~8.85 tons per day in ~~2002~~2007 to ~~11.08~~ 9.69 tons per day in ~~2020~~ 2030 while NO_x emissions from onshore stationary sources are expected to ~~increase~~decrease from ~~6.61~~ 7.61 tons per day in ~~2002~~2007 to ~~6.63~~6.73 tons per day in ~~2020~~ 2030. ROC emissions from area-wide sources are forecasted to increase from ~~9.92~~8.36 tons per day in ~~2002~~2007 to ~~11.45~~ 9.59 tons per day in ~~2020~~ 2030. Area-wide NO_x emissions are predicted to ~~increase~~decrease from ~~0.63~~ 0.91 tons per day in ~~2002~~2007 to ~~1.14~~ 0.29 tons per day by ~~2020~~ 2030.

The largest decreases in both onshore NO_x and ROC emissions are attributable to decreased emissions from onshore mobile sources (On-road Motor Vehicles and Other Mobile Sources). ROC emissions from onshore mobile sources are projected to decrease from ~~21.62~~14.62 tons per day in ~~2002~~2007 to ~~11.97~~7.27 tons per day in ~~2020~~ 2030 (~~45~~50 percent decrease), while NO_x emissions from onshore mobile sources are expected to decrease to ~~15.36~~11.43 tons per day by ~~2020~~ 2030 from ~~33.96~~30.27 tons per day in ~~2002~~2007 (~~55~~62 percent decrease).

Figure 6-2 presents forecasts for OCS ROC and NO_x emissions. The figure shows that total offshore ROC emissions are predicted to increase from ~~3.88~~3.27 tons per day in ~~2002~~2007 to ~~4.53~~ 4.82 tons per day in ~~2020~~ 2030. Total offshore NO_x emissions are anticipated to ~~increase~~decrease from ~~39.26~~49.94 tons per day in ~~2002~~2007 to ~~77.35~~42.55 tons per day in ~~2020~~ 2030. Mobile sources on the OCS, predominately marine shipping, account for almost all of the ~~anticipated growth in~~ OCS ROC and NO_x emissions. ROC emissions from OCS mobile sources are expected to increase from ~~2.71~~2.44 tons per day in ~~2002~~2007 to ~~3.40~~3.99 tons per day in ~~2020~~ 2030, while OCS mobile source NO_x emissions are forecasted to increase decrease from ~~38.42~~ 49.36tons per day in ~~2002~~2007 to ~~76.52~~ 41.97 tons per day in ~~2020~~ 2030 as a result of revised international marine engine standards. The impacts of these international standards, along with state and federal marine fuel and engine standards are discussed in more detail in sections 6.4.1 and 6.4.2.

It is anticipated that mobile sources (on-road and other mobile sources) will account for ~~43~~ 30 percent of total onshore ROC emissions and ~~77~~68 percent of the onshore NO_x emissions by ~~2010~~2020. By ~~2020~~ 2030, mobile sources are predicted to account for ~~35~~ 27percent of the onshore ROC emissions and ~~66~~ 62percent of the onshore NO_x emissions.

The relative contribution of ROC and NO_x from onshore stationary and area sources to overall onshore emissions increases considerably over the planning horizon due to significant reductions of these pollutants from onshore mobile sources during this time period. The relative percentage of total ROC emissions from onshore stationary sources increases from ~~23~~ 28percent in ~~2002~~2007 to ~~32~~ 35 percent of the onshore inventory in ~~2020~~ 2030, while NO_x emissions from onshore stationary sources increases from ~~16~~ 20 percent in ~~2002~~2007 to ~~29~~ 33 percent of the overall onshore inventory in ~~2020~~ 2030. Area-wide ROC emissions are forecasted to increase from ~~24~~ 26 percent of total onshore emissions in ~~2002~~2007 to ~~33~~ 36 percent of the total onshore inventory by ~~2020~~ 2030. The projected contribution from area-wide NO_x emissions ~~increases from~~ is about 2 percent in ~~2002~~2007 with the same percentage to the total onshore NOx inventory projected in 2030.~~ to 5 percent of the total onshore NO_x inventory by 2020.~~

6.4 IMPACTS OF MARINE SHIPPING EMISSIONS

~~As discussed in the previous section, Santa Barbara County onshore emissions of ROC and NO_x are expected to decrease significantly by 2020, primarily from reductions in on-road mobile emissions and through the implementation of the California Clean Air Act's every feasible measure requirements. While Santa Barbara County onshore emissions are forecasted to substantially decrease during the planning horizon, OCS NO_x emissions are expected to dramatically increase from base year levels. The increase in OCS NO_x emissions is the result of projected growth in marine shipping activities, which are estimated to more than double from 2002~~2007 ~~levels by 2020. Note that in the 2001 and 2004 Plans, marine shipping emission forecasts were based on the projection of the number of vessel transits through the Santa Barbara Channel. It has become clear since then that transit projections are not a good indicator of forecasted emissions since transits can actually decrease while emissions increase. This is due to the fact that marine vessels are becoming larger in order to accommodate significant growth in cargo entering California ports. The trend toward larger ships is associated with larger engines that consume more power. As a result, forecasted emissions for this 2007 Plan are based on projections of ship power consumption rather than forecasted marine vessel transits.~~

~~**Figure 6-3** presents combined OCS and onshore NO_x forecasts out to 2020. This figure clearly illustrates that increases in NO_x emissions from marine vessels will overwhelm stationary source NO_x reductions that will be achieved by implementing the every feasible measure strategy and by significant decreases in NO_x from onshore mobile sources. Combined NO_x emissions from onshore and OCS sources are anticipated to grow from 80.47 tons per day in 2002~~2007 ~~to 90.09 tons per day by 2010~~2020~~. By 2020, combined NO_x emissions are anticipated to increase to 100.47 tons per day, about 25 percent higher than base year estimates.~~

~~NO_x emissions from marine shipping alone (excluding commercial and recreational boats) are expected to grow to 53.58 tons per day by 2010~~2020 ~~from base year estimates of 37.37 tons per day, a 43 percent increase. By 2020, marine vessel NO_x emissions are forecasted to reach 75.37 tons per day, representing a more than two-fold increase from base year levels. At these growth rates, marine vessel NO_x emissions will account for about 59 percent of the overall (onshore and~~

~~OCS) NO_x inventory by 20102020, increasing to approximately 75 percent of the total NO_x inventory by 2020.~~

~~**Figure 6-4** presents total onshore and OCS NO_x 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 NO_x emissions below baseline levels. Excluding marine shipping emissions, total onshore and OCS NO_x emissions are predicted to be reduced from 43 tons per day in 20022007 to 25 tons per day by 2020, which represents about a 42 percent decrease in NO_x emissions over the planning horizon. These data are presented because while onshore control strategies provide significant reductions in NO_x 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.~~

~~**Figure 6-5** displays combined onshore and OCS ROC forecasts. This figure shows that total ROC emissions are projected to decline through the forecast period. Combined ROC emissions from onshore and OCS sources are projected to decrease from base year levels by approximately 5.7 tons per day by 2020. Any increases in ROC emissions from marine shipping are negated by significant reductions in ROC emissions that occur from onshore sources, particularly on-road mobile sources.~~

~~**Figure 6-6** provide a graphical representation of ROC emissions from each source category for both onshore and OCS sources, but excludes marine shipping. As stated above, combined ROC emissions from onshore and OCS sources are expected to remain below baseline levels even with significant growth in marine shipping. **Figure 6-6**, however, emphasizes that proposed control strategies for onshore and non-marine shipping OCS sources will be effective in reducing ROC emissions to below baseline levels.~~

~~It is important to note that increases in NO_x 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 NO_x), 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 USEPA and ARB.~~

6.4.1 California Air Resources Board Fuel Sulfur Regulation

On May 29, 2009, as part of its Diesel Risk Reduction Plan, the ARB approved the regulation for Fuel Sulfur for Ocean-Going Vessels within California Waters and 24 Nautical Miles of the

California Baseline. This regulation became effective on June 28, 2009, with compliance for Phase I fuel requirements beginning on July 1, 2009 for the main engines, auxiliary engines, diesel electric engines and auxiliary boilers. The Phase I fuel requirement requires the sulfur levels of Marine gas oil (DMA) to be at or below 1.5% sulfur, or Marine diesel oil (DMB) to be at or below 0.5% sulfur. The Phase II fuel requirement will become effective January 1, 2012, and will require both DMA and DMB fuels to be at or below 0.1% sulfur.

The United States Coast Guard (USCG) Headquarters issued a Marine Safety Notice to provide guidance on switching between heavy/intermediate fuel oils and marine distillates. In addition, ARB strongly advised non-tanker ocean-going vessels to continue using traffic separation lanes established by the International Maritime Organization (IMO) and USCG and avoid transiting through the Point Mugu Sea Range outside this traffic separation scheme. Evidence confirms that ocean-going vessels have chosen to ignore this advice from ARB and instead of traveling in the Santa Barbara Channel, about 70% of the vessels are now traveling south around the Channel Islands to avoid fuel switching and using the more expensive lower sulfur fuel. The USCG is concerned about safety and is now developing a Port Access Route Study to explore the range of impacts of vessel routing and to evaluate whether to establish shipping lanes south of the Channel Islands. The District will be working with the USCG to ensure that this study assesses air quality impacts and also requesting that the study considers vessel speed reduction measures.

The District is currently coordinating with ARB to model the onshore air quality impacts from ships using cleaner fuel traveling through the Santa Barbara Channel versus south of the Channel Islands.

6.4.~~1~~ 2. ~~Proposed Revisions~~ 2008 Amendments to MARPOL Annex VI

In October 2008, the International Maritime Organization (IMO) amended Annex VI of the MARPOL convention and will include several new requirements for Emission Control Areas (ECA) and global that enter into force starting July 1, 2011. Annex VI was ratified by 53 countries including the United States and represents almost 82% of the global shipping tonnage. The new Annex VI requirements include:

- new fuel quality requirements beginning from July 2010
- Tier I NOx requirements for existing pre-2000 engines
- Tier II NOx requirements for new engines starting 2011 (global). (Tier II standards represent a 20% NOx reduction below Tier I).
- Tier III NOx requirements for new engines starting 2016 (ECA). (Tier III standards represent a 80% NOx reduction below Tier I).

On March 26, 2010, the IMO designated North American ECA, extending up to 200 nautical miles from the coast. The North American ECA, which will become enforceable in 2012, includes standards for both NOx and Sox emissions. The ECA NOx emission standards require new engines to be certified Tier III by 2016. The ECA Sox emission standards require the sulfur content of fuel not to exceed 1.5% until July 2010, 1.0% until 2015, and 0.1% thereafter.

To summarize the IMO NOx standards, pre-2000 engines, require a 20% NO_x reduction except for those engines where reduction is impractical. These reductions need to be met by the year 2012. All engines on board any vessel constructed on or after January 1, 2011 need to meet a NO_x limit 15-25% below the current limits. These are known as Tier 2 NO_x limits.

Beginning in 2016, all engines on board any new vessel constructed on or after January 1, 2016 must meet a NO_x limit 80% below the Tier 1 limits discussed above. These are known as Tier 3 limits.

Figure 6-3 presents combined OCS and onshore NO_x forecasts out to 2030. This figure illustrates that while marine shipping NOx emissions account for the largest percentage of the overall combined NOx inventory, IMO engine requirements will lead to a decrease in NOx emissions through the period. ~~increases in NO_x emissions from marine vessels will overwhelm stationary source NO_x reductions that will be achieved by implementing the every feasible measure strategy and by significant decreases in NO_x from onshore mobile sources.~~ Combined NO_x emissions from onshore and OCS sources are anticipated to decline ~~grow~~ from ~~80.47~~ 88.73 tons per day in 2007 to ~~90.09~~ 71.24 tons per day by 2020. By 2030, combined NO_x emissions are anticipated to ~~increase~~ decrease to ~~100.47~~ 61.00 tons per day, about ~~25~~ 31 percent ~~higher~~ lower than base year estimates.

NO_x emissions from marine shipping alone (excluding commercial and recreational boats) are expected to slightly decrease to 48.23 tons per day by 2020 from base year estimates of 48.62 tons per day. By 2030, marine vessel NO_x emissions are forecasted to decline to 41.87 tons per day, representing a 14% decrease in NOx emissions from base year levels levels.

Figure 6-4 presents total onshore and OCS NO_x emissions but excludes the marine shipping contribution. This figure shows that existing and proposed emission reduction strategies on all sources, excluding marine shipping, are anticipated to be successful at reducing future NO_x emissions below baseline levels. Excluding marine shipping emissions, total onshore and OCS NO_x emissions are predicted to be reduced from about 39 tons per day in 2007 to 19 tons per day by 2030, which represents about a 51 percent decrease in NO_x emissions over the planning horizon. ~~These data are presented because while onshore control strategies provide significant reductions in NO_x 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.~~

Figure 6-5 displays combined onshore and OCS ROC forecasts. This figure shows that total ROC emissions are projected to decline through the forecast period. Combined ROC emissions from onshore and OCS sources are projected to decrease from base year levels by approximately 3.7 tons per day by 2030. Any increases in ROC emissions from marine shipping are negated by significant reductions in ROC emissions that occur from onshore sources, particularly on-road mobile sources.

Figure 6-6 provide a graphical representation of ROC emissions from each source category for both onshore and OCS sources, but excludes marine shipping. As stated above, combined ROC emissions from onshore and OCS sources are expected to remain below baseline levels even with significant growth in marine shipping. **Figure 6-6**, however, emphasizes that proposed control strategies for onshore and non-marine shipping OCS sources will be effective in reducing ROC emissions to below baseline levels.

Formatted: Strikethrough
Formatted: Strikethrough
Formatted: Strikethrough
Formatted: Strikethrough
Formatted: Strikethrough
Formatted: Strikethrough
Formatted: Strikethrough
Formatted: Strikethrough

~~It is important to note that increases in NO_x 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 NO_x), 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 USEPA and ARB.~~

Based on the IMO NOx limits, future emissions have been calculated to determine the emission benefits of the IMO standards . As shown in Figure 6-7, NO_x emissions based on IMO limits are significantly lower than current estimates for the years 2012 through 2020. The NO_x emissions reflect the assumption that the marine shipping fleet turnover would be 2% per year. Additionally, Tier 2 reductions are assumed to be 20% below the current limits, which is the mid-point of the range proposed by the IMO. In the year 2012, one year after the proposed Tier 2 limits are initiated, NO_x emissions are calculated to be 48.85 tons per day, which is about 7 tons per day less than current NO_x emission forecast for 2012. By 2030, the NO_x limits provide a NOx reduction of about 65tons per day less than an uncontrolled forecast. These NO_x reductions are substantial and reflect the introduction of Tier 3 standards, which are 80% lower than Tier 1 standards.

~~On May 12, 2005, the Marine Environment Protection Committee (MEPC) of the International Marine Organization (IMO) requested that its Sub-Committee on Bulk Liquids and Gases (BLG) consider future emission limits for marine diesel engines and their fuels as amendments to MARPOL Annex VI. The BLG was asked to examine available and developing methods for reducing NO_x emissions from large marine vessels and to recommend future NO_x emission limits. Recently, the United States membership of the BLG drafted a NO_x control proposal for large marine vessels engaged in international commerce. The key elements of the United States proposal are:~~

~~For pre-2000 engines, a 20% NO_x reduction would be required except for those engines where reduction is impractical. These reductions would need to be met by the year 2012.~~
~~All engines on board any vessel constructed on or after January 1, 2011 would need to meet a NO_x limit 15-25% below the current limits. These are known as Tier 2 NO_x limits.~~
~~Beginning in 2016, all engines on board any new vessel constructed on or after January 1, 2016 must meet a NO_x limit 80% below the Tier 1 limits discussed above. These are known as Tier 3 limits.~~

~~While these limits are only recommendations based on current and developing technologies, future emissions have been calculated to determine emission benefits should the proposed emission standards be adopted. As shown in Figure 6-7, NO_x emissions based on proposed limits would be significantly lower than current estimates for the years 2012 through 2020. The NO_x emissions based on the proposed limits reflect the assumption that the marine shipping fleet turnover would be 2% per year. Additionally, Tier 2 reductions are assumed to be 20% below the current limits,~~

Formatted: Strikethrough

Formatted: Not Strikethrough

Formatted: Not Strikethrough

Formatted: Not Strikethrough

~~which is the mid-point of the range proposed by the United States. In the year 2012, one year after the proposed Tier 2 limits would be initiated, NO_x emissions are calculated to be 44.11 tons per year if the proposed NO_x limits were adopted. This is about 3 tons per day less than current NO_x emission forecasts for 2012. By 2020, the proposed NO_x limits would provide a NOx reduction of about 28 tons per day less than the current forecast. These potential NO_x reductions are substantial and reflect proposed Tier 3 standards, which are 80% lower than Tier 1 standards.~~

Formatted: Not Strikethrough

~~The NO_x reduction proposal submitted by the United States, along with proposals submitted by other member nations was scheduled to for further discussion with the MEPC in July 2007. These discussions, however, have been postponed until March 2008, which is the earliest time any amendments to Annex VI will be adopted. The APCD will closely follow the development of the United States' proposal and other proposed revisions to MARPOL Annex VI. With the current IMO schedule, any revisions to MARPOL Annex VI will not be adopted in time to be reflected in this Plan. Any amendments to MARPOL Annex VI leading to NO_x reductions, however, will be incorporated into future planning cycles.~~

6.5 CONCLUSION

This chapter presents the ~~2010~~2020 and~~,~~ ~~2015~~2030 ~~and 2020~~ Planning Emission Inventory Forecasts. The ~~2000~~ 2007 Planning Emission Inventory is used as the basis to calculate the ~~2010~~2020 and 2030 ~~, 2015 and 2020~~ forecasts.

ROC emissions from onshore stationary and area-wide sources are forecasted to increase over base year levels by about ~~1.77~~0.53 and ~~1.53~~ 1.23 tons per day, respectively, by ~~2020~~ 2030. NO_x emissions from onshore stationary sources are anticipated to ~~increase~~ decrease from base year levels by about ~~0.02~~1.49 tons per day by ~~2020~~ 2030.~~, while~~ NO_x emissions ~~increases~~decrease from ~~over~~ base year estimates by about 0.62 tons per day by 2030 ~~are expected to be about 0.51 tons per day by 2020~~ for onshore area-wide sources.

Any increases in ROC and NO_x 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 9~~ over 7 tons tons per day by ~~2020~~ 2030, while baseline NO_x emissions are anticipated to decrease by nearly ~~12~~ 19 tons per day by ~~2020~~ 2030. Mobile sources account for the highest percentage of overall onshore ROC emissions until ~~2010~~ 2030, when area-wide sources comprise the largest percentage contribution to the overall ROC onshore inventory. Although there are substantial reductions of NO_x emissions from mobile sources through ~~2020~~ 2030, mobile sources are anticipated to comprise the largest portion of the total onshore NO_x inventory for each of the planning years.

International, federal and state marine shipping fuel and engine standards will significantly reduce shipping emissions throughout the planning horizon. Based on revised IMO engine standards, it is expected that NOx emissions from marine shipping will decrease from about 49 tons per day in 2007 to about 42 tons per day by 2030. ~~While reductions of onshore ROC and NO_x 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 NO_x and ROC emissions in the OCS are exclusively from significant growth that is forecasted for marine shipping. Marine shipping NO_x emissions are expected to more than double from 20022007 to 2020. The increases in marine vessel NO_x emissions that are~~

~~expected to occur will eliminate anticipated NO_x emission reductions from onshore sources. While monitoring data show that air quality in Santa Barbara County has improved significantly over the past several years, the expected growth in emissions from marine shipping could potentially jeopardize our ability to meet or maintain state or federal ozone standards. It should be noted that the ARB is currently in the process of finalizing a control measure to reduce particulate matter and NO_x emissions from marine vessel auxiliary engines. The proposed rule requires that marine vessel operators use cleaner marine distillate fuels when operating auxiliary engines within 24 miles of the California coastline. While significant reductions in particulate matter are expected from this proposed statewide rule, we anticipate that NO_x reductions will be less than 0.1 tons per day for Santa Barbara County. Further emission reductions from marine shipping will require additional action from ARB and USEPA.~~

TABLE 6-3 SANTA BARBARA COUNTY EMISSION INVENTORY	2002 ROC (tons per day)	2002 NO_x (tons per day)	2010 ROC (tons per day)	2010 NO_x (tons per day)	2015 ROC (tons per day)	2015 NO_x (tons per day)	2020 ROC (tons per day)	2020 NO_x (tons per day)
STATIONARY SOURCES								
Fuel Combustion								
010 ELECTRIC UTILITIES	0.0050	0.0244	0.0050	0.0244	0.0050	0.0244	0.0050	0.0244
020 COGENERATION	0.0358	0.1183	0.0249	0.0830	0.0202	0.0681	0.0166	0.0564
030 OIL AND GAS PRODUCTION (COMBUSTION)	0.2374	1.5376	0.2320	0.9674	0.1888	0.7880	0.1548	0.6474
040 PETROLEUM REFINING (COMBUSTION)	0.0023	0.0497	0.0016	0.0344	0.0013	0.0273	0.0010	0.0218
050 MANUFACTURING AND INDUSTRIAL	0.0853	1.1559	0.1054	1.4269	0.1172	1.5861	0.1290	1.7457
052 FOOD AND AGRICULTURAL PROCESSING	0.1226	3.0207	0.1233	3.0295	0.1178	2.9594	0.1141	2.9164
060 SERVICE AND COMMERCIAL	0.0295	0.4787	0.0317	0.5042	0.0332	0.5179	0.0346	0.5411
099 OTHER (FUEL COMBUSTION)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fuel Combustion Total	**0.5179**	**6.3853**	**0.5239**	**6.0697**	**0.4835**	**5.9711**	**0.4553**	**5.9532**
Waste Disposal								
110 SEWAGE TREATMENT	0.0003	0.0088	0.0003	0.0094	0.0003	0.0097	0.0003	0.0100
120 LANDFILLS	0.3372	0.0034	0.4229	0.0043	0.4745	0.0048	0.5128	0.0052
130 INCINERATORS	0.0009	0.0086	0.0010	0.0091	0.0010	0.0093	0.0010	0.0095
140 SOIL REMEDIATION	0.0864	0.0000	0.8064	0.0000	0.8064	0.0000	0.8064	0.0000
199 OTHER (WASTE DISPOSAL)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste Disposal Total	**1.1448**	**0.0208**	**1.2306**	**0.0228**	**1.2822**	**0.0238**	**1.3205**	**0.0246**
Cleaning and Surface Coatings								
210 LAUNDERING	0.0055	0.0000	0.0063	0.0000	0.0066	0.0000	0.0068	0.0000
220 DEGREASING	1.5860	0.0000	1.8514	0.0000	1.9728	0.0000	2.0793	0.0000
230 COATINGS AND RELATED PROCESS SOLVENTS	1.9794	0.0000	2.3824	0.0000	2.7487	0.0000	3.0188	0.0000
240 PRINTING	0.4523	0.0000	0.5142	0.0000	0.4844	0.0000	0.5013	0.0000
250 ADHESIVES AND SEALANTS	0.8591	0.0000	0.8096	0.0000	0.7764	0.0000	0.7489	0.0000
299 OTHER (CLEANING AND SURFACE COATINGS)	0.0963	0.0000	0.1190	0.0000	0.1324	0.0000	0.1458	0.0000
Cleaning and Surface Coatings Total	**4.9786**	**0.0000**	**5.6828**	**0.0000**	**6.1213**	**0.0000**	**6.5008**	**0.0000**
Petroleum Production and Marketing								
310 OIL AND GAS PRODUCTION	1.8019	0.0740	1.5989	0.0651	1.5026	0.0609	1.4081	0.0569
320 PETROLEUM REFINING	0.0441	0.0001	0.0305	0.0001	0.0248	0.0001	0.0203	0.0001
330 PETROLEUM MARKETING	0.5971	0.0000	0.6628	0.0000	0.6964	0.0000	0.7300	0.0000
Petroleum Production and Marketing Total	**2.4431**	**0.0741**	**2.2922**	**0.0652**	**2.2238**	**0.0610**	**2.1584**	**0.0569**

Formatted: Right: 0.5", Top: 0.5", Bottom: 0.5", Width: 8.5", Height: 11"

	TABLE 6 – 3 SANTA BARBARA COUNTY EMISSION INVENTORY	2002 ROC *(tons per day)*	2002 NO_x *(tons per day)*	2010 ROC *(tons per day)*	2010 NO_x *(tons per day)*	2015 ROC *(tons per day)*	2015 NO_x *(tons per day)*	2020 ROC *(tons per day)*	2020 NO_x *(tons per day)*
Industrial Processes									
410	CHEMICAL	0.0260	0.0000	0.0318	0.0000	0.0353	0.0000	0.0389	0.0000
420	FOOD AND AGRICULTURE	0.1329	0.0000	0.1479	0.0000	0.1572	0.0000	0.1666	0.0000
430	MINERAL PROCESSES	0.0110	0.0475	0.0136	0.0587	0.0151	0.0653	0.0166	0.0719
440	METAL PROCESSES	NA	NA	NA	NA	NA	NA	NA	NA
450	WOOD AND PAPER	NA	NA	NA	NA	NA	NA	NA	NA
470	ELECTRONICS	0.0006	0.0000	0.0008	0.0000	0.0009	0.0000	0.0000	0.0000
499	OTHER (INDUSTRIAL PROCESSES)	0.0523	0.0839	0.0523	0.0839	0.0523	0.0839	0.0523	0.0839
	Industrial Processes Total	**0.2228**	**0.1314**	**0.2463**	**0.1426**	**0.2608**	**0.1492**	**0.2754**	**0.1558**
	STATIONARY SOURCES TOTAL	**9.3072**	**6.6116**	**9.9758**	**6.3002**	**10.3715**	**6.2050**	**10.7104**	**6.1906**
AREA-WIDE SOURCES									
Solvent Evaporation									
510	CONSUMER PRODUCTS	3.0527	0.0000	2.7620	0.0000	2.8304	0.0000	2.8987	0.0000
520	ARCHITECTURAL COATINGS AND SOLVENTS	1.6885	0.0000	1.4751	0.0000	1.5216	0.0000	1.5758	0.0000
530	PESTICIDES/FERTILIZERS	3.1186	0.0000	2.8335	0.0000	3.1172	0.0000	3.4295	0.0000
540	ASPHALT PAVING/ROOFING	0.2755	0.0000	0.3353	0.0000	0.3702	0.0000	0.4043	0.0000
	Solvent Evaporation Total	**8.1353**	**0.0000**	**7.4059**	**0.0000**	**7.8394**	**0.0000**	**8.3083**	**0.0000**
Miscellaneous									
610	RESIDENTIAL FUEL COMBUSTION	0.1273	0.4875	0.1319	0.4493	0.1350	0.4632	0.1385	0.4476
620	FARMING OPERATIONS	1.2442	0.0000	1.2442	0.0000	1.2442	0.0000	1.2442	0.0000
630	CONSTRUCTION AND DEMOLITION	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
640	PAVED ROAD DUST	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
645	UNPAVED ROAD DUST	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
650	FUGITIVE WINDBLOWN DUST	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
660	FIRES	0.0035	0.0011	0.0038	0.0011	0.0038	0.0012	0.0039	0.0012
670	MANAGED BURNING AND DISPOSAL	0.3828	0.1440	1.7218	0.6897	1.7218	0.6897	1.7221	0.6897
690	COOKING	0.0287	0.0000	0.0319	0.0000	0.0339	0.0000	0.0359	0.0000
699	OTHER (MISCELLANEOUS PROCESSES)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Miscellaneous Total	**2.7275**	**0.6326**	**3.1338**	**1.1401**	**3.1388**	**1.1541**	**3.1448**	**1.1385**
	AREA-WIDE SOURCES TOTAL	**9.9218**	**0.6326**	**10.5397**	**1.1401**	**10.9782**	**1.1541**	**11.4529**	**1.1385**

MOBILE SOURCES

	TABLE 6—3 SANTA BARBARA COUNTY EMISSION INVENTORY	2002 ROC *(tons per day)*	2002 NO_x *(tons per day)*	2010 ROC *(tons per day)*	2010 NO_x *(tons per day)*	2015 ROC *(tons per day)*	2015 NO_x *(tons per day)*	2020 ROC *(tons per day)*	2020 NO_x *(tons per day)*
On-Road Motor Vehicles									
710	LIGHT DUTY PASSENGER	6.1110	5.0790	2.9220	2.5770	1.7910	1.5610	1.2370	0.9910
722	LIGHT DUTY TRUCKS—1	2.7330	3.0280	1.7960	1.8300	1.3800	1.3230	0.9790	0.8660
723	LIGHT DUTY TRUCKS—2	1.9110	2.9100	1.4480	2.0750	1.1560	1.4950	0.9420	1.0560
724	MEDIUM DUTY TRUCKS	0.4220	0.8510	0.4070	0.7820	0.3660	0.6010	0.3170	0.4330
732	LIGHT HEAVY DUTY GAS TRUCKS—1	0.2940	0.2170	0.1880	0.3090	0.1320	0.3090	0.1400	0.2920
733	LIGHT HEAVY DUTY GAS TRUCKS—2	0.3410	0.3000	0.2260	0.2270	0.1310	0.1900	0.1030	0.1480
734	MEDIUM HEAVY DUTY GAS TRUCKS	0.3910	0.3260	0.1920	0.2470	0.1060	0.1750	0.0690	0.1160
736	HEAVY HEAVY DUTY GAS TRUCKS	0.3070	0.8690	0.1720	0.4260	0.0880	0.2480	0.0540	0.1290
742	LIGHT HEAVY DUTY DIESEL TRUCKS—1	0.0020	0.0320	0.0140	0.3030	0.0080	0.2280	0.0110	0.1640
743	LIGHT HEAVY DUTY DIESEL TRUCKS—2	0.0100	0.2350	0.0160	0.3030	0.0090	0.2360	0.0120	0.1660
744	MEDIUM HEAVY DUTY DIESEL TRUCKS	0.0370	1.8350	0.0430	1.6300	0.0300	1.0860	0.0330	0.7000
746	HEAVY HEAVY DUTY DIESEL TRUCKS	0.1510	2.1650	0.1620	2.2870	0.0980	1.4540	0.0870	1.0200
750	MOTORCYCLES	0.4040	0.0930	0.5390	0.1790	0.4990	0.1790	0.5110	0.1880
760	HEAVY DUTY DIESEL URBAN BUSES	0.0030	0.3570	0.0120	0.3170	0.0110	0.2820	0.0100	0.2640
762	HEAVY DUTY GAS URBAN BUSES	0.0340	0.0230	0.0270	0.0280	0.0270	0.0300	0.0310	0.0320
770	SCHOOL BUSES	0.0170	0.2160	0.0160	0.3010	0.0110	0.3140	0.0170	0.2790
776	OTHER BUSES	0.0280	0.1020	0.0230	0.1200	0.0150	0.0900	0.0120	0.0610
780	MOTOR HOMES	0.0810	0.2030	0.0440	0.1470	0.0170	0.1140	0.0110	0.0720
	On-Road Motor Vehicles Total	**13.2770**	**18.8410**	**8.2470**	**14.0880**	**5.8750**	**9.9150**	**4.5760**	**6.9770**

TABLE 6 – 3 SANTA BARBARA COUNTY EMISSION INVENTORY	2002 ROC *(tons per day)*	2002 NO_x *(tons per day)*	2010 ROC *(tons per day)*	2010 NO_x *(tons per day)*	2015 ROC *(tons per day)*	2015 NO_x *(tons per day)*	2020 ROC *(tons per day)*	2020 NO_x *(tons per day)*
Other Mobile Sources								
810 AIRCRAFT	0.7744	0.0865	0.9106	0.1021	0.9722	0.1077	1.0337	0.1133
820 TRAINS	0.1399	2.6075	0.2331	2.3467	0.2416	2.2518	0.2501	2.1910
830 SHIPS AND COMMERCIAL BOATS	0.0406	0.4931	0.0445	0.5385	0.0470	0.5668	0.0494	0.5951
840 RECREATIONAL BOATS	1.3761	0.0981	1.1197	0.1655	1.0122	0.1782	0.9618	0.1958
850 OFF-ROAD RECREATIONAL VEHICLES	1.6637	0.0774	2.2768	0.1253	2.6419	0.1363	3.1343	0.1585
860 OFF-ROAD EQUIPMENT	2.9900	8.1365	2.2217	6.2875	1.7435	4.7869	1.4736	3.5093
870 FARM EQUIPMENT	0.7249	3.6212	0.5139	2.6557	0.3457	1.9054	0.2242	1.2542
890 FUEL STORAGE AND HANDLING	0.6276	0.0000	0.3417	0.0000	0.2477	0.0000	0.1994	0.0000
Other Mobile Sources Total	**8.3372**	**15.1203**	**7.6620**	**12.2213**	**7.2518**	**9.9331**	**7.3265**	**8.0172**
MOBILE SOURCES TOTAL	**21.6142**	**33.9613**	**15.9090**	**26.3093**	**13.1268**	**19.8481**	**11.9025**	**14.9942**
SOURCE REGISTER EMISSION REDUCTION CREDITS	**NA**	**NA**	**0.3740**	**0.4377**	**0.3740**	**0.4377**	**0.3740**	**0.4377**
VANDENBERG AIR FORCE AIRBORNE LASER MISSION	**NA**	**NA**	**0.0656**	**0.3602**	**0.0656**	**0.3602**	**0.0656**	**0.3602**
SANTA BARBARA COUNTY TOTAL	**40.8432**	**41.2055**	**36.8641**	**34.5475**	**34.9161**	**28.0051**	**34.5054**	**23.1212**

TABLE 6-34 SANTA BARBARA COUNTY EMISSION INVENTORY	2002 ROC (tons per day)	2002 NO_x (tons per day)	2010 ROC (tons per day)	2010 NO_x (tons per day)	2015 ROC (tons per day)	2015 NO_x (tons per day)	2020 ROC (tons per day)	2020 NO_x (tons per day)
STATIONARY SOURCES								
Fuel Combustion								
030 OIL AND GAS PRODUCTION (COMBUSTION)	0.0685	0.8090	0.0693	0.8070	0.0693	0.8069	0.0693	0.8069
Fuel Combustion Total	**0.0685**	**0.8090**	**0.0693**	**0.8070**	**0.0693**	**0.8069**	**0.0693**	**0.8069**
Cleaning and Surface Coatings								
230 COATINGS AND RELATED PROCESS SOLVENTS	0.0542	0.0000	0.0197	0.0000	0.0197	0.0000	0.0197	0.0000
Cleaning and Surface Coatings Total	**0.0542**	**0.0000**	**0.0197**	**0.0000**	**0.0197**	**0.0000**	**0.0197**	**0.0000**
Petroleum Production and Marketing								
310 OIL AND GAS PRODUCTION	1.0440	0.0271	1.0440	0.0271	1.0440	0.0271	1.0440	0.0271
Petroleum Production and Marketing Total	**1.0440**	**0.0271**	**1.0440**	**0.0271**	**1.0440**	**0.0271**	**1.0440**	**0.0271**
STATIONARY SOURCES TOTAL	**1.1668**	**0.8361**	**1.1330**	**0.8341**	**1.1330**	**0.8340**	**1.1330**	**0.8340**
MOBILE SOURCES								
Other Mobile Sources								
810 AIRCRAFT	0.0214	0.0156	0.0214	0.0156	0.0214	0.0156	0.0214	0.0156
830 SHIPS AND COMMERCIAL BOATS	1.3119	38.3060	1.7400	54.5200	2.0815	65.4960	2.4180	76.3090
840 RECREATIONAL BOATS	1.3761	0.0981	1.1197	0.1655	1.0122	0.1782	0.9618	0.1958
Other Mobile Sources Total	**2.7094**	**38.4197**	**2.8811**	**54.7011**	**3.1151**	**65.6898**	**3.4012**	**76.5204**
MOBILE SOURCES TOTAL	**2.7094**	**38.4197**	**2.8811**	**54.7011**	**3.1151**	**65.6898**	**3.4012**	**76.5204**
OUTER CONTINENTAL SHELF TOTAL	**3.8762**	**39.2558**	**4.0141**	**55.5352**	**4.2481**	**66.5238**	**4.5342**	**77.3544**

TABLE 6-3 SANTA BARBARA COUNTY EMISSION INVENTORY	2007 ROC *(tons per day)*	2007 NO_X *(tons per day)*	2020 ROC *(tons per day)*	2020 NO_X *(tons per day)*	2030 ROC *(tons per day)*	2030 NO_X *(tons per day)*
STATIONARY SOURCES						
Fuel Combustion						
010 ELECTRIC UTILITIES	0.0019	0.0042	0.0019	0.0042	0.0019	0.0042
020 COGENERATION	0.0323	0.1106	0.0230	0.0789	0.0184	0.0631
030 OIL AND GAS PRODUCTION (COMBUSTION)	0.1172	1.7651	0.0844	1.2459	0.0680	0.9986
040 PETROLEUM REFINING (COMBUSTION)	0.0005	0.0121	0.0004	0.0036	0.0003	0.0028
050 MANUFACTURING AND INDUSTRIAL	0.0639	1.0022	0.0639	0.9979	0.0639	0.9979
052 FOOD AND AGRICULTURAL PROCESSING	0.1878	3.8758	0.1179	2.9266	0.1348	3.1373
060 SERVICE AND COMMERCIAL	0.0577	0.6413	0.0626	0.6751	0.0670	0.7251
099 OTHER (FUEL COMBUSTION)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fuel Combustion Total	**0.4613**	**7.4113**	**0.3541**	**5.9322**	**0.3543**	**5.9290**
Waste Disposal						
110 SEWAGE TREATMENT	0.0020	0.0023	0.0021	0.0023	0.0021	0.0024
120 LANDFILLS	0.1390	0.0046	0.1823	0.0061	0.2152	0.0072
130 INCINERATORS	0.0004	0.0039	0.0004	0.0040	0.0004	0.0041
140 SOIL REMEDIATION	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
199 OTHER (WASTE DISPOSAL)	0.0000	0.0000	0.0313	0.0000	0.0313	0.0000
Waste Disposal Total	**0.1414**	**0.0108**	**0.2161**	**0.0124**	**0.2490**	**0.0137**
Cleaning and Surface Coatings						
210 LAUNDERING	0.0063	0.0000	0.0069	0.0000	0.0072	0.0000
220 DEGREASING	1.8800	0.0000	2.0473	0.0000	2.0473	0.0000
230 COATINGS AND RELATED PROCESS SOLVENTS	2.0500	0.0000	2.6978	0.0000	2.6978	0.0000
240 PRINTING	0.4775	0.0000	0.5193	0.0000	0.4847	0.0000
250 ADHESIVES AND SEALANTS	0.8300	0.0000	0.7491	0.0000	0.7491	0.0000
299 OTHER (CLEANING AND SURFACE COATINGS)	0.1056	0.0000	0.1511	0.0000	0.1511	0.0000
Cleaning and Surface Coatings Total	**5.3494**	**0.0000**	**6.1715**	**0.0000**	**6.1372**	**0.0000**
Petroleum Production and Marketing						
310 OIL AND GAS PRODUCTION	2.1050	0.0667	1.8752	0.0575	1.7274	0.0519
320 PETROLEUM REFINING	0.0407	0.0002	0.0290	0.0001	0.0232	0.0001
330 PETROLEUM MARKETING	0.5224	0.0000	0.5502	0.0000	0.5597	0.0000
Petroleum Production and Marketing Total	**2.6681**	**0.0669**	**2.4544**	**0.0576**	**2.3103**	**0.0520**

	TABLE 6-3 SANTA BARBARA COUNTY EMISSION INVENTORY	2007 ROC *(tons per day)*	2007 NO_X *(tons per day)*	2020 ROC *(tons per day)*	2020 NO_X *(tons per day)*	2030 ROC *(tons per day)*	2030 NO_X *(tons per day)*
Industrial Processes							
410	CHEMICAL	0.0155	0.0000	0.0108	0.0000	0.0108	0.0000
420	FOOD AND AGRICULTURE	0.1124	0.0000	0.1525	0.0000	0.1689	0.0000
430	MINERAL PROCESSES	0.0043	0.0348	0.0043	0.0348	0.0043	0.0348
440	METAL PROCESSES	NA	NA	NA	NA	NA	NA
450	WOOD AND PAPER	NA	NA	NA	NA	NA	NA
470	ELECTRONICS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
499	OTHER (INDUSTRIAL PROCESSES)	0.0959	0.0839	0.1488	0.0839	0.1488	0.0839
	Industrial Processes Total	**0.2281**	**0.1187**	**0.3164**	**0.1187**	**0.3328**	**0.1187**
	STATIONARY SOURCES TOTAL	**8.8483**	**7.6077**	**9.5125**	**6.1209**	**9.3836**	**6.1134**
AREA-WIDE SOURCES							
Solvent Evaporation							
510	CONSUMER PRODUCTS	2.7200	0.0000	2.9275	0.0000	2.9275	0.0000
520	ARCHITECTURAL COATINGS AND SOLVENTS	1.2200	0.0000	1.5765	0.0000	1.5765	0.0000
530	PESTICIDES/FERTILIZERS	3.2200	0.0000	3.6869	0.0000	3.6869	0.0000
540	ASPHALT PAVING/ROOFING	0.2348	0.0000	0.2997	0.0000	0.3017	0.0000
	Solvent Evaporation Total	**7.3948**	**0.0000**	**8.4906**	**0.0000**	**8.4926**	**0.0000**
Miscellaneous							
610	RESIDENTIAL FUEL COMBUSTION	0.0368	0.9098	0.1359	0.3225	0.1369	0.2821
620	FARMING OPERATIONS	0.8768	0.0000	0.8768	0.0000	0.8768	0.0000
630	CONSTRUCTION AND DEMOLITION	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
640	PAVED ROAD DUST	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
645	UNPAVED ROAD DUST	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
650	FUGITIVE WINDBLOWN DUST	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
660	FIRES	0.0000	0.0000	0.0037	0.0032	0.0037	0.0032
670	MANAGED BURNING AND DISPOSAL	0.0225	0.0016	0.0426	0.0020	0.0461	0.0020
690	COOKING	0.0283	0.0000	0.0332	0.0000	0.0368	0.0000
699	OTHER (MISCELLANEOUS PROCESSES)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Miscellaneous Total	**0.9644**	**0.9114**	**1.0922**	**0.3277**	**1.1003**	**0.2873**
	AREA-WIDE SOURCES TOTAL	**8.3592**	**0.9114**	**9.5828**	**0.3277**	**9.5929**	**0.2873**

	TABLE 6-3 SANTA BARBARA COUNTY EMISSION INVENTORY	2007 ROC *(tons per day)*	2007 NO_X *(tons per day)*	2020 ROC *(tons per day)*	2020 NO_X *(tons per day)*	2030 ROC *(tons per day)*	2030 NO_X *(tons per day)*
	MOBILE SOURCES						
	On-Road Motor Vehicles						
710	LIGHT DUTY PASSENGER	3.6800	3.0200	1.1400	0.8000	0.6800	0.3900
722	LIGHT DUTY TRUCKS – 1	1.9000	1.8800	0.0900	0.7000	0.4900	0.2700
723	LIGHT DUTY TRUCKS – 2	1.5300	2.1900	0.8700	0.8600	0.6700	0.4500
724	MEDIUM DUTY TRUCKS	0.4100	0.8000	0.2900	0.3500	0.2400	0.1900
732	LIGHT HEAVY DUTY GAS TRUCKS – 1	0.1800	0.3100	0.1200	0.2800	0.1100	0.2500
733	LIGHT HEAVY DUTY GAS TRUCKS – 2	0.2000	0.2500	0.0900	0.1400	0.0500	0.1100
734	MEDIUM HEAVY DUTY GAS TRUCKS	0.2400	0.3100	0.0600	0.1200	0.0400	0.0600
736	HEAVY HEAVY DUTY GAS TRUCKS	0.1900	0.6300	0.0500	0.1300	0.0200	0.0500
742	LIGHT HEAVY DUTY DIESEL TRUCKS – 1	0.0100	0.3800	0.0000	0.1400	0.0000	0.0800
743	LIGHT HEAVY DUTY DIESEL TRUCKS – 2	0.0100	0.3300	0.0100	0.1400	0.0000	0.0800
744	MEDIUM HEAVY DUTY DIESEL TRUCKS	0.0300	2.0500	0.0300	0.7400	0.0200	0.4100
746	HEAVY HEAVY DUTY DIESEL TRUCKS	0.1600	2.7700	0.0700	0.9700	0.0500	0.6200
750	MOTORCYCLES	0.5400	0.1600	0.4400	0.1500	0.4600	0.1500
760	HEAVY DUTY DIESEL URBAN BUSES	0.0100	0.3200	0.0100	0.2600	0.0100	0.2200
762	HEAVY DUTY GAS URBAN BUSES	0.0200	0.0300	0.0300	0.0300	0.0100	0.0200
770	SCHOOL BUSES	0.0100	0.3400	0.0100	0.3200	0.0100	0.2800
776	OTHER BUSES	0.0200	0.1300	0.0100	0.0600	0.0100	0.0400
780	MOTOR HOMES	0.0300	0.1700	0.0100	0.0800	0.0000	0.0300
	On-Road Motor Vehicles Total	**9.1700**	**16.0600**	**4.1900**	**6.2800**	**2.8600**	**3.7200**
	Other Mobile Sources						
810	AIRCRAFT	0.3102	0.8321	0.3792	1.0821	0.4270	1.2554
820	TRAINS	0.2100	3.0500	0.1983	2.4922	0.1983	2.4922
830	SHIPS AND COMMERCIAL BOATS	0.0431	0.5552	0.0506	0.6445	0.0554	0.6999
840	RECREATIONAL BOATS	0.6930	0.0994	0.4980	0.1200	0.5920	0.1610
850	OFF-ROAD RECREATIONAL VEHICLES	0.8440	0.0824	1.1280	0.1020	1.5350	0.1110
860	OFF-ROAD EQUIPMENT	2.4790	7.1000	1.3960	3.5100	1.2790	2.500
870	FARM EQUIPMENT	0.5008	2.4900	0.1904	1.0300	0.1220	0.4930
890	FUEL STORAGE AND HANDLING	0.3700	0.0000	0.1994	0.0000	0.1994	0.0000
	Other Mobile Sources Total	**5.4501**	**14.2091**	**4.0399**	**8.9808**	**4.4081**	**7.7125**
	MOBILE SOURCES TOTAL	**14.6201**	**30.2691**	**8.2299**	**15.2608**	**7.2681**	**11.4325**
	SOURCE REGISTER EMISSION REDUCTION CREDITS	**NA**	**NA**	**0.3077**	**0.6212**	**0.3077**	**0.6212**
	SANTA BARBARA COUNTY TOTAL	**31.8276**	**38.7882**	**27.6329**	**22.3306**	**26.5523**	**18.4544**

	TABLE 6 – 4 OUTER CONTINENTAL SHELF EMISSIONS INVENTORY	2007 ROC *(tons per day)*	2007 NO_x *(tons per day)*	2020 ROC *(tons per day)*	2020 NO_x *(tons per day)*	2030 ROC *(tons per day)*	2030 NO_x *(tons per day)*
Fuel Combustion							
030	OIL AND GAS PRODUCTION (COMBUSTION)	0.0284	0.5706	0.0284	0.5640	0.0284	0.5640
	Fuel Combustion Total	**0.0284**	**0.5706**	**0.0284**	**0.5640**	**0.0284**	**0.5640**
Cleaning and Surface Coatings							
230	COATINGS AND RELATED PROCESS SOLVENTS	0.0355	0.0000	0.0355	0.0000	0.0355	0.0000
	Cleaning and Surface Coatings Total	**0.0355**	**0.0000**	**0.0355**	**0.0000**	**0.0355**	**0.0000**
Petroleum Production and Marketing							
310	OIL AND GAS PRODUCTION	0.7654	0.0129	0.7654	0.0129	0.7654	0.0129
	Petroleum Production and Marketing Total	**0.7654**	**0.0129**	**0.7654**	**0.0129**	**0.7654**	**0.0129**
	STATIONARY SOURCES TOTAL	**0.8293**	**0.5835**	**0.8293**	**0.5769**	**0.8293**	**0.5769**
MOBILE SOURCES							
Other Mobile Sources							
810	AIRCRAFT	0.0092	0.0040	0.0092	0.0040	0.0092	0.0040
830	SHIPS AND COMMERCIAL BOATS	1.6110	49.2571	2.2277	48.2300	3.5029	41.870
840	RECREATIONAL BOATS	0.8200	0.10000	0.4809	0.0979	0.4809	0.0979
	Other Mobile Sources Total	**2.4402**	**49.3611**	**2.7178**	**48.3319**	**3.9930**	**41.9719**
	MOBILE SOURCES TOTAL	**2.4402**	**49.3611**	**2.7178**	**48.3319**	**3.9930**	**41.9719**
	OUTER CONTINENTAL SHELF TOTAL	**3.2695**	**49.9446**	**3.5471**	**48.9088**	**4.8223**	**42.5488**

TABLE 6-5

2007 CLEAN AIR PLAN ACTIVITY INDICATORS AND FACTORS FOR 2010, 2015 AND 2020

ACTIVITY INDICATOR	UNITS	VALUE				FACTOR			INFORMATION SOURCE
		2002	2010	2015	2020	2010	2015	2020	
Agricultural Acres	Acres	120,653	121,527	114,596	110,350	1.007	0.950	0.915	(7)
Aircraft Operations	Operations	304,464	385,300	414,200	443,100	1.266	1.360	1.455	(1) / (10)
Daily Vehicle Miles	1,000 Miles Traveled	9,952	12,064	13,108	14,151	1.212	1.317	1.422	(12)
EMP. - Commercial	Employees	92,300	102,700	109,200	115,700	1.113	1.183	1.254	(11)
EMP. - Industrial	Employees	28,900	35,820	39,840	43,860	1.239	1.379	1.518	(11)
EMP. - Public Services	Employees	39,480	42,000	43,200	44,400	1.064	1.094	1.125	(11)
Housing	Households	140,638	154,053	160,724	164,641	1.095	1.143	1.171	(11)
Landfills	1,000 Tons in Place	16,729	20,983	23,545	25,443	1.254	1.407	1.521	(13)
Locomotives	Annual Train Passages	6,023	10,038	10,403	10,768	1.667	1.727	1.788	(2) / (4) / (13)
No Growth	No Units	1	1	1	1	1.000	1.000	1.000	(8)
OCS Production	No Units	1	1	1	1	1.000	1.000	1.000	(9)
Petroleum Production	1,000 Barrels Oil	3,635	2,517	2,044	1,672	0.692	0.562	0.460	(3)
Petroleum Wells	Producing & Inactive Wells	2,202	1,979	1,871	1,762	0.899	0.850	0.800	(3)
Population	Residents	399,300	462,000	488,000	505,000	1.157	1.222	1.265	(11)
Prescribed Fires	Acres	1,275	6,250	6,250	6,250	4.902	4.902	4.902	(15)
Ship Activity	1,000 Kilowatts	165,081	249,509	300,610	350,966	1.511	1.821	2.126	(5) / (6)

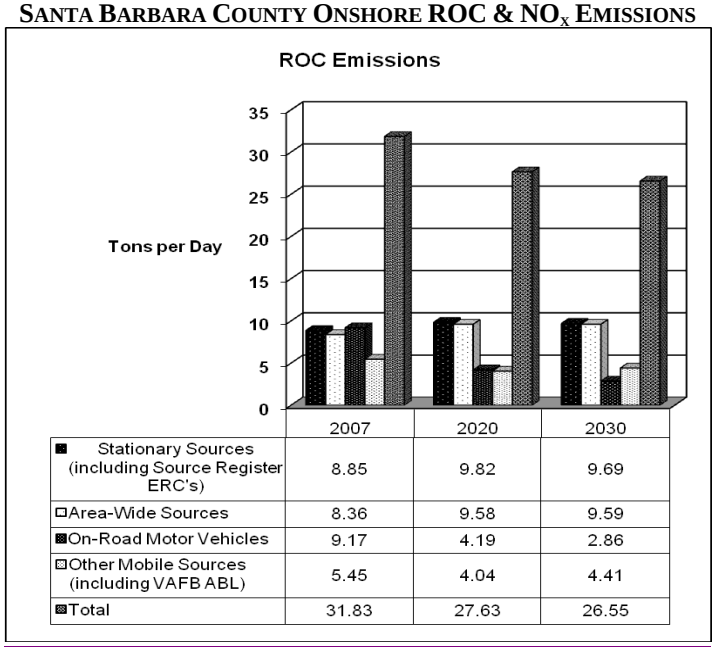
INFORMATION SOURCES

(1) Airport Master Plans within Santa Barbara County
(2) AMTRAK
(3) California Department of Conservation - Divisions of Oil & Gas
(4) California Department of Transportation
(5) Lloyds Maritime Database
(6) Marine Exchange of Southern California
(7) Santa Barbara County Agriculture Commissioner: Agricultural Crop Reports
(8) Santa Barbara County Air Pollution Control District
(9) Santa Barbara County Air Pollution Control District Community Advisory Council
(10) Santa Barbara County Association of Governments
(11) Santa Barbara County Association of Governments 2004 Regional Growth Forecast
(12) Santa Barbara County Association of Governments Travel Model
(13) Solid Waste Agencies within Santa Barbara County
(14) Union Pacific
(15) United States Forest Service

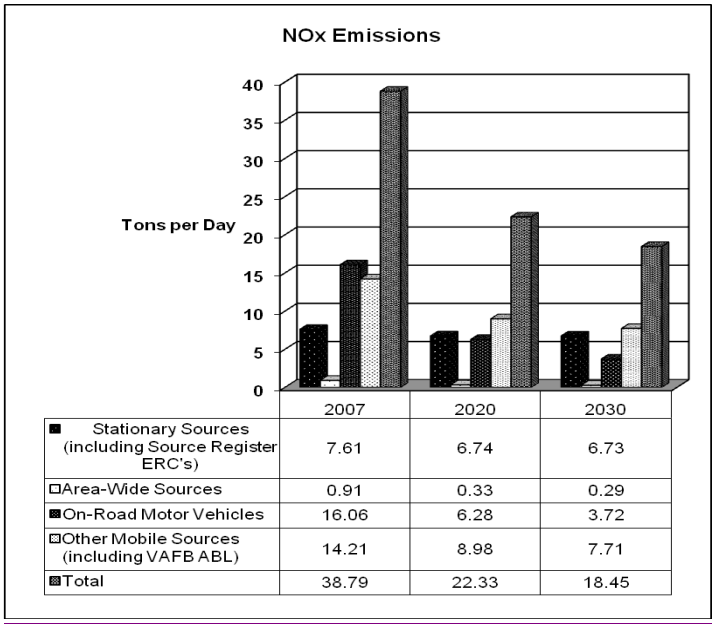
TABLE 6-5
2010 CLEAN AIR PLAN ACTIVITY INDICATORS AND FACTORS FOR 2020 AND 2030

ACTIVITY INDICATOR	UNITS	VALUE			FACTOR		INFORMATION SOURCE
		2007	2020	2030	2020	2030	
Agricultural Acres	Acres	132,434	110,826	131,334	0.8368	0.9917	Agricultural Commissioner's Crop Reports
Aircraft Operations	Operations	259,746	340,383	396,238	1.3104	1.5255	Airport Master Plans / SBCAG RTP
Daily Vehicle Miles	1,000 Miles Traveled	10,346	11,515	11,852	1.1130	1.1456	SBCAG Travel Model
EMP. - Commercial	Employees	103,180	121,150	134,250	1.1742	1.3011	SBCAG RGF
EMP. - Industrial	Employees	24,506	24,500	24,500	0.9998	0.9998	SBCAG RGF
EMP. - Public Services	Employees	39,650	40,950	41,950	1.0328	1.0580	SBCAG RGF
Housing	Households	149,022	157,648	164,422	1.0579	1.1033	SBCAG RGF
Landfills	1,000 Tons Waste in Place	19,022	24,950	29,442	1.3116	1.5478	Local Solid Waste Agencies
Locomotives	Annual Train Passages	10,038	16,729	16,729	1.6666	1.6666	AMTRAK/Union Pacific
No Growth	No Units	1	1	1	1.0000	1.0000	APCD
OCS Production	No Units	1	1	1	1.0000	1.0000	APCD Community Advisory Council
Petroleum Production	1,000 Barrels Oil	3,178	2,267	1,813	0.7133	0.5705	CA Division of Oil & Gas
Petroleum Wells	Producing & Inactive Wells	2,105	1,903	1,762	0.9040	0.8371	CA Division of Oil & Gas
Population	Residents	422,580	459,600	481,400	1.0876	1.1392	SBCAG RGF
Prescribed Fires	Acres	1,275	6,250	6,250	4.9020	4.9020	U.S. Forest Service
Ship Activity	1,000 TEU	15,668	21,827	34,563	1.3931	2.2060	Ports of LA and LB

FIGURE 6-1
SANTA BARBARA COUNTY ONSHORE ROC & NO_x EMISSIONS

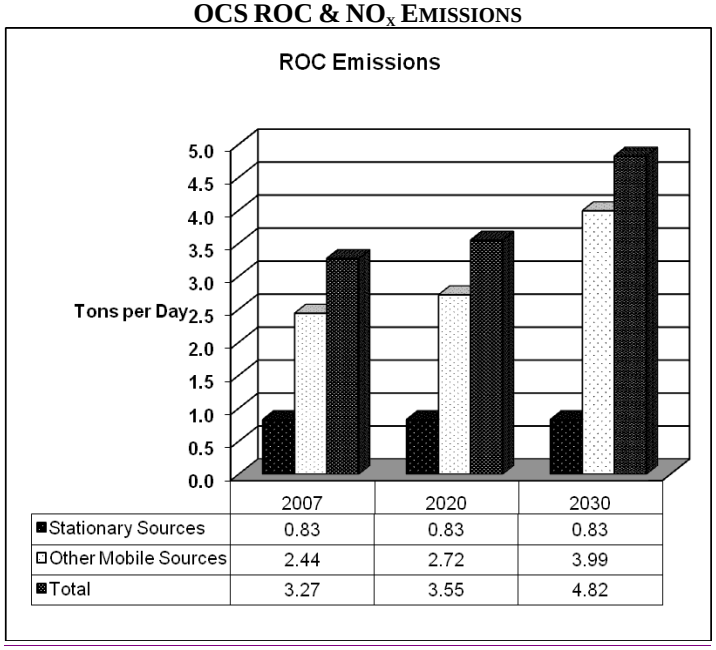


	2007	2020	2030
Stationary Sources (including Source Register ERC's)	8.85	9.82	9.69
Area-Wide Sources	8.36	9.58	9.59
On-Road Motor Vehicles	9.17	4.19	2.86
Other Mobile Sources (including VAFB ABL)	5.45	4.04	4.41
Total	31.83	27.63	26.55

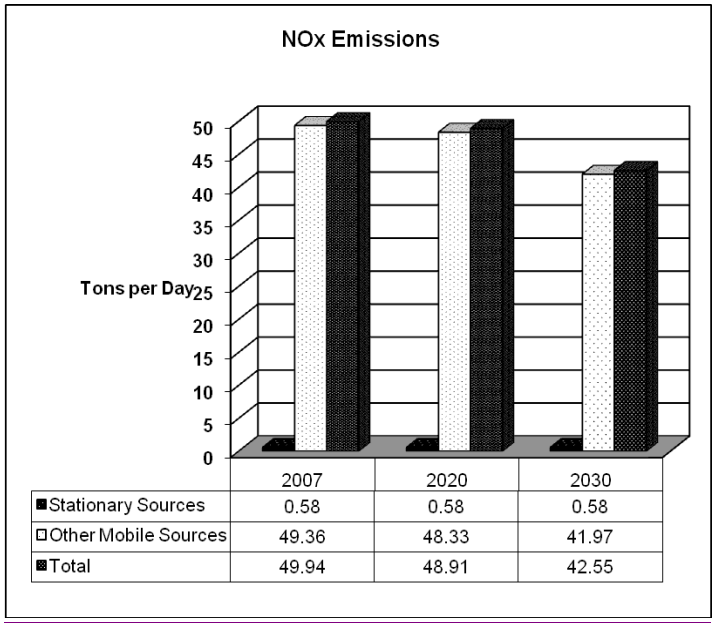


	2007	2020	2030
Stationary Sources (including Source Register ERC's)	7.61	6.74	6.73
Area-Wide Sources	0.91	0.33	0.29
On-Road Motor Vehicles	16.06	6.28	3.72
Other Mobile Sources (including VAFB ABL)	14.21	8.98	7.71
Total	38.79	22.33	18.45

FIGURE 6-2
OCS ROC & NO_x EMISSIONS

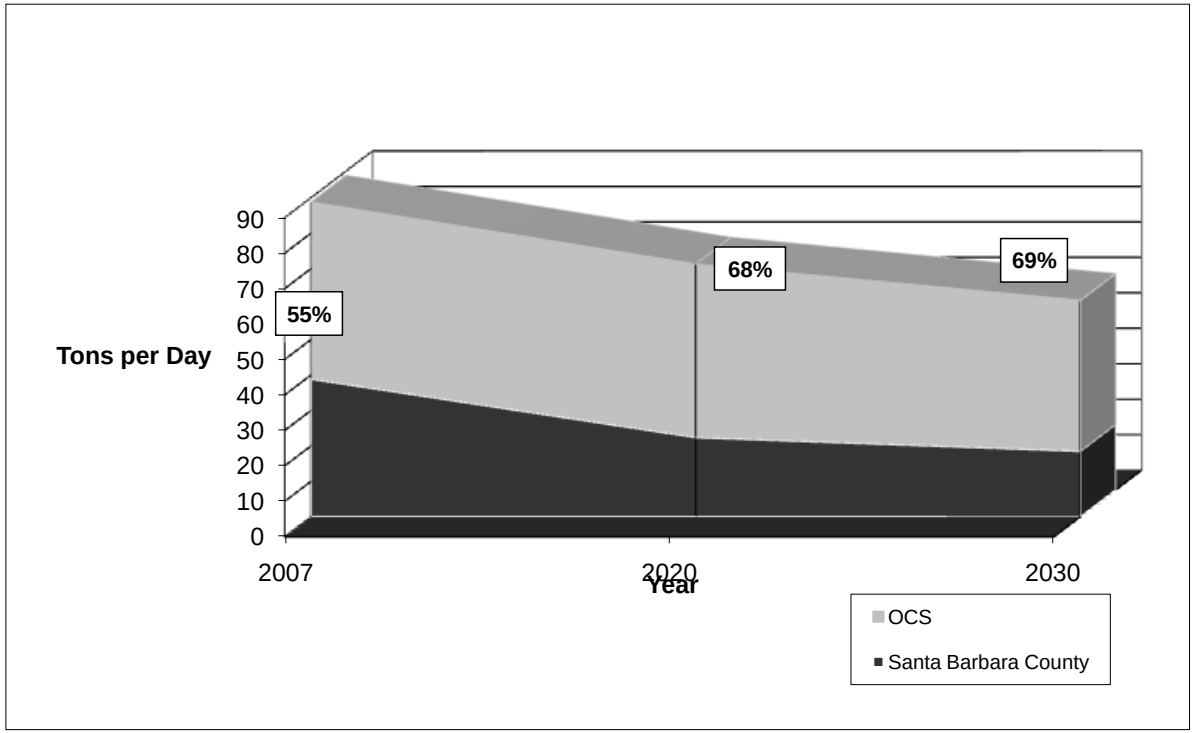


	2007	2020	2030
Stationary Sources	0.83	0.83	0.83
Other Mobile Sources	2.44	2.72	3.99
Total	3.27	3.55	4.82



	2007	2020	2030
Stationary Sources	0.58	0.58	0.58
Other Mobile Sources	49.36	48.33	41.97
Total	49.94	48.91	42.55

FIGURE 6-3
SANTA BARBARA COUNTY AND OCS NO_x EMISSIONS FORECAST INCLUDING MARINE VESSELS



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

FIGURE 6-4
SANTA BARBARA COUNTY AND OCS NO_x EMISSIONS FORECAST MARINE VESSELS EXCLUDED

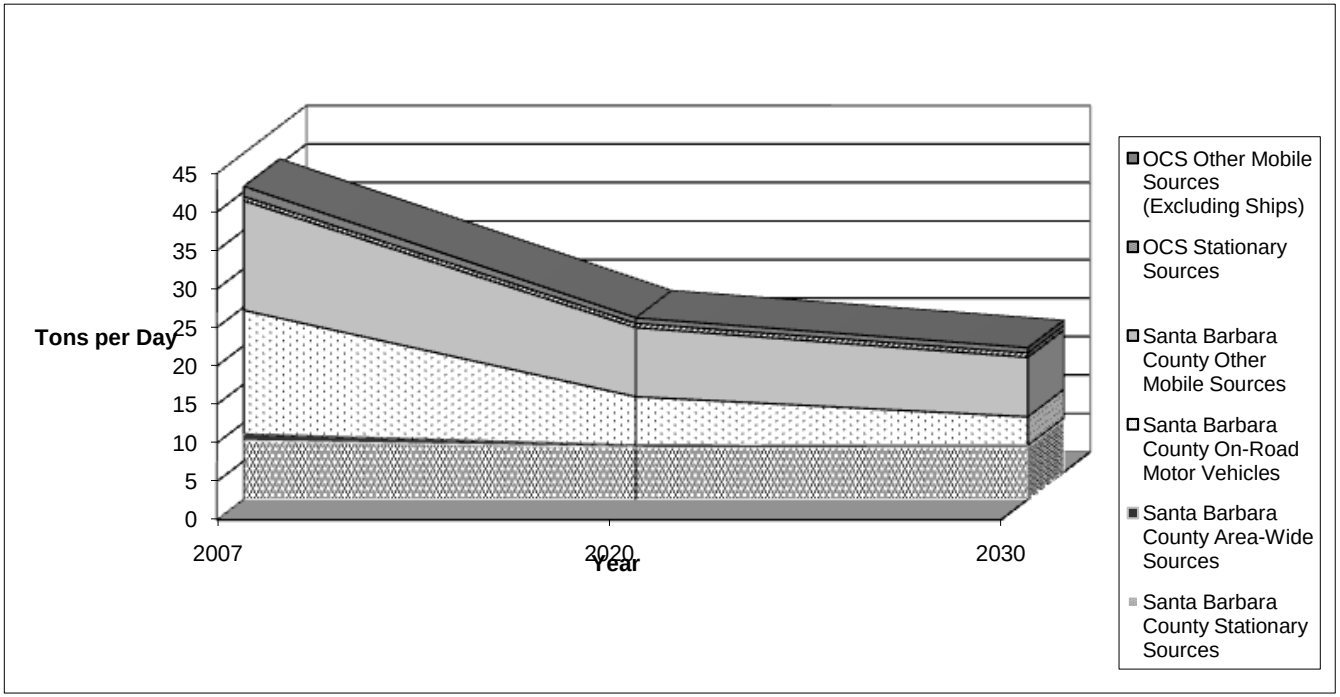
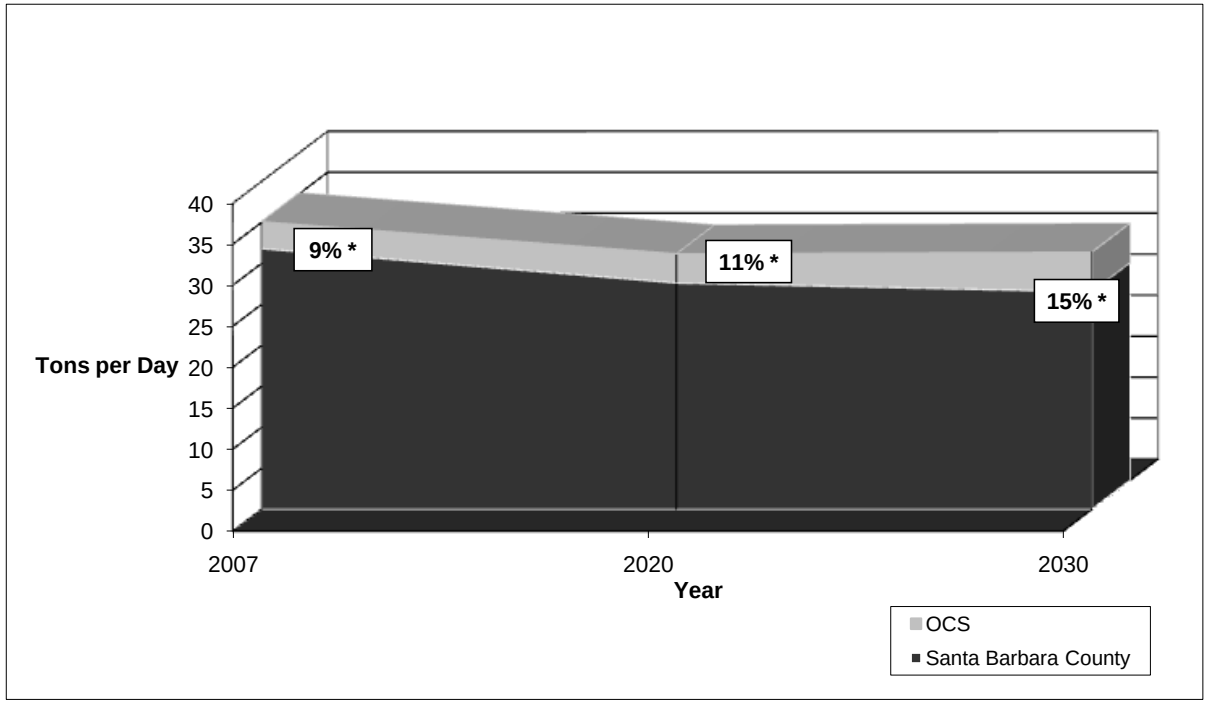


FIGURE 6-5
SANTA BARBARA COUNTY AND OCS ROC EMISSIONS FORECAST INCLUDING MARINE VESSELS



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

FIGURE 6-6
SANTA BARBARA COUNTY AND OCS ROC EMISSIONS FORECAST MARINE VESSELS EXCLUDED

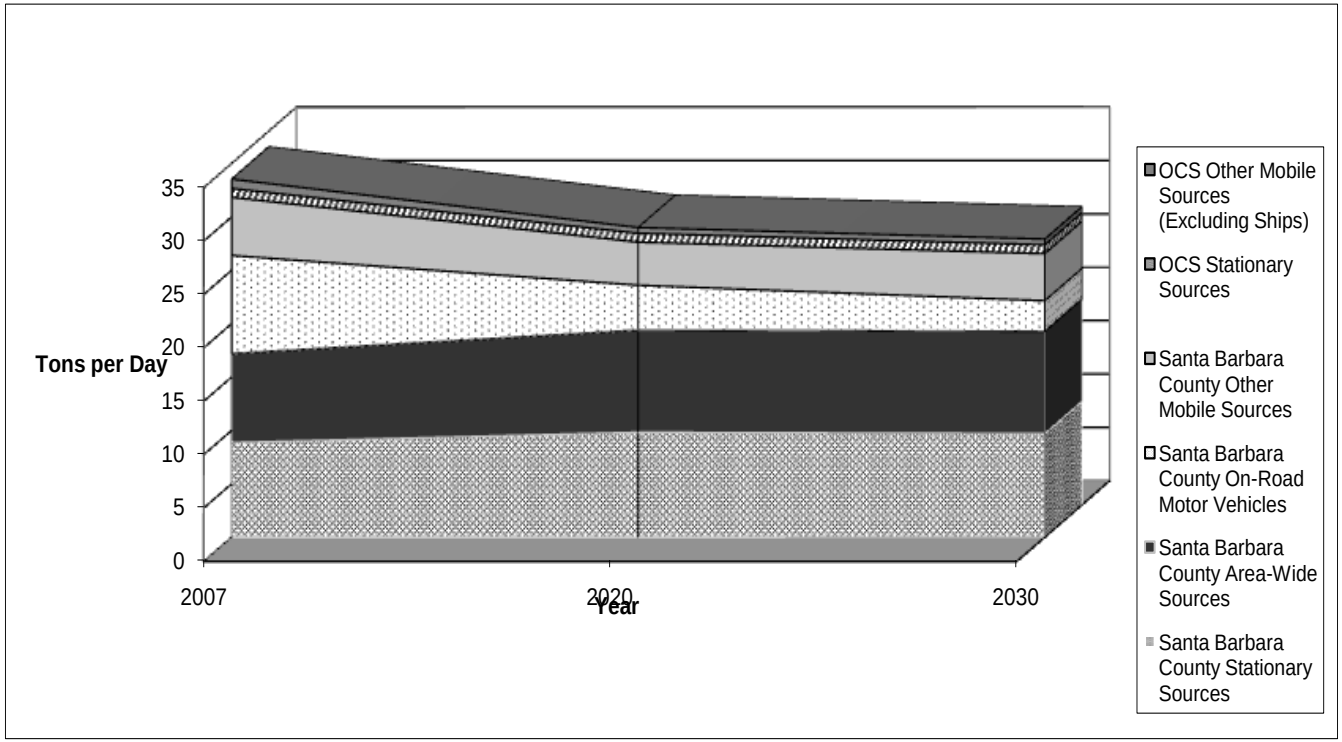


FIGURE 6-7
POTENTIAL MARINE SHIPPING NO_x EMISSIONS BASED ON ~~PROPOSED~~ MARPOL ANNEX VI REVISIONS COMPARISON TO CURRENT MARINE SHIPPING NO_x EMISSION FORECASTS

Formatted: Strikethrough