SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Draft Socioeconomic Report For Proposed Amendments to Regulation XX—Regional Clean Air Incentive Market (RECLAIM)

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EXECUTIVE SUMMARY

A socioeconomic analysis has been conducted to assess the impacts of the proposed amendments to Regulation XX—RECLAIM. The analysis compares the cost and job impacts of the proposed amendments with those of the command-and-control (CAC) regulations. The same magnitude of analysis has also been performed on the California Environmental Quality Act (CEQA) alternatives. A summary of the analysis and findings are presented below.

Key Elements of the Proposed Amendments	The proposed amendments would reduce 7.7 tons of NOx allocations per day by the year 2010, of which 4 tons per day would occur in 2007 and the remaining 3.7 tons would be distributed evenly over the period of 2008–2010 at the rate of 1.2 tons per day per year. These reductions will help attain the ozone and PM2.5 standards. Furthermore, the trading restrictions on large power plants would be modified and completely lifted on January 1, 2007. If the annual average NOx RTC price exceeds $15,000 a ton in any of the years 2008 to 2010, the prescribed 1.2 tons of daily NOx emission reductions would become tradable/usable. Reductions will be resumed for the following compliance year if prices of RECLAIM Trading Credits (RTCs) drop below $15,000 for at least six months. Other amendments include exemption of agricultural sources and exemption of certain RECLAIM facilities from further reductions in initial RTC allocations. Please refer to the Rule Staff Report for a detailed description of the proposed amendments.
Market Analysis	Two economists were under contract with the AQMD to examine the market implications of reducing NOx RTCs by three to 10 tons daily. Their conclusions are: • NOx emissions are likely to increase after the 2001-03 economic slowdown. • The rate of decline in NOx emissions (without future controls) would be smaller than that in RTCs in the future, based on economic projections relying on historical data. • The $15,000 per ton of NOx trigger is a price stabilizing force. • Re-entry of large power plants to the RECLAIM market would increase market size and efficiency. Re-entry may be implemented on an incremental basis to avoid potential disruption on the market, if necessary. • The across-the-board emission reduction is more efficient and cost effective than a facility-specific reduction.

	• The opt-out-of-RECLAIM option may make the market less efficient on the one hand and serve as an additional strategy to reduce RTC allocations on the other hand. • Periodic review of the best available retrofit control technology (BARCT) can mitigate adverse conditions on the market demand and supply.
Affected Facilities	Nearly all the facilities in the RECLAIM universe will be affected. There are approximately 332 RECLAIM facilities today. They belong to all the sectors in the four-county economy.
Assumptions for the Socioeconomic Analysis	The socioeconomic analysis herein follows a least cost approach to evaluating the cost of the proposed amendments. It is assumed that excess RTC holders are willing to sell. Furthermore, facilities with lower cost of controls are willing to install them beyond the need for their own compliance purposes. As such, the schedule of control equipment installation under the proposed amendments depends on the demand for and supply of RTCs as well as achievable emission reductions at the BARCT level. The qualifying sources for reducing emissions to the BARCT level include heat treating and metal melting furnaces, Rules 1146 (Emissions of Oxides of Nitrogen from Industrial, Institutional and Commercial Boilers, Steam Generators, and Process Heaters) and 1146.1 (Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters) boilers and heaters, miscellaneous combustion equipment, fluid catalytic cracking units (FCCUs), and Rule 1109 (Emissions of Oxides of Nitrogen from Boilers and Process Heaters in Petroleum Refineries) boilers and heaters. Furthermore, it is assumed that Selective Catalytic Reductions (SCRs) would be the retrofit technology for FCCUs and Rule 1109 boilers and heaters and low-NOx burners would be the technology for the remaining source categories. The annualization factor for capital costs is based on a four percent real interest rate and a 25-year equipment life for SCRs for refinery applications and a 10-year equipment life for low-NOx burners.
Costs Impact	The total compliance costs of the proposed amendments and their CAC counterpart are projected to be $16.96 and $46.74 million annually, on average, respectively. With respect to California Health and Safety Code (H&SC) §39616 (c) (1) on comparing the costs of RECLAIM and the CAC, the cost of the CAC is nearly three times the cost of the proposed amendments. The higher cost under the CAC is due primarily to the additional

	control mandated on refinery FCCUs and boilers and heaters. All the sectors except refineries (SIC 29) have the same cost under the proposed amendments as that under the CAC. The sector of refineries has the largest share of the total cost among all the industries. Its share is 24 percent under the proposed amendments and 71 percent under the CAC. The sectors that have the next largest shares of the total cost include transportation equipment (SIC 37), textile (SIC 22), food (SIC 20), and public utilities (SIC 49).
Regional Economic Impact	It is projected that the proposed amendments would result in 156 jobs forgone annually on average, compared with 157 jobs forgone under the CAC. The difference in job impacts between the proposed amendments and the CAC is within the noise of the Regional Economic Models, Inc. (REMI) model used for macroeconomic impact assessments. At the sectoral level, the job impacts between the two programs are also similar except for the construction industry where 28 more jobs are created under the CAC relative to the proposed amendments due to the expenditures on additional SCRs placed on refinery FCCUs and boilers and heaters under the CAC. These additional expenditures, however, would result in few additional jobs forgone because refineries (SIC 29) are a capital-intensive industry. Relative to H&SC §39616 (c)(4) on comparing impacts of RECLAIM and the CAC on higher versus lower skilled jobs, for the majority of the years in the simulation period (2007 to 2020), the proposed amendments have shown either more jobs created or fewer jobs forgone across all major industrial and occupational groups than the CAC regulations.
Impact of CEQA Alternatives	There are four alternatives to the proposed amendments. Alternative A is the No Project Alternative where existing Regulation XX would stay intact. Alternative B is an industry proposal where a four-ton NOx reduction would be achieved by 2010. Alternative C would implement the same NOx reduction but at a slower pace (until 2012). Alternative D is an illustrative command-and-control approach to RECLAIM on one source category only. There will be no additional cost or job impact under Alternative A. Aside from the No Project alternative, Alternative B has the lowest cost ($3.67 million annually) among all the alternatives because it requires the least amount of controls. Alternative D has a higher cost than the proposed amendments due to the SCR controls. Alternative D has the least job impact. This is because

	refineries are capital-intensive. The positive job impacts from the investment in controls more than offset the negative job impacts due to the additional cost of doing business in this sector. Compared with the proposed amendments, Alternative C is projected to have lower cost ($12.03 million annually) and job impact (68 jobs forgone annually). Since demand for and supply of NOx RTCs beyond 2010 cannot be accurately assessed, no additional controls are assumed to be brought in beyond 2010 under Alternative C.

INTRODUCTION

The proposed amendments to Regulation XX (RECLAIM) implement Control Measure CMB-10 (Additional NOx Reductions for RECLAIM) in the 2003 Air Quality Management Plan (AQMP) and address the requirements for the best available retrofit control technology (BARCT) in the California Health and Safety Code (H&SC) §40440. The proposed amendments would reduce 7.7 tons of NOx allocations per day by the year 2010, of which four tons would occur in 2007 and the remaining 3.7 tons would be distributed evenly over the period of 2008–2010 at the rate of 1.2 tons per day. These reductions will help attain the ozone and PM2.5 standards.

Under the proposed amendments as of January 1, 2007 large power plants would no longer be restricted from trading RECLAIM Trading Credits (RTCs) in the RECLAIM market. Furthermore, if the annual average NOx RTC price exceeds $15,000 a ton in any of the years from 2008 to 2010, the prescribed 1.2 tons of daily NOx emission reductions would become tradable. Reductions will be resumed for the following compliance year if RTC prices drop below $15,000 for at least six months. The proposed amendments include exemptions from further reductions in initial RTC allocations, facility exemptions from the RECLAIM program, and changes to emission factors. Please refer to the Rule Staff Report for a detailed description of these and other proposed amendments.

REGULATORY HISTORY

In 1993, the AQMD adopted an emissions trading program (RECLAIM) for stationary sources as a market incentive system to further achieve emission reductions. RECLAIM establishes facility mass emission limits for NOx and SOx and allows sources the flexibility to achieve prescribed emission reduction targets through process changes, installation of control equipment, and emissions trading. H&SC §39616 (c)(1) and (c)(4) require that a market-based incentive program result in “equivalent or less cost” and “not result in greater loss of jobs or more significant shifts from higher to lower skilled jobs than” the counterpart command-and-control regulation.

A socioeconomic analysis of RECLAIM was conducted at the time of its adoption. The cost of RECLAIM was estimated to be $80.8 million annually, on average, compared with the $138.7 million cost of the corresponding command-and-control system (which included rules and control measures in the 1991 AQMP that were subsumed by RECLAIM). RECLAIM was predicted to result in an average of 866 jobs forgone annually, compared with 2,013 jobs forgone under the command-and-control system. Based on the five occupational categories from the lowest-paid to the highest-paid, RECLAIM was projected to result in increased employment opportunities for nearly every category relative to the command-and-control system.

Until 2000 prices of NOx RTCs were relatively stable between $1,500 and $3,000 a ton. In 2000, prices of NOx RTCs rose to over $45,000 a ton due to the increased demand for

RECLAIM Trading Credits (RTCs) from power plants in response to the deregulated electrical generation market and limited installation of air pollution controls. In order to address the issues in the RECLAIM market, the Board removed large power plants from the market in May 2001. These power plants were required to file compliance plans for the installation of BARCT and restrictions were placed on the use and trade of their NOx RTCs. Other amendments to RECLAIM in 2001 included filing of compliance plans and forecast reports by large (at least 50 tons of NOx emissions) and medium (between 25 and 50 tons of NOx emissions) non-power plant facilities and the access to RECLAIM AQIP, Mitigation Fee Program, and state Emission Credit Bank by designated facilities. At the time, the Board also adopted several mobile and area source emission reduction credit rules whose credits could be used by RECLAIM facilities to comply with their allocations.

The annualized cost for installing controls on power plants was projected to be $9 million. The annualized cost for the level 1 controls (known technologies at the time) on non-power plant facilities was estimated to be $26 million.[1] It was projected that 640 jobs would be forgone annually from the proposed controls, filing of compliance plans and forecast reports, the access to a reserve of NOx emission reductions, and the creation of mobile and area source credit rules.

LEGISLATIVE MANDATES

The socioeconomic assessments at the AQMD have evolved over time to reflect the benefits and costs of regulations. The legal mandates directly related to the assessment of the proposed amendments include the AQMD Governing Board resolutions and various sections of the H&SC.

AQMD Governing Board Resolutions

On March 17, 1989 the AQMD Governing Board adopted a resolution that calls for preparing an economic analysis of each proposed rule for the following elements:

- Affected Industries
- Range of Control Costs
- Cost Effectiveness
- Public Health Benefits

On October 14, 1994, the Board passed a resolution which directed staff to address whether the rules or amendments brought to the Board for adoption are in the order of

[1] Specifically, Level 1 technologies included selective catalytic reduction (SCR) and low-NOx burner (LNB) controls on non-power plant turbines (SCR), internal combustion engines (SCR), boilers (LNB), heaters (ultra LNB), dryers (ultra LNB or LNB), ovens (LNB), furnaces (LNB or oxy-fuel), and afterburners (LNB).

cost effectiveness as defined in the AQMP. The intent was to bring forth those rules that are cost effective first.

H&SC Requirements

The California state legislature adopted legislation that reinforces and expands the Governing Board resolutions for socioeconomic assessments. H&SC §40440.8(a) and (b), which became effective on January 1, 1991, require that a socioeconomic analysis be prepared for any proposed rule or rule amendment that "will significantly affect air quality or emissions limitations." Specifically, the scope of the analysis should include:

- Type of Affected Industries
- Impact on Employment and the Economy of the Basin
- Range of Probable Costs, Including Those to Industries
- Emission Reduction Potential
- Necessity of Adopting, Amending or Repealing the Rule in Order to Attain State and Federal Ambient Air Quality Standards
- Availability and Cost Effectiveness of Alternatives to the Rule

Additionally, the AQMD is required to actively consider the socioeconomic impacts of regulations and make a good faith effort to minimize adverse socioeconomic impacts. H&SC §40728.5, which became effective January 1, 1992, requires the AQMD to examine small business impacts and consider socioeconomic impacts in rule adoption.

Furthermore, H&SC §39616 (c)(1) and (c)(4) require that a market-based incentive program result in equivalent or less cost and not result in greater job losses or more significant shifts from high- to low-skilled jobs as compared with command-and-control measures. This finding was made in 1993 when RECLAIM was adopted.

Finally, H&SC §40440.5 require that social, economic, and public health analyses of proposed rules be available to the public by no fewer than 30 days prior to the hearing.

MARKET ANALYSIS

In summer 2004, the AQMD contracted with two economists to examine the market implications of reducing NOx RECLAIM trading credits (RTCs) by three to 10 tons daily by the year 2010 or 2013, analyze market impacts of power plants' re-entry to the RECLAIM market, and provide possible means to ensure market stability resulting from negative market impacts. Their detailed analyses are in Appendix D—Economist Reports on potential Impacts of the RECLAIM Amendments—of the RECLAIM Rule Staff Report and are summarized below.

Professor Anil Puri

Professor Puri is Dean of the College of Business & Economics at California State University, Fullerton. In his report to the AQMD, Professor Puri noted that the annual NOx RTC reduction was at 12.1 percent between 1994 and 1999, which was accompanied by the steady declining emissions despite strong job growth during this period. He expected that NOx emissions would rise after the 2001-03 economic slowdown, which could result in an upward pressure on NOx RTC prices. He also predicted that the rate of decline in emissions would be smaller than that in RTCs in the future based on his five-year moving average projection of emissions. The potential upward pressure on RTC prices would be tempered because the last three years' emission reductions would become eligible for trading if the 12-month rolling averages of NOx RTCs exceed $15,000 per ton. Thus, the $15,000 a ton trigger acts as a price stabilizing force.

Re-entry of power plants to the RECLAIM market would increase the market size and efficiency. However, the opt-out-of-RECLAIM option would do the opposite. If power plants can provide cheaper emission reduction technologies, then smaller increases in RTC prices would be expected. Additionally, the AQMD may seek low cost reductions first to keep prices of RTCs low.

Professor Karen Polenske

Professor Polenske, Head of the International Development and Regional Planning group at the Massachusetts Institute of Technology, collaborated with Dr. Ali Shirvani-Mahdavi on the assessment of the proposed amendments to RECLAIM. Specifically, they examined the demand for and supply of NOx RTCs based on the worst (at the 2000–01 level during the California energy crisis) and average cases for power plant generation capacity throughout 2013 and the proposed new BARCT levels.[2]

They concluded that historically the majority of the RECLAIM facilities looked for internal means to meet the emission needs with RTC transactions as an auxiliary solution. They suggested that demand and supply conditions in the RECLAIM market be considered in establishing RTC reductions and re-entry of power plants. Re-entry of power plants would increase RTC supply more than RTC demand. Based on their analysis of the most stringent scenarios (a combination of the worst and average cases for power generation capacity and steeper rate of NOx reductions in the early years than the proposed amendments), re-entry of power plants on an incremental basis may be considered, if necessary. The incremental re-entry could be based on a percentage of power plants (a plant is either in or out) or a percentage of their emission levels (only a

[2] The average is referred to as the baseline-normal scenario by the California Energy Commission. It represents a medium (normal) level of hydroelectric generation availability in the Pacific Northwest region and a normal demand forecast under the baseline generation scenario. The baseline generation scenario assumes the retirement of approximately 3,200 megawatts (MWs) of existing steam and combustion type turbines, addition of approximately 6,600 MWs of newer more efficient generation by 2013, and availability of 900 MWs of new renewables throughout Southern California through 2013.

proportion of emissions from every plant is in). The former scheme would be easier to implement.

The opt-out-of-RECLAIM option and periodic review of the BARCT level were viewed as additional strategies to mitigate adverse conditions on the market demand or supply, thereby relieving the pressure on RTC prices. Furthermore, the across-the-board emission reduction was viewed as more efficient and cost effective than the facility-specific reduction.

AFFECTED FACILITIES

The RECLAIM universe evolves constantly due to shutdowns and the entry of new facilities. There are currently 332 facilities in the NOx RECLAIM universe. These facilities are spread across all industries in the four-county economy. Of the 332 facilities, 213 (64 percent) were in Los Angeles County, 62 (19 percent) in Orange County, 22 (7 percent) in Riverside County, and 35 (10 percent) in San Bernardino County. Figure 1 shows the location of these facilities within the district.

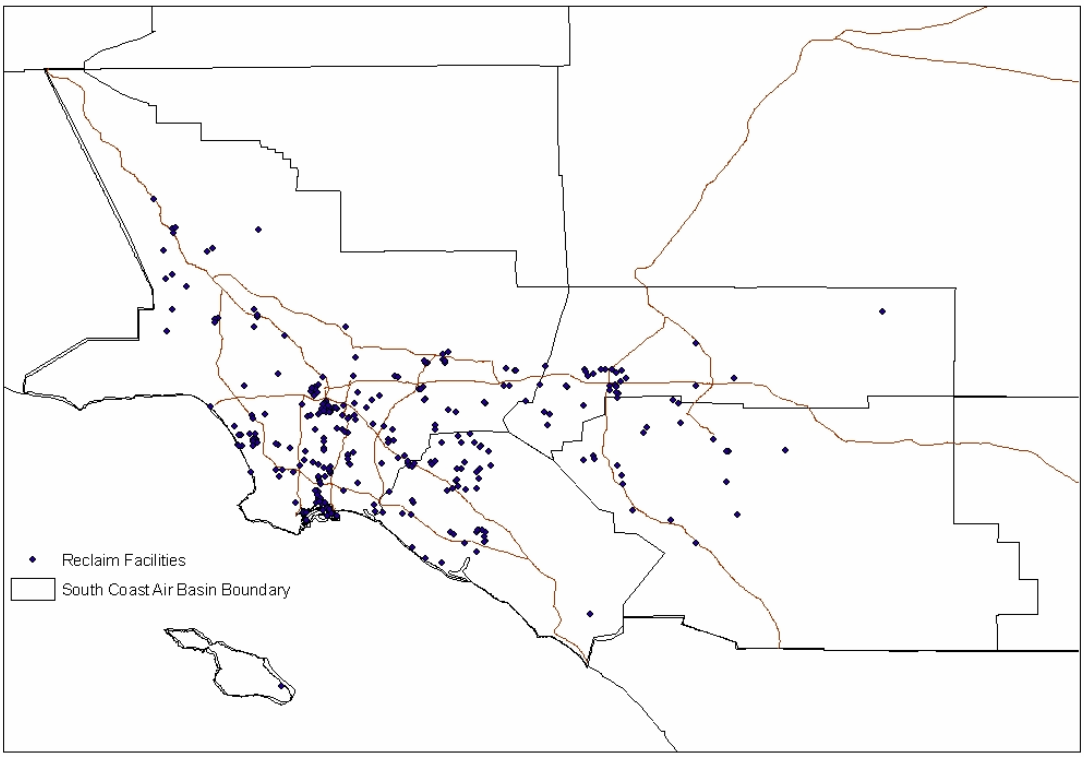
Small Businesses

The AQMD defines a "small business" in Rule 102 as one which employs 10 or fewer persons and which earns less than $500,000 in gross annual receipts. In addition to the AQMD's definition of a small business, the federal Small Business Administration (SBA), the federal Clean Air Act Amendments (CAAA) of 1990, and the California Department of Health Services (DHS) also provide definitions of a small business.

The SBA's definition of a small business uses the criterion of gross annual receipts (ranging from $0.5 million to $25 million), number of employees (ranging from 100 to 1,500), or assets ($100 million), depending on industry type. The SBA definitions of small businesses vary by 4-digit SIC code. For example, for the manufacturing sector, the threshold for small businesses ranges from 500 to 1,500 employees; for the construction sector, the threshold is $11.5 million in gross annual receipts; for the transportation and public utilities sector, the threshold is from $1 to $25 million in gross annual receipts or 500 to 1,500 employees; and for the service sector, the threshold ranges from $5 to $21.5 million in gross annual receipts.

The CAAA classifies a facility as a "small business stationary source" if it: (1) employs 100 or fewer employees, (2) does not emit more than 10 tons per year of either VOC or NOx, and (3) is a small business as defined by SBA.

Figure 1
Location of RECLAIM Facilities



The 2002 Dun and Bradstreet data has employment on 283 and gross revenue on 125 out of 332 facilities in the RECLAIM universe. According to the AQMD definition of a small business, 13 facilities would be classified as small businesses. Based on SBA's definition of a small business, 186 facilities would be small businesses. Based on CAAA's definition of a small business, 82 facilities would be classified as small businesses. The demonstration of the emission criterion under the CAAA was based on VOC and NOx emissions between July 1, 2002 and June 30, 2003 in the fiscal year 2002-2003 Annual Emissions Program (AER).

COST IMPACT

The assessment of the cost of the proposed amendments is compared with their command-and-control (CAC) counterpart, as required under the H&SC §39616 (c)(1). In 1993 during the adoption of RECLAIM, it was demonstrated that the cost of implementing RECLAIM was lower than that of the subsumed CAC regulations. The shave in the proposed amendments represents changes to the existing program. If the cost of implementing the proposed shave is proved to be lower than that of the CAC

counterpart, then the cost of the entire RECLAIM program would also be lower than that of the corresponding CAC regulations.

Proposed Amendments

RECLAIM allows facilities to search for the least cost option to comply with their allocations. Unlike the command-and-control regulations where every source has to be controlled to the same emission standard, RECLAIM facilities can purchase RTCs from others in lieu of control equipment installation. Under this principle and based on the perspective of the entire RECLAIM market, as long as there is an oversupply of RTCs, RECLAIM facilities may purchase RTCs to meet their compliance requirements. This is especially true in light of the lead time required for equipment installation. As the RTC supply decreases, it may be more economical to pursue cost effective control options.

As such, timing of equipment installation is very much dependent upon the demand for and supply of RTCs. The socioeconomic analysis herein follows a least cost approach to evaluating the cost of the proposed amendments. It is assumed that excess RTC holders are willing to sell. Furthermore, facilities with lower cost of controls are willing to install them beyond the need for their own compliance purposes. However, it is likely that reality may depart from the above tenets. Due to the concern for compliance margin or corporate policy on trading RTCs, not all cost effective credits would be generated, nor would all excess credits be available for trading in the market. As a result, more controls may be implemented, but not to the extent as those under the CAC.

Table 1 shows the projected emissions (which incorporate the NOx reductions that have already been achieved by large power plants) from 2007 to 2010 based on the growth projections in the 1997 AQMP and reported emissions for compliance year 2003. Allocations in Table 1 reflect a shave of four tons from the current allocations in 2007 and an additional approximately 1.2-ton per day shave every year from the current allocations between 2008 and 2010 in the proposed amendments. Assuming no further equipment installation from today's level, it is projected that a NOx RTC shortage would not occur until 2008.

Table 1
NOx RECLAIM Market Demand and Supply

Year	(tons/day) Allocations with Proposed Amendments (Supply)	Emission Projections (Demand)	Surplus (Deficit)	Equipment
2007	30.2	29.3	0.9	N/A
2008	29.0	29.7	(0.7)	• Heat Treating (259) & Metal Melting (64) Furnaces • Rules 1146 & 1146.1 Boilers & Heaters (182)
2009	27.8	30.2	(2.4)	• Rules 1146 & 1146.1 Boilers & Heaters (426)
2010	26.5	30.6	(4.1)	• Miscellaneous Combustion (449)

The parenthesized information indicates the pieces of equipment that would have control devices installed.

Table 2 identifies the emission reductions for various types of equipment in the RECLAIM universe that can be achieved if they meet the BARCT emission level. The type of equipment is ranked from the most cost effective (lowest number of dollars per ton of NOx reduced) to the least cost effective. Based on the information on RTC surplus or deficit in Table 1, it is assumed that when there is a shortage of RTCs in the market, the type of equipment that represents the most cost effective option will be retrofitted first, followed by the next most cost effective type of equipment, and so on until the shortage is made up, as shown in Table 2. The pieces of equipment that would be installed with control devices are in proportion to the excess NOx RTC demand (or deficit in Table 1) as a fraction of the total emission reductions potential, as shown in Table 2.

For example, in 2008, the RECLAIM market indicates a shortage of 0.7 tons per day. Approximately 0.1 ton can be made up with the installation of low NOx burners on heat treating and metal melting furnaces. The remaining 0.6 tons represents 26 percent of the 2.3 tons of NOx emission reductions potential from the entire 608 boilers and heaters in the RECLAIM universe that would otherwise be subject to the retrofit requirement (with low NOx burners) in Rules 1146 and 1146.1. To ensure a comfortable margin for the market, it is assumed that 30 percent of the 608 boilers and heaters (608 * 30% = 182) would be retrofitted with low NOx burners.

The last column in Table 1 indicates the type of equipment that would be brought to the BARCT level in each year. The parenthesized information indicates the pieces of equipment that would have control devices installed.

Table 2
Cost Effectiveness Ranking and Emission Reduction*

Equipment	Control Device	Ranking	Emission Reductions (t/d)
Heat Treating & Metal Melting Furnaces	Low-NOx Burner	1	0.1
Rules 1146 and 1146.1 Boilers	Low-NOx Burner	2	2.3
Miscellaneous Combustion	Low-NOx Burner	3	1.7
FCCU	SCR	4	1.0
Rule 1109 Boilers/Heaters (> 110 mmBtu)	SCR	5	2.1

Shaded equipment categories are needed to be retrofitted to meet the 2010 emission demand for the proposed amendments.
*Projected reductions in 2010 beyond current controls.

Based on the RECLAIM universe, equipment counts were obtained by county by industry by equipment category by equipment size to facilitate cost data compilation. The unit capital and operating and maintenance costs for the appropriate equipment category and size in Appendix B—DCF Cost Effectiveness—to the Rule Staff Report were multiplied by the number of equipment to arrive at the total annualized cost. The annualization factor for capital costs is based on a four percent real interest rate and a 25-year equipment life for SCRs in refinery applications and a 10-year equipment life for low-NOx burners. In cases where a range of cost estimates was provided, the average of low- and high-end costs was used. It is assumed that the installation of control devices would begin one year earlier than what the market condition dictates in order to have the intended emission reductions available the following year.

Command-and-Control (CAC) Regulations

An implementation schedule for various equipment categories was developed for the command-and-control system in the September 2004 white paper on RECLAIM. According to the schedule, NOx emission reductions from heat treating and metal melting furnaces and the Rules 1146 (Emissions of Oxides of Nitrogen from Industrial, Institutional and Commercial Boilers, Steam Generators, and Process Heaters) and 1146.1 (Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters) boilers and heaters would be achieved in 2006 and 2007. Reductions from miscellaneous combustion equipment would be implemented between 2006 and 2009. Finally, reductions from FCCUs and the Rule 1109 (Emissions of Oxides of Nitrogen from Boilers and Process Heaters in Petroleum Refineries) boilers and heaters would be implemented between 2007 and 2010. Based on the implementation schedule, timing of control device installation and the number of subject equipment are shown in Table 3. The installation of controls on heat treating and metal melting furnaces and the Rules 1146 and 1146.1 boilers and heaters is assumed to be completed in one year only.

Table 3
Equipment Installation Schedule under the CAC

Installation Year	Equipment
2006	• Heat Treating (259) & Metal Melting (64) Furnaces • Rule 1146 & 1146.1 boilers & Heaters (608) • Miscellaneous Combustion (108)
2007	• Miscellaneous Combustion (114) • FCCUs (1) • Rule 1109 Boilers & Heaters (13)
2008	• Miscellaneous Combustion (113) • FCCUs (1) • Rule 1109 Boilers & Heaters (13)
2009	• Miscellaneous Combustion (114) • FCCUs (1) • Rule 1109 Boilers & Heaters (13)
2010	• FCCU (1) • Rule 1109 Boilers and Heaters (12)

Parenthesized numbers show equipment counts.

The total annual compliance costs of the proposed amendments and CAC are projected to be $16.96 and $46.74 million, on average, respectively. With respect to H&SC §39616 (c)(1) on comparing the costs of RECLAIM and the CAC, the cost of the CAC is nearly three times the cost of the proposed amendments. The higher cost under the CAC is due to the additional controls on refinery FCCUs and boilers and heaters that are required under the CAC, but are not needed for the proposed amendments. Table 4 shows the cost by equipment category by year.

Table 4
Costs by Equipment Category by Year (million of 2003 dollars)

Equipment Category	RECLAIM				CAC			
	2007	2008	2009	Avg Ann (2007-20)	2006	2007	2010	Avg Ann (2006-20)
Heat Treating Furnaces	$0.74	$0.74	$0.74	$0.74	$0.74	$0.74	$0.74	$0.74
Metal Melting Furnaces	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Rules 1146 & 1146.1 Boilers & Heaters	4.82	15.05	15.05	14.32	15.05	15.05	15.05	15.05
Misc. Combustion	0.00	0.00	1.94	1.66	0.40	0.96	1.95	1.73
FCCUs	0.00	0.00	0.00	0.00	0.00	1.87	7.49	6.25
Rule 1109 Boilers & Heaters	0.00	0.00	0.00	0.00	0.00	6.84	27.25	22.73
Total	$5.80	$16.03	$17.97	$16.96	$16.43	$25.71	$52.71	$46.74

Table 5 shows the cost by industry by year for the proposed amendments and CAC. All the sectors except refineries (SIC 29) are projected to have the same cost on an industry-wide basis under the proposed amendments as that under the CAC. The sector of refineries has the largest share of the total cost among all the industries. Its share is 24 percent under the proposed amendments and 71 percent under the CAC. The sectors that have the next largest shares of the total cost include transportation equipment (SIC 37), textile (SIC 22), food (SIC 20), and public utilities (SIC 49).

Additional factors under RECLAIM that would lower the cost of RECLAIM as compared with the CAC but cannot be quantified for inclusion into the analysis herein are:

- Sources subject to Rule 2005—New Source Review for RECLAIM—are not subject to the 1.2 offset factor that is applied to new and modified sources for non-RECLAIM facilities when purchasing emission reduction credits (ERCs).[3] Instead, they are required to hold sufficient RTCs based on their maximum potential to emit in the beginning of each compliance year.
- Rule 2005 facilities can sell excess RTC offset holdings at the end of each compliance year resulting from the new and modified sources. This option is not available under the CAC.
- RTCs resulting from shutdowns are not subject to the best available control technology (BACT) discount that is applicable to non-RECLAIM sources, although these RTCs may be subject to future shaves at the BARCT level.
- RECLAIM facilities can take advantage of facility or program emission averaging to implement the least cost controls. Cross-cycle trading under RECLAIM provides an additional compliance option.

Other Potential Cost Impact

Under the proposed amendments, all RTC holders would be subject to the same percentage shave to achieve a programmatic total reduction of 7.7 tons per day by 2010 with limited exemption provisions. However, because RECLAIM is a trading program, at any given time there would be a different makeup of "winners" and "losers." Thus, it is difficult to define them in the context of RECLAIM program.

On the surface, it could be conceived that facilities with greatest emission reductions potential are "winners," because they receive less shave than what would otherwise be if the shave were based on potential emission reductions. Facilities with no equipment under the proposed new BARCT could be considered "losers" because they have to share the reduction burden. However, since RECLAIM is a market-based program and is designed to achieve a programmatic BARCT equivalency, all the affected facilities, as a whole, should meet the current BARCT level. A facility's current emission levels and RTC holdings are the result of many investment decisions made since 1994. Thus, shaving emissions at a facility or industry level would not necessarily be more equitable

[3] Rule 2005—New Source Review for RECLAIM.

than the across-the-board shave. Furthermore, because of the compliance flexibility incorporated into the RECLAIM design features (e.g., 1 to 1 offset ratio, sale of RTCs due to throughput change, facility averaging, etc.) every facility is a "winner" under this program as compared with the command-and-control system.

Table 5
Cost by Industry for RECLAIM and CAC by Year (millions of 2003 dollars)

Industry (SIC)	RECLAIM				CAC			
	2007	2008	2009	Avg Ann (2007-20)	2006	2007	2010	Avg Ann (2006-20)
Mining (10,12-14)	$0.16	$0.42	$0.56	$0.52	$0.51	$0.53	$0.56	$0.55
Construction (15-17)	0.00	0.03	0.04	0.03	0.03	0.03	0.04	0.04
Food (20)	0.38	0.88	1.06	1.00	0.92	0.96	1.07	1.04
Textiles (22)	0.30	1.39	1.58	1.47	1.44	1.49	1.58	1.56
Apparel (23)	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Furniture (25)	0.00	0.06	0.08	0.07	0.07	0.07	0.08	0.08
Paper (26)	0.01	0.95	0.99	0.92	0.95	0.98	0.99	0.99
Printing (27)	0.00	0.11	0.19	0.17	0.13	0.13	0.19	0.18
Chemicals (28)	0.13	0.77	0.81	0.76	0.77	0.79	0.81	0.81
Refineries (29)	1.31	4.03	4.39	4.15	4.04	12.84	39.13	33.31
Rubber (30)	0.07	0.34	0.36	0.34	0.35	0.35	0.36	0.36
Stone, Clay, etc. (32)	0.02	0.11	0.23	0.21	0.13	0.17	0.23	0.22
Primary Metals (33)	0.42	0.94	1.37	1.27	1.00	1.18	1.36	1.32
Fabricated Metal (34)	0.45	0.71	0.82	0.79	0.75	0.77	0.82	0.81
Non-electric Machinery (35)	0.00	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Elect. Equipment (36)	0.02	0.55	0.56	0.52	0.55	0.55	0.56	0.56
Transportation Equipment (37)	1.24	1.84	2.01	1.94	1.88	1.97	2.02	2.00
Instruments (38)	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Misc. Manuf. (39)	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03
Trucking (42)	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Air Transp. (45)	0.00	0.20	0.20	0.18	0.20	0.20	0.20	0.20
Other Transp. (44,46-47)	0.00	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Communication (48)	0.00	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Public Utilities (49)	0.92	1.43	1.43	1.40	1.43	1.43	1.43	1.43
Wholesale (50-51)	0.08	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Rest of Retail (52-57,59)	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Banking (60)	0.00	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Hotels (70)	0.04	0.04	0.05	0.05	0.04	0.04	0.05	0.05
Misc. Busi. Serv. (73)	0.02	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Personal Serv. & Repair (72,76)	0.07	0.17	0.18	0.17	0.17	0.17	0.18	0.17
Amuse. & Recreation (79)	0.00	0.23	0.23	0.22	0.23	0.23	0.23	0.23
Misc. Prof. Serv. (81,87,89)	0.00	0.09	0.09	0.08	0.09	0.09	0.09	0.09
Government	0.02	0.12	0.12	0.11	0.12	0.12	0.12	0.12
Total	**$5.80**	**$16.03**	**$17.97**	**$16.96**	**$16.43**	**$25.71**	**$52.71**	**$46.74**

To further address concerns raised by facilities that would be potentially adversely affected by the across-the-board reduction, a set of exemption criteria was developed to relieve facilities from further emission reductions, if adopted. Qualifying facilities need to demonstrate, among other requirements, that all on-site equipment has met BARCT as defined by the emission limits in the RECLAIM rule and the total compliance costs under RECLAIM since its beginning in 1994 have exceeded the costs that would otherwise be under the CAC program. RTCs associated with these facilities would become non-tradable. The forgone reductions would then be redistributed among remaining facilities in the program, thereby moving reduction burden more toward source categories where additional reduction opportunities exist. Depending on the number of facilities applying for this exemption, there could be fewer participants in the market.

The remaining market ultimately would then consist of facilities (potential sellers) that have controlled their emissions beyond BARCT or have reduced production rates and facilities (potential buyers) that have additional reduction opportunities onsite. The overall compliance costs under the least cost scenario would still be the same because facilities exempted from the further reductions do not take away cost-effective control opportunities from the market with them. However, the burden for paying for the least control options would be shifted toward the facilities that are not at the BARCT. If the costs of credits approach control costs, facilities may elect to install controls. In the end the programmatic compliance costs would be closer to the costs under the CAC.

Current trades of RTCs are on a bilateral basis. As long as sellers and buyers of RTCs are satisfied with each other's bid, a deal will be executed. Since the facilities leaving the market are at the BARCT, they need not be a buyer even if they were to stay in RECLAIM. They need not be a seller either. Otherwise, they would have stayed on to sell RTCs for a profit. Therefore, their leaving the RECLAIM program has no programmatic impact on the demand for and supply of RTCs. The current bilateral relationship between sellers and buyers will continue without being disturbed despite the existence of a smaller market.

MACROECONOMIC IMPACT ASSESSMENTS

The potential job and other socioeconomic impacts of implementing the proposed amendments compared with the CAC approach were analyzed through the Regional Economic Models, Inc. (REMI) model. The REMI model is an economic and demographic forecasting and simulation model designed to examine the economic and demographic effects resulting from policy initiatives or external events in a local economy. The REMI model used in this analysis contains historical economic data of the four-county area from 1969 throughout 2001. A 14-year analysis period from 2007 to 2020 was used for the proposed amendments and a 15-year period from 2006 to 2020 was used for the CAC.

The two types of control equipment included in the cost analysis for the proposed amended rules are low-NOx burners and SCRs. The capital cost of a low-NOx burner is comprised of the burner itself, instrumentation, freight, installation, and local sales tax. The operating and maintenance cost covers filter cleaner and replacement, insurance, property tax, and labor. The capital cost of an SCR is comprised of the equipment itself, instrumentation, freight, installation, local sales tax, and catalyst (on a five-year replacement schedule). The operating and maintenance cost covers ammonia, electricity, insurance, property tax, and labor.

Capital expenditures will benefit the industries of fabricated metal (SIC 34) for the burner; non-electric machinery (SIC 35) for the SCR equipment itself; construction (SICs 15-17) for installation; instruments (SIC 38) for instrumentation; trucking (SIC 42) for freight; and chemical products (SIC 28) for catalyst. Operating and maintenance expenditures will benefit the industries of chemical products for ammonia; public utilities (SIC 49) for electricity; fabricated metal for filter cleaner and replacement; and insurance (SICs 63 – 64) for property insurance. Expenditures on labor are treated as a reduction in labor productivity because more labor will now be required to produce the same amount of output in an industry affected by the proposed amendments. The local government will benefit from the property tax and only the portion (2.5%) of sales tax kept locally.

Industries affected by the proposed amendments will incur the additional cost of doing business due to the capital and operating and maintenance expenditures. This and the additional sales made to the suppliers of equipment and materials are simulated through the REMI model to obtain the total employment impact on the local economy.

It is projected that the proposed amendments would result in 156 jobs forgone annually on average, compared with 157 jobs forgone under the CAC. The difference in job impacts between the proposed amendments and the CAC is within the noise of the REMI model.

Job Impact by Industry

Table 6 compares the job impact of the proposed amendments and that of the CAC. At the sectoral level, the job impacts between the two programs are also similar except for the construction industry where 28 more jobs are created under the CAC relative to the proposed amendments due to the expenditures on additional SCRs placed on refinery FCCUs and boilers and heaters under the CAC. These additional expenditures, however, would result in few additional jobs forgone because refineries (SIC 29) are a capital-intensive industry. The retail trade sector (SICs 52-59) is projected to have 41 jobs forgone annually, on average, under the CAC as compared with 28 jobs forgone under the proposed amendments due to a greater reduction in personal income under the CAC.

Table 6
Job Impact by Industry by Year for RECLAIM and CAC

Industry (SIC)	RECLAIM				CAC			
	2007	2008	2009	Avg Ann (2007-20)	2006	2007	2010	Avg Ann (2006-20)
Lumber (24)	3	4	0	0	8	4	2	0
Furniture (25)	2	2	-2	-3	6	1	-2	-3
Stone, Clay, etc. (32)	3	5	-1	-1	9	4	2	0
Primary Metals (33)	5	8	0	-1	14	3	0	-1
Fabricated Metal (34)	61	110	14	20	183	18	6	20
Non-electric Machinery (35)	6	9	-4	-4	18	33	18	2
Elect. Equipment (36)	4	6	-4	-4	13	9	1	-4
Motor Veh. (371)	1	2	-1	-2	4	1	-1	-2
Rest of Transp. Equip. (372-379)	0	-1	-4	-7	1	-2	-7	-8
Instruments (38)	9	9	3	0	21	11	6	2
Misc. Manuf. (39)	1	2	-2	-2	4	1	-2	-3
Food (20)	1	1	-2	-3	4	0	-3	-4
Tobacco Manuf. (21)	0	0	0	0	0	0	0	0
Textiles (22)	1	0	-3	-8	2	-1	-6	-9
Apparel (23)	1	-1	-6	-6	2	-3	-9	-9
Paper (26)	1	2	-1	-1	3	1	-1	-2
Printing (27)	2	3	-2	-2	7	2	-1	-3
Chemicals (28)	1	1	-1	-2	3	3	1	0
Refineries (29)	0	1	0	-1	1	3	3	-1
Rubber (30)	3	5	-2	-3	9	3	0	-3
Leather (31)	0	0	-1	-1	1	0	-1	-2
Mining (10,12-14)	0	0	-1	-1	1	0	-4	-5
Construction (15-17)	99	162	3	15	287	173	121	43
Railroad (40)	0	0	0	0	1	0	0	0
Trucking (42)	12	20	-2	-1	35	18	10	1
Local/Interurban (41)	1	1	-1	-1	2	1	0	-1
Air Transp. (45)	2	3	-2	-2	6	2	0	-2
Other Transp. (44,46-47)	1	1	-1	-1	3	1	-1	-2
Communication (48)	3	4	-2	-2	8	3	-1	-2
Public Utilities (49)	2	2	-1	-1	4	2	2	0
Banking (60)	5	6	-3	-3	13	4	-2	-4
Insurance (63,64)	6	11	4	4	17	14	22	17
Credit & Finance (61-62,67)	5	7	-4	-3	15	5	-1	-4
Real Estate (65)	6	9	-3	-3	17	8	3	-3
Eating & Drinking (58)	17	21	-18	-15	48	13	-8	-18
Rest of Retail (52-57,59)	33	41	-33	-28	92	24	-21	-41
Wholesale (50-51)	17	23	-13	-12	51	15	-14	-21
Hotels (70)	2	3	-2	-2	6	2	0	-2
Personal Serv. & Repair (72,76)	8	10	-5	-4	22	7	-2	-6
Private Household (88)	1	2	-2	-1	5	1	-1	-2
Auto Repair/Serv. (75)	4	5	-3	-2	11	4	-1	-3
Misc. Busi. Serv. (73)	40	58	-25	-25	112	43	-2	-33
Amuse. & Recreation (79)	7	10	-6	-5	20	6	-3	-7
Motion Pictures (78)	0	0	-1	-1	1	-1	-2	-2
Medical (80)	5	9	0	0	15	8	7	4

Table 6 (Continued)

Industry (SIC)	RECLAIM				CAC			
	2007	2008	2009	Avg Ann (2007-20)	2006	2007	2010	Avg Ann (2006-20)
Misc. Prof. Serv. (81,87,89)	23	34	-10	-9	67	31	7	-11
Education (82)	8	10	-7	-5	21	6	-3	-7
Non-Profit Org. (83)	9	11	-7	-6	25	7	-2	-7
Agri/Forest/Fish Serv. (07-09)	4	6	-2	-2	11	5	1	-3
Government	4	8	4	-9	10	12	10	-10
Total	**431**	**644**	**-159**	**-156**	**1241**	**507**	**123**	**-157**

According to the average annual wage in each industry, industries were classified from the lowest-paid to the highest-paid group. Table A-1 in Appendix A shows how the 49 two-digit SIC private sectors were grouped. Table 7 shows the job impact as a percentage of the baseline jobs under the proposed amendments beyond that under the CAC for each industrial wage group. A positive figure indicates that the proposed amendments either create more jobs or have fewer jobs forgone relative to the CAC. A negative figure means the opposite.

For example, in 2008 the proposed amendments are projected to result in 0.004 percent of more jobs created with respect to the 2008 baseline total employment for the industries in Group 3 than the CAC. Relative to H&SC §39616 (c)(4) on comparing impacts of RECLAIM and the CAC on higher versus lower skilled jobs, for all groups in Table 7, the proposed amendments show either more jobs created (e.g., 2008) or fewer jobs forgone (e.g., 2015 and 2020) than the CAC in all the years except the years 2009, 2010, and 2016 (not shown). All groups under the proposed amendments are projected to have more jobs forgone than the CAC in 2009.

Table 7
Job Impact of RECLAIM Relative to CAC by Industrial Wage Group by Year

Group	Average Annual Wage*	% Impact from Baseline						SIC Codes
		2007	2008	2009	2010	2015	2020	
1	$9,221 - $19,881	0.000%	0.003%	-0.003%	-0.003%	0.002%	0.001%	07-09,21,23,58, 65,72,75-76,79,82,88
2	$21,056 - $26,137	0.001%	0.005%	-0.003%	-0.004%	0.003%	0.002%	22,24-25,31,4142,52-57,59,70,73,83
3	$27,018 - $35,024	-0.005%	0.004%	-0.013%	-0.013%	0.002%	0.001%	15-17,30,32-34,371,39, 44,46-47,61-62,67,80
4	$37,998 - $46,007	0.000%	0.003%	-0.004%	-0.004%	0.002%	0.001%	10,12-14,20,26-8,36,45, 50-51,63-64,81,87,89
5	$47,608 - $82,169	-0.001%	0.003%	-0.006%	-0.006%	0.003%	0.003%	29,35,372-379,38,40,48-49,60,78

*Source: Bureau of Economic Analysis. U.S. Department of Commerce.

Job Impact by Occupation

Occupations can be grouped into five categories according to median weekly earnings (See Table A-2 in Appendix A for more details). Group 1 has the lowest-paid occupations while Group 5 has the highest-paid occupations. Table 8 shows the job impact as a percentage of the baseline jobs under the proposed amendments beyond that under the CAC for each occupational wage group. A positive figure indicates that the proposed amendments either create more jobs or have fewer jobs forgone relative to the CAC. A negative figure means the opposite.

For example, in 2008 the proposed amendments are projected to result in 0.003 percent of more jobs created with respect to the 2008 baseline total employment for the occupations in Group 3 than the CAC. Relative to H&SC §39616 (c)(4) on comparing impacts of RECLAIM and the CAC on higher versus lower skilled jobs, for all groups in Table 8, the proposed amendments show either more jobs created (e.g., 2008) or fewer jobs forgone (e.g., 2015 and 2020) than the CAC in all the years except the years 2009, 2010, and 2016 (not shown). All groups under the proposed amendments are projected to have more jobs forgone than the CAC in 2009.

Table 8
Job Impact of RECLAIM Relative to CAC by Occupational Wage Group by Year

Group	Median Weekly Earnings*	% Impact from Baseline						No. of Occup-ations
		2007	2008	2009	2010	2015	2020	
1	$265 - $389	0.001%	0.003%	-0.002%	-0.003%	0.002%	0.002%	20
2	$399 - $523	0.000%	0.004%	-0.005%	-0.005%	0.002%	0.002%	20
3	$540 - $691	-0.003%	0.003%	-0.010%	-0.010%	0.003%	0.003%	18
4	$693 - $801	0.000%	0.002%	-0.004%	-0.004%	0.002%	0.002%	20
5	$804 - $1,483	-0.001%	0.002%	-0.005%	-0.005%	0.003%	0.002%	16

*Source: Employment and Earnings. Bureau of Labor Statistics.

IMPACT OF CEQA ALTERNATIVES

Four alternatives to the proposed amendments were developed for the CEQA purposes. The alternatives are summarized in Table 9 below. An assessment of the possible different socioeconomic impacts resulting from the alternatives is evaluated.

Table 9
CEQA Alternatives

Rule Component	Proposed Project	Alternative A (NO PROJECT)	Alternative B	Alternative C	Alternative D
1. Reduction of NOx RTCs	1. Reduce NOx by 7.7 tons per day for all RECLAIM facilities.	1. No NOx reduction.	1. Reduce NOx by 4.0 tons per day for all RECLAIM facilities.	1. Reduce NOx by 7.7 tons per day for all RECLAIM facilities.	1. Reduce NOx by 7.0 tons per day on an equipment-specific basis.
2. Effective Compliance Dates	2. 4.0 tons per day in 2007 and 3.7 tons per day from 2008 through 2010 (4 years).	2. N/A	2. 2.0 tons per day in 2007 and 2.0 tons per day in 2008. (2 years)	2. 2007 through 2012. (6 years)	2. 2007 through 2010 (4 years)

Alternative A (No Project Alternative)

Under Alternative A, existing Regulation XX would stay as they are. Additional NOx reductions are not anticipated because the current level of NOx allocations is projected to exceed NOx emissions. Consequently, no additional cost is expected from Alternative A. No other socioeconomic impact is foreseen either.

Alternative B

Alternative B represents an industry proposal where a two-ton NOx reduction daily will be implemented in 2007 and another two tons in 2008. Table 10 shows the allocations from 2007 to 2010 for Alternative B. The projected emissions are the same as those under the proposed amended rules. Under Alternative B, the RECLAIM market would not have excess demand until 2010. Based on the cost effectiveness ranking in Table 2, installation of low-NOx burners on all heat treating and metal melting furnaces; and on approximately 15 percent of the Rules 1146 and 1146.1 boilers and heaters (91 pieces) in the RECLAIM universe (Table 11) that exceed the BARCT level would more than satisfy the excess demand of 0.4 tons per day (Table 10) based on the difference between the projected emissions and shaved allocation in 2010 for Alternative B. It is assumed that the installation would occur in 2009 in order to meet the allocation requirement in 2010.

Table 10
Allocation and Projected Emissions by Alternative (tons/day)

Alternative	2007	2008	2009	2010
Alternative B				
Allocations (Supply)	32.2	30.2	30.2	30.2
Emission Projections (Demand)	29.3	29.7	30.2	30.6
Surplus (Deficit)	2.9	0.5	0.0	(0.4)
Alternative C				
Allocations (Supply)	32.9	31.6	30.3	29.0
Emission Projections (Demand)	29.3	29.7	30.2	30.6
Surplus (Deficit)	3.6	1.9	0.1	(1.6)

Table 11
Retrofit Equipment Schedule by Alternative

Year	Alternative B	Alternative C
2007	N/A	N/A
2008	N/A	N/A
2009	N/A	N/A
2010	• Heat Treating (259) & Metal Melting Furnaces (64) • Rules 1146 & 1146.1 Boilers & Heaters (91)	• Heat Treating (259) & Metal Melting (64) Furnaces • Rules 1146 & 1146.1 Boilers & Heaters (425)

Relative to the proposed amendments and Alternative C, Alternative B has the lowest cost ($3.67 million annually) and job impact (25 jobs forgone annually). This is because Alternative B requires the fewest number of the Rules 1146 and 1146.1 boilers and heaters to be retrofitted.

Alternative C

Alternative C would reduce daily NOx allocations by 7.7 tons by 2012. The 7.7-ton reduction will be spread evenly between 2007 and 2012. Relative to the proposed amendments, Alternative C would achieve the same amount of reductions in six years instead of four years. Additionally, Alternative C would have a uniform reduction rate (i.e., 1.3 tons per day every year) versus a 4-ton NOx reduction daily in 2007 and another 1.2-ton reduction daily every year from 2008 to 2010 under the proposed amendments.

According to the projected allocations and emissions in Table 10, excess demand for NOx RTCs would occur in 2010 in the RECLAIM market. Demand for and supply of NOx RTCs beyond 2010 cannot be accurately assessed. Therefore, no additional controls would be brought in beyond 2010. Table 11 shows that low-NOx burners would be installed on all heat treating and metal melting furnaces and approximately 65 percent of

the Rules 1146 and 1146.1 boilers and heaters (425 pieces) in 2009 in order to meet the allocation requirements in 2010.

The cost of Alternative C is lower than that of the proposed amendments because Alternative C would require that fewer pieces of the Rules 1146 and 1146.1 boilers and heaters be retrofitted with low NOx burners than the proposed amendments (425 versus 608 pieces) by 2010. Moreover, Alternative C would not require controls on miscellaneous combustion units to be brought in before 2010. The cost of Alternative C is higher than that of Alternative B because the latter would require that fewer pieces of the Rules 1146 and 1146.1 boilers and heaters be retrofitted with low NOx burners. Alternative C is projected to result in 68 jobs forgone. The jobs forgone under Alternative C are more than those under Alternative B but fewer than those under the proposed amendments.

Alternative D

Alternative D represents an initiation of a CAC approach that would transition the RECLAIM program into source specific rules. In general, the command-and-control approach would require the reinstatement of all the rules and control measures that are subsumed by the proposed amendments. However, given the speculative nature of future rulemaking activities, Alternative D would reinstate the BARCT NOx concentration limits for the applicable facility and equipment under Rule 1109 only. Specifically, currently uncontrolled boilers would be brought to SCR controls and other boilers would meet the Rule 1109 limits. It is assumed that there would be 37 low-NOx burners and 19 SCRs installed, as a result. It should be noted that Alternative D is an illustration of a command-and-control approach on one particular source category only. Only refineries are analyzed under Alternative D, but all categories for which additional BARCT has been identified would have to install additional controls.

Alternative D has a higher cost than Alternatives A through C but lower cost than the proposed amendments because the cost of SCR controls required under Rule 1109 would exceed the combined cost of measures needed under the proposed amendments (Table 2). It is projected that Alternative D would create an additional 26 jobs annually, on average. The additional cost placed on the refineries would not generate as many negative job impacts as if the cost were placed on other industries because refineries are capital-intensive. The positive job impacts from the investment in controls more than offset the negative job impacts due to the additional cost of doing business in this sector.

Table 12
Costs and Job Impacts by CEQA Alternative

Equipment Category	Costs (millions of 2003 $)	Jobs
Proposed Amendments	$16.96	-156
Alternative A	0	0
Alternative B	3.67	-25
Alternative C	12.03	-68
Alternative D	13.46	26

RULE ADOPTION RELATIVE TO THE COST EFFECTIVENESS SCHEDULE

On October 14, 1994, the Governing Board adopted a resolution that requires staff to address whether rules being proposed for adoption are considered in the order of cost-effectiveness. The 2003 Air Quality Management Plan (AQMP) ranked, in the order of cost-effectiveness, all the control measures for which costs were quantified. It is generally recommended that the most cost effective measures be taken first.

The proposed amended rules implement control measure CMB-10 (Additional Reductions for NOx RECLAIM) in the 2003 AQMP. The cost effectiveness of this measure was estimated to be $7,000 per ton of NOx reduced. This measure was ranked fifth among all the AQMD control measures for stationary sources in terms of cost-effectiveness in the 2003 AQMP. The programmatic weighted average of $12,000 per ton of NOx for the proposed amendments would have been ranked seventh in the 2003 AQMP.

Appendix A
Data on Wage Rate and Earnings

Table A-1
Average Annual Wage Rate by Industry

Quintile	Industry (SIC)	Wage Rate
1	Tobacco Manuf. (21)	9221
1	Personal Serv. & Repair (72,76)	9385
1	Private Household (88)	11972
1	Eating & Drinking (58)	13281
1	Real Estate (65)	13410
1	Agri/Forest/Fish Serv. (07-09)	14679
1	Education (82)	18328
1	Auto Repair/Serv. (75)	18739
1	Apparel (23)	19130
1	Amuse. & Recreation (79)	19881
2	Local/Interurban (41)	21056
2	Hotels (70)	21229
2	Rest of Retail (52-57,59)	21241
2	Trucking (42)	22905
2	Leather (31)	23357
2	Furniture (25)	23391
2	Non-Profit Org. (83)	23688
2	Lumber (24)	25182
2	Misc. Busi. Serv. (73)	25799
2	Textiles (22)	26137
3	Misc. Manuf. (39)	27018
3	Construction (15-17)	27359
3	Fabricated Metal (34)	31618
3	Stone, Clay, etc. (32)	31712
3	Rubber (30)	32289
3	Other Transp. (44,46-47)	33226
3	Medical (80)	33272
3	Primary Metals (33)	34151
3	Motor Veh. (371)	34933
3	Credit & Finance (61-62,67)	35024
4	Misc. Prof. Serv. (81,87,89)	37998
4	Food (20)	38662
4	Air Transp. (45)	39740
4	Printing (27)	39988
4	Wholesale (50-51)	42123
4	Mining (10,12-14)	42897
4	Chemicals (28)	43431
4	Paper (26)	44095

Table A-1 (Continued)

Quintile	Industry (SIC)	Wage Rate
4	Insurance (63,64)	45470
4	Elect. Equipment (36)	46007
5	Banking (60)	47608
5	Non-electric Machinery (35)	49339
5	Rest of Transp. Equip. (372-379)	53358
5	Motion Pictures (78)	54475
5	Communication (48)	57184
5	Public Utilities (49)	58326
5	Instruments (38)	58765
5	Railroad (40)	60265
5	Petroleum Products (29)	82169

Table A-2
Median Weekly Earnings

Quintile	Occupational Title	Median Weekly Earnings
1	Child care workers	265
1	Other food preparation and serving	290
1	Cooks and food preparation workers	309
1	Food and beverage serving workers	315
1	Textile, apparel, and furnishings occupations	316
1	Fishers and fishing vessel operator	334
1	Animal care and service workers	335
1	Funeral service workers	340
1	Gaming occupations	340
1	Personal and home care aides	340
1	Residential advisors	340
1	All other personal care and service workers	340
1	Healthcare support occupations	343
1	Grounds maintenance workers	343
1	Personal appearance workers	343
1	Building cleaning workers	345
1	Agricultural workers	345
1	Retail salespersons	349
1	Supervisors, food preparation and serving workers	359
1	Communications equipment operators	389
2	Entertainment attendants and relate workers	399
2	Information and record clerks	404
2	Food processing occupations	407
2	Other protective service workers	411
2	Recreation and fitness workers	413
2	All other financial, information, and record clerks	433
2	Supervisors, building and grounds cleaning and maintenance workers	442
2	Other production occupations	446
2	Woodworkers	448
2	Assemblers and fabricators	449
2	Secretaries, administrative assistants	469
2	Financial clerks	478
2	Material recording, scheduling, dispatching and distributing occupations	479
2	Pest control workers and all other building and grounds cleaning and maintenance workers	481
2	Forest, conservation, and logging workers	483
2	First line supervisors/managers of personal service workers	498
2	Metal workers and plastic workers	502

Table A-2 (Continued)

Quintile	Occupational Title	Median Weekly Earnings
2	Material moving occupations	511
2	Printing occupations	514
2	Other health professionals and technicians	523
3	Air transportation occupation	540
3	Motor vehicle operators	543
3	First line supervisors/managers/contractors of farming, fishing, and forestry workers	559
3	Transportations, tourism, and lodging attendants	568
3	Construction trades and related workers	576
3	First line supervisors/managers of office and administrative support workers	592
3	Life, physical and social science	599
3	Social workers	602
3	Vehicle and mobile equipment mechanics	604
3	Supervisors, sales workers	608
3	All other and misc. legal and related workers	609
3	All other and misc. counselors, social, and religious workers	610
3	Other installation, maintenance, and repair occupations	630
3	Library, museum, training and other education occupations	665
3	Other education, training, library, and museum workers	665
3	Supervisors, transportation and material moving workers	688
3	Law enforcement workers	690
3	First line supervisors/managers of production and operating workers	691
4	Drafters, engineering, and mapping technicians	693
4	Religious workers	700
4	Electrical and electronic equipment mechanics, installers, and repairers	702
4	Primary, secondary, and special education teachers	711
4	Other teachers and instructors	711
4	Real estate brokers and sales agents	713
4	Plant and system operators	721
4	Entertainers and performers, sports and related occupations	727
4	Media and communications occupations	727
4	Media and communication equipment occupations	727
4	Art and design occupations	737
4	All other sales and related workers	738
4	First line supervisors/managers of construction trades and extraction workers	744
4	Business operations specialists	746
4	Water transportation occupations	778
4	Counselors	784

Table A-2 (Continued)

Quintile	Occupational Title	Median Weekly Earnings
4	Extraction workers	793
4	Life scientists	799
4	Health diagnosing and treating practitioners	800
4	Fire fighters and inspectors	801
5	First line supervisors/managers of mechanics, installers, and repairers	804
5	Related transportation occupations	816
5	Social scientists and related occupations	826
5	Management occupations	840
5	First line supervisors/managers, protective service workers	846
5	Rail transportation occupations	863
5	Mathematical science occupations	891
5	Postsecondary teachers	939
5	Physical scientists	945
5	Financial specialists	965
5	Computer specialists	1009
5	Architects, surveyors, and cartographers	1052
5	Engineers	1104
5	Lawyers	1304
5	Judges, magistrates, and other judicial workers	1314
5	All other farming, fishing, and forestry workers	1483

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