

**An Evaluation of the South Coast Air Quality Management District's  
Regional Clean Air Incentives Market - Lessons in Environmental  
Markets and Innovation**

**November, 2002**

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## ACRONYM LIST

**AQMP - air quality management plan**  
**BACT - best available control technology**  
**CAA - Clean Air Act**  
**CAAA - Clean Air Act Amendments**  
**CAC - command and control**  
**CARB - California Air Resources Board**  
**CAT - cap and trade**  
**CCEEB - California Council for Environmental and Economic Balance**  
**CEC - California Energy Commission**  
**CEMS - continuous emissions monitoring system**  
**EIP - Economic Incentive Program**  
**EPA - Environmental Protection Agency**  
**ERC - emission reduction credit**  
**ETM - emissions trading model**  
**ETPS - Emissions Trading Policy Statement**  
**FR - Federal Register**  
**IEc - Industrial Economics, Incorporated**  
**LAER - lowest achievable emission rate**  
**MPP - marketable permits program**  
**MRR - monitoring, reporting, and record-keeping**  
**NESHAP - National Emission Standard for Hazardous Air Pollutants**  
**NO<sub>x</sub> - nitrogen oxides**  
**NSPS - New Source Performance Standards**  
**NSR - New Source Review**  
**OMT - open market trading**  
**OPEI - Office of Policy, Economics, and Innovation**  
**P2- pollution prevention**  
**PM<sub>10</sub> - particulate matter under ten microns**  
**PSD - Prevention of Significant Deterioration**  
**RACT - reasonably available control technology**  
**RECLAIM - Regional Clean Air Incentives Market**  
**REMI - Regional Economic Modeling, Incorporated**  
**RTC - RECLAIM trading credit**  
**SCAQMD - South Coast Air Quality Management District**  
**SCR - selective catalytic reduction**  
**SDR - surplus discrete reduction**  
**SEC - Securities and Exchange Commission**  
**SO<sub>x</sub> - sulfur oxides**  
**VOC - volatile organic compounds**

## **Acknowledgements**

EPA appreciates the cooperation and insights of the staff and management of the South Coast Air Quality Management District, who not only designed the RECLAIM program, but have continued to effectively manage its implementation and who have successfully modified the program to respond to significant challenges. We appreciate their willingness to share their insights and lessons in design and implementation of the RECLAIM program.

We also appreciate the stakeholders who we interviewed taking the time to share their insights and experience with RECLAIM over its lifetime.

We are hopeful that by the stakeholders and the District staff providing the information presented in this report, the future direction of policies on these types of programs will be enhanced.

## **EXECUTIVE SUMMARY**

The development of the Regional Clean Air Incentives Market (RECLAIM) was a milestone for air quality management in the Los Angeles area and for the use of market-based incentives in achieving clean air. This report looks at the RECLAIM program from its development to the present in an effort to better understand the issues impacting market based programs and the factors influencing their success. This report is based on practical implementation experience in the most active locally-implemented air emissions trading market in the United States. More specifically, the primary objectives of this effort were:

- To evaluate the program's performance over its lifetime;
- To make recommendations about the functioning of RECLAIM that could improve its performance; and
- To identify lessons learned from RECLAIM's experience that may be of benefit to other incentive programs and may inform evolving policies.

To meet these objectives, the U.S. Environmental Protection Agency (EPA) reviewed program literature including annual reports from the South Coast Air Quality Management District (SCAQMD), to gain a better understanding of RECLAIM's theoretical background, the anticipated results, and the program's performance since inception in 1993. In addition, the research team interviewed over 20 stakeholders from regulated facilities, environmental organizations, regulatory agencies, and brokerage firms to collect feedback on how the market has performed and the overall success of RECLAIM in achieving its intended objectives. These efforts enabled the research team to develop, based on qualitative information, recommendations and lessons applicable to both RECLAIM and market based programs in general.

### **Lessons learned for application in RECLAIM are:**

- Overall, the research team believes that any changes made to RECLAIM at this stage in the program must be taken in small steps and should not involve dramatic regulatory modifications. Stakeholders noted that regulatory change can destabilize the market and make long-range planning difficult. Therefore, modifications should be taken gradually and should be market-based. This generally applicable lesson can also be applied to RECLAIM.
- In order to encourage more efficient operation of the market for emissions control, SCAQMD could provide more information on the performance of the market, the current state of the environment, and expected economic and market conditions. Stakeholders have noted that market and economic information is key to encouraging long-range planning and decision making. While SCAQMD warned that the cross-over point was approaching, the majority of the regulated community did not act in advance of this point. More definite information to forecast future demand shortages may be more effective in encouraging early action and avoiding "crisis" situations. Alternatively, third parties could serve in this role.
- There should be a comprehensive suite of performance parameters identified and tracked at both macro and micro levels of program operation.

- SCAQMD and designers of other trading programs should consider the needs of small facilities which may differ from larger entities.
- Stakeholders have very different opinions about the suitability of inter-sector trading, banking, clean air investment funds and other program features. In order to clarify whether these features are appropriate for RECLAIM, those responsible for administering RECLAIM need to carefully consider the purpose, benefits and risks of such features.
- Some stakeholders believe that SCAQMD could consider modifying the missing data provisions. For penalties incurred solely because CEMs data is not available, stakeholders suggest SCAQMD could require facilities to pay into a mitigation fund or could enable SCAQMD to resell RTCs attributable to the use of missing data provisions. They believe that this would prevent penalties levied against one facility from affecting the entire regulated community.<sup>1</sup>
- SCAQMD could consider serializing credits to allow more accurate tracking.
- SCAQMD could attempt to improve their permitting and compliance systems and to conduct audits and inspections more quickly after the end of the trading year.

**Lessons for consideration in other programs and evolving national policy are:**

- Market-based programs require significant planning, preparation, and management during development and throughout the life of the program.
- Market information is a key factor affecting facility decision-making.
- Regulators should strive to create confidence and trust in the market by making a full commitment to the program and ensuring consistency in the market and their policies.
- Unforeseen external circumstances can have dramatic impacts on market-based programs. Therefore, these programs must be designed to react quickly and effectively to unforeseen external factors.
- Periodic evaluation, revisiting of program design assumptions, and contingency strategies are crucial to keeping programs on track.
- Once programs are up and running, major regulatory changes may be disruptive. Therefore, any actions taken to change or stabilize the market should be incremental and market-based, rather than programmatic.
- RECLAIM's experience seems to demonstrate that cap and trade (CAT) can work with Clean

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<sup>1</sup> EPA continues to believe, as it has since 1992, that SCAQMD's approach effectively achieves the goals of making the environment whole and deterring noncompliance.

Air Act (CAA) New Source Review (NSR). This may be a function of the types of sources included or the controls in place at many facilities. This lesson is contrary to the commonly reported federal view and should be further researched.

- Regulators need to have a strong understanding of the regulated facilities and the factors impacting their decision-making.

We are hopeful that the lessons learned from our evaluation of the RECLAIM program will be applied to inform further evolution of trading policy both locally and nationally. These lessons are discussed in detail in Section 10 of this report.

# 1. INTRODUCTION

## **Background on the RECLAIM Program**

The Regional Clean Air Incentives Market (RECLAIM) is a pioneering federally approved economic incentive program developed and implemented by the California South Coast Air Quality Management District (SCAQMD).<sup>2</sup> Prior to development of RECLAIM, the regulatory environment was dominated by command and control (CAC) regulations—where agencies set specific facility-based (or, in the case of SCAQMD, equipment-based standards). The RECLAIM program, adopted in October 1993, set an emissions cap and declining balance for many of the largest facilities emitting nitrogen oxides (NO<sub>x</sub>)<sup>3</sup> and sulfur oxides (SO<sub>x</sub>)<sup>4</sup> in the South Coast Air Basin (Basin). RECLAIM includes over 350 participants in its NO<sub>x</sub> market and about 40 participants in its SO<sub>x</sub> market. RECLAIM has the longest history and practical experience of any locally designed and implemented air emissions cap and trade (CAT) program.<sup>5</sup> RECLAIM allows participating facilities to trade air pollution while meeting clean air goals.

The program was designed to provide industry with flexibility to decide how to reduce emissions and advance pollution control technologies. NO<sub>x</sub> and/or SO<sub>x</sub> allocations were issued to RECLAIM facilities based on their historical activity levels and applicable emission control levels specified in the subsumed rules or in the AQMP. Facilities within the RECLAIM program have the option of complying with their allocation allowance by either reducing emissions or purchasing RECLAIM Trading Credits (RTCs) from other facilities. Facilities ranging from power producers to glass melters and facilities using industrial boilers participate in RECLAIM.

## **Objectives of the RECLAIM Evaluation**

During the summer of 2000 for a number of reasons, RECLAIM experienced a sharp and sudden increase in credit prices which had a large impact on the ability of industry to purchase RTCs. In order to better understand what caused the price increase and what it might mean for the future of RECLAIM and other incentive based programs, the U.S. Environmental Protection Agency (EPA), SCAQMD, and others

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<sup>2</sup> See 63 Federal Register (FR) 32621, dated June 15, 1998 for the most recent federally-approved version.

<sup>3</sup> NO<sub>x</sub>, pollutants that are emitted by a variety of industrial processes and equipment, including utility boilers and internal combustion engines, can cause or contribute to the formation of ozone or smog, which can affect human respiratory health.

<sup>4</sup> SO<sub>x</sub>, pollutants that are emitted by a variety of industrial processes, including petroleum refining process, can cause or contribute to fine particulate matter pollution, which inhibits visibility and can affect human respiratory health.

<sup>5</sup> These types of programs, where facilities are placed under overall emissions caps and allowed to trade unused portions of their or other facilities' caps in order to comply are known as “cap and trade” (CAT) programs.

began examining the factors that contributed to this increase.<sup>6</sup>

As EPA began to look at the RECLAIM program, it realized that there were fundamental areas of the program that should be examined to provide insight and recommendations for the RECLAIM program, evolving national policy on innovative strategies, and for other locally-implemented programs with features similar to RECLAIM.

In designing an overall evaluation to which this analysis contributed, EPA's Region 9 sought to answer the following questions related to program performance:

1. How has the rate of control installation under RECLAIM compared to the rate of installation required under subsumed CAC rules, projected control installation in SCAQMD staff reports, and the RECLAIM environmental impact report?<sup>7</sup>
2. Has the program achieved the same level of emissions reduction as would have been achieved in the aggregate by implementing the replaced rules and control measures?
3. What was the decision-making process with regard to control investments at a representative sampling of facilities? What has been the relationship between the incentives and deterrence? How does this decision-making process compare to the decision-making process modeled during program development?
4. What evaluative and corrective mechanisms are incorporated into the program? Have they been implemented? Have they been effective, and why/why not? Should other evaluative and corrective mechanisms be considered?
5. Has the program been more cost-effective than the subsumed program?
6. Has there been a surplus or a shortage of available RECLAIM credit and what effect has this had on the credit situation during the high energy demand experienced during 2000-2001? If there was a shortage, if control installation had proceeded as projected, or according to the control scheme subsumed by this program, what effect would this have had on the credit situation during the high energy demand scenarios of 2000 - 2001?

In section 9 EPA presents responses to these questions, using information from this evaluation as well as from other sources.

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<sup>6</sup> The primary focus of our effort has been to look at the NO<sub>x</sub> market, therefore our review of the SO<sub>x</sub> market was limited, though we believe that the lessons learned from NO<sub>x</sub> RECLAIM may be equally applicable and precautionary to SO<sub>x</sub> RECLAIM.

<sup>7</sup> Prepared in compliance with the California Environmental Quality Act.

## **Evaluation Methodology**

EPA and the research team<sup>8</sup> reviewed existing materials on the background of RECLAIM, its implementation, and reviews and evaluations of its performance. The primary source of this evaluation comes from a series of interviews conducted with over 20 stakeholders from regulated facilities, environmental organizations, regulatory agencies, and brokerage firms. A complete list of those individuals whom we interviewed and the questions used can be found in Appendices A and B. It is important to note that the number of stakeholders interviewed as well as the composition and the variety of the views represented by our interviews is not necessarily representative of the variety of views that are held about the RECLAIM program. In addition, during the review of our report, it was clear that SCAQMD does not agree with the views that many of the interviewees provided to EPA. EPA's views, findings and recommendations are denoted throughout this report in italics. Additionally, the reader is referred to Section 9 for EPA's responses to the evaluation's six key questions.

There was little emphasis in the available literature that describes how the underlying theories of market based incentives programs can be practically tested. Accordingly, this investigation focused in large part on the decision-making behavior by operators of the regulated sources, since it is these decisions that ultimately determine the outcome of the program. EPA views this analysis as contributing to the continued efforts to examine and improve RECLAIM and other innovative regulatory efforts; further improvements and examination are welcomed and warranted. We have provided the SCAQMD the opportunity to comment on this report. SCAQMD's comments and our responses to them are found in Appendix F.

## **Structure of the Report**

The evaluation report comprises ten sections and five appendices. The first four sections provide the overview of the RECLAIM program. Section one provides an introduction to RECLAIM and the purpose of the evaluation. Section two outlines the regulatory structure prior to RECLAIM and Section three provides a general description of trading programs. Section four specifically describes the development of RECLAIM. Sections five through eight are structured as the stakeholders' findings and recommendations for the program based on interviews and supplemented with additional documentation. EPA views that are expressed in these sections are italicized. The sections respectively include the findings and recommendations related to decision-making by regulated sources, enforcement and compliance under RECLAIM, the evaluation and oversight by the regulatory agencies, and the performance of the trading market. Section 9 includes EPA responses to the six evaluation questions. Section ten details the lessons learned and recommendations for RECLAIM and those lessons that can be applied to other economic

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<sup>8</sup> Ken Israels and Richard Grow of EPA Region 9 lead the evaluation. EPA Region 9 was awarded contractor assistance from EPA's Office of Policy, Economics, and Innovation (OPEI). Abigail Campbell, Alice Liddell, and Andrew Schwarz of Industrial Economics, Incorporated (IEc) and David Pekelney of A & N Technical Services, are collectively referred to as the research team. EPA Region 9 conducted file reviews and interviews with SCAQMD management and staff to gain the perspective of the implementing agency. The research team performed analyses and conducted interviews of stakeholders.

incentive based trading programs. Appendix A is an interview list of the primary sources, Appendix B lists the questions used in our stakeholder interviews, Appendix C lists secondary sources used in the evaluation, Appendix D is the project workplan, Appendix E briefly lists areas of further research, and Appendix F contains SCAQMD's comments on a September, 2002 draft of this report, along with our responses to their comments.

## **2. THE REGULATORY STRUCTURE PRIOR TO RECLAIM**

### **Requirements of the Clean Air Act**

The 1990 federal Clean Air Act Amendments (CAAA) were designed to bolster and extend the framework of the Clean Air Act (CAA) of 1977. Of particular relevance to Los Angeles, the CAAA sought to address the persistent problem of smog in urban areas. The CAAA created a new schedule for Los Angeles to achieve ozone attainment within 20 years and to demonstrate progress in the interim. The Los Angeles area was the only area of the country to fit into the category of “extreme nonattainment” for ozone. Another important feature of the CAAA is the authority described in the preamble that encouraged the use of market-based programs including emissions trading.

### **The Regulatory Structure in California Prior to RECLAIM**

The seriousness of the local air pollution problem in Southern California was recognized in the early 1940s. In 1946, the Los Angeles County Board of Supervisors established the first air pollution control district in the nation to address the problems of industrial air pollution. In the mid-1950s, California established the first state agency to control motor vehicle emissions. Countywide or regional air pollution districts were required throughout the state by 1970. Many of the controls developed in California became the basis for the federal control program which began in the 1960s.

In 1976, California adopted the Lewis Air Quality Management Act which created SCAQMD from a voluntary association of air pollution control districts in Los Angeles, Orange, Riverside, and San Bernardino counties. The geographic area of which SCAQMD consists is known as the Basin. SCAQMD develops plans and programs for the region to attain federal standards by dates specified in federal law. The agency is also responsible for meeting state standards by the earliest date achievable, using reasonably available control measures.

SCAQMD rule development through the 1970s and 1980s resulted in dramatic improvement in Basin air quality. However, the effort to impose incremental rule changes on thousands of stationary sources under SCAQMD permits was laborious and time consuming. Nearly all control programs developed through the early 1990s relied on the development and application of cleaner technology and add-on emission controls. Industrial sources have been significantly affected by this approach and vehicular emissions have been affected by technologies implemented at the state level by the California Air Resources Board (CARB). Around this time, SCAQMD concluded that there may be alternatives to the CAC regulatory process.

### **Results of Past Controls**

Past air quality programs have been effective in improving the Basin’s air quality. Ozone levels have been reduced by half over the past 30 years, sulfur dioxide and lead standards have been met, and other criteria pollutant concentrations have significantly declined. For the first time in 1992, the federal annual nitrogen

dioxide standard was not exceeded in the Basin. However, the Basin still experiences exceedances of health-based standards for ozone, carbon monoxide, and particulate matter under ten microns (PM<sub>10</sub>). To confront these and other air quality issues, SCAQMD started to look at new types of regulatory programs, including trading programs. Trading programs are discussed in the next section.

### 3. TRADING PROGRAMS

EPA's air policy has embraced the theory of trading since 1976, with the introduction of the "offset" policy. This allowed major stationary sources to credit reductions from other sources as an alternative means of complying with CAA permitting requirements for major stationary sources. In addition, EPA has investigated the role of emission "bubbles"<sup>9</sup> and developed an Emissions Trading policy Statement (ETPS) in 1986.<sup>10</sup> Note that all of these policies were applicable only to stationary sources and provided for "alternative compliance" with standards applicable to those sources.

In a report prepared for SCAQMD and the California Council for Environmental and Economic Balance (CCEEB), Roger Noll from Stanford University identified four mechanisms for potential cost savings under a marketable permit program (MPP).<sup>11</sup> The first, and most commonly advanced mechanism, is that trading within source categories provides the opportunity for compliance cost savings. These savings are derived from trading between high and low cost-of-control equipment and facilities within a source category such as utilities or refineries.

The second mechanism for cost savings is trading between source categories. By creating a trading program with a broad array of control categories, trading can take place between high and low cost-of-control categories. For example, trading would take place between utilities and refineries, or between utilities and mobile sources. Again, a well-functioning market would result in more of the low cost reductions, reducing overall compliance costs.

The third mechanism promoting the reduction in compliance costs with emissions trading is technological innovation. Facilities have the incentive to reduce emissions below the required level as long as their cost of control is below the market price, thus, they have the incentive to develop more efficient means of control. Regulatory agencies do not need to assess the exact technological fit on a case-by-case basis allowing a more general incentive rather than being constrained by standards within defined equipment categories. Further, there is the ongoing continuous incentive over all years of the program.

The fourth mechanism for reducing the compliance costs is the flexibility in timing of investments. Under emissions trading, facilities have the ability to postpone or advance control technology or other capital investments to achieve cost savings. Perhaps it makes sense to retrofit a middle-aged power plant with advanced technology and to postpone investments in an aging plant until it is retired. In general, the more cost effective control measures can be implemented first and the least cost effective control measures can be postponed.

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<sup>9</sup> U.S. EPA, "Recommendations for Alternative Emission Reduction Options within State Implementation Plans," 44 FR 71780, December 11, 1979.

<sup>10</sup> U.S. EPA, "Emissions Trading Policy Statement, Final Policy Statement and Accompanying Technical Issues Document", 51 FR 43814, December 4, 1986.

<sup>11</sup> R, Noll., "Discussion Paper on Marketable Emissions Permits," December, 1990.

## **EPA 1994 Economic Incentive Program**

In 1994 EPA issued a final rule and guidance on its Economic Incentive Program (EIP) designed in response to the 1990 CAAA which required states to adopt EIPs if they failed to meet certain milestones in the Act. EIPs include emission fees, marketable permits, product fees, and transportation control measures. EIPs may not interfere with any federal regulatory requirements.<sup>12</sup> Many state and local authorities began development of programs consistent with the policies outlined in the 1994 EIP.<sup>13</sup>

## **Open Market Trading**

While the 1994 EIP was directed primarily at stationary sources, there were references to the potential expansion of the EIP beyond these sources, but little guidance as to how implement it. In 1993 the Agency issued its “Interim Guidance for the generation of Mobile Source Emission Reduction Credits.”<sup>14</sup> However, this guidance also stopped short of a detailed discussion of how the use of such credits for compliance by stationary sources would be implemented.

A December 1994 policy paper, prepared by a program advocate, described the potential benefits of open market trading (OMT).<sup>15</sup> In contrast to previous trading policies, OMT allowed crediting of temporary, or “discrete” reductions,<sup>16</sup> substantially expanded the use of intersector eligibility for generation and use of credits, and the use of these credits intertemporally, (i.e., several years after they had been generated). Surplus Discrete Reduction (SDR) addressed design criteria such as use of a registry, the creation of SDRs using proper baselines and emission rates, banking options, and the use of SDRs for compliance. Subsequently, based in large part on this paper, EPA proposed an Open Market Trading Rule.<sup>17</sup> Though

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<sup>12</sup> Including reasonably available control technology (RACT), Prevention of Significant Deterioration (PSD), New Source Review (NSR), lowest achievable emission rate (LAER), best available control technology (BACT), New Source Performance Standards (NSPS), National Emission Standard for Hazardous Air Pollutants (NESHAP), Title IV, vehicle inspection and maintenance, clean fuel fleets, reformulated gasoline, employee commute options, or transportation control measures of federal motor vehicle controls.

<sup>13</sup> For a fairly thorough survey of these programs, see “US Experience with Emissions Trading,” Clean Air Action Corporation, January 22, 2002.

<sup>14</sup> 58 FR 11134, February 23, 1993.

<sup>15</sup> Richard E. Ayers, “Developing a Market in Emissions Credits Incrementally: An ‘Open Market’ Paradigm for Market-Based Pollution Control”, The Bureau of National Affairs, Inc., Washington DC, December 2, 1994.

<sup>16</sup> Previous policies required that reductions be “permanent”, by which was meant the reductions should occur over a time period commensurate with the time period for which they were being used by other sources to demonstrate compliance.

<sup>17</sup> U.S. EPA, “Correction: Open Market Trading Rule for Ozone Smog Precursors,” 60 FR 44290, August 25, 1995 and U.S. EPA, “Open Market Trading Rule for Ozone Smog Precursors”, 60 FR

this rule was never finalized, some state and local authorities began developing and implementing OMT systems.<sup>18</sup>

### **EPA 2001 EIP Guidance**

In 2001, EPA issued its next guidance document for EIPs,<sup>19</sup> which describes four main types of EIPs: emission averaging, source-specific emission cap, CAT, and OMT.<sup>20</sup> The guidance reinforces that the programs are voluntary and that states have much flexibility in adopting a program. They are categorized as either trading EIPs, which includes emission averaging, source specific emission caps, multi-source emission caps, CAT, and OMT; or financial mechanisms, which include fees or taxes on emissions; clean air investment funds; and public information programs, such as product labeling or information programs. The guidance also includes some new provisions on hazardous air pollutants, environmental justice, and is more reader friendly in that it is written in plain language.

## **4. DEVELOPMENT OF RECLAIM**

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39668, August 3, 1995.

<sup>18</sup> See 66 FR 9264, dated February 7, 2001, for a sample program in Michigan.

<sup>19</sup> U.S. EPA, “Economic Incentive Programs: Improving Air Quality With Economic Incentive Programs: Final Guidance,” Office of Air Quality and Planning & Standards, January 19, 2001.

<sup>20</sup> The different trading EIPs are more specifically described as:

*Emission averaging EIP:* Allows sources to comply with rate-based regulatory limits so that the total emissions of the averaging units are less than the total would be if they each complied as individual units. Typically, emission averaging would be used by a single controlling entity so that it could be responsible for meeting the requirements of the program.

*Source-specific emission cap EIP:* Allows a specific group of sources subject to rate-based regulatory limits to operate under an emissions cap. This is similar to emission averaging but goes further by setting an absolute cap in terms of mass per unit of time rather than mass per unit of activity (e.g. pounds per day or tons per ozone season).

*CAT EIP:* Limits total emissions for a group of sources to an absolute level of mass per unit of time (e.g. tons per ozone season, tons per year) and allows sources to trade among themselves giving them more flexibility and lower cost. Most systems are designed by determining a universe of sources (typically similar, such as all boilers over a certain size), establishing a total mass of emissions to be allowed from the sources, allocating each source a number of allowances which gives them the ability to emit a prescribed mass of pollution, and allowing trading among the sources so that they have more flexibility in complying. Sources may emit at their level of allowance allocation, emit less than their allocation and sell the unused credits, or obtain more allowances than they were issued so they can emit at higher levels.

*OMT EIP:* Gives sources the flexibility to comply with emission limits by applying emission reductions made in the past to meet future obligations. This program is not limited to any particular type of source sector.

SCAQMD had in place more limited provisions for emission trading before the development of RECLAIM. SCAQMD funded the research done by Roger Noll on marketable permits. In addition to efficiencies inherent in a trading program as described in Section 3, Noll also articulated the expectation that emissions trading would alleviate some of the adversarial nature of air pollution control rule making. Since CAC regulations are based on specific control technologies, there may be "adversarial use of technical information." This effect, it was hoped, would be mitigated with emissions trading.

During the same time period, RECLAIM's conceptual development was also advanced by an analysis produced by National Economic Research Associates for CCEEB and the Regulatory Flexibility Group.<sup>21</sup> This document reviews and articulates the mechanisms for compliance cost savings from emissions trading, lays out a possible design for a trading program for SCAQMD, and estimates the economic costs of implementing the emissions trading program. The program modeled in this analysis includes a broader range of sources than ultimately included emissions in RECLAIM such as motor vehicles and volatile organic compounds (VOCs).

### **Modeling RECLAIM's Potential Cost Savings**

Through the rule development process, SCAQMD focused on forging a practical program that would maintain as much of the potential cost savings benefits predicted by economic theory while achieving environmental and public health protection equivalent to the subsumed CAC system.

To estimate the magnitude of the potential savings and to assist the process of policy development, SCAQMD utilized a series of economic models that represented the trading market and the regional economy. The emissions trading model (ETM) estimates trades that are likely to occur under the program, and its links to a general equilibrium model of the regional economy. The ETM is a linear programming model that simulates firm behavior regarding emission control, technology choice, and emissions credit trading.<sup>22</sup> Based on projected engineering cost data and RTC allocations, the model predicted the price, volume, and direction of emission credit trades for the years 1994 through 2000.

The REMI model (Regional Economic Modeling, Inc.) simulates primary and secondary economic impacts by modeling the regional economy and reporting jobs and other economic indicators.<sup>23</sup> The model links five primary components: 1) production; 2) population and labor supply; 3) labor and capital demand; 4) wages, profits, and prices; and 5) market share (regional, imports, and exports). The REMI model has

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<sup>21</sup> D. Harrison and A.L. Nichols, "Market-Based Approaches to Reduce the Cost of Clean Air in California's South Coast Basin," National Economic Research Associates, November, 1990.

<sup>22</sup> SCAQMD "RECLAIM Volume III: Final Socioeconomic Report," October 1993 (1993b) and S.L. Johnson and D.M. Pekelney, "Economic Assessment of the Regional Clean Air Incentives Program," Land Economics, Vol. 72, Nov. 3, August 1996 are the primary references for the economic analysis.

<sup>23</sup> G. Treyz, D. Rickman, and G. Shao. "The REMI Economic-Demographic Forecasting and Simulation Model," International Science Review, 14, 221-253. 1992.

been used by SCAQMD since 1990 to analyze proposed rules. REMI and ETM interact and the compliance cost results from the ETM are supplied to REMI, whose results are then used to update economic conditions in the trading model. The process is repeated until no significant changes in economic conditions between iterations are observed. Job and price indicators are the criteria used to determine when the two models converge. The results from these analyses are contained in the 1993 Development Report.<sup>24</sup>

The assumptions from the theoretical modeling about the expected behavior of RECLAIM are summarized below:

- *Least cost.* This assumes plant operators will choose the least cost path of compliance, choosing from (1) installation of controls, (2) process modifications, or (3) purchase of credits representing reductions from other sources.
- *Perfect information.* All participants will be instantly aware of the availability of control options and/or credit prices and equilibrium will be reached for each compliance year.
- *Investment in credit generation.* Following from the least cost assumption, the model also assumes that plant operators, in deciding whether or not to invest in controls, will factor in the projected future sale of any excess credits they generate as a result in installation of controls.
- *Long range planning.* Implicit in the model is projected behavior by plant managers that the planning horizon, meaning the period over which return on investment is considered, extends for some time into the future.
- *Noncompliance is not an option.* In the modeling, plant operators did not have the option of considering the cost of noncompliance. This is not to say program designers made the same assumption, but rather that the program's performance was projected on this assumption.

At the time of adoption, RECLAIM was estimated to affect approximately 390 and 41 of the largest emitters of NO<sub>x</sub> and SO<sub>x</sub> in the Basin and was designed to reduce emissions of these pollutants by 80 and 14 tons per day, respectively, by July 1, 2004.<sup>25</sup> Using these models, SCAQMD projected that RECLAIM facilities would save an average of \$57.2 million (1987 dollars) annually compared to the projected costs of CAC regulation or a 42 percent savings from 1994-1999. The models estimated that prices of emissions trading credits would range from \$577 per ton in 1994 to \$11,257 in 1999. Over the same period, RECLAIM was also predicted to result in an annual average of 1,147 fewer jobs foregone than CAC regulation. Although RECLAIM cost savings and job impacts are quite small compared to the region's total economic output and the job base respectively, they are of great interest to policy makers and regulated industries.

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<sup>24</sup> See SCAQMD, "RECLAIM Volume III: Final Socioeconomic Report," October 1993b.

<sup>25</sup> See "RECLAIM, Volume I: Development Report and Proposed Rules", South Coast Air Quality Management District; October 1993.

## Public Process

Throughout development, implementation, and modification of RECLAIM, SCAQMD worked extensively with a variety of stakeholders including RECLAIM facilities, environmental groups, EPA, the CARB, the California Energy Commission (CEC), and other interested parties. Many of these individuals and organizations participated in the Advisory Committee process that assisted SCAQMD in development of the White Paper prepared in reviewing possible RECLAIM modifications to mitigate market performance issues in 2000.

## The RECLAIM Program 1994-2001

### Trading Activity

Trading activity during the first year (1994) of the program was light, the following two years (1995-1996) showed higher trading activity in terms of emissions, but throughout the first three years of the program, the vast majority of emissions were traded for no price.<sup>26</sup> From 1997 to 1999, more trades took place (the average emissions traded was about 42,000 tons) and the price of NOx RTCs remained relatively low and stable (\$1,500 to \$3,000 per ton), though a significant majority of the emissions were traded for no price. Finally, in 2000, about the same quantity of emissions were traded as in the 1997-1999 time-frame, though for those trades with prices, the prices were significantly higher than any prior year (up to \$90,000 per ton in some cases).

### Compliance

The compliance rates in terms of the number of facilities that complied with their annual allocation during each year of the program are presented in the table below:

Compliance Year	Compliance Rate
1994	86%
1995	92%
1996	85%
1997	96%

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<sup>26</sup> Trades are registered as “no price” because either a) RTCs are transferred from a seller to a broker (the price would then be recorded when transferred from broker to buyer), b) RTCs are transferred between facilities of common ownership where there is no cash transaction, or c) RTCs are transferred between facilities where there was no specific price such as when the price is imbedded in another part of the transaction (e.g., a plant is bought for X\$’s including RTCs).

1998	94%
1999	91%
2000	88%

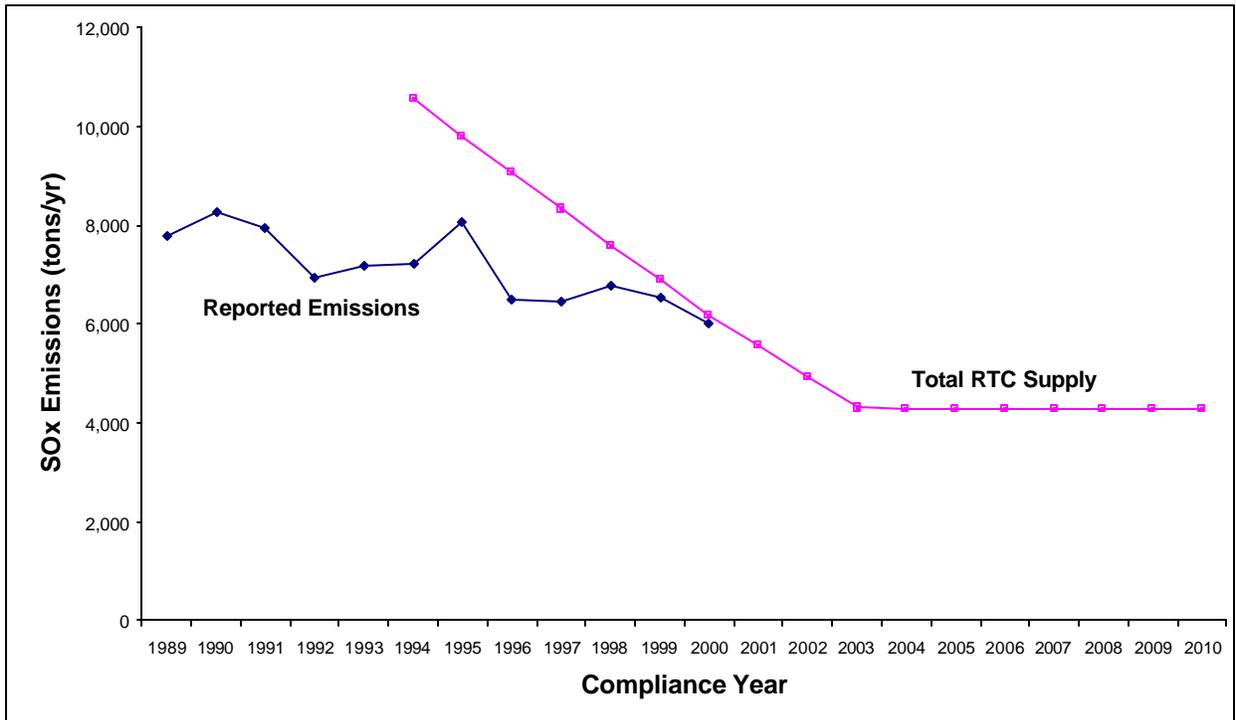
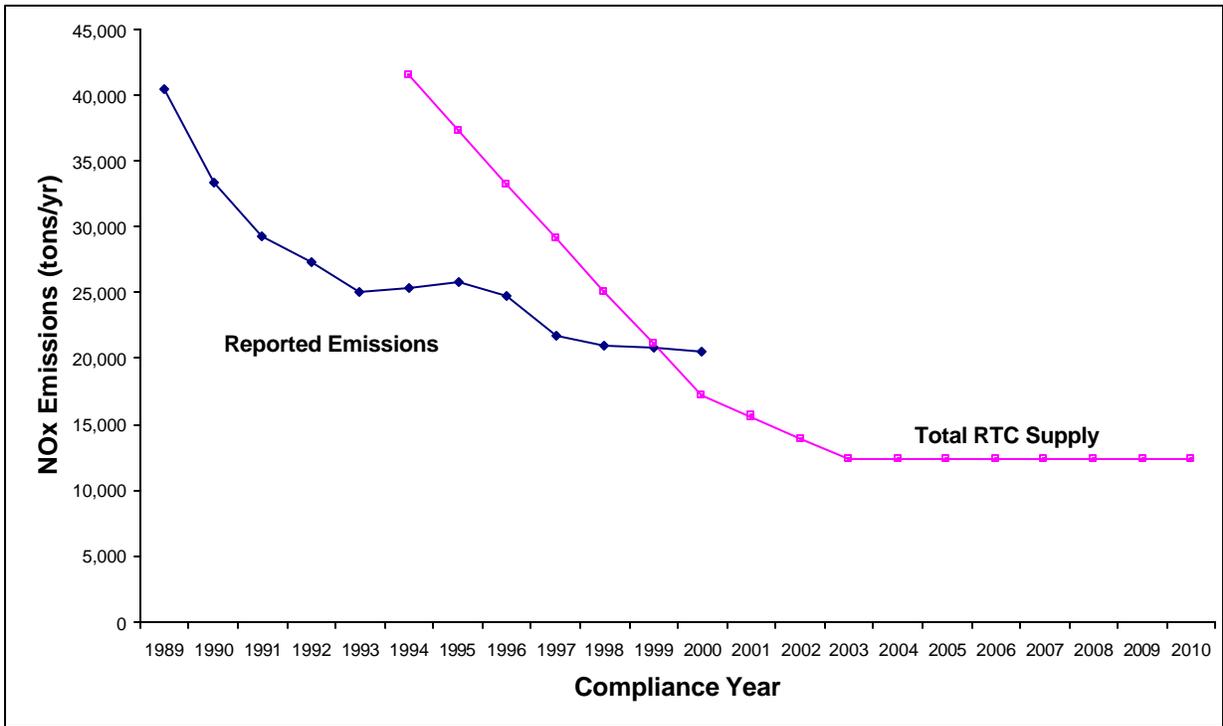
It should be noted that the compliance rates in the table above are not related to the amount of actual excess emissions that occurred as a result of facility noncompliance. One can, however, say that the majority of facilities in RECLAIM had little difficulty complying with their annual allocations even during the time-frame during which California's energy deregulation affected RECLAIM.

Each year an annual report on RECLAIM's performance has been prepared. These reports highlighted that a crossover point was anticipated to occur in 1998 or 1999, where aggregate actual emissions would approach or potentially exceed total allocations. When this occurred, facilities would have to purchase credits, reduce emissions, install control equipment, and/or take other emission-reducing actions like improved process management.<sup>27</sup> The figures below illustrate these crossover points for both the NOx and SOx RECLAIM markets.<sup>28</sup>

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<sup>27</sup> For instance see SCAQMD, "Annual RECLAIM Audit Report", May 1998.

<sup>28</sup> These graphs are from SCAQMD's Compliance Year 2000 RECLAIM Evaluation Report.



Between compliance year 1994 and compliance year 1999 NOx emissions at RECLAIM facilities, in

aggregate, were below allocations and the price of NO<sub>x</sub> RTCs remained relatively low and stable. As stated in SCAQMD's "White Paper on Stabilization of NO<sub>x</sub> RTC prices",

"Beginning June 2000, RECLAIM program participants experienced a sharp and sudden increase in NO<sub>x</sub> RTC prices for both 1999 and 2000 compliance years. The average price of 1999 NO<sub>x</sub> RTCs traded in 2000 was \$15,377 per ton, which was almost ten times higher than the average price of \$1,827 per ton of NO<sub>x</sub> RTCs traded in 1999 for the same compliance year. More significantly, the average price of NO<sub>x</sub> RTCs for compliance year 2000, traded in the year 2000 increased sharply to over \$45,000 per ton compared to the average price of \$4,284 per ton traded in 1999."

SCAQMD has stated that this was mainly due to three factors: (1) increased demand for power generation, related to deregulation, (2) the crossover point described above, and (3) delayed installation of controls by power plants and other participants.<sup>29</sup> The first factor resulted in the electric power industry purchasing large quantities of RTCs and depleted the available RTCs.

### **Structure of the Program after the May 2001 Modifications**

The SCAQMD Governing Board (Board), at its October 2000 meeting, formed an Advisory Committee to examine issues affecting the price of NO<sub>x</sub> RTCs and recommend actions that could be taken to stabilize RTC prices. This effort resulted in SCAQMD's development of a White Paper,<sup>30</sup> which included a series of recommendations developed to help address the energy situation and stabilize RTC prices. At the January 19, 2001 Board meeting, SCAQMD proceeded with rule development amending the existing program in an attempt to lower and stabilize RTC prices by increasing supply, reducing demand, and increasing the exchange of RTC trading information. A key element of the regulations, which were amended on May 11, 2001, took power producing facilities out of the RECLAIM program. In addition, the amendments were designed to expedite installation of emissions control equipment at power plants, while reducing the impacts of California's electricity deregulation on the RECLAIM market and facilitating the development of a reliable statewide electricity supply.<sup>31</sup>

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<sup>29</sup> See page 40, South Coast Air Quality Management, "White Paper on Stabilization of NO<sub>x</sub> RTC Prices," January 11, 2001.

<sup>30</sup> See South Coast Air Quality Management, "White Paper on Stabilization of NO<sub>x</sub> RTC Prices," January 11, 2001.

<sup>31</sup> The rule amendments include the following key elements:

- Isolating power producing facilities from the rest of the RECLAIM facilities;
- Requiring power producing facilities to submit compliance plans delineating schedules for installation of Best Available Retrofit Technology on electric generating facilities by the end of 2000;
- Requiring facilities with 50 tons or more NO<sub>x</sub> emissions to submit compliance plans specifying approaches for complying with the facility allocation;
- Requiring facilities with NO<sub>x</sub> emissions between 25 and 50 tons to submit forecast reports projecting allocations for Compliance Years 2002 through 2005;

As the program underwent modifications in 2001, an advisory letter was mailed to RECLAIM Facility Permit holders to provide information on available, cost-effective control options. SCAQMD also conducted four technology meetings to help disseminate information on available control options.

The report examines the RECLAIM program from its inception to the price spike, including facility decision-making, enforcement and compliance under RECLAIM, the oversight by regulatory agencies, and the performance of the trading market. The following sections detail the findings and recommendations from our review of the RECLAIM program in 2001-2002. The information contained in Sections 5 through 8 is derived from the research team's interviews with relevant industry, environmental, broker, and regulatory stakeholders. The recommendations in these sections are taken directly from these stakeholders and therefore do not necessarily reflect the views of either EPA or the research team. Some additional details from EPA are also included to provide clarification. To distinguish this information from the views of the stakeholders, this information is italicized. Section 9 provides EPA's responses to the six performance questions identified in our workplan. Section 10, Lessons Learned, draws from these findings and recommendations and provides the research team's overarching conclusions and recommendations that can be applied to RECLAIM and other market-based programs.

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- Requiring timely registration of RTC trades to provide RECLAIM facilities with better price information;
  - Creating a Mitigation Fee Program to provide a means for power producing facilities to comply with annual allocations;
  - Creating an Air Quality Investment Program to provide small RECLAIM facilities with needs for additional emission reduction credit;
  - Creating a reserve of emission reductions to support the Mitigation Fee Program and Air Quality Investment Program.

## 5. DECISION-MAKING BY REGULATED SOURCES

This section of the report is a reporting of views from interviews of stakeholders. Our interviews were limited for a variety of reasons, including the amount of resources available to conduct this review. It is important to note that the number of stakeholders interviewed as well as the composition and the variety of the views represented by our interviews is not necessarily representative of the variety of views that are held about the RECLAIM program. In addition, during the review of our report, it was clear that SCAQMD does not agree with the views that many of the interviewees provided to EPA. The findings and recommendations in this section of the report are based on the results of these interviews. **EPA's views, findings and recommendations are denoted throughout this report in italics. Additionally, the reader is referred to section 9 for EPA's responses to the evaluation's six key questions.**

### Factors That Affect Decision-Making

Regulated facilities base their decisions about whether to control emission levels or purchase RTCs on more than the cost of credits and the marginal cost of control technology installation. Additional circumstances, such as lead time, market uncertainty, short term considerations and the regulatory environment also impact facilities' decisions. The findings and recommendations in the following section elaborate on the issues impacting and guiding facility decision-making.

### **Findings**

#### Long-Range Planning

- **Decisions about whether to install control technology or buy credits have been made by different levels of management as the RECLAIM program has changed over the years.**

While the decision-making process is conducted differently by each company, most stakeholders believed that, in general, the environmental compliance staff identifies the several options which could be relied upon to ensure compliance and then presents the options to upper-level management. However, several companies said that during the 1993-1995 time-frame, decisions regarding implementing compliance measures were made by the companies' upper-management (the president, vice-president, etc.) and hired consultants. This was due to the importance of managing allocations and the political consequences of the program as many companies were unsure whether RECLAIM was going to be successful. Between 1996-1999, more of the decision-making process was delegated to environmental compliance personnel in medium and large size companies. When the RTC price spike occurred in 2000, upper-management became involved in the decision-making process. Now that RTC prices have stabilized, environmental compliance personnel are beginning to make the decisions again.

- **Most large companies make an effort to integrate decision about control technology or process modifications into long-range planning.**

Most large companies attempt to weigh the price of the credits and the marginal cost of compliance to determine whether they should install control technology or purchase additional credits. This implies weighing options based on the current and future projected prices of credits. However, uncertainty about the future direction of RTC demand and supply makes weighing compliance costs and control options difficult. Market uncertainty therefore discourages some stakeholders from investing in costly control technologies because of the risk involved. In order to minimize the risks of uneconomical decisions, facilities may only invest in those technologies with short pay-back periods (e.g., one year).

However, environmental stakeholders believed that facility managers chose to base decisions on short-term costs rather than integrating decisions into long-range planning. These stakeholders felt that facilities often did not consider the total costs viewed over a longer time horizon. Because financial performance is tracked quarterly, facility managers felt an incentive to keep costs as low as possible in the short-term, even if this decision was not the most economical in the long-run. Therefore, facilities weighed the costs of the credits that would be purchased for the short-term versus the total cost of installing pollution control technologies.

- **In general, small and medium size companies conduct little, if any, long-term planning that involves environmental concerns.**<sup>32</sup>

When small and medium size companies conduct long-range planning, it is usually in regard to market share, not environmental compliance. In addition, these companies only forecast a few years in advance because they do not have the resources to look at their long-term capital needs; they are more concerned about “market” considerations other than the cost of compliance, such as their short-term goals of selling products and making money. Companies will only take environmental concerns into consideration in their planning because they know how important it is to stay below the RTC limits.

### **Market Information**

- **Many participants said they did not have sufficient market information to make informed compliance decisions and to conduct long-range planning.**

The structure of the RECLAIM market contributes to market unpredictability, which inhibits the ability of facilities to conduct long-range planning. Because the market can be impacted by regulatory policy, the supply and demand for credits are not as predictable as they might be for other commodities. Additionally, credits are very different from other

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<sup>32</sup> A notable exception to this statement are the efforts of the Association of Textile Dyers, Printers, and Finishers of Southern California; on the internet see <http://www.atdpf.com/>.

commodities because extra credits at the end of the reporting year are valueless and the penalties for having insufficient credits are severe. The RTC market is also very inelastic in the short term because substitutes are not available. Therefore, shifts in demand can have dramatic impacts on market prices.

In addition, a few companies believe that the information base was not adequate for facilitating long-range decisions. SCAQMD emissions data were aggregated so companies did not know what control technologies had been installed by other facilities in the market or whether the market was nearing the cap. They believed that SCAQMD did not communicate adequately with industry participants. As a result, some industries were not well informed of the cross-over period and could not see the price spike coming. Since it can take two to three years to install pollution control technology, facilities would have needed to speculate about future prices to act in advance of the spike.

- **Some stakeholders believe the RECLAIM market may have been affected by misinformation and manipulation.**

Several stakeholders noted that they have heard allegations of manipulation in the market by industry participants and brokers. Facilities may have posted inaccurate trade information on their website to skew perceptions of RTC supply. Interviewees have also suggested that brokers hoarded RTCs, traded amongst themselves to create a perception of high demand, and otherwise manipulated the market. However, brokers note that their role in RECLAIM is as unbiased players to facilitate the transfer of RTCs by bringing buyers and sellers together. They have always had a responsibility to comply with the rules and report trades in an accurate and responsible manner.

The RECLAIM market has also been affected by simple misunderstandings. In the summer of 2000, one facility contacted three brokers in an attempt to locate the best price for a credit purchase. (Public facilities are required to collect bids for services in order to ensure they are receiving the best prices, therefore, these facilities are required to contact multiple brokers). However, because three brokerage firms were inquiring about the credits, market participants believed demand was higher than actually was the case. Several industry stakeholders believe that this single incident was partially responsible for a rise in prices.

Some broker and industry stakeholders noted that there have been cases when facilities put RTCs into trust funds prior to broker-arranged trades and the trade has not been completed. However, because RTCs become commingled in the trust, it is sometimes difficult for facilities to reclaim their credits.

Finally, there are ongoing investigations into allegations of manipulation of the energy market. Given the dependence of the RECLAIM program on the utility sector, any such manipulations could also be expected to affect the workings of RECLAIM. This poses

issues of whether safeguards are needed to insulate the trading program against such external factors.

### **Lead Time**

- **Some stakeholders believe that lead time for installation of controls is a significant factor affecting program performance.**

Installation of controls is the main compliance option under the CAC strategy subsumed by RECLAIM. As verified in industry interviews, there is typically an 18-36 month lag time between the decision to purchase and install controls and when they are in place and reducing emissions. Thus there is a predictable lag time between the decision to install controls and their effect, both on the market and the environment. For example, many companies began installing pollution controls when the price spike began in the summer of 2000. However, the effect of these installations, a drop in RTC demand and price, was not seen for over a year.

Some industry stakeholders applaud SCAQMD's attempt to expedite the permitting process for new controls. However, some companies cited what they described as "permitting delays" as limiting companies' ability to respond quickly to changes in RTC prices.<sup>33</sup> Other stakeholders argue that while pollution control installation may be time consuming, facilities can always make changes to their production process to reduce emissions in the short-term, and in fact some companies reported that they had curtailed production.

Because of the lag time associated with permitting, some companies have delayed installing controls because they must project future RTC prices. Other facilities stated plainly that under the previous CAC system decision-making was simpler and faster. Arguably, market based programs increase the lead time for control installation because of the introduction of more factors, some of them less predictable, than under CAC.

### **Control Versus Credit**

- **Choosing the appropriate type of pollution control equipment has been harder for some companies under RECLAIM because they are not guided by the rigid structure of CAC regulations.**

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<sup>33</sup> While stakeholders noted delays, EPA believes that the length of the permitting process is well within national norms and found no evidence to support points to the contrary.

While companies have greatly benefitted from the flexibility under RECLAIM, many feel that making decisions to install pollution control equipment has been harder under RECLAIM. Some companies felt that CAC regulations were easier to understand as they clearly identified the type of control equipment to purchase by a certain date. Under RECLAIM, companies have had to figure out their emissions levels and make decisions about whether to install control technology, make process modifications, or buy and sell additional credits. In addition, under RECLAIM, companies lost the “CAC compass” and so they did not know what equipment was available to be installed.

- **Some facilities have had difficulty adjusting to the ideology of the market-based system.**

Some companies are not yet geared towards a market-based ideology. One industry stakeholder stated that some companies did not trade credits because they did not understand the market or because they were not encouraged to trade extra credits. For some, compliance decision-making may be difficult because market trends are not readily apparent. Other facilities may still be uncomfortable engaging in market transactions to ensure compliance for fear of the significant violations that may result from non-compliance. While not necessarily the most cost-effective option, these companies may prefer to implement compliance measures, rather than purchasing RTCs.

- **Companies did not generate additional credits for trade because their primary concern was simply to stay in compliance.**

The RECLAIM program assumed that large facilities would over-control their emissions and sell their excess RTCs in order to generate profit. However, most facilities installed controls, made process modifications, bought credits, or reduced production simply to stay in compliance. They did not go above and beyond what was required for compliance and did not focus on generating excess credits for revenue. One company explained that they did not generate credits for sale as a means of profit because it is not their primary business. Because credit prices were so low for much of the program, it is also unlikely that it would have been economically beneficial for facilities to engage in credit generation projects.

One facility indicated that it believed it could make money by installing pollution control devices and then selling their excess credits. However, the main impetus for further compliance was not to make money, but rather a response to the fear that if the RECLAIM market collapsed, they would have to install pollution control devices under traditional CAC regulations. Even so, the company found that when it tried to sell its excess credits, the price of RTCs was so low that it was not profitable for the company to sell its credits.

## **Recommendations Regarding Factors That Affect Decision-Making**

- **SCAQMD could consider improving the amount of current market information that it makes available and making this information available more quickly.**

In order to make compliance decisions, facilities need to be aware of the supply, demand, and price of RTCs. SCAQMD could consider posting information about trade activity and current prices so that regulated facilities can have a current understanding of the market. SCAQMD has recently added a spreadsheet on the AQMD website so that they can post trade information within days of when confirmation is received. Speeding the posting of the spreadsheet would be beneficial since it can sometimes take a few weeks for information to become available. A better alternative would be to post RTC trades on the Internet to allow easy transfer of information. SCAQMD has committed to converting the bulletin board to a web-based system within two years. Speeding the development of the web site is important since timely information is vital to the market. SCAQMD could potentially delegate this responsibility to a contractor more familiar with managing this type of information posting mechanism. Requiring facilities selling or trying to purchase credits to post information on an Internet based system would also allow the regulated community to track whether RTC demand was increasing or decreasing. This type of trading system would also improve price signals. Posting credits available for sale and purchase also eliminates misunderstandings and misinterpretation about current levels of supply and demand.

- **SCAQMD could investigate ways to provide information that would facilitate long-range planning and decision-making.**

SCAQMD could consider providing market signals to the regulated community. Facilities have indicated that they have not felt comfortable making long-range capital decisions because of the lack of information and understanding of the RECLAIM trading market. Decision-makers have had difficulty weighing compliance options because of uncertainty in the future performance of the market and the availability and price of RTCs. While future projections will always involve a degree of uncertainty, SCAQMD could improve facilities' ability to make informed decisions by collecting and providing market information.

SCAQMD could consider making information about emission levels and control technology installations more easily accessible. Providing information about the installation of control technologies and emissions reports for facilities or sectors would give market participants a better idea of whether demand for RTCs will decrease, stabilize, or potentially grow. For example, SCAQMD was aware that companies were not installing selective catalytic reduction units (SCRs) or other controls during the late 1990s because they had not received many applications for control equipment. By providing this information to the market, the facilities could have been better prepared for the imminent cross-over point.

- **SCAQMD could consider serializing RECLAIM credits.**

RTCs could be serialized so they can be tracked and reclaimed more easily once placed into a trust for the purposes of trading. This would guard against the difficulties some facilities have had when trading credits through RECLAIM brokers. In addition, serialization could reduce misinformation when brokers are advertising the sale of a group of credits; facilities could easily determine whether inquiries were being made regarding one or multiple groups of credits. This approach has been used successfully in EPA's Acid Rain program.

### **Facility Decisions and Actions**

Ultimately, the control technologies installed over the course of RECLAIM, the emissions reductions that are achieved, and the cost-savings that could potentially result from the market-based approach, are dependent upon facility decision-making. The following describes facilities' behavior throughout the program and the impact of these trends on control technology installation and emission levels.

### **Findings**

#### **1993-1999**

- **Most facilities did not either make new capital expenditures or purchase credits in order to remain in compliance up until 1999.**

In the early years of the RECLAIM program (1993-1999), most companies had an excess number of RTC credits because of the initial allocation. According to SCAQMD's 2000 Annual RECLAIM Audit, there were 14,813 tons of excess RTCs in 1994 and 10,267 in 1995, exceeding the actual emissions by 58 percent and 40 percent respectively. This represents approximately 37 and 28 percent of the total RTCs in the market. As a result, there was very little trading of RTCs. Because of the surplus in supply, from 1996-1999, the price of credits was very low. Current year NOx credits were trading between \$154 per ton of NOx in 1996 and \$1,827 per ton in 1999.

Industry, environmental, and regulatory participants all agree that the level of controls installed during the early years of the program was very low. When regulated facilities should have been taking steps to ensure compliance during the pending crossover, many facilities did not have an incentive to install control technologies because credits were inexpensive and purchasing RTCs was more cost-effective. For example, under the previous CAC regulations, power producers would have had to install BACT, such as SCRs, by 1999. When RECLAIM was implemented, many power producers who had ordered control equipment prior to RECLAIM cancelled their orders for SCRs and chose to purchase RTCs instead.

#### **The 2000 Price Spike**

- **Prices rose dramatically in 2000 and regulated facilities had not planned or prepared for this sudden shift in the market. As a result, some regulated facilities were not able to purchase sufficient credits to cover their total emissions.**

In 1999 and 2000, several factors impacted the RTC market. First, the RECLAIM market reached the long predicted “cross-over point” where there were no longer excess credits available for purchase. Installation of controls had also fallen far short of the expectations of program managers, contributing to the shortage of credits in the market.<sup>34</sup> California’s energy deregulation also impacted the market, increasing power producers’ demand for RTCs. These factors are discussed in greater detail elsewhere in this report. The combination of these forces resulted in a shortage of credits and consequent dramatic price spike during the summer of 2000. At the height of the price spike, 2000 NOx credits were trading for an average of \$45,609 per ton.

Stakeholders agree that industry participants were not prepared for the sudden, sharp price increases that occurred in 2000. Several companies stated that they did not realize that the cross-over point would occur as early as 1999. As a result, many companies believed that they would be able to continue buying RTCs more cheaply than purchasing pollution control equipment. For example, many small companies say they assumed that utilities and other large companies were reducing their emissions or were going to begin installing controls, and as a result believed that they would be able to buy credits from the larger companies. This assumption is supported by the projections in the 1993 Development Report.

Other stakeholders suggest that given the low RTC prices from 1993 to 1999, many companies believed that the long-term RTC prices would continue to stay low or would at least rise gradually to the cross-over point. On the other hand, environmental stakeholders suggest that facilities simply failed to take appropriate long-term action to forecast future market conditions and reduce pollution since they believed that SCAQMD would bail them out in the event of a market crisis.

While most companies recognized that the price spike would be unsustainable in the long-term, they still had to respond to the short-term increase. Some companies curtailed their production, some started to install pollution control technology, and others continued to buy credits because it was still more cost-effective than installing pollution control technology. In addition, some companies attempted to obtain orders of abatement from SCAQMD so that they could install controls over a longer period of time.

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<sup>34</sup> SCAQMD acknowledged this in the May 1998 Audit Report, October 2000 Review of RECLAIM findings, and the January 2001 briefing materials.

During the 2000 compliance year, power producing facilities emitted 6,788 tons of NO<sub>x</sub>, which exceeded their RTC holdings by 1,935 tons. Non-power producing facilities generated 13,703 tons of NO<sub>x</sub>, above the 12,345 tons of year 2000 credits held by these facilities.<sup>35</sup> While NO<sub>x</sub> RTC allocations in 2000 total 17,197 tons, emissions levels were 20,491 tons, resulting in an excess of 3,294 tons of NO<sub>x</sub>. Of the 356 facilities in RECLAIM during Compliance Year 2000, 315, or 88 percent, complied with their allocations. In addition, 76 percent of the excess emissions are from two power producing facilities.

### **Post-Price Spike**

- **Since the 2000 price spike, facilities have installed more controls.**

One facility that deferred installation of controls during the early years of RECLAIM decided to make capital expenditures because their RTC holdings were no longer sufficient to cover emissions and controls became more cost effective than credit purchases. Another company, which has always had an RTC deficit, has installed some controls but have relied heavily on RTCs to remain in compliance. Since the 2000 RTC price spike, the facility has had to cut production and install more controls to remain in compliance.

### **RECLAIM Versus CAC - Emissions and Controls:**<sup>36</sup>

- **Stakeholders disagree over how the overall amount of emission control technology and subsequent emission reductions under RECLAIM compares to what would have been the case under CAC regulations.**

The majority of environmental and regulatory stakeholders believe that the lag in installing control technology, due in significant part to the initial allocations of RTCs, and in conjunction with the emission exceedances in 2000, have resulted in lower emission reductions than CAC would have achieved. Environmental stakeholders believe facilities are not likely to meet their limits by 2003 and the program will have to be extended to achieve the desired emission reduction goals.

Industry stakeholders stress that RECLAIM achieved its emissions reductions up until the effects of energy demand impacted the market. While the increased emissions from power producers was a significant contributor to emissions being above allocations in 2000, the

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<sup>35</sup> In SCAQMD's 2001 Annual RECLAIM Audit, they note that the total quantity of RTCs held by non-power producing facilities is 12,345 tons of NO<sub>x</sub>. However, based on the other data provided in the audit, the research team calculated total holdings to be 12,435 tons of NO<sub>x</sub>.

<sup>36</sup> The reader is also referred to Section 9 for additional detailed discussion of market performance as framed by the evaluation's six key questions.

excess emissions have been mitigated by a fee program and the excess only lasted a few months. Additionally, industry participants argue that since the price spike, the overall level of control has increased to be equal or greater than the level of control anticipated under CAC. Because facilities have had the flexibility to delay installation of controls, some of the technologies that companies are now installing are more efficient and effective than what would have been required under the CAC regulations. They argue that the level of control and total emissions is ultimately the same as would have been the case under CAC regulations; the timing of installation and reduction is just different.

Industry stakeholders also note that some small sources regulated under RECLAIM may not have been required to install any emission controls under CAC. Therefore smaller facilities may have installed significantly more emission controls under RECLAIM.

SCAQMD representatives have said that there is no way to compare whether RECLAIM would have reduced emissions as much as CAC regulations because there are too many confounding factors. For instance, under CAC there may be other emissions increases at a given facility that are not regulated because specific technologies and controls are not mandated for the emission point. Furthermore, although RECLAIM has “lived through” and been adapted to unforeseen circumstances, such as deregulation and the increased energy demand, it is impossible to say how these changes might have impacted CAC regulations.

### **Innovation**

- **While many industry stakeholders relied upon existing off-the-shelf technologies to comply with RECLAIM, some facilities have been able to employ innovative methods of emission reduction.**

Most industries have relied on off-the-shelf technologies to achieve reductions in emissions rather than more innovative alternatives. Facilities believe there are additional costs and risks associated with innovative technologies because they are on the cutting edge and may break down or not work as well as expected, resulting in compliance problems. Therefore, companies are more likely to install conservative, tried and true technologies, rather than pushing the envelope to minimize regulatory risk from non-compliance. One industry stakeholder believes that an important consideration in determining which control technology should be installed is whether the technology is warranted. Environmental stakeholders note that because companies are only now installing off-the-shelf controls that have been around for years, there will not be enough time in the program to allow for further technological innovation.

However, some industry participants believe that RECLAIM has allowed them to be more innovative with respect to emissions controls than would have been the case under CAC regulations. While several participants noted that they relied solely on off-the-shelf

technologies, other industry participants have noted that they have been able to take advantage of the following innovations:

- An overfire air on a carbon monoxide boiler;
- SCRs on catalytic cracking units;
- De-SO<sub>x</sub> and de-NO<sub>x</sub> catalysts at a fluidised catalytic cracking unit;
- A more-efficient distillation column; and
- Use of “in-duct” SCR technology.

RECLAIM has encouraged the development and use of these innovations for several reasons. First, RECLAIM gives facilities the flexibility to choose their own methods for achieving emissions reductions. As a result, companies can now receive credit for process changes and modifications that would not have met the specific CAC requirements. Furthermore, because RECLAIM monitors the total level of emissions, rather than emissions over a short specific period (i.e., one 60 minute interval), facilities have been able to install technologies that reduce overall emissions, but allow fluctuation in emission levels. Finally, facilities have timing flexibility under RECLAIM so rather than installing controls by a set deadline, companies can take time to develop more innovative, efficient, and cost-effective control technologies.

- **Activity in the market and the structure of RECLAIM have not encouraged innovation to the extent anticipated when the program was developed.**

When RECLAIM was developed, SCAQMD anticipated that companies would purchase and install the most cost-effective technologies. While it was anticipated that facilities would begin by implementing relatively inexpensive off-the-shelf technologies, SCAQMD assumed that facilities would innovate to develop more advanced and efficient technologies that would allow companies to not only maintain compliance, but also move beyond compliance and generate credits for trade. As has been discussed, facilities are often hesitant to innovate because of the additional costs and risks that may be involved. In addition, facilities did not face strong incentives to take these risks because initial allocations were high, making significant control in the early stages of the program unnecessary to remain in compliance.

The recent modifications to RECLAIM may inhibit innovation further. In order to encourage innovation and long-term planning, facilities need to be able to weigh the increased risks and costs against future RTC prices. Therefore, businesses must believe they are operating in a stable, long-term program, where the supply and demand of RTCs drive the market price. Unfortunately, many businesses are not confident that RECLAIM is driven by economic factors, but rather by SCAQMD’s actions, as witnessed during the recent modifications. This uncertainty is coupled with the imposition of compliance plans on power producers and facilities emitting 50 tons or more of NO<sub>x</sub> annually. Because

companies believe that they must stick to their agreements, they believe that they will not be able to innovate after the compliance plan is developed.<sup>37</sup>

- **The term “innovation” is used in widely varying ways, and the lack of clarity on this contributes to confusion around issues of program design and performance.**

The most common implication of “innovation” is technological innovation. However, the term has also been used interchangeably with expressions referring to flexibility in choosing and timing controls, better process management and pollution prevention (P2). While each of these may be commendable and useful in themselves, they are in fact different strategies, and various program design considerations will incentivize or disincentivize them in differing ways. Arguably an effective cap would ensure that each of these control paths come under consideration.

### **Recommendations Regarding Facility Decisions and Actions**

- **SCAQMD could take several steps to encourage further technological innovation.**

Some stakeholders believe that further innovation could be encouraged by allocating extra credits to those facilities that develop and employ innovative methods of emission reduction. However, these extra allocations could distort the market for other facilities. SCAQMD could also modify and extend RECLAIM by decreasing the cap further into the future. Additional reduction requirements could provide the incentive for facilities to begin looking for alternative means of emission control.<sup>38</sup>

Another stakeholder believes that in order to encourage innovation, businesses must feel they are in a stable, long-term program affected only by changes in supply and demand. Normal market forces (i.e., the rise in price of RTCs) should trigger the incentive to innovate to find more effective and efficient means of control emissions. Further recommendations for how to encourage stability and confidence in the market are provided in Sections 5 and 6.

- **SCAQMD could make available information on the control options and process modifications facilities have relied upon to reduce emissions. This information would paint a better picture of what has occurred under RECLAIM and may provide other facilities with ideas for emission control.**

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<sup>37</sup> SCAQMD strongly disagrees with this position in their comments on the evaluation report, since a compliance plan is easily amended.

<sup>38</sup> RECLAIM currently provides for this type of situation in a limited manner; see RECLAIM rule 2012(c)(4).

SCAQMD's auditing process could be modified to focus on the technologies or processes facilities have adopted, particularly those innovative technologies which would not have been credited under a traditional regulatory system. Because many facilities have made changes to their internal processes, it is difficult to get a full understanding of what has happened in the market from just counting control installation.

Several companies agreed that SCAQMD is doing a better job at letting companies know about available technology. SCAQMD has produced guidance on control effectiveness and the type and size of controls. One company has even called SCAQMD directly when they did not receive the information they needed from SCAQMD's guidance documents. More information about available types of control technologies will help companies make informed decisions. *EPA believes that SCAQMD's recently adopted compliance plan requirements will foster this development.*

## 6. ENFORCEMENT AND COMPLIANCE UNDER RECLAIM

It is important to remember that RECLAIM, and most emissions trading programs, are basically “alternative compliance” programs. The design of enforcement protocols and compliance assurance mechanisms have an important impact on the effectiveness of the program and the burden on both the regulated community and the regulating agency. These factors balance each other— requirements must be stringent enough to ensure the program is performing but not so burdensome as to limit all flexibility and savings that can be achieved from the market-based system. Deterrence, directly related to enforcement and compliance, in comparison to a CAC system has a similar but different function in a market incentives based “alternative compliance” system, because here deterrence becomes just one of several factors under consideration in making a market based decision. The following findings discuss these important counterparts and how the market, facilities, and regulators have been impacted under RECLAIM. **EPA’s views, findings and recommendations are denoted throughout this report in italics. Additionally, the reader is referred to section 9 for EPA’s responses to the evaluation’s six key questions.**

### Findings

#### Enforcement Under RECLAIM

- **SCAQMD adapted well to developing conditions as California’s deregulated energy market impacted RECLAIM during high energy demand in 2000.**

*As RTC prices spiked in 2000, SCAQMD responded by using a combination of increased field presence, consent orders, and permit modifications to minimize impacts on RECLAIM. Fortunately, SCAQMD was able to avail themselves of a variety of tools in the enforcement/compliance area to manage the impacts of high RTC prices during these events. This adaptability and the types of steps called for are rarely necessary in a traditional CAC regulatory structure.<sup>39</sup>*

- **Shifting from CAC to a trading based compliance system requires a significant shift in resources and, at least initially, requires increased attention to compliance.**

*SCAQMD realized early in program implementation that it had underestimated how much time and money they needed to determine facility compliance and resolve disputes. During program design, it was estimated that RECLAIM would require about five percent of SCAQMD’s budget; actual costs significantly exceed this level and have been far more resource intensive than CAC regulations. SCAQMD*

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<sup>39</sup> It should be noted that during the period of high energy demands in California, other Air Pollution Control Districts also had significant problems with non-compliance at their respective power plants. Because most command-and-control rules do not limit increases due to production increase, they are less likely to need adjustment when energy or other production demands increase.

*anticipated that the program would be self-regulating; this is not the case and, as a result, resources have been inadequate. For instance, audit compliance operations that took a day to complete under CAC regulations, take at least a week under RECLAIM, and can take longer if there are disputes with the source.*

*Inspectors also had to be retrained to be able to conduct RECLAIM inspections. Under CAC, inspections usually checked to ensure that the proper equipment was installed and that it was functioning properly. The inspection was basically a NSR check. RECLAIM necessitated inspectors learn an entirely new set of compliance protocols. Inspectors had to generate mass numbers, interface with program managers at a facility to ensure compliance, and check the RTC allocation system.*

*This situation was compounded by a deemphasis in the number of inspections at RECLAIM facilities during the early stages of the program. Some stakeholders contend that SCAQMD has not been able to adequately enforce the program. For instance, there are hundreds of outstanding violations that have not been enforced. CARB's evaluation of RECLAIM indicated that violation notices involving RECLAIM facilities are not settled in a timely manner— a study of twelve facilities showed that settlement ranged from seven to twenty-three months with an average settlement time of twelve months.*

- **Failures with SCAQMD's emissions monitoring systems have also increased enforcement costs and delayed the auditing of RECLAIM facilities.**

*As originally conceived, SCAQMD's monitoring and record-keeping technology should have reduced the costs of enforcement because it could have provided instantaneous information on which facilities are in compliance. However, SCAQMD has had problems in the automation of their information system. Accordingly, the inspection process is labor intensive because it is difficult to ensure that a source is in compliance and the software and hardware failures have increased the burden on inspectors. In addition, SCAQMD does not always receive the compliance information transmitted by companies, which leads to unnecessary compliance investigations.*

SCAQMD's system of tracking RECLAIM permits can also cause random errors to be introduced every time a permit is modified. For instance, a software problem caused SCAQMD to receive data from one company which incorrectly showed a fuel switch to oil from natural gas. In order to ensure that no random errors have occurred, facilities must print out and review their entire 500-600 page permit every time a permit is modified.

- **It can take several years for SCAQMD to audit facilities. As a result, facilities may hold onto extra RTCs in case the audit shows they are out of compliance.**

*Due to the time consuming inspection process, SCAQMD fell several years behind in their auditing in the early stages of RECLAIM. On certain occasions, SCAQMD found out that a facility was out of compliance for the current year only when the facility notified them directly. We do not believe that this is the present state of the program; inspections have improved. If an audit shows that a facility has exceeded its allocations, the facility must purchase current year credits to equal the emissions level in excess of their RTC holdings. Therefore, facilities frequently hold an excess of current year credits to insure against any problems that are uncovered through the auditing process, preventing credits from circulating in the market. Future planning is also made difficult as facilities need to consider not only their expected emissions, but also the extra credits they may need to obtain to ensure against future audits.*

- **For the first few years of the program, RECLAIM reduced the enforcement burden on EPA because of the initial over allocation. CARB does not have significant enforcement responsibilities for the program.**

*RECLAIM has made it easier for EPA to oversee enforcement activities at the local level because they now have access to more emissions information via RECLAIM's monitoring protocols. In addition, the surplus of credits made enforcement involvement by EPA an apparent non-issue since companies were able to remain in compliance without having to significantly reduce emissions. Under CAC, EPA might have issued enforcement actions, but there have been many fewer cases of violations of permit limits under RECLAIM. CARB was not affected by the implementation of RECLAIM because they are not actively involved in enforcement. CARB is only involved in enforcement activities relating to mobile sources. CARB also oversees SCAQMD's handling of the RECLAIM program, although it is not treated differently than any other program CARB oversees. Now that the annual emissions cap has reached the cross-over point, it is likely that some facilities may experience compliance problems and EPA enforcement will increase.*

- **Deterrence aspects of the program are not well integrated in the market structure of the program.**

*In pre-adoption modeling of program performance, noncompliance was not included in the market model. Yet during the program development process, planners engaged in discussions of how market considerations would make noncompliance an increasingly attractive option if credit prices became too expensive. This possibility was addressed in two ways. First, backstop provisions were added, to be triggered by certain credit price thresholds, and which would increase the number of tolled violations when the price exceeded \$8,000 per ton, as well as instigating a re-evaluation of the incentive-deterrence structure of the overall program under Rule 2015(b)(6) if RTC prices exceeded \$15,000 per ton. Secondly, the penalty structure of the program was designed to remove any incentives for noncompliance. The*

*structure developed was tied to the cost of credits to ensure that penalties for noncompliance would never be exceeded by the cost of credits.<sup>40</sup> In addition to this structure, SCAQMD also has California's existing penalty authorities. SCAQMD has yet to employ the innovative penalty structure as, in their view, the existing State authorities have so far been adequate to deter noncompliance in RECLAIM.*

*Unfortunately, as has been discussed previously, the credit shortage of 2000 resulted in part from the failure of many sources to have proceeded in the 1998-1999 time frame with the installation of the controls which had long been projected to be needed for their source categories. There is also evidence that during the 2000-2001 excursion some sources were willingly and openly violating their allowance limits because they could make substantially more selling their increased production than they would have to pay in penalties. Both of these phenomena suggest that the program lacked adequate deterrence to drive either the projected or needed behavior. While SCAQMD did belatedly prepare a 2015(b)(6) incentives/deterrence evaluation, it did not consider the market role of deterrence. It is unknown whether the use of the innovative penalty structure would have been more effective at deterring noncompliance than SCAQMD's traditional authorities had it been used early on in the RECLAIM program.*

#### **Monitoring, Reporting, and Record-Keeping Under RECLAIM**

- **Although some companies feel that the increased monitoring, reporting, and record-keeping (MRR) under RECLAIM is more burdensome than under CAC, they agreed that some additional monitoring is appropriate given RECLAIM's dependence on emissions measurement.**

*The MRR requirements under RECLAIM are more stringent than CAC regulations. This is inherent in the shift from a technology and rate based program to a mass/trading based program. Under CAC, the emissions from most pieces of equipment was regulated by specific control technology. Under RECLAIM, facilities do not have equipment-specific control technology regulations, other than new source BACT. Rather, facilities need to monitor emissions from all pieces of equipment and report total emissions. For instance, while CAC regulations required a company to install specific technologies, a company under RECLAIM is required to account for all emissions. In addition, large RECLAIM facilities must measure and report their mass emissions on a daily basis to SCAQMD instead of the requirements for CAC to report emissions on a quarterly or yearly basis.*

Stakeholders have commented that SCAQMD has continued to be more flexible in monitoring by allowing facilities to use different operating parameters to measure emissions.

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<sup>40</sup> See RECLAIM Rule 2004.

At first, SCAQMD asked for a great deal of monitoring information to develop confidence in the program and ensure that companies had the ability to measure and account for their emissions. Sources agree that they have a better understanding of their emissions levels due to the increased monitoring. Facilities have also mentioned that some of them would have been forced to install additional monitoring equipment under CAC regulation, so these costs would have been incurred in the absence of RECLAIM as well. For instance, while one company spent over \$20 million installing continuous emission monitoring systems (CEMS) equipment under RECLAIM, they feel that they would have had to install most of this equipment under CAC regulations.

- **While MRR is more stringent under RECLAIM than it was under CAC, some monitoring problems exist.**

Regulatory and environmental stakeholders agree that MRR has improved under RECLAIM because more companies were required to install CEMS. This allows SCAQMD to have a greater understanding of the sources' operations and enables them to track emissions more easily. However, environmental stakeholders believe that the current level of monitoring is not sufficient because there is still a heavy reliance on the use of emissions factors to estimate pollution levels. They also believe that the two-cycle compliance year makes it difficult to determine where facilities are vis-a-vis their allocation. As a result, it is difficult for SCAQMD staff and the public, including environmental groups, to determine whether companies are in compliance.

- **The MRR burden on smaller companies is more significant than the burden on large companies.**

Small companies cannot offset the additional monitoring and record-keeping costs with the savings they may accrue through the flexibility of RECLAIM in the same way that larger companies can. Some stakeholders believe that the additional monitoring costs of RECLAIM outweigh the savings small companies receive from RECLAIM. For instance, one industry stakeholder stated that the permitting costs on industry and government for facilities that produce less than ten tons per year far outweigh the benefits they received under RECLAIM. Had these facilities been regulated under the existing CAC regulations, the funds devoted to monitoring might have been directed to the installation of control technologies.

- **SCAQMD's MRR is more burdensome than the Federal MRR requirements.**

SCAQMD's monitoring requirements are in some places similar to Federal requirements, and slight variations between the requirements create an additional burden on the facility. If the CEMS data reporting system breaks down, the company must submit emissions calculations to SCAQMD and EPA using two different algorithms. SCAQMD also requires that CEMS be tested on a certain day each year. If the equipment is offline at this

time, the facility must fire up the boilers to test the CEMS, resulting in a considerable expense. Federal regulations allow the test to be delayed for 14 days from the date of the start-up if the equipment is offline which allows the facility more operating flexibility. One company believes that SCAQMD's CEMS requirements are unnecessarily more stringent than EPA's.

- **The increased cost of monitoring may not be proportionate to the benefit. As a result, several environmental stakeholders believe that the money SCAQMD spent on monitoring could have been used to directly install control technology.**

Many environmental stakeholders have commented that not only has RECLAIM been a drain on SCAQMD's resources, there have been seven years of no real emissions controls. One observer stated that although greater MRR has increased the availability of data and been a great benefit to the environment and the community, the benefit has not been proportionate to the cost. Some environmental stakeholders feel that, because monitoring has been so expensive, it would have been more cost-effective for SCAQMD to have taken the money they invested in RECLAIM and used it to install control technologies and directly reduce emissions.

- **SCAQMD's permit system is somewhat complicated but no more so than that associated with the Title V permits.**

Many companies agreed that RECLAIM's permitting structure is not more burdensome than the existing Title V permit structure. Although some permitting engineers were concerned that unit specific limits had to be maintained for RECLAIM permitting purposes, these limits were ultimately removed after a few years. Stakeholders do note that the structure of the permit is confusing because it consists of a table with individual items of equipment which references 20-30 pages of conditions. Facilities sometimes have difficulty understanding what conditions apply to what equipment.

In addition, RECLAIM permits include the company's current RTC allocation so that permits must be revised frequently, and they are often inaccurate as they lag actual holdings. Revising RECLAIM permits constantly is burdensome and it interferes with the programs flexibility and streamlining capabilities.

- **Some stakeholders believe that the missing-data provisions may be unnecessarily punitive.**

When emissions monitoring equipment such as CEMs, or another approved record-keeping system, fails and provides either an inaccurate emissions record or no information on emissions, companies have to comply with missing data provisions. Missing data provisions were introduced into RECLAIM to remove any incentive to disable record-keeping systems and thus diminish RECLAIM's integrity. However, the missing data

provisions often punish facilities unnecessarily. For instance, missing data provisions were used to determine one company's emissions when the CEMs was off-line for repair, resulting in a 20-ton penalty for the company, even though the boiler the CEMS was monitoring was not even operating. Because of the potential for large fines, some companies have installed duplicate emissions monitoring systems. In addition, SCAQMD requires that CEMS monitoring be operating properly when facilities start-up, while it can take new facilities up to 14 days to start-up and tweak CEMS to ensure compliance. In these situations, the missing data provisions apply immediately after start-up.

The nature of the missing data provisions distorts RECLAIM in several ways. First, facilities must purchase large quantities of credits to comply with the emissions levels calculated under the missing data provisions putting significant pressure on demand for RTCs. These provisions also inflate the reported levels of emissions. The general public may not be aware that when the missing data provisions are applied, reported facility emissions may be higher than is actually the case.

### **Recommendations Regarding Enforcement and Compliance under RECLAIM**

- **SCAQMD could consider expediting their monitoring and inspections. SCAQMD could also consider conducting audits soon after the end of the trading year and reducing the number of violations that have not been enforced.**

SCAQMD could invest in ways to improve their monitoring activities so that they are able to conduct compliance audits at the end of each year instead of being several years behind. Developing a fully automated system to calculate facility allocations and potential violations would greatly reduce the time and resources required to conduct facility audits. If audits were conducted at the end of the trading year, facilities could purchase current year credits rather than holding on to extra RTCs.<sup>41</sup> SCAQMD could also provide more information about audits because if facilities have a better understanding of their compliance status, they may feel more comfortable holding fewer credits for assurance purposes.

*The CARB RECLAIM evaluation also suggested that SCAQMD improve its timeliness in completing the final inspection reports. Timely inspections are especially important if violations are documented to help the Prosecutor's Office and also to help reduce the facility's liability to exposure in case of continuing violations. Completing audits and annual*

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<sup>41</sup> EPA understands there are real resource implications to expediting this aspect of the program, as there were to moving from a CAC to a CAT program. It is important in any innovative program to ensure that there is no lessening of real world verification, inspection and auditing, especially during the early years of program implementation or during a transitional period in the program. Therefore EPA acknowledges that this recommendation implies an even greater resource commitment than the commendable level already being provided by SCAQMD.

*inspections promptly will also ensure that any problems in the market, such as the large excess of RTCs during the early years of the program, are caught early on enabling better opportunities to make market adjustments. EPA believes that much progress has already been made in these areas; current efforts are adequate, but additional improvement would make information flow more efficient.*

- **SCAQMD could consider revising RECLAIM's permit structure.**

Interviewees suggest that the SCAQMD permit structure could potentially be improved by organizing conditions into categories of equipment or by types of equipment instead of equipment numbers. This would make the permit structures clearly organized and easier to comprehend. CARB's 2000 Evaluation of RECLAIM also suggested that SCAQMD consider providing a simplified process flow diagram of the facility which clearly shows the location of the emissions points (major, large, and process units) and monitoring equipment.

Currently, every time a trade occurs, permits must be revised. In order to reduce unnecessary revisions, permits could reference an accounting system which tracks current RTC allocations, instead of listing the actual RTC permit holdings. The main body of the permit could also reference specific subparts that indicate allocations. As credit holdings change, the main permit would not require revision, only the permit subpart.

- **Some stakeholders believe that SCAQMD could consider improving the emissions reporting system.**

SCAQMD could ensure that its emissions reporting system is working correctly. This would reduce the number of incidents where emissions monitoring is reported by the facility although it is not properly received by SCAQMD. According to the 2000 Annual Audit, SCAQMD set up an Internet based application (known as Web Access to Electronic Reporting System, WATERS) to view the electronic reports that were submitted and received by SCAQMD. This is a good start to reducing the incidences where missing data provisions have to be used for late or missing daily reports because the facilities can easily re-submit the reports if an error occurred.

SCAQMD could examine the possibility to having companies report mass emissions on a quarterly basis instead of a daily basis. EPA's Acid Rain program relies on quarterly reporting of data, which has been adequate for compliance and enforcement purposes.

- **SCAQMD and EPA could make an effort to reduce unnecessary duplicative reporting requirements.**

There does not need to be duplicate reporting requirements for both EPA and SCAQMD. For instance, if SCAQMD's CEM requirements are more stringent, EPA could consider using the information collected from SCAQMD instead of requiring companies to submit reports using different emissions factors.

- **Some stakeholders believe that SCAQMD could consider increasing their use of investment and mitigation funds as an additional means of emissions control.**

Several stakeholders supported the idea of investment and mitigation funds as an additional means of controlling emissions. When the price of RTCs reaches a certain point, rather than buy credits, facilities could contribute to a fund which would aggregate contributions and invest in large scale emissions reductions projects. This type of fund would allow investment in technologies too expensive for one facility to pursue independently. Additionally, facilities found to be exceeding their allocations after an audit could pay into a mitigation fund rather than purchasing extra RTCs. This flexibility would remove pressure on current year allocations from exceedances in previous years. Mitigation funds for the power producers have been implemented under the May 2001 modifications to RECLAIM; SCAQMD introduced a mitigation fund where power producing facilities can contribute \$7.50 per credit for any emissions exceeding their allocation. Because this fund invests in generation projects quarterly, however, contributions may not be aggregated long enough to enable some of the largest, most cost-effective investments.

- **SCAQMD should be prepared to remedy credit shortages, price spikes and imbalances in the market quickly. However, some stakeholders note that this involvement could affect confidence in the market.**

Stakeholders disagree over the level of involvement SCAQMD could have when market shifts occur. Some stakeholders feel that it is SCAQMD's responsibility to moderate the market and ensure that stakeholders are not forced to shut-down because of RECLAIM market shifts. However, others believe that the involvement of SCAQMD is too disruptive as stakeholders may not have faith that market factors are the real forces impacting RTC demand and price.

- **However, when SCAQMD modifies the RECLAIM market, they could consider taking smaller steps and making changes to supply and demand commercially.**

Stability and trust in the market are key to encouraging facilities to incorporate compliance decisions in their long-term planning and to develop more efficient and cost-effective means of reducing emissions. It is unclear based on the modifications made in May, 2001, whether all of the changes were necessary to reduce RTC prices. For example, some stakeholders disagreed about whether removing the utilities from RECLAIM was the primary reason RTC prices were reduced. In order to assure regulated facilities of this stable environment, regulators should not make changes to the supply/demand balance through regulations or policy changes, because facilities will believe that prices are determined by the governing body rather than the marketplace. Rather, changes and modifications to supply or price could be done commercially by buying or selling credits. For instance, instead of removing power producers from the market, SCAQMD might have helped smaller, more marginal facilities during the short-term price spikes by allowing these facilities to purchase credits at a fixed price. Alternatively, SCAQMD could hold back a set amount (e.g., five to ten percent) of credits from each year's allocation which could be publicly auctioned off twice

per year. Public auctions can be used to moderate price spikes when there are dramatic shifts in supply and also provide information regarding the current demand for and price of credits.

## 7. EVALUATION AND OVERSIGHT

In general, market-based programs require a higher level of evaluation and oversight than traditional CAC regulations. Because facilities' compliance options are more flexible than under CAC, evaluating compliance is less clear-cut. In addition, environmental improvements and reduced compliance costs will only be achieved in a well-functioning market. Regulatory agencies responsible for market-based programs must regularly determine whether a market is operating as intended. Finally, because trading programs are relatively new regulatory tools, their success at ensuring environmental improvements has not been fully tested and confirmed. As a result, oversight and evaluation of RECLAIM is crucial to understanding how the trading market operates and whether the goals of the program are being achieved. **EPA's views, findings and recommendations are denoted throughout this report in italics. Additionally, the reader is referred to section 9 for EPA's responses to the evaluation's six key questions.**

### Findings

#### Evaluation

- **State law and the adopted RECLAIM rules mandate several layers of periodic evaluations and other backstop provisions for evaluations.**

*The SCAQMD rules provide for detailed annual program self-audits, and a triennial audit in 1998. State law further compelled a septennial program review to be completed by October, 2000. All of these have been performed and the reports provided to CARB and EPA. The list of parameters to be audited in the annual and triennial report is very detailed. Rule 2015(b)(6) also directs SCAQMD, in the event prices rise above a prescribed threshold of \$15,000 dollars per ton, to review the penalty, deterrence and incentive aspects of the program and recommend changes where needed.*

- **The periodic evaluations were valuable as audit tools as well as educational and capacity building tools.**

*SCAQMD staff was adamant that programs such as RECLAIM should be audited no less frequently than annually. The annual audit allows regulator and regulatees to engage in a joint learning curve and prevents program performance from going too far off-track, as it might if audits were performed only triennially. The annual program audit combined with the annual compliance audit grounded the program in reality, building capacity and working relationships between SCAQMD and the regulated community and within SCAQMD.*

- **Evaluation and correction provisions of the rules failed to catch some of the primary drivers of the credit shortage and price crisis of 2000-2001.**

*As described elsewhere, there were several drivers of the credit shortage crisis of 2000, but only one of them, energy deregulation, was truly external to the program. The other two, the crossover and deferral of controls, were internal to the program and even commented upon occasionally in the periodic SCAQMD program audits. In hindsight EPA can see that many of the controls that should have been in place by the 2000 energy situation would have had to be decided upon and ordered, in light of lead time considerations, sometime in 1998. Indeed the 1998 Triennial Audit (May, 1998 reporting on program performance through the end of 1997) showed that control installations were running far behind initial projections, and that avoidance of the pending “crossover” point required that controls be installed. Thus there were concerns within SCAQMD, publicly reported, as early as mid-1998. However, in extensive discussions with staff, the research team was unable to discern a course of corrective action having been implemented.*

*In discussing what indicators might have been tracked more closely and/or corrective actions taken, it became evident that the focus on overall emissions levels and whether or not they stayed, in the aggregate, below the overall allocation line, tended to overshadow and obscure other questions of program performance.*

### **Program Oversight**

- **SCAQMD is directly involved in the RECLAIM program, while CARB and EPA play more of an oversight role. CARB and EPA became more involved in RECLAIM after the 2000 price spike.**

*SCAQMD is responsible for RECLAIM’s day-to-day implementation. SCAQMD monitors RECLAIM facilities and conducts annual reviews of the program. They conduct the site inspections, monitor compliance rates, conduct an annual review of emissions, review all trades, decide whether emissions are on target, and monitor the use of the reconciliation period to meet caps. EPA and CARB’s oversight is broader and they rely on SCAQMD’s overall review of the program. EPA also examines particular companies for enforcement reasons, and CARB has conducted a program assessment on the enforcement of RECLAIM.*

*CARB and EPA became actively involved in the RECLAIM program after the 2000 price spike due to Rule 2015– Backstop Provisions. Rule 2015 (b)(6) requires SCAQMD’s Executive Officer to submit an evaluation and review of the compliance and enforcement aspects of the RECLAIM program to CARB and EPA within six months of the time that the average RTC price has exceeded \$15,000 per ton or when total emissions were five percent above aggregate RTC allocations. SCAQMD issued their “White Paper on the Stabilization of NOx RTC Prices” on January 11,*

2001. On May 11, 2001, SCAQMD's Board adopted proposed changes to RECLAIM. In March 2002, SCAQMD submitted their 2015(b)(6) report to EPA.

- **EPA and CARB could have been more involved with program oversight throughout the duration of RECLAIM.**

Several stakeholders believe that EPA and CARB could have taken a more active role in overseeing and managing RECLAIM. Some believe that EPA and CARB could have been more aggressive in ensuring that RECLAIM was designed so that it could meet its goals; especially with regard to the initial allocation of RTCs. For instance, while EPA provided constructive comments to SCAQMD about RECLAIM's flaws during the development stage, the Agency did not pressure SCAQMD to modify the program. Some environmental stakeholders believe that CARB did not play a strong environmental role in determining the initial allocations.

In addition, some environmental stakeholders believe that EPA and CARB could have conducted more extensive oversight earlier on in the program. Earlier evaluations might have revealed problems in the program which SCAQMD could have resolved. For instance, some environmental stakeholders believe that EPA could have forced SCAQMD to take action when the annual and three-year audits revealed the extent of the excess allocations. However, one regulatory stakeholder made clear that there was never a "red flag" to notify EPA of the allocation problem.

- **Some stakeholders believe that SCAQMD should have taken a more "hands-off" approach to the 2000 price spike in the RECLAIM market.**

For RECLAIM to be successful, the market needs to be allowed to function, enabling facilities to make economic decisions regarding control technologies. After the price spike, SCAQMD stepped in and altered the market by removing the electric power utilities. While facilities might not be able to install controls quickly, facilities could have implemented process modifications to immediately decrease their emissions. Everyone agreed that the high price of credits was not sustainable in the long run. Some stakeholders believe that had SCAQMD not acted, the market would have continued to function and the high price of RTCs would have encouraged the installation of pollution control technologies. By intervening in the market and taking actions to reduce RTC demand and price, SCAQMD replaced some of the economic incentives with compliance plans.

Some industry stakeholders believe SCAQMD's modifications were unnecessary and have resulted in higher overall compliance costs than would have been the case if the market had been allowed to function. Ultimately, power producers are facing higher compliance costs when their emissions are above their allocation because they are paying \$7.50 per pound of NO<sub>x</sub> to the mitigation fund, which is higher than the current price of RTCs. In addition, RTC sellers are receiving a lower price because of the lack of

competition from power producers. The dramatic modifications SCAQMD made to the program have also caused wide swings in demand and RTC price. These sudden shifts make planning difficult and damage trust between SCAQMD and the business community. For RECLAIM to be truly successful, all businesses need to be able to base their compliance decisions on economics. However, there is evidence that businesses have adapted to the modified market as the current cost of RTCs is close to the marginal cost of control technologies, and credit purchasers have benefitted from the decreased cost of RTCs.

## **Recommendations Regarding Evaluation and Oversight**

- **EPA could consider providing more oversight of the RECLAIM program.**

Some environmental and regulatory stakeholders believe that EPA could become more actively engaged in the RECLAIM program especially because it is the first CAT program of its kind. EPA could require SCAQMD to submit compliance information and documentation to the Agency. In particular, details on trades, violations, and enforcement actions should be shared with EPA. Some stakeholders also feel that EPA or a third party could provide more oversight to prevent problems such as RTC price manipulation. Unlike traditional commodity markets, there is no overseeing authority, such as the Securities and Exchange Commission (SEC), to ensure honesty and prevent manipulation. This type of management would improve the efficiency of the market.

In addition, one environmental stakeholder suggested that in order to ensure that RECLAIM is meeting its goals, EPA could establish interim milestones for emissions reductions every year or two years to ensure continual improvement. EPA could develop a “Plan B” such as an overlay of CAC regulations, that could be put in place if the market fails to achieve reductions and meet interim milestones.

*EPA should reinforce the inclusion of a list of cap violators in annual reports to inform the market and public about those who have failed to properly reconcile their emissions. In addition, the 2015(b)(6) audit should be submitted more quickly to comply with requirements of the program and EPA should review and provide comments on SCAQMD’s findings.*

## 8. TRADING MARKET PERFORMANCE

The structure of the RECLAIM trading market directly impacts market performance and the end results of the program. However, performance is also impacted by external factors, which cannot always be predicted and addressed in program design. The following section elaborates on important aspects of the market's structure and external factors that affected the market as well as the impacts of the program on the regulated community. **EPA's views, findings and recommendations are denoted throughout this report in italics. Additionally, the reader is referred to section 9 for EPA's responses to the evaluation's six key questions.**

### Findings

#### Structure of the Market

- **The initial allocation of RTCs was, in retrospect, too high and this ultimately affected performance in the market.**

While some industry participants believed the initial allocation was fair and realistic, the majority of stakeholders agree that the initial allocation of RTCs was too high. Environmental stakeholders argue that allocations were based solely on politics and ignored environmental and health concerns. Regulatory stakeholders concede that credits were over-allocated to participating facilities in order to implement RECLAIM, because SCAQMD had to ensure that the market was politically feasible and that industry supported the effort. SCAQMD claims that it had to build assumptions of economic growth into the initial allocation in order not to penalize sources for the recession, nor to impose a greater burden on them than they would have faced under CAC, which imposed no mass cap. However, as described above, the initial allocations were 40-60 percent above actual emissions during the early years. SCAQMD also believes that an initial over-allocation was necessary to allow participants to gain familiarity with the program's structure and market behavior. While regulators knew that credit allocations were high, they hoped that this would not affect the program because the excess credits would disappear quickly and the reductions would ultimately be achieved.

Several environmental, regulatory, and industry stakeholders indicated that the initial allocation ultimately had a very negative impact on the performance of the market and the emissions reductions that were achieved. Because of the high allocations of RTCs and high supply of extra credits, credits were inexpensive during the first seven years of the program. Prices for current year credits ranged from \$26 per ton in 1994 to \$451 for 1998 credits. Credits rose somewhat in 1999 to \$1,827 per ton of NO<sub>x</sub>. Participants noted that the sustained low price of RTCs lulled regulated facilities into believing inexpensive credits would always be available. Because credits could be purchased for under \$500 a ton, there was no incentive to invest in more expensive control technologies

and companies delayed the installation of control technologies. While many companies expected the cross-over at some point, the dramatic price surge in 1999 and 2000 was unexpected. However, environmental stakeholders, such as Communities for a Better Environment, claim to have correctly predicted when the cross-over point would occur and they argue that industry and SCAQMD should also have been able to predict this in advance. However, brokers note that it was commonly thought the price spike would occur slightly later, between 2000 and 2001.

- **While stakeholders now believe that RTCs have been over-allocated, many believe the allocation scheme used during RECLAIM development was the best method for apportioning credits and weighing the political, economic, and environmental dynamics during program design. In addition, once the program began, changing the initial allocation of RTCs may have had an impact on the trading market.**

In general, allocation schemes need to be determined on a program-by-program basis depending on the pollutant being controlled, the purpose of the program, and the nature of the sources involved in the program. The initial allocation scheme developed under RECLAIM may have been the best possible compromise for this particular situation. RECLAIM credits were allocated in order to allow for expected increases in economic growth and production. While this method of allocation may have been the best scenario, in retrospect it may have been more appropriate to limit the number of years that facilities could choose as a baseline production level for determining initial allocations. Credit allocations may have been overinflated because of the flexibility in the baseline year. However, it is important to ensure that credits are not underallocated, potentially stifling economic growth.

Several industry and broker stakeholders said that reallocating credits mid-program would create several potential problems. Primarily, potential reallocations create further uncertainty in the market which impacts facilities' ability to make long-range planning decisions. Reallocation also fosters the idea that the governing body determines credit prices, not the market.

- **While a few companies experienced problems with the initial allocation of RTCs, most problems have been resolved.**

Approximately five companies had their initial allocation incorrectly calculated because of the use of incorrect emissions factors. While some companies did not realize their initial allocation problems until they were audited, some initially believed that the cost of figuring out the proper allocations was more expensive than simply buying more credits. Most of these allocation problems were solved by 1995-1996, although it caused major problems to those affected.

- **Inter-sector trading would have allowed an additional source of credits during the price surge of 2000 which could have mitigated the rise in prices. However some stakeholders believe that introducing inter-sector trading may be an inappropriate modification to the program.**

California state law directs SCAQMD to allow for mobile source trading in RECLAIM and mobile source trading was included in the original design of RECLAIM as reflected in Rule 2008.<sup>42</sup> While a limited vehicle scrap generation project was allowed, more extensive use of mobile sources in RECLAIM was not approved by EPA. The ability to invest in credit generation in other sectors, such as mobile sources would have increased the supply of RTCs and therefore reduced prices during the 2000 price spike. This additional stream of credit could have provided facilities with another option rather than investing in on-site control technology or purchasing RTCs, providing a “release-valve” in times of tight supply. Some brokerage firms expected to move into credit generation through the generation of mobile source credits. For instance, one brokerage firm hopes to invest in the replacement of marine diesel engines with clean burning electrical units. Mobile and area source credit generation is currently being tested on a limited basis through the Air Quality Investment Program created during the May 2001 modifications. In addition, SCAQMD is completing a program review of mobile source credit generation pilot projects under Rule 1612.1. Thus far, no projects have been submitted to SCAQMD for credit generation.

Environmental stakeholders disagree with the use of inter-sector trading stating it is contrary to the concept of the RECLAIM; a CAT program which sets a cap on emissions from the regulated stationary sources. Allowing other sources of emission reduction into the program essentially increases the cap on these sources. Other stakeholders who take a different view of the program’s ultimate objectives, to reduce a set amount of emissions through the most cost-effective avenues, believe that mobile sources are appropriate.

Several stakeholders cautioned against the introduction of mobile source credits for other reasons. Mobile source emissions comprised 60 to 70 percent of all emissions in the basin. The abundance of easy to control mobile sources could drive the price of RTCs so low that pollution control equipment might not be installed. Additionally, mobile sources are more difficult to quantify and more expensive to monitor. Finally, environmental stakeholders argue that incorporating mobile source credits can create environmental justice issues by lessening emission reductions at stationary sources, often located in low income communities.<sup>43</sup>

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<sup>42</sup> See California Health and Safety Code §40440.1.

<sup>43</sup> In fact in 1997, SCAQMD Rule 1610, a rule which allows credit generation for scrapping old vehicles, was challenged by environmental justice advocacy groups using a combination of tools including a CAA citizen suits against credit users and a Civil Rights Act complaint. This issue has largely been resolved as most of the users settled with EPA and the advocacy groups for large

- **RECLAIM has an unequal impact among participating companies because some industries have been able to pass on the increased cost of RTCs more easily than others.**

The RECLAIM market includes companies with very different price market elasticity for their products so that changes in RTC prices can have differential impacts on the cost structure of participants. For instance, an electric utility can often pass the RTC price on to customers. Additionally, the deregulated market resulted in power generators being paid according to the highest cost electricity. As a result, power generators were receiving generous payments for energy and could afford to pay very high prices for RTCs. Power companies could pass the entire cost of RTCs on to energy buyers, so they were able to continue purchasing more and more expensive credits and had no incentive to limit compliance costs. On the other end of the spectrum, industries with inelastic product demand, such as aluminum manufacturing, have more difficulty passing on their costs.

### **External Factors and their Impact on the Market**

- **Energy deregulation was not anticipated when RECLAIM was developed and it had unforeseen impacts on the trading market.**

According to regulatory stakeholders, deregulation and the possible impacts it could have on the energy sector were not factored into the development of RECLAIM. One stakeholder noted that the RECLAIM trading program was less appropriate in a deregulated market because power plants were owned by different parties. As a result, power plants could no longer easily shift RTCs between plants with the same owner.

Other stakeholders agreed that deregulation had a negative impact on the RECLAIM market, but for a different reason. As a result of deregulation, the bidding structure changed. Power generators were paid an equal market clearing price for energy based on the highest bid. California's energy deregulation led to a high demand for energy and inflated bids for generation. The generators were not prepared for such rapid price rises and did not, then, have enough time to weigh the price of RTCs against the cost of compliance technologies and make a determination based on the most cost-effective option. In addition, power generators did not have much incentive to minimize their RTC costs because they could pass the cost of compliance on through to their customers. In this situation the market mechanisms were not effective in encouraging pollution control and the costs of credits eventually far outweighed the price of control technologies.

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monetary penalties coupled with supplemental environmental projects along with the advocacy groups' withdrawal of the Civil Rights Act complaint. In response to these types of concerns, EPA significantly revised its economic incentive policy to include factors to address these issues.

Furthermore, facilities in other sectors were unable to purchase credits as a result of the price spike.<sup>44</sup>

- **Operation and emissions increased dramatically during the 2000 increase in energy demand, straining the market for RTCs.**

Beginning in June 2000, RECLAIM program participants experienced a sharp and sudden increase in NOx RTC prices for both 1999 and 2000 compliance years. This was due in large part to an increased demand for power and delayed installation of controls by power plants. During the 2000 increase in energy demand, demand for power greatly exceeded supply forcing power generators to operate at a much higher level than their normal operations or anticipated levels. When power plants projected future activity, the use of alternative power sources, such as hydro-power, was anticipated. During the summer of 2000, other sources of power did not materialize because droughts in the Northwest reduced total hydropower. To compensate for the drop in alternative power supplies, older, less efficient boilers were brought online. These activities greatly increased emission levels at generating facilities. Current credit holdings were strained as a result of the increased activity.

As a result, electric power generators purchased a large quantity of RTCs, depleting the available market. While some industry stakeholders noted that their facilities were able to stay within the limits defined by their credit holdings, another respondent noted that the increased operation, and therefore emissions, exhausted the facility's reserve margin of credits and increased their demand for RTCs. While the impacts of the increase in energy demand may have been mitigated by companies installing control technologies, it is clear that many RECLAIM participants in the energy sector did attempt to purchase credits, dramatically increasing the demand and price of RTCs. One industry stakeholder believed that the generators' primary concern was meeting demand and that compliance with RECLAIM was secondary. This comment suggests that even with growing scarcity and rising credit prices, generators would continue to operate at accelerated production levels with high credit prices.

- **RTC prices spiked in the summer of 2000 in part as a result of increased energy demand, deregulation, and the market cross-over point.**

During the summer of 2000, prices spiked dramatically as a result of several factors including increased energy demand, deregulation, and the market cross-over point. The combination of these factors occurring simultaneously exacerbated the impact any one of

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<sup>44</sup> For additional information, see "Prepared direct testimony of Michael H. Scheible before the Federal Energy Regulatory Commission", dated November 21, 2000 available on the internet at <http://www.ferc.gov/>.

them individually would have had on RTC demand and price. Several broker and industry stakeholders note that the market behaved very rationally during the summer of 2000. Brokers note that by definition, markets have highs and lows and are never “normal.” The market did behave as expected; as production and emissions rose, demand for RTCs increased, driving up prices and causing the spike. An industry participant agrees with the brokers’ assessment; as supply decreased and the cross-over point was reached, prices rose. However, this rise in price was likely much more dramatic than would have been the case in the absence of increased energy demand.

Other stakeholders believed that the RECLAIM market faltered under the stress of these three factors. Regulatory stakeholders believed that RECLAIM was not able to adapt well to the unforeseen circumstances of the increase in energy demand and deregulation. Facilities in the market and SCAQMD have struggled as a result of the spike and only with hard work has the market adapted to the new situation. Another industry respondent felt that RECLAIM could have performed better during increased energy demand by having contingency plans in place to deal with sudden price spikes more immediately.

### **Impact of the Market on the Business Community**

- **The trading market has become more active as the supply of RTCs decreased and the price of RTCs has increased.**

For the first several years after RECLAIM was initiated, the trading market was fairly inactive because the supply of credits was so large many facilities did not need to purchase RTCs. Additionally, the transfer of credits was relatively easy and inexpensive because companies could call a broker who could easily find a buyer of RTCs. Companies did not have much interest in RTC negotiations. As the supply of RTCs diminished, trading increased as the price rose.

Over the years, the RECLAIM facilities and the brokers became more educated and more efficient in buying and selling credits. Instead of just having a transactional role, helping facilities buy and sell credits, brokers have also helped discuss control options and other market opportunities. In addition, with the rise of RTC prices, companies became more aware of how to get better values for RTCs. Companies sometimes called several brokerage firms to complete one trade and companies also called other companies to get a sense of the value of RTCs in the market. As the price of RTCs has increased, the market has become more efficient because companies have become more involved and they understand the market and use it to find the best value.

Trading was most active during the spring of 2000 to the spring of 2001 although trading has tapered off since the fall of 2001. In general, the electric power industry producers have been the largest purchaser of NO<sub>x</sub> credits, while the petroleum industry has been the largest purchaser of SO<sub>x</sub> credits.

- **The added flexibility of trading under RECLAIM has reduced the costs of compliance for most regulated industries.**

Industry stakeholders believe that compliance costs have been reduced as a result of the program. Facilities were able to minimize costs by controlling emissions using the least costly methods and by altering the timing of control installations. Facilities are able to optimize their timing by replacing equipment or installing pollution control devices when these activities fit into manufacturing and production schedules. For example, one stakeholder noted that RECLAIM has reduced the need for unplanned shut-downs required to meet specific mandated compliance dates. These savings are considerable as a one-day shut down can cost the facility \$250,000. In some situations, companies have also been able to recoup the costs of controlling emission levels by selling excess RTCs. Unfortunately, RECLAIM has not reduced costs by as much as theoretically possible because facilities have, at times, made decisions based on regulatory rather than economic concerns.

Several stakeholders noted that compliance costs were lower under RECLAIM because their RTC allocations were sufficient to cover any emissions generated. Initial allocations allowed some facilities to defer installation of controls and comply with the program without making changes to their facilities or production practices. Other regulatory and environmental stakeholders thought that the nominal compliance costs were more aptly characterized by a “free-ride” in terms of emission reduction during the first seven years of the program. Up until the price spike in 2000, many facilities also purchased credits to cover excess emissions because there was an abundant supply of inexpensive RTCs. Because the RTCs were less expensive than the installation of control technologies, facilities faced lower compliance costs under RECLAIM. However, industry stakeholders also noted that some cost savings were lost as the cross-over point was reached in 1999 and 2000 and RTC prices increased dramatically.

- **In general, facilities incur minimal transaction costs associated with trading RTCs. However, transaction costs have in some instances limited trades.**

RECLAIM participants incurred transaction costs from broker fees between one to three and a half percent of the value of trades. Most facilities regarded these broker fees as relatively nominal. However in the early stages of RECLAIM, when credit prices were still low, trades were at times limited because the costs associated with trading (e.g., broker fees and administrative costs) were higher than the potential revenue generated by the sale of RTCs. Even after 1996 when trading became more active, the broker and negotiation fees remained prohibitively high for certain facilities. Transaction costs are especially great for small and medium sized companies because brokers sometimes give facilities making large trades a reduced fee. However, some industry participants felt that, despite what might be considered significant transaction costs, trading is an economically viable option.

- **RECLAIM has had limited impacts on employment levels and facility shut-downs at regulated facilities.**

*SCAQMD economic projections before the start of the program suggested that RECLAIM would result in fewer job impacts than those caused by CAC regulations and could save as many as 1,147 jobs per year between 1994 and 1999. According to SCAQMD's 2002 Annual Audit Report, during Compliance Year 2000, six RECLAIM facilities attributed 47 new jobs to the program. Thirteen facilities also attributed 510 job losses to RECLAIM. 445 of these jobs were reported by two of these facilities. Total employment by RECLAIM facilities is 130,448 jobs, so in any event, job gains and losses attributable to the program are negligible. Some facilities incurred costs because they have had to hire additional consultants and personnel to manage credit trading, and small companies may have incurred a disproportionate amount of this burden.*

*RECLAIM facility shut-downs are examined annually through SCAQMD audit process and, thus far, have shown that shut-downs have been limited. A total of 56 facilities ceased operation between October 1993 when RECLAIM was adopted and June 2000. Twenty-two of these facilities shut-down in Compliance Year 2000. Only two of these twenty-two facilities cite RECLAIM as a contributing factor in their shut-down. RTC supplies were not impacted by these shut-downs as the original facilities retained ownership of their credits. In addition to permanent shut-downs, several facilities stopped operations during the price spike because selling their RTCs became more profitable than continuing production.*

- **While some may believe it is burdensome for new companies to enter the RECLAIM trading market, there have been a large number of facility modifications at existing RECLAIM facilities that indicate that the NSR structures in RECLAIM are working effectively.**

*Some stakeholders believe that there is a large burden on new businesses that enter the RECLAIM program because they can only buy existing credits; they do not get an initial allocation of credits. The barriers are particularly high for new small companies trying to enter the market. It is interesting to note two things, however: 1) in every year of the RECLAIM market, there have been a range of 40 to 100 RECLAIM facility modifications that have been subject to RECLAIM's NSR provisions and 2) SCAQMD's experience has been that new facilities prefer to opt-in to RECLAIM because NO<sub>x</sub> and SO<sub>x</sub> RTCs are more readily available than the ERC counterpart under command-and-control. These modifications have occurred without compromising the program's economic and environmental goals and while meeting the requirements of the CAA.<sup>45</sup> As with all NSR programs, RECLAIM NSR*

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<sup>45</sup> In fact, almost all of the new power plants elected to opt-in to RECLAIM.

*includes both an offset ratio of 1:1 (though the program must make a 1.5:1 offset ratio demonstration annually using a tracking system), as well as the installation of LAER equipment. It is both impressive and informative that the RECLAIM CAT program has been able to preserve and sustain a vital NSR program from intelligent design to effective implementation. This CAT program's success in this area is notable.*

## **Recommendations Regarding Trading Market Performance**

- **SCAQMD and designers/managers of CAT systems in general, should clarify the objectives of their programs, in particular regarding the functioning of various market features, as stakeholders have differing opinions of the program's ultimate purpose, and therefore the appropriateness of various features.**

*Among the features of CAT trading programs which need careful consideration are banking<sup>46</sup>, intersector trading, and credit life. Overarching all of these is setting the aggregate cap for the program in order to best capture and balance the benefits generally attributed to a CAT system, i.e., flexibility in achieving identified emissions reduction, environmental, and public health goals while harnessing the productivity and innovation of the private sector.*

*For instance, overallocations tend to disincentivize innovation, and delay the development of a functioning market system. Similar dynamics can be introduced by allowance of excessive credits from outside the population of capped sources, and likewise for banking. It may also be useful, in design and evaluation of CAT programs, to consider the benefits and risks of capping individual facilities separately from those resulting from interfacility trading. Some of these design features are covered in more detail below.*

*The cap should have a well defined, rational and understandable relationship to the program (generally, CAC) which it subsumes. This is the baseline or quantification issue, but also goes beyond those issues. This should take into account the presumptive level of technology from the subsumed program, and also anticipate that there is a residual amount of "internal," or process-management related, reductions available, analogous to P2. Failing to take these into account makes true innovation less likely, and also undermines the basic credibility of the program.*

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<sup>46</sup> Banking, while not used explicitly in RECLAIM, has been used in other programs, notably EPA's Acid Rain Program. In addition to EPA's website on the Acid Rain Program at <http://www.epa.gov/airmarkets/arp/>, the reader is referred to Byron Swift's article in the Tulane Environmental Law Journal (2001, volume 14, beginning on page 309) and A. Denny Ellerman's publication, "Markets for Clean Air: The U.S. Acid Rain Program" (New York: Cambridge University Press, 2000) for a description of how this program works.

*Overall EPA feels there are a host of legitimate concerns which must be addressed in considering introduction of other sector emissions trading program capping stationary source emissions. EPA identified those concerns in guidance and in rulemaking on the South Coast generating rules for area and mobile sources.<sup>47</sup>*

- **The ability to bank credits for future use could have jeopardized RECLAIM’s ability to meet environmental goals, though it would allow facilities greater flexibility and reduce compliance costs further.**

Banking allows facilities to manage their supply of credits more closely to better coincide with technological investment. Facilities that bank credits for future use would also have a greater level of insurance in times of changing activity level and could mitigate dramatic changes in the market. Finally, banking could encourage facilities to install controls early on in the program to generate credits for later use. Conversely, banking can also result in an overabundance of credits, disincentivizing controls and emission reductions, and potentially resulting in real world emission “spikes”.

Banking was initially considered and incorporated in a limited way using a two-cycle market because of concern about peak ozone levels. In retrospect, banking would have been inappropriate during the initial years of RECLAIM, since facilities were given generous initial allocations to allow for increases in future production. Under these circumstances, banking could have allowed facilities to save excess initial credits, further delaying control installation. Indications are that doing so may have only exacerbated the issues encountered in the compliance year 2000 timeframe leading to a fatal failure of the RECLAIM program at the expense of cleaner air.

*EPA notes that the functions and supposed benefits of banking are sometimes manifested and available by way of features not described per se as banking. For instance, EPA recommends that those desiring the benefits of banking credits pursue the purchase of futures in the RECLAIM market or more fundamentally that they bank their money and purchase credits as they are available; EPA believes that their return on their investment will be greater using this strategy while the environment will more certainly be improved as a result of only present credits being used. Other features such as credit rollover and credit*

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<sup>47</sup> Primary among those concerns are the technical safeguards to ensure that the credited reductions are indeed surplus (not already required) and quantified with a degree of accuracy and certainty comparable to the quantification techniques applicable to the stationary sources included in the cap program. The issue of whether reductions are surplus is essential, and our Inspector General recently cautioned Jeffrey Holmstead, EPA’s Assistant Administrator for Air and Radiation, that this issue required even more “careful consideration” than it had been receiving in the Agency’s proposed actions on OMT programs. For specific information, see U.S. EPA, “Economic Incentive Programs: Improving Air Quality With Economic Incentive Programs: Final Guidance”, Office of Air Quality and Planning & Standards, January 19, 2001 and 67 FR 5729, dated February 7, 2002 and “Observations on the Use of Shutdown Credits in Michigan’s Air Emissions Open Market Trading Program”, Beusse (OIG) to Holmstead, April 5, 2002.

*life entail some of the same benefits and detriments of banking. This review did not indicate there was sufficient incentive in the RECLAIM market for early reductions to suggest modifying this program to allow banking.*

- **SCAQMD could consider clarifying the role of intersector trading vis-a-vis the objectives of RECLAIM, as stakeholders have differing opinions of RECLAIM's ultimate purpose.**

Environmental and industry stakeholders have very different views of the RECLAIM's goal and the impact that the introduction of mobile sources would have on the program. Industry participants generally understand RECLAIM to be a vehicle for lower emissions in general. Therefore, while RECLAIM is focused on the stationary sources, emissions reductions could in fact be broader based. These stakeholders tend to believe that mobile sources and inter-sector trading would enable this goal to be met by decreasing overall emissions in a more cost-effective manner. However, environmental stakeholders view RECLAIM differently because they believe the program is focused on decreasing the emissions at regulated stationary sources. Therefore, environmental stakeholders argue that mobile sources credits are contrary to the purpose of the program. *SCAQMD could consider clarifying this issue through the Board or at another policy level to ensure that all stakeholders have similar expectations and understanding of the program. The first steps of this process have been undertaken with the process of working together with SCAQMD, industry and the environmental stakeholders to better define what federally-approvable strategies are and ultimately gaining approval for a suite of mobile and area source credit-generating rules. The next step, from EPA's perspective, is for interested parties to begin using this suite of rules.*<sup>48</sup>

- **Projected performance of market based systems depends on defined, and sometimes implied, assumptions about decision-making and the workings of the market. These assumptions can and should be periodically revisited.**

*The discussion above revealed that several assumptions made during initial projections for the program were not valid predictors of real world behavior (see Sections 4 and 9 of this report). While this result is inherent and unsurprising in analytical modeling, it is nevertheless important that the assumptions be re-evaluated and lessons provided. Otherwise the designers and advocates for other programs will make needless mistakes and continue to create unrealistic expectations.*

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<sup>48</sup> The use of mobile source credits was discussed during the May 11, 2001 RECLAIM Board meeting. SCAQMD believes that mobile and area source credit programs can help stabilize RTC prices and provide credits for temporary credit assistance programs or for facilities that need RTCs to balance emissions while controls are being planned and installed. Although great effort was undertaken by EPA and others to approve a suite of mobile and area source credit-generating rules, few projects have been implemented to date (See 67 FR 5729, dated February 7, 2002 for EPA's rulemaking).

- **Projected performance must be provided to all stakeholders in clear, commonsense and understandable ways.**

*As noted above, there was continuing and, in our view, unnecessary, confusion regarding the expectations and real world results in the area of actual emission reductions and installation of controls. Public support for innovative programs such as this requires that the public be provided real world information and practical comparisons in order to judge for itself whether the program is living up to their needs and expectations. None of this is to disagree with SCAQMD's position on "equivalence" of emission reductions, or the difficulty of projecting controls in an innovative system, but we are also aware that in numerous discussions of potential programs across the country there is a dearth of practical markers being set down, tested and reported upon.*

- **Shifting from CAC to a trading based compliance system requires a significant shift in resources and, at least initially, requires increased attention to compliance.**

*Determinations of compliance under CAT can be more complex under CAT compared to CAC, and this is particularly true during the first years of transition to CAT. In order for compliance determinations and deterrence aspects of the program to be credible, there will almost certainly need to be increases in resources in the areas of compliance, inspections, audits by the regulators, and in MRR for regulated sources. A failure to make the necessary investments in these areas can significantly weaken program credibility. This is not to say that as the program matures, perhaps after 3 or more years of operation and associated source and programmatic audits, that the program cannot be streamlined to a degree.*

## 9. ANSWERING THE PERFORMANCE QUESTIONS FOR RECLAIM

**“RECLAIM was designed to reduce emissions from sources in the program to the same extent that would be required through implementation of existing regulations...The program provides the maximum flexibility to sources in achieving the required emission reductions, while stimulating innovation and technology advancement”**

**- RECLAIM Development Report, Executive Summary, October, 1993**

Claims similar to the statement above can be found in almost every promotional document for emissions trading, or “market based strategies”, whether authored by industry, regulatory agencies including our own, or academia. Much has been written on the theory and policy of economic incentive programs. However, during our review, we discovered little in the literature and reports by implementing agencies describing how the underlying theories or assumptions of market incentives programs are to be (or were) practically tested. It is not enough to assert that market prices are low, or that emissions are “down”, and therefore the market is healthy and environmental improvements are being made; this is one of the key lessons from RECLAIM.

This project evaluated the performance of the RECLAIM program since inception, and not just during the price spike excursion of 2000 - 2001. Accordingly, prior to initiating the evaluation and in order to test the performance of the program, EPA developed a series of six questions as the basis for our evaluation. They are included in the April, 2001 workplan for the evaluation and reproduced in the introduction to this report. Below are EPA’s observations on the answers to these six questions, based in part on the research team’s interviews and analyses, but also drawing upon reviews of District reports and other documents as well as their own knowledge and experience with RECLAIM. *The views in this Section are solely EPA’s and are the result of a synthesis and analysis of the interviews conducted by the research team and our interviews with District staff and reviews of District reports, other documents, and our knowledge and experience with RECLAIM.*

### **Question 1: How has control installation compared to initial projections and to CAC?**

*There was clear evidence by mid-1998 that control installation was occurring at a fraction of the rate anticipated at the time of program adoption<sup>49</sup>. This situation did not improve by early 2000 and undoubtedly played a part in the credit shortage that occurred in 2000-2001. It is difficult to compare control installation to CAC, since by intent and design the program allows for approaches differing from CAC.*

### **Question 2: How have actual emission reductions compared to those that would have occurred under the subsumed CAC system?**

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<sup>49</sup> For a more detailed answer to this question, a comparison could be made of the actual controls installed versus the control scenarios underlying the projections in the 1993 Development Report at Tables 6-4 and G-1. Such an analysis was beyond the scope of this evaluation.

*While there can be no definitive answer to this question, the data suggest that the program has produced far less emission reductions than either were projected for the program or could have been expected from the subsumed CAC system. This question is so central to the affected public in any area contemplating converting from CAC to a trading based program that we are obligated to try to answer it.*

*Among the indicators EPA considered were:*

- The actual rate of reductions has been 19 percent from 1994 to 2000,<sup>50</sup> or 3.2 percent per year, which contrasts sharply with the control factors for the subsumed rules were generally 40-60 percent, implying a six to ten percent per year rate of reduction if implemented over the same time period.*
- The projected rate of reductions in actual emissions in the 1993 Development Report was 65 percent, or approximately 11 percent per year.<sup>51</sup> The same chart shows 72 percent, or 12 percent per year, for the “no project” alternative, or CAC. The 11 percent per year figure has routinely been cited in the literature on emissions trading as indicative of the expected performance for RECLAIM, although sometimes it is characterized as the reductions in the “allocation line.” The Development Report makes no such qualification.*
- SCAQMD’s own projection of CAC reductions showed a slope similar to the allocation line, or approximately 9.5 percent per year (Figure 1-3, October, 2000 Report). SCAQMD questioned the validity of this analysis, saying it did not account for the effects of the economic growth that were incorporated in the initial allocation scheme.*

*As previously indicated, there is no detailed answer to this question, but there are some observations that EPA will provide. The initial allocations were excessively high and well beyond what was needed to account or allow for recovery from the “recessionary” economic conditions at the time RECLAIM was initiated. As indicated elsewhere, the initial allocations were roughly 40-60 percent above actual emissions during the first two years (1994-1995). EPA was unable to locate analyses justifying such a growth allowance based on economic data. Further, the data that has been provided in SCAQMD reports indicates that the Gross Regional Product has increased by approximately 13 percent since start of the program.<sup>52</sup> This is not of sufficient magnitude to explain a rate of emissions decrease of less than half the initial projections.*

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<sup>50</sup> Tables 3-1 and 3-2 of the March 1, 2002 audit report.

<sup>51</sup> Table 9-8, comparison of alternatives.

<sup>52</sup> Figure 1-5, October, 2000 Report.

*In making this finding EPA also acknowledges SCAQMD's argument that "equivalence" has been provided for in setting the year 2000 targets, and EPA has considered the logic by which SCAQMD starts from the control strategy in the 1991 Air quality management plan (AQMP) and arrives at the year 2000 and 2003 targets. While EPA agrees with the basic validity of the "equivalence" argument, EPA believes its meaning is unclear to the general public and its advocacy groups. As to the cause of this performance shortfall, EPA's estimation is that it is the result mainly of the initial inflation of the allocation line. To verify this would require extensive analyses, which were beyond the scope of this evaluation.*

**Question 3: What was the decision-making process and how does it compare to the decision-making process modeled during program development?**

*The evaluation's findings on decision-making by the stakeholders are contained in Section 5. This was the heart of our effort and EPA invites all concerned to review the basic interview results, which will be available on file at the EPA's Region 9 office (the interviews do not identify the interviewees, beyond the sector they represent).*

*It is worth revisiting some of the assumptions implied by the modeling of decision-making performed during program development, enumerated earlier in the report. To revisit them briefly here:*

- ***Least cost and perfect information.*** *It is clear from the interviews that not only did many participants lack sufficient information to participate effectively in the market, some of them lacked capacity to avail themselves of the benefits of the information even when they had access to it. Conversion to a market based alternative compliance system dramatically increases the factors for consideration in choosing a compliance path, and calls on different skills than under CAC. Therefore a least cost - perfect information equilibrium result as projected is not likely to occur unless and until the information system is thoroughly developed and the necessary capacity has been developed by the affected sources.*
- ***Investment in credit generation.*** *The research team found, as have other studies of other trading programs, that the potential savings from sale of excess reductions resulting from control installation are a relatively insignificant factor in decisions to install controls. This appears to be due to several factors, among them the uncertainty of future credit prices and the fact that compliance decisions are often not based entirely on economic considerations. As one source stated, their business model did not include sale of credits. EPA feels this factor may be of considerable significance in projecting and understanding trading program behavior. Conversely, its relative insignificance in real world decision-making seems to undercut the likelihood that such programs will produce innovation.*
- ***Long range planning.*** *It is evident from the interviews that, while long-range economic planning is the intent of at least the larger sources, the market never arrived at the kind of steady state functioning that could overcome short term market dynamics and considerations. The initial overallocations and consequent deflation of credit prices*

*undercut the market driver for many of the projected decision-making behaviors. Basically the market failed to develop, as a true market in which competing compliance schemes contended, for the first several years of the program.*

- ***Noncompliance is not an option.*** *While the 2000-2001 events were atypical and in significant part driven by unanticipated and external factors, they also demonstrated that noncompliance will be decided upon when other economic considerations weigh towards that option.*

**Question 4: How have the evaluative and corrective mechanisms in the program worked, and should they be modified?**

*EPA believes that there could have been better use of indicators. In hindsight, EPA can see that the 1998-1999 time frame was pivotal in contributing to the credit shortage that came to a head in 2000. While several factors contributed to the price spikes, the factor in evidence years earlier was the lack of installation of controls. By the time of the May, 1998 Audit Report it was clear that control investments were running at about 20 percent of the rates projected at the time the program was adopted. SCAQMD appears to have been generally aware of this, but unsure what, if anything, to do about it. In hindsight it would have been useful to have contingencies in place which would trigger corrective actions in order to get the program back on track. In addition, neither CARB nor EPA in their program oversight role, took any actions to bring attention to this developing problem.*

**Question 5: Has the program been more cost-effective than the subsumed program?**

*To answer this question meaningfully requires consideration of both public health and economic factors. Thus far, the District's reporting on this question has primarily been on the economic factors, and the District makes the case that regulated sources, in the early years of the program, were spending less to comply with this program than the costs projected for the subsumed CAC program. As the energy demand issues arose, data would indicate that the program may not have been as cost-effective, in terms of dollars per ton for compliance, as the subsumed program (see "White Paper on Stabilization of NOx RTC Prices," January 11, 2001, SCAQMD). This, however, does not fully answer the cost-effectiveness question. The goal conveyed by most of the promotional literature for trading is that the programs should provide at least the same environmental result, i.e. emission reductions in this case, at less cost. Presumably one could compare the cost per ton of emissions reduced and arrive at a meaningful comparison of the cost-effectiveness of reducing emissions. Unfortunately what is almost always reported on in the literature is the "cost of compliance" and whether that cost has been reduced. Other measures of cost-effectiveness include whether the reductions that a program was designed to achieve occurred and whether the actual costs to the implementing agency to administer the program are in line with what was projected.*

**Question 6: What was the effect of credit shortages or surpluses during the 2000-2001 price spikes, and what effect, if any, did the rate of installation of controls play in these events?**

*The report discussed elsewhere that lack of control installation was one of three factors in the credit shortages. It may be possible to factor out the effects of deferred control installation, but such analyses were beyond the scope of this evaluation and EPA is unaware of such analyses having been prepared by SCAQMD. The events of 2000-2001 are discussed in greater detail in Section 5.*

## 10. LESSONS LEARNED AND RECOMMENDATIONS

The following lessons and recommendations represent the research team's analysis of the findings found in Sections 5 through 8. These lessons are an interpretation of these findings, the story that they tell about RECLAIM and market-based programs, and recommendations for changes that can be made to market-based programs to improve their effectiveness and performance.<sup>53</sup>

### Lessons Learned and Recommendations for RECLAIM<sup>54</sup>

- **Overall, the research team believes that any changes made to RECLAIM at this stage in the program must be taken in small steps and should not involve dramatic regulatory modifications.**

Stakeholders noted that regulatory change can destabilize the market and make long-range planning difficult. Therefore, modifications should be taken gradually and should be market-based. This generally applicable lesson can also be applied to RECLAIM.

If SCAQMD determines it is necessary to take steps to stabilize the market, rather than make dramatic regulatory changes to the program, SCAQMD should have market based contingency plans in place. Contingency plans could include credit auctions, mitigation funds, or incremental sales of credits.

SCAQMD should consider making detailed contingency plans available to the regulated community. While regulatory factors may impact demand and price, this involvement is anticipated and the impacts on the market can be considered in decision-making. When developing a contingency plan, SCAQMD should consider the ability of facilities to plan and account for the measures that might come into play during a price spike. For example, if the contingency plan states that in the event of a price spike, facilities will be allowed to pay into a mitigation fund at \$8 per pound, facilities will be assured that a complete bail out is unlikely and that the minimum they will pay will be \$8 per pound. Therefore, facilities may be more inclined to install controls that are more cost-effective.

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<sup>53</sup> This discussion is not intended to reflect all program experience with cap and trade systems in the United States. For example, program performance in the Acid Rain Program has been different. In addition to EPA's website on the Acid Rain Program at <http://www.epa.gov/airmarkets/arp/>, the reader is referred to Byron Swift's article in the Tulane Environmental Law Journal (2001, volume 14, beginning on page 309) and A. Denny Ellerman's publication, "Markets for Clean Air: The U.S. Acid Rain Program" (New York: Cambridge University Press, 2000) for a description of how this program works.

<sup>54</sup> Our recommendations in this report should not be construed as steps necessary to gain federal approval of modifications; they are made to improve the implementation of RECLAIM only.

SCAQMD should consider modifying the permitting process to allow facilities to have contingency plans in place and enable advanced permitting. This flexibility would enable facilities to react more quickly to market changes, shortening the time between short-run inelasticity of their demand for credits and greater elasticity in the long-run. By encouraging facility contingency plans, SCAQMD could ensure that price spikes would be brought under control more quickly, without necessitating such drastic actions to mitigate the market.

- **In order to encourage more efficient operation of the market for emissions control, SCAQMD could provide more information on the performance of the market, the current state of the environment, and expected economic and market conditions. Alternatively, third parties could serve in this role.**

Stakeholders have noted that market and economic information is key to encouraging long-range planning and decision making. While SCAQMD warned that the cross-over point was approaching, the majority of the regulated community did not act in advance of this point. More definite information to prove future demand shortages may be more effective in encouraging early action and avoiding “crisis” situations.

Posting trade information such as total RTCs for sale or the total number facilities want to purchase would provide facilities a good indicator of current market conditions. This would eliminate any confusion resulting from multiple broker inquiries or inaccurate information on company web sites. SCAQMD could provide detailed information about the number of controls that have been installed and the permits that have been submitted to provide some indication of the level of control in the near future. This might allow facilities a more accurate assessment of future emission levels.

SCAQMD could conduct or make available information already produced discussing economic growth in the Los Angeles Basin. Information on the recent history of growth and potential trends for future projects could be helpful. Additionally, SCAQMD could provide economic information for key sectors in the RECLAIM market. For example, by making information about hydro-imports from the Northwest and gas prices available, facilities may be more prepared for another energy shortage and the jump in the power-producing sector that would result.

Collecting and making available information on the current technologies and process changes that facilities could employ to reduce emissions would also be helpful. If SCAQMD inspectors collected information on innovative controls or process modifications during inspections, this information could be used to promote “best practices” or alternative means of control other facilities might be able to employ. Clearly, facilities may consider this information privileged so full disclosure of techniques and technologies may be impossible. The reader is referred to the following websites to see how SCAQMD is currently addressing this need:

[http://www.aqmd.gov/reclaim/rtc\\_main.html](http://www.aqmd.gov/reclaim/rtc_main.html)

[http://www.aqmd.gov/rules/reclaim/reclaim\\_home\\_page.html](http://www.aqmd.gov/rules/reclaim/reclaim_home_page.html)

- **There should be a comprehensive suite of performance parameters identified and tracked at both macro and micro levels of program operation.**

The need for both macro and micro indicators of performance should be considered in all performance based environmental management systems. In tracking and evaluating program performance, an overemphasis on overall program performance parameters such as aggregate emissions levels obscures the performance of other parameters which actually determine much of the program's performance. As an example of an area which could have used more attention, the research team notes that the issue of overallocation was very much on the table during pre-adoption discussions in 1993, as was the posture that excess allocations were needed in order to accommodate anticipated economic growth. Given the contentious nature of these issues and the significant stakes, some indicators or surrogate parameters might have been identified to track the various manifestations of the economic recovery, and to isolate its effects when evaluating the program. Likewise, as much as the pending "crossover" was mentioned at various meetings and the occasional report, the research team has been unable to discover any tracking other than at the grossest level (aggregate emissions levels) designed to deconstruct and avoid potential problems related to the crossover. Overall program performance and individual source category performance could be tracked to improve the knowledge of market supply and demand.

- **SCAQMD and designers of other trading programs should consider the needs of small facilities which may differ from larger entities.**

While RECLAIM was designed to cut out small emitters (those emitting less than four tons per year), there are some small businesses who are large emitters of NO<sub>x</sub> and so are regulated under RECLAIM. Smaller businesses have fewer resources to analyze market trends and plan for future emission controls. They may also not have the resources available to determine the least-cost control option. Providing information on market conditions and compliance options targeted to small businesses through industry workshops, conferences, or mailings could enable these facilities to perform more effectively in the market.

- **Stakeholders have very different opinions about the suitability of inter-sector trading, banking, clean air investment funds and other program features. In order to clarify whether these features are appropriate for RECLAIM, those responsible for administering RECLAIM need to carefully consider the purpose, benefits and risks of such features.**

Industry and environmental stakeholders differ over whether mobile source credits should be part of RECLAIM. Others have supported banking while still others have been adamantly opposed to banking. Incorporation of such fundamental design features as these in any trading program must be accompanied by considered analysis of the benefits and risks vis-a-vis the program goals, and not simply against short terms goals such as relief of credit price spikes.

Overall EPA feels there are a host of legitimate concerns which must be addressed in considering introduction of other sector emissions trading program capping stationary source emissions. EPA identified those concerns in guidance and in rulemaking on the South Coast generating rules for area and mobile sources.<sup>55</sup> Primary among those concerns are the technical safeguards to ensure that the credited reductions are indeed surplus (not already required) and quantified with a degree of accuracy and certainty comparable to the quantification techniques applicable to the stationary sources included in the cap program. The issue of whether reductions are surplus is essential, and EPA's Inspector General recently cautioned Jeffrey Holmstead, EPA's Assistant Administrator for Air and Radiation, that this issue required even more "careful consideration" than it had been receiving in the Agency's proposed actions on OMT programs

- **Some stakeholders believe that SCAQMD could consider modifying the missing data provisions. For penalties incurred solely because CEMs data is not available, stakeholders suggest SCAQMD could require facilities to pay into a mitigation fund or could enable SCAQMD resell RTCs attributable to the use of missing data provisions. They believe that this would prevent penalties levied against one facility from affecting the entire regulated community.<sup>56</sup>**

Missing data procedures force companies to buy current year RTCs equal to their potential emissions when their required emissions data is unavailable. This increase in demand for RTCs increases prices for all participants in the market. Industry stakeholders argue this pressure is artificial as facilities may have to purchase credits at a level exceeding their actual emissions.

If missing data provisions are employed because no accurate emission information exists, their use seems appropriate. While at times, facilities may be required to purchase more RTCs than tons of pollutants actually emitted, the lack of data makes this situation impossible to determine and avoid. However, CARB's evaluation of RECLAIM showed that in some instances SCAQMD Prosecutor's Office allows facilities to demonstrate that their actual emissions are below the levels established by the missing data provisions, using other means of emission calculation. Therefore, SCAQMD does in some circumstances support emissions data other than the CEMS monitoring required by the program. SCAQMD could define alternative emissions measurement strategies and conditions when these could be employed. Therefore, missing data provisions would not be applied unless other options were not available.

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<sup>55</sup> See U.S. EPA, "Economic Incentive Programs: Improving Air Quality With Economic Incentive Programs: Final Guidance", Office of Air Quality and Planning & Standards, January 19, 2001 and 67 FR 5729, dated February 7, 2002.

<sup>56</sup> EPA continues to believe, as it has since 1992, that SCAQMD's approach effectively achieves the goals of making the environment whole and deterring noncompliance.

If missing data provisions are intended as a means of punishing facilities for a lack of required emissions data, the integrity of RECLAIM can be maintained without interfering in the RTC market. SCAQMD could instead levy a standard fine for the lack of required emissions monitoring or require facilities to pay into a mitigation fund rather than purchasing credits. Alternatively, facilities could be required to purchase credits and turn them over to SCAQMD, which could then resell the RTCs to ensure credit supply is not impacted. This will ensure that the facility is penalized for its lack of emissions data, while not affecting other regulated facilities.

- **SCAQMD could consider serializing credits to allow more accurate tracking.**

Serializing credits would eliminate conflicts that have occurred when credits have been placed in trusts and intermingled. Serializing would also allow facilities to better track credits for sale or available for purchase and eliminate confusion over multiple inquiries for one set of credits. Another benefit of this recommendation is that facilities would be able to track when credits have been generated from inter-sector projects not approved by EPA. Therefore, buyer facilities would be fully aware that their credits might at some point be contested. Finally, serializing credits ensures that credit life provisions of the program are enforced. This approach has been used successfully in EPA's Acid Rain program.

- **SCAQMD could attempt to improve their permitting and compliance systems and to conduct audits and inspections more quickly after the end of the trading year.**

SCAQMD's current system for calculating allocations and emission levels is inefficient and time consuming. A fully automated system would allow SCAQMD to conduct audits more quickly and ultimately may save resources. Timely audits and inspection reports help facilities by decreasing the incentive to hold extra credits as insurance against late audits. In addition, SCAQMD would be able to document violations more quickly and ensure timely actions. If this information was collected more quickly, SCAQMD would stay attuned to the level of controls installed and total emissions from regulatory sources to provide accurate, up-to-date information on the state of RECLAIM to citizens and the regulated community.<sup>57</sup>

The permitting system could be revised by providing a simplified process flow diagram and by allowing the permit to be easily amended to reflect the current RTC allocation.

EPA believes that much progress has already been made in these areas; current efforts are adequate, but additional improvement would make information flow more efficient.

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<sup>57</sup> EPA understands there are real resource implications to expediting this aspect of the program, as there were to moving from a CAC to a CAT program. It is important in any innovative program to ensure that there is no lessening of real world verification, inspection and auditing, especially during the early years of program implementation or during a transitional period in the program. Therefore EPA acknowledges that this recommendation implies an even greater resource commitment than the commendable level already being provided by SCAQMD.

## Lessons Learned for Other Market-based Programs

- **Market-based programs require significant planning, preparation, and management during development and throughout the life of the program.**

Market-based programs are often touted as a solution to difficult political discussions. In addition, it has been suggested that after market-based programs are designed and set into action, they can, in a sense, manage themselves. While market-based programs can be a successful substitute for CAC regulations, their design and management can continue to be contentious and require extensive debate and discussion. Market-based programs cannot necessarily resolve political issues and are not a universal solution. Thus, expectations of market-based programs must be managed.

Key program structure features such as setting the cap, banking, intersector trading and so on need careful consideration. For example, the initial allocation of emissions credits is key to the success of programs in that it: 1) determines the ultimate health and environmental standards that the program is designed to achieve, and 2) determines the share of the emissions reduction burden faced by the facilities in the program. Allocations must be politically feasible— if allocations are too low, it will negatively impact the economy. However, if allocations are too high, it can jeopardize the emissions control effectiveness of the program. While, the projected emissions that would result from CAC regulations can be used as a benchmark for trading program allocations, this issue can be a very contentious element of the program's design.

- **Market information is a key factor affecting facility decision-making.**

Control technology decisions are based on projections of future prices. Facilities must believe that the emissions cap is really low enough to require installation of controls in order to install controls in advance of when it is absolutely necessary. The air quality agency's claim that the emissions cap is binding and will push the market imminently may not be sufficient advance notice.

More extensive information on the state of the market, such as the level of emissions, the number of controls installed, and expectations of future emissions could encourage future planning and decision-making. In order to achieve this goal, regulatory agencies should strive to achieve as free a flow of information between themselves as the regulated industry as possible.

- **Regulators should strive to create confidence and trust in the market by making a full commitment to the program and ensuring consistency in the market and their policies.**

Future projection and decisions about emission control are based in large part on the certainty that the market will exist in the future and that the supply and demand for credits will regulate prices. In order to project future prices, facilities must have confidence that the regulatory body will stick with the program and not interfere with the market, or at least that potential changes have some reasonable degree of predictability (e.g., explicit and detailed contingency plans). In the case of RECLAIM, a belief on the part of many participants that SCAQMD would not allow the market forces to work (i.e., SCAQMD would bail facilities out or dissolve the program) discouraged the installation of controls.

- **Unforeseen external circumstances can have dramatic impacts on market-based program. Therefore, these programs must be designed to react quickly and effectively to unforeseen external factors.**

Because of the lag between when facilities make decisions to install controls and when these controls are actually up and running, substitutes for purchasing credits are not immediately available and credit demand in the short run is very inelastic. As a result, factors affecting the market, such as increased demand for energy production, can result in dramatic price spikes in the short term.

Contingency plans and modifications to cope with severe changes in the market should be in place and ready for immediate implementation to reduce instability in the market. Implementing contingency plans quickly may reduce the time between the short run inelasticity and more elastic demand that exists in the long run. However, the potential for regulatory change can impact trust in the market by creating uncertainty. Regulatory agencies can improve planning and forecasting by making details of the plans are known before hand.

Facilities could also be encouraged to develop contingency plans so that they might react more quickly to changing market conditions. Facilities could submit permit for compliance plans years before they may actually choose to install the controls. The permits could be made contingent upon market conditions, such as the price of credits. When these market conditions then occur, facilities can immediately begin construction on control installation and do not have to move through the permitting process.

Accurate future projections and planning could also mitigate the impact of the short run supply shortages; facilities could act in advance of the cross-over point, gradually decreasing their demand. Making information about market conditions known to facilities may allow them to forecast more accurately so they can act in advance. In addition, presenting information on best practices in production process modifications may provide facilities with ideas on interim measures they can take. Finally, increasing the diversity of facilities in the market can mean that external factors may only affect certain sectors of the market, mitigating the impact.<sup>58</sup>

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<sup>58</sup> For additional detail on how this issue may have affected other markets, the reader is referred to the February 15, 2002 edition of Inside EPA, "New Jersey Emissions Trading System Appears on Verge

- **Periodic evaluation, revisiting of program design assumptions, and contingency strategies are crucial to keeping programs on track.**

It is important that parameters be identified prior to or early in program implementation that can test and track the real world validity of assumptions underlying the program's design. For instance, if the program design presumes certain sectors will be overcontrolling and selling excess emission reduction credits (ERCs), or that general economic factors will require an initial cushion in allowances, then these factors can be readily tracked. Likewise, contingency measures can be identified to either compensate or correct for divergences from the projected behavior. Public support and trust in innovative programs such as this will be enhanced by accessible and understandable evaluation and correction features.

- **Once programs are up and running, major regulatory changes may be disruptive. Therefore, any actions taken to change or stabilize the market should be incremental and market-based, rather than programmatic.**

Because of the importance of regulatory predictability, sweeping regulatory changes can dramatically impact decision-making by causing facilities to focus their attention on a changing regulatory landscape rather than future market conditions. Any changes made to the market should therefore be made to have the most limited impact on market conditions. Gradual, incremental changes allow for regulated facilities and the market to adjust to the changes. For example, programs could include small sales and purchases of credits, similar to mitigation measures taken in the currency market.

The type of contingency plan or mitigation measure is also important to maintaining stability when making adjustments to the market. Making market-based changes, such as facility auctions, rather than regulatory adjustments maintains trust in the market and regulatory agency.

- **RECLAIM's experience seems to demonstrate that cap and trade (CAT) can work with Clean Air Act (CAA) New Source Review (NSR). This may be a function of the types of sources included or the controls in place at many facilities. This lesson is contrary to the commonly reported federal view and should be further researched.**

In every year of the RECLAIM market, there have been a range of 40 to 100 RECLAIM facility modifications that have been subject to RECLAIM's NSR provisions. These modifications have occurred without comprising the program's economic and environmental goals and while meeting the requirements of the CAA. As with all NSR programs, RECLAIM NSR includes both an offset ratio of 1:1 (though the program must make a 1.5:1 offset ratio demonstration annually), as well as the installation of LAER equipment. It is both impressive and informative that the RECLAIM cap-and-trade program has been able to preserve and

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of Collapse.”

sustain a vital NSR program from intelligent design to effective implementation. This CAT program's success in this area is notable.

There seems to be no either-or choice between NSR and CAT, but rather a continuum of options for integrating CAT and the various NSR requirements, such as offsets, technology requirements, consideration of alternatives, assessment of air quality impacts, public involvement. The most obvious application of an area-wide cap would be to meet area-wide requirements, such as the offset requirement which is tied statutorily to the reasonable further progress requirement.

- **Regulators need to have a strong understanding of the regulated facilities and the factors impacting their decision-making.**

In order to anticipate the cost-savings and emissions reductions that will result from a market-based program, regulators need to understand how facilities will react to the flexibility offered under the new regulations. For example, when RECLAIM was developed, many anticipated that facilities participating in RECLAIM would make efforts to develop innovative emission controls to generate credits for trade. Innovation was relatively limited as facilities could remain in compliance using off-the-shelf technologies. Credits were not generated for the purpose of profit either because this was not the main business goal or because uncertainty and credit price risk, made this an unsound investment.

Small facilities may also operate very differently in market-based programs than larger businesses. With fewer resources to spend on analysis of the market and the most appropriate control technologies, small businesses may not be able to take on the burden associated with being an active player in the market.

**Appendix A**

**Primary Sources (Interview List)**

## **PRIMARY SOURCES**

### **Industry Participants:**

1. Bob Wyman, Latham & Watkins
2. Bill Quinn, California Council for Environmental and Economic Balance
3. Jeff Johnson, Johnson & Tekosky
4. Lyle Nelson, Southern California Edison
5. Charlie Aarni, Chevron Texaco
6. Michael Coffman, Hayes - Lemmerz International Inc
7. Bruce Moore and Jodine Giese, LA Dept of Water and Power
8. Gary Rubenstein, Sierra Research

### **Environmental Group Participants:**

1. Suma Peesapati, Communities for a Better Environment
2. Tim Carmichael, Coalition for Clean Air
3. Gail Ruderman-Feuer, Natural Resources Defense Council

### **Brokers:**

1. John Owyang, Market Based Solutions
2. Josh Margolis, Cantor-Fitzgerald
3. Robin Langdon, Cantor-Fitzgerald
4. David Oppenheimer, NatSource
5. Jay Burack, Boldwater Brokers

### **Regulatory:**

1. Jack Broadbent, USEPA Region 9
2. Allan Zabel, USEPA Region 9
22. David Howekamp, Independent Consultant (EPA Region 9 Air Division Director at the time of RECLAIM adoption)
4. Michael Scheible, California Air Resources Board

**Appendix B**  
**Interviewee Questions**

<b>Broker Questionnaire Question Headings</b>	
<b><u>Questions</u></b>	<b><u>Database Heading</u></b>
<b>Program Development and Implementation</b>	
1. Please describe your role in the RECLAIM program. What does it mean to be a broker for RECLAIM?	Role
2. Which organizations do you work with regarding the RECLAIM program (EPA, SCAQMD, RECLAIM facilities, environmental groups, the California Air Resources Board (CARB), etc.)? Describe the nature of the interaction?	Regulatory Organizations
3. Were you involved in developing RECLAIM? What role did you have? If not, when did you or your firm become involved in the program? Have your responsibilities changed over time?	Involvement
4. Is your role the same as that envisioned when the program began? Describe the differences, if any, between what was envisioned and what has actually occurred.	Envisioned Role
<b>Trading Dynamics</b>	
5. How many industries are you involved with regarding RECLAIM Trading Credits (RTCs)?	Number of Industries
6. Which industries are the biggest purchasers of each type of RTC?	Purchasers
7. How has the trading market for RTCs changed over the past few years? Do you know how many RTCs are traded each year? How many RTCs does your firm handle?	Changes in Trading Market
8. What is the average annual price of each type of RTC? What has been the highest price paid for each type of RTC? What is the lowest price that has been paid for each type of RTC? How has the price changed over the years? What factors caused the price of RTCs to change?	RTC Price
9. Why have Nitrogen Oxides (NO <sub>x</sub> ) RTCs exceeded the backstop price of \$15,000 per ton? Why haven't Sulfur Oxides (SO <sub>x</sub> ) RTCs exceeded the backstop price?	Backstop Prices
<b>Program Effectiveness</b>	

<p>10. Is RECLAIM effective in terms of how well it works as a market mechanism? For example, have effective and efficient markets for RTCs developed? How have internal and external factors (such as the economy, the installation of pollution control devices, or administrative turnover, etc.) affected RECLAIM's performance as a market mechanism?</p> <p><i>Revised Question: What factors have influenced the RECLAIM market? Do you think an efficient and effective market for RTCs has developed?</i></p>	<p>Effectiveness</p>
<p>11. What adjustments, if any, in the operation of trading have you made since the program was first implemented?</p> <p><i>Revised Question: After the spike in 2000, have market conditions stabilized? What impact will credits from mobile sources have on the RECLAIM market?</i></p>	<p>Operations Adjustment</p>
<p>12. Given the goals of RECLAIM, from your perspective as a broker, do you think RECLAIM is successful? What primary factors are related to RECLAIM's success?</p>	<p>Success</p>
<p>13. Are there modifications that could make the program more effective? What aspects of RECLAIM would you change and why?</p>	<p>Recommendations</p>

<b>Broker Questionnaire Question Headings</b>	
<b><u>Questions</u></b>	<b><u>Database Heading</u></b>
<b>Program Development and Implementation</b>	
14. Were you involved in developing RECLAIM? What role did you have? If not, when did you or your firm become involved in the program? Have your responsibilities changed over time?	Involvement
<b>Trading Dynamics</b>	
15. How has the trading market for RTCs changed over the past few years?	Changes in Trading Market
<b>Program Effectiveness</b>	
16. What factors have influenced the RECLAIM market? Do you think an efficient and effective market for RTCs has developed?	Effectiveness
17. After the spike in 2000, have market conditions stabilized? What impact will credits from mobile sources have on the RECLAIM market?	Operations Adjustment
18. Given the goals of RECLAIM, from your perspective as a broker, do you think RECLAIM is successful? What primary factors are related to RECLAIM's success?	Success
19. Are there modifications that could make the program more effective? What aspects of RECLAIM would you change and why?	Recommendations

<b>Industry Questionnaire Question Headings</b>	
<b><u>Questions</u></b>	<b><u>Database Heading</u></b>
<b>Environmental Management Decision-Making</b>	
<p>1. Please discuss your decision-making process in regard to implementing compliance measures as you participated in RECLAIM, for each of the three-year periods (1993-1995, 1996-1999, and 2000 to now).</p> <p>2. Who makes these decisions?</p> <p>3. Are decisions about control technology installation or process modifications integrated into long-range capital planning?</p> <p>4. What information led to your compliance option choices and what factors did you consider?</p> <p>5. Is your information base adequate for making long-range planning decisions? If not, what types of information would be useful in deciding which compliance options to choose?</p> <p>6. Which compliance options (installation of control technologies, process management changes, credit purchases, other innovations) did you choose and why?</p>	Decision-Making Process
<p>7. Do you think you have implemented a higher or lower level of emissions control than you would have under command-and-control? Why?</p>	Emission Control Levels
<p>8. To what degree have changes in the economy, installation of pollution controls, and the existence of the trading market affected your facility's emission levels?</p>	External Factors
<b>Cost-Effectiveness</b>	
<p>9. Has the added flexibility of trading reduced the costs of compliance? If so, how?</p>	Added Flexibility
<p>10. Are there any other financial benefits or costs that your company has realized or incurred as a result of RECLAIM (e.g., changes in market share, number of personnel, etc.)?</p>	Financial Cost/Benefit
<p>11. Are there changes that could be made to RECLAIM or the trading market to make it more cost-effective to comply with the program?</p>	Cost-Effective Modifications
<b>Trading Dynamics</b>	

12.	Have you implemented more controls in order to generate credits for trade, or have you chosen to purchase credits rather than implement controls? How has the increasing price of RTCs influenced your decisions?	Control vs Credits
13.	In cases where credits were traded, what were the transaction costs associated with the trade (e.g., broker fees, negotiation costs, etc.)? If credits were not traded, what were the limiting factors (e.g., lack of supply/demand, high/low cost of credits, high transaction costs, etc.)?	Trade Costs
14.	Is the trading market performing as well as you envisioned it functioning when the program was implemented?	Market Expectations
15.	Could the trading market be changed in any way to encourage more trading or enhance the benefits of trades?	Changes to Trading
<b>Regulatory Burden</b>		
16.	How well does the RECLAIM facility permitting process interface with other air quality requirements and permits, such as Title V? Are RECLAIM facility permits more complex or burdensome than traditional command-and-control regulations?	Permit Interface
17.	Have monitoring, record-keeping, and other costs of the program been a significant burden? How do these costs compare to alternative command-and-control regulations?	Regulatory Burden
18.	Are there any changes that could be made to the program to reduce the permitting burden?	Limiting Burden

## Environmental Stakeholder Questionnaire Question Headings

<u>Questions</u>	<u>Database Heading</u>
<b>Regulatory Compliance and Program Effectiveness</b>	
1. Do you view the RECLAIM program as an effective and efficient means to achieve federal clean air health standards? Why or why not?	Effectiveness
2. Are there elements of the RECLAIM program that should be modified or eliminated? How can these elements be modified to make them more effective?	Modifications
3. Has RECLAIM improved environmental conditions over what would have occurred under traditional command-and-control regulations? Has it resulted in accelerated emission reductions over those that would have been realized under command-and-control measures? Has RECLAIM achieved the emission reductions projected for it when the program was adopted in 1993?	Environmental Condition
4. How does the effectiveness of monitoring under RECLAIM compare to the monitoring prior to implementation of the program?	Monitoring
5. How do RECLAIM's reporting and recordkeeping requirements compare to those prior to implementation of the program? Are the RECLAIM requirements adequate? If not, how should they be improved?	Reporting and Recordkeeping
6. How does the implementation of control technologies under RECLAIM compare to that expected prior to RECLAIM? Do you think that increases in RECLAIM Trading Credit (RTC) prices will result in more companies installing control equipment?	Control Technologies
7. What additional technologies should be considered to achieve emission reductions required through 2003? How would you encourage these technologies?	New Technologies
8. Based on your experience, what recommendations do you have to increase the effectiveness of the RECLAIM program?	Recommendations
<b>EPA's Role in the Program</b>	
9. How effective a role did EPA play in the RECLAIM development process? What recommendations do you have for EPA in terms of its role in the development process so that the Agency can contribute value to these types of programs?	EPA Development Role
10. What role did EPA play during RECLAIM implementation? What recommendations do you have for EPA in terms of its role in implementation that would provide additional value to these types of programs?	EPA Implementation Role

<p>11. What role did the California Air Resources Board (CARB) play in the RECLAIM development process? What recommendations do you have for CARB in terms of its role in the development process so that the Agency can contribute value to these types of programs?</p>	<p>CARB Development Role</p>
<p>12. How effective a role did CARB play during RECLAIM implementation? What recommendations do you have for EPA in terms of its role in implementation that would provide additional value to these types of programs?</p>	<p>CARB Implementation Role</p>

## Regulatory Stakeholder Questionnaire Question Headings

<u>Questions</u>	<u>Database Heading</u>
<b>Program Development and Implementation</b>	
1. What was the nature of your office's involvement in the development of the RECLAIM program? Which of the other EPA offices (i.e., Headquarters Program Offices) were involved in the development of the RECLAIM program? What was the nature of each office's involvement? What were the key planning issues EPA sought to address during the program design?	Involvement
2. What is the extent of EPA's oversight of the RECLAIM program? Has this role been the same as the Agency envisioned prior to implementation of the program? Should EPA become more or less involved? Why?	Oversight
3. Did EPA accurately forecast the resources it would need to help implement the program?	Forecasting Resources
4. What factors (changes in administration, research & development) have impacted RECLAIM's performance during program implementation? Why?	Performance Factors
<b>Regulatory Compliance and Program Effectiveness</b>	
5. Do you believe that RECLAIM improved environmental conditions over what would have occurred under traditional command-and-control regulations? Has the program resulted in accelerated emission reductions over those realized under command-and-control measures? Has RECLAIM achieved the emission reductions projected for it when the program was adopted in 1993? On what do you base your assessments?	Emission Levels
6. Has the RECLAIM program been more cost-effective than the command-and-control measures that existed prior to RECLAIM? How do you measure program effectiveness, beyond emissions reductions?	Effectiveness
7. How does the effectiveness of monitoring, recordkeeping, and reporting under RECLAIM compare to before implementation of the program?	MRR
8. How has the implementation of control technologies under RECLAIM compared to that which might have been expected prior to RECLAIM? Do you think that increases in RECLAIM Trading Credit (RTC) prices will result in more companies installing control equipment?	Control Technologies

<p>9. Was energy deregulation considered a possibility during the development of RECLAIM? How much of a role have changes in energy costs played in the increase in RTC prices? Do you think the recent RECLAIM program modifications are adequate for adaption to a deregulated energy market (if this is the cause of the high prices)?</p>	<p>Energy Deregulation</p>
<p>10. How has implementation of the RECLAIM program affected enforcement activities within California by EPA, SCAQMD, and the California Air Resources Board (CARB)? Has utilization of new monitoring technology and computer information management systems reduced the cost of enforcement incurred by SCAQMD, CARB, or EPA? Has it improved enforcement effectiveness? Has it improved the ability of EPA to oversee enforcement activities at the local level?</p>	<p>Enforcement Activities</p>
<p>11. In general, was RECLAIM able to adapt to unforeseen circumstances?</p>	<p>Adaptability</p>
<p>12. What additional technologies should be considered to achieve emission reductions required through 2003? How would you encourage the increased use of these technologies? How will their use affect the cost of RECLAIM? How will the cost of RECLAIM compare to costs that would have been needed under command-and-control during the same time period?</p>	<p>New Technologies</p>
<p>13. What outside (external to EPA) factors (changes in market conditions, other regulatory developments) have impacted RECLAIM's performance during program implementation? Why?</p>	<p>External Factors</p>
<p>14. Based on your experience, what recommendations do you have to increase the effectiveness of the RECLAIM program?</p>	<p>Recommendations</p>

**Appendix C**  
**Secondary Sources**

## SECONDARY SOURCES

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U.S. EPA, "Emissions Trading Policy Statement, Final Policy Statement and Accompanying Technical Issues Document," 51 Federal Register 43814, December 4, 1986.

U.S. EPA, "Open Market Trading Rules for Ozone Smog Precursors," 60 Federal Register 44290, August 3, 1995.

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**Appendix D**  
**Project Proposal**

**Title:** Region 9: Clean Air Act, Title I: RECLAIM Cap and Trade Program.

Has this market-based program produced the innovative and cost-effective emissions reductions that were projected for it when the program was adopted in 1993?

**Manager:** Region 9, Air Division, Ken Bigos, Associate Director (415) 744-1240.

**Questions:**

1. Controls. How has the rate of control installation under RECLAIM compared to
  - the rate of installation required under subsumed command and control rules;
  - projected control installation in District Staff reports and the CEQA EIR.
  
2. Emission reductions. Has the program achieved the same level of emissions reduction as would have been achieved in the aggregate by implementing the replaced rules and control measures?
  
3. Decisionmaking. What was the decisionmaking process with regard to control investments at a representative sampling of facilities? What has been the relationship between the incentives and deterrence ? How does this decisionmaking process compare to the decisionmaking process modelled during program development?
  
4. Evaluation and correction. What evaluative and corrective mechanisms are incorporated into the program ? Have they been implemented? Have they been effective, and why/why not ? Should other evaluative and corrective mechanisms be considered ?
  
5. Effectiveness. Has the program been more cost-effective than the subsumed program ?
  
6. Credit shortage/surplus. Is there a surplus or a shortage of available RECLAIM credits? If there is a surplus, what effect would this have had on the credit situation during the high energy demand experienced during 2000-2001? If there is a shortage, if control installation had proceeded as projected, or according to the control scheme subsumed by this program, what effect would this have had on the credit situation during the high energy demand scenarios of 2000 - 2001?

**Justification:** RECLAIM is the premier Clean Air Act Title I economic incentive program (EIP) in the country, as evidenced by its frequent citation in the literature and in the design studies for other subsequently developed programs. Market based programs have been a priority in previous and current administrations and are clearly a core theme for future Agency regulatory programs. However, it is a matter of record that, under RECLAIM, many in the regulated community have chosen not to install the controls at a rate commensurate with what would have been required under the subsumed control scheme. This could be either an indication of success in reducing emissions with fewer controls, or, alternatively, it could be symptomatic of a failure of the incentive mechanisms. Ultimately the test is whether the program achieved an equivalent or better environmental result, more cost-effectively, than the program which was replaced.

According to District reports, accelerated energy demands interacted with “delay” in installation of controls last year to produce skyrocketing credit prices<sup>1</sup>, resulting in calls for fundamental revisions in the program. There have also been claims that the program contributed to the “energy shortage”. However, very little, if any, analysis has attempted to deconstruct the relative roles of delayed controls vs. increased energy

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<sup>1</sup> Preliminary Draft Staff report for Proposed Amendments to Regulation XX, February, 2001, see pp ES-1, 1-3.

demand, nor has there been more than anecdotal description of the causes of the control approaches chosen by industry.

This study would shed light on the implementation of incentive-based programs. It will allow lessons to be extracted which can be of use by state and local agencies in developing economic incentive programs, and by EPA in its oversight of such efforts as other programs and policies are developed and implemented.

This evaluation is timely because the Agency is on the threshold of substantially expanding the use of EIPs in Title I programs. While the Agency is being actively challenged by environmentalists for being overly lax, it is also being challenged by industry for being overly inflexible. The lessons learned from this evaluation could provide an analytical basis for the Agency's policies as it supports further development and implementation of EIPs. The core questions examined in this study have to do with the actual workings of the "incentives" aspect of EIPs, and complementary aspects in terms of monitoring, record-keeping, deterrence, and periodic evaluation features to be taken into consideration during program design.

We also note that the RECLAIM program as included in the approved SIP contains provisions suggesting a similar program evaluation, although of a more limited scope, and that environmental stakeholders have directed their attention to this requirement. There is the possibility of collaboration with the District so that the evaluation proposed here could augment and complement the District's effort and result in a much more valuable product.

**5. Information Needed:** The principle source of information would be existing District records, supplemented by interviews with District staff, facility managers and other stakeholders. Also available are several recent studies from the academia pertaining to the dynamics of incentive and other "reform" initiatives. They and their authors could be consulted in designing the study and associated questionnaires.

**6. Resource Estimate:** Contractor funds and person-hours: \$60,000, 750 hours  
Extramural funds from Region 9: In kind FTE.

**7. Contacts:** Richard Grow, Grants and Program Integration Office (415) 744-1203;  
Ken Israels, Grants and Program Integration Office (415) 744-1194.

Project Oversight: Jack Colbourn, Chief, Grants and Program Integration office.

## **Appendix E**

### **List of Areas for Potential Further Research**

## **Areas of Potential Further Research**

As a result of a number of factors, including time, funding and scope, the research team has identified two broad areas that seem ripe for additional research. These areas are:

The potential suitability of inter-sector trading, banking, clean air investment funds, and other program features for inclusion in RECLAIM, and

Identifying the factors that contribute to RECLAIM's experience with Clean Air Act (CAA) New Source Review (NSR) being successful.

Readers are encouraged to contact the authors for further information.

**Appendix F**

**South Coast Air Quality Management District  
Comments on September, 2002 Draft of Evaluation Report and EPA Response**



# South Coast Air Quality Management District

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September 20, 2002

Mr. Ken Bigos  
Associate Director  
U.S. Environmental Protection Agency  
Region IX  
75 Hawthorne Street  
San Francisco, CA 94105-3901

Dear Mr. Bigos:

Comments on Draft Report "An Evaluation of the  
South Coast Air Quality Management District's  
Regional Clean Air Incentives Market—  
Lessons in Environmental Markets and Innovation"

Thank you for the opportunity to comment on your draft report entitled "An Evaluation of the South Coast Air Quality Management District's Regional Clean Air Incentives Market--Lessons in Environmental Markets and Innovation." We appreciate EPA's attempt to conduct an evaluation of the RECLAIM program and provide recommendations for improving RECLAIM and other market-based programs. We also appreciate the time you and your staff invested during our meeting and conference calls as we tried to understand the structure and basis for your findings. After reviewing this draft report and the interview questions and answers from the small group of stakeholders EPA interviewed, we have several concerns about the findings and recommendations, information collection methodology, the evaluation process, and the content and structure of the report. At this time, we do not believe the findings and recommendations in this draft report can be relied upon for considering improvements for the RECLAIM program or as a meaningful set of "lessons learned" observations for any other programs because the draft report lacks objectivity and adequate supporting data.

We urge EPA to more extensively review and analyze the information collected from the AQMD and other stakeholders. In most cases, the actual program performance data such as reported emissions, actual control equipment installation and costs, trade volume and credit prices, should help you to make objective evaluation of RECLAIM performance. As indicated in your draft report, AQMD provided this information to you at the start of your project and would be more than happy to provide any additional information you may need. We are concerned that the findings and recommendations in this report are not derived from the objective sets of data collected from RECLAIM facilities and RECLAIM markets, but instead the authors have relied on select comments made by interview participants. Often, these comments were made without supporting data. In many instances, we observed that the findings and recommendations are collections of

responses from a few participants with added editorial comments by EPA, resulting in information being presented out of context. In using this approach, the report loses its objectivity and becomes merely a subjective compilation of potentially biased opinions unsupported by scientifically or statistically meaningful data.

Detailed comments on the content of this draft report are provided in Attachment A of this letter. The summary of our comments is outlined below. We hope you will find it useful and constructive in formulating your final report.

## 1) Findings and Recommendations

There appears to be inadequate data and information to support findings and recommendations made in this report. The key objectives of this report as stated are to answer six questions regarding RECLAIM performance and recommend improvements based on any deficiencies found in program performance. In reviewing EPA's "observations" in Section 9, we found that many opinions were formed with inadequate supporting information or through misinterpretation of information. For issues such as control equipment installation and RECLAIM emissions reductions as compared to command-and-control, AQMD published several documents such as Annual Reports and the White Paper on Stabilization of RTC Prices that specifically addressed the issue with actual supporting data collected from RECLAIM facilities, equipment vendors, and AQMD data bases. EPA chose not to consider all relevant information in AQMD reports, but instead formed opinions based on selected sets of data and misinterpretation of RECLAIM information.

a) Findings: As mentioned earlier, most of the findings made in this report were made without adequate or valid supporting data. One of the key objectives of this report is to answer six questions regarding RECLAIM performance. EPA's "observation" of these six performance areas is documented in Section 9. AQMD staff is not clear from EPA's remarks in this section as to what data EPA relied upon in making its "observation," and how observations made by EPA are relevant to the determination of RECLAIM performance and the recommendations for improvement, Section 10. We would appreciate your providing further clarification and consideration of our comments with respect to the following six questions:

- Question 1: *"How has the rate of control installation under RECLAIM compared to the rate of installation required under subsumed command-and-control rules, projected control installation in SCAQMD staff reports, and the RECLAIM environmental impact report?"*

**AQMD request:** Please identify the "clear evidence by mid-1998" that control installation lagged behind anticipated levels.

- Question 2: *“Has the program achieved the same level of emissions reduction as would have been achieved in the aggregate by implementing the replaced rules and control measures?”*

**AQMD comment:** EPA concluded there was a performance shortfall when comparing actual emission reductions under RECLAIM to that which would have occurred under the subsumed command-and-control rules. EPA “estimated” that the performance shortfall resulted mainly from the initial inflation of the allocation line. However, EPA did not perform data analysis to support this conclusion, instead noting that to verify this assumption would require extensive analyses that were beyond the scope of this evaluation.

AQMD appreciates EPA’s effort to justify its conclusion by using indicators rather than actual data analysis. However, AQMD staff believes the indicators used by EPA are based on misinterpretation of RECLAIM information. Again, we invite EPA to review AQMD documents that provided extensive analysis of this issue based on actual RECLAIM facilities’ performance data. We strongly disagree that there are any performance shortfalls in this area. In fact, EPA indicated in the same paragraph that EPA agrees with the basic validity of AQMD’s “equivalence” argument.

Furthermore, the discussion needs to state the basis for the initial starting and ending allocations. Starting allocations were calculated by multiplying the maximum throughput year from 1989-1992 by the equipment-specific emission factor set forth in the rule. (Rule 2002(c)(1).) The equipment-specific emission factors were determined to reflect the emissions reductions required by adopted District rules through December 31, 1993. (RECLAIM Development Report, October 1993, Appendix II-F.) The intent of selecting the highest throughput year was to replicate what would have been the facility’s emissions in 1994 had it not been for the recession. The rationale for this adjustment was that command-and-control rules do not place a cap on mass emissions, so under command-and-control emissions could reach this level depending on the economy. The District believed it would be inappropriate for RECLAIM to cap emissions at recessionary levels.

The AQMD strongly disagrees with EPA’s claim that the rate of reductions was “less than half the initial projections.” EPA erroneously states that the RECLAIM Development Report characterizes a projected 11% per year reduction as reductions in actual emissions rather than reductions in the allocation line. To the contrary, the RECLAIM Development Report, Vol. I, p. 5-20, states that NO<sub>x</sub> RECLAIM will reduce total “potential to emit” by 11% per year in the second year. Reductions in “potential to emit” refer to the allocation line, not actual emissions. Table 9-8, Vol. III, p. 9-73, refers to “remaining NO<sub>x</sub> emissions.” However, these numbers are based on the allocation line and do not necessarily represent actual emissions, as can be seen by comparing Table 9-8 to Figure 5-3 (Vol. I, p. 5-17).

EPA asserts that initial allocations were 40-60% above actual emissions in the first two years and that EPA was “unable to locate analyses justifying such a growth allowance based on economic data.” However, the justification for the “growth allowance” is abundantly clear in the rule itself – it was based on actual throughput levels at the affected RECLAIM facilities. (Rule 2002(b)(1).) If these facilities had returned fully to their highest pre-recessionary levels of throughput, they would have needed emissions levels up to the RECLAIM allocation line. Therefore, the AQMD does not agree that initial allocations are higher than was necessary to allow for recovery from recessionary conditions, as asserted by EPA. However, not all facilities returned to their highest levels of throughput.

In summary, AQMD strongly disagrees with EPA’s statement that RECLAIM has produced less emission reductions than were projected for the program. By meeting or surpassing the reductions required by the allocation line, RECLAIM has met or exceeded its emission reduction goals. Moreover, RECLAIM produced the same emission reductions that “could have been expected”—and in fact were expected—from the subsumed command-and-control rules.

The AQMD believes it is unrealistic to try to determine in retrospect what “would have happened” under command-and-control because the Governing Board may not have adopted all the control measures in the AQMP. Nevertheless, the AQMD believes an important lesson can be learned from the RECLAIM experience. In conducting the program evaluation as required by Health & Safety Code §39616(e) the AQMD realized that additional reductions potentially could be obtained from the RECLAIM universe of sources. (October 2000 RECLAIM report, Tables 1-13 and 1-14, p. 1-20.) This realization helped trigger the decision to re-evaluate RECLAIM ending allocations as part of the 2002-2003 AQMP. Therefore, AQMD believes that in establishing any market incentive program, provisions should be made for periodic program evaluations to determine if adjustments need to be made.

- Question 3: *“What was the decision-making process with regard to control investments at a representative sampling of facilities? What has been the relationship between the incentives and deterrence? How does this decision-making process compare to the decision-making process modeled during program development?”*

**AQMD comment:** EPA observes that AQMD should revisit the decision-making assumptions implied by the Economic Trading Model (ETM) because the facilities’ decision-making processes as expressed by the four RECLAIM facility representatives and four other participants comprised of consultants, attorneys, and trade association representatives are inconsistent with the model assumptions. As stated earlier, AQMD is concerned that EPA relies on

such limited data from individuals who may have biased or self serving opinions while making a finding on an important issue identified by EPA to be the “heart” of this effort. Although EPA indicates that the evaluation findings on this subject are contained in Section 5, AQMD found upon reviewing information in Section 5 that it contains merely a selection of responses from certain stakeholders rather than an objective evaluation of opinions provided by all stakeholders.

AQMD would like to emphasize the fact that, as stated on p. 13, for most years over 90% of facilities were in compliance, and that for compliance year 2000 (the only year emissions exceeded allocations), 76% of excess emissions were from two power-producing facilities (p. 25). This was during California’s energy shortfall and very unusual circumstances. AQMD believes there is insufficient evidence to suggest noncompliance is a serious option for RECLAIM facilities.

AQMD concurs with EPA that the apparent relative insignificance of the prospect of savings/profits from sale of excess RTCs in deciding whether to install controls may be an important lesson from RECLAIM implementation. To address this concern, AQMD suggests it may be desirable to require facilities to draft compliance plans early in program implementation.

- Question 4: *“What evaluative and corrective mechanisms are incorporated into the program? Have they been implemented? Have they been effective, and why/why not? Should other evaluative and corrective mechanisms be considered?”*

**AQMD comment:** In hindsight, AQMD believes it would have been desirable to require compliance plans at an earlier date. Initially, AQMD believed that such requirements were inconsistent with the theory of market-based programs, but perhaps a lesson learned from RECLAIM is that such programs need mechanisms beyond the market to assure long range planning by facilities.

- Question 5: *“Has the program been more cost-effective than the subsumed program?”*

**AQMD comment:** RECLAIM and most other market incentive programs are designed with a premise that they can achieve equivalent emission reductions at a lesser compliance cost than command-and-control. Therefore, it is appropriate to compare compliance cost in evaluating program performance. Evaluation of the cost effectiveness per ton of actual emissions reduced is impractical, if not impossible, to do under either RECLAIM or command-and-control scenarios. Although cost-effectiveness in dollars per ton of emissions reduced is normally evaluated for the command-and-control rules, it does not

account for changes in operations such as changes in throughput and process modifications.

AQMD agrees that the key concern for any regulatory program is to preserve the environmental and public health goals. However, AQMD disagrees that the cost per ton of emission reduced is necessarily a meaningful indicator for these goals. Environmental and public health goals can be best evaluated through the application of mathematical models simulating the environmental conditions in this basin. In this case it was determined at the time of adoption that the emissions at or below RECLAIM allocation levels will help us reach that goal. Cost effectiveness of emissions reduced can only be accurate and reliable through the summation of costs and emissions information for individual pieces of equipment. Such complex and time-consuming analysis is further complicated by the change in methods of operation and production increases at each facility.

- Question 6: *“Has there been a surplus or a shortage of available RECLAIM credits and what effect has this had on the credit situation during the high energy demand experienced during 2000/2001?”*

**AQMD comment:** This issue was explored in detail in the AQMD’s White Paper on Stabilization of NOx RTC Prices. The spike in RTC demand by power plants during this period was a temporary situation that was quickly corrected by AQMD utilizing the backstop measures in the RECLAIM rules. Keep in mind that any contingency plan will only be activated after a certain program parameter exceeds a decision point. Most decision points are unlikely to be instantaneous, but are usually an average of a parameter’s values observed over time. The current RECLAIM contingency plan calls for a program evaluation after the price exceeds \$15,000 per ton over one year. The RECLAIM program amendment in May 2001, put in place the requirement for facilities to submit and comply with the control methods selected in the compliance plan. This requirement sunsets in 2005, but could be extended if necessary.

- b) Recommendations: AQMD appreciates the time and effort EPA invested to provide insights and recommendations to strengthen our program. However, we have some questions and concerns regarding the following recommendations:

- *“Overall, the research team believes that any changes made to RECLAIM at this stage in the program must be taken in small steps and should not involve dramatic regulatory modifications.”*

**AQMD Comment:** As you know, the AQMD Governing Board amended the RECLAIM program in May 2001. The changes resulted in accelerating control equipment installation, reduced emissions, and stabilized RTC prices. AQMD does not agree that changes must always be taken in small steps.

Dramatic actions may become necessary in cases of great need. Thus, AQMD has committed to proposing an “overlay” of command-and-control rules if RECLAIM does not result in anticipated reductions in the future. The AQMD is very surprised that EPA would suggest “borrowing” against future emissions, since EPA firmly opposed such a concept during program development. AQMD is receptive to the concept of “contingency plans” to deal with price spikes and is interested in exploring how concepts such as credit auctions and mitigation fees might be used in this regard. Finally, AQMD strongly disagrees with the concept that AQMD needs to modify its permitting process to allow facilities to react more quickly to price spikes. There is no evidence that permit time frames prevented timely installation of controls. However, AQMD agrees that the program should encourage facility contingency plans.

**AQMD Request:** AQMD would like to know if EPA believes the suggested example of contingency plans outlined in the report would not appear to conflict with the market-base principles. Since the ultimate intent of air pollution control regulation is to reduce emissions, how should the \$8 per pound be spent? Will there be sufficient EPA-approved emission reduction projects for the money collected? Also, what would be the net investment value after deducting program administration/investment overhead?

- *“In order to encourage more efficient operation of the market for emissions control, SCAQMD could provide more information on the performance of the market, the current state of the environment, and expected economic and market conditions.”*

**AQMD Comment:** EPA suggests posting trade information such as total RTCs for sale or the total number of facilities that want to purchase RTCs. Such activity would lead us to implement a centralized market for RECLAIM. As you know, we recently conducted extensive review of this concept and found that the current system is more appropriate for RECLAIM participants. This view is fully supported by most of our RECLAIM facilities and credit brokers as documented in AQMD report to the Governing Board in May 2002 entitled, “Merits of a Centralized Market for RECLAIM.” We would appreciate further clarification of EPA’s view on this matter.

AQMD supports concepts such as posting trade registration information, providing permitting information, and publicizing information regarding available controls. AQMD doubts that it is appropriate for it to act as a predictor of hydro-imports and gas prices, and further doubts that information on regional economic growth would have helped assure RECLAIM compliance. Instead, AQMD believes an important lesson learned from RECLAIM is that it may not be feasible to rely on a “pure” market-based program without requiring enforceable compliance plans from affected facilities.

- *“There should be a comprehensive suite of performance parameters identified and tracked at both macro and micro levels of program operation.”*

**AQMD request:** Please provide specific examples of performance parameters you recommend for identification and tracking of “various manifestation of the economic recovery,” and those that are “designed to deconstruct and avoid potential problems related to the crossover.”

- *“Stakeholders have very different opinions about the suitability of inter-sector trading, banking, clean air investment funds and other program features. In order to clarify whether these features are appropriate for RECLAIM, those responsible for administering RECLAIM need to carefully consider the purpose, benefits and risks of such features.”*

**AQMD comment:** AQMD believes that EPA has already recognized that mobile and area source credits can play a legitimate role in implementing RECLAIM. Rule 2008, allowing the use of mobile source credits in RECLAIM, was adopted as a part of the original RECLAIM package in October 1993. EPA approved that rule into the SIP. Likewise, EPA has now approved into the SIP a series of mobile and area source credit rules that will allow the generation of NO<sub>x</sub> RTCs from reductions in emissions from sources such as marine vessels and agricultural pumps. The AQMD recognizes that it is important that such credits be surplus. However, AQMD believes that quantification may not always be as accurate as for certain stationary sources, and that this can be addressed through program design and uncertainty factors in establishing the value of the credit. EPA’s Economic Incentive Program Guidance (January 2001), Section 6.4(c), suggests exactly this method of addressing uncertainty. Moreover, the EIP Guidance recognizes that allowing mobile source credits in trading programs can lead to reductions that would not otherwise be achieved. (Id.)

- *“SCAQMD could consider modifying the missing data provisions. For penalties incurred solely because CEMs data is not available, SCAQMD could require facilities to pay into a mitigation fund or could enable SCAQMD to resell punitive RTC purchases. This would prevent penalties levied against one facility from affecting the entire regulated community.”*

**AQMD Comment:** There is no evidence that missing data has adversely affected the RTC market as a whole. Missing data provisions were primarily used in the earlier years of the program while CEMs were being installed and when there were excess RTCs available in any event. It is important to recognize that the impetus for the missing data provisions came from EPA in the first place. In a letter from EPA’s Assistant Administrator for Air & Radiation to AQMD’s Executive Officer dated February 28, 1992, EPA states: “We believe that RECLAIM should provide that the emissions from each

source for each day on which monitoring or recordkeeping data is missing, inadequate or erroneous should be presumed to be the maximum emissions which the source was capable of generating for the day in question, subject to a demonstration by the facility owner, by clear and convincing evidence, that the emissions did not exceed some lesser amount.” (RECLAIM Development Report, October 1993, Vol. II, p. 11-M-15.) EPA compliance staff was very supportive of the missing data provisions as adopted. Moreover, now that facilities have had their CEMs operational, the missing data provisions allow sources to use calculations based on previous actual emissions. It is also misleading to imply that AQMD used other methods to calculate missing data. AQMD staff always implements the rules as written. Under the settlement process, we could agree to allow sources to use other equivalent actual emissions and operational data to calculate emissions in accordance with missing data procedures specified in the rule.

Is EPA now suggesting we undo that effort based on the comments received from two “Industry” interview participants?

- *“SCAQMD could consider serializing credits to allow more accurate tracking.”*

AQMD believes the current RTC tracking system provides adequate enforcement of RECLAIM. Expiration date is currently attached to each pound of RTCs and appropriate disclaimers are included in trading of inter-sector credits. At this time we have no evidence to indicate that serializing credits will enhance RECLAIM goals for achieving emission reduction levels as approved in the SIP by EPA. However, AQMD is evaluating the feasibility and any potential benefits of implementing this concept. AQMD is very interested to consider any information EPA can provide on anticipated program benefits.

- *“SCAQMD could attempt to improve their permitting and compliance systems and to conduct audits and inspections more quickly after the end of the trading year.”*

**AQMD comment:** AQMD believes the report should acknowledge the progress already made in this regard. All installation of emissions control equipment now has priority permitting status. In fact most of the proposed emission control projects obtained permits within 60 days of AQMD receiving complete technical information and other documents necessary for permit evaluation. Our compliance staff now begins their audit process for RECLAIM facilities within 90 days of the end of the reconciliation period. For your information, AQMD compliance staff has already completed compliance audits of more than seventy percent of RECLAIM Cycle 1

facilities for the Compliance Year 2001 (reconciliation period ended on March 2, 2002).

## 2) Information Collection Methodologies

As described in the Executive Summary and the Introduction (Section 1), the stated EPA methodologies for evaluating RECLAIM performance include reviewing RECLAIM literature and interviewing stakeholders for “qualitative” information. EPA also noted in the report that because there was little emphasis in the available literature on how to practically test the theories of a market-based incentives program, EPA “focused in large part on the decision-making behavior by the operators of the regulated sources” because “these decisions ultimately determine the outcome of the program.” Although we agree with the approach, we believe there are significant deficiencies in the implementation of the methodologies as outlined below:

- a) Insufficient Sample Size: Although EPA noted in this report that the recommendations and lessons learned were developed based on qualitative information, we believe for such information to be valid it must be based on a statistically representative sample size. Random selection of opinions from a limited number of interview participants cannot be considered as statistically valid information for use as a basis for making findings and recommendations.

For this specific project, EPA interviewed 20 stakeholders of which eight (8) are identified as “Industry” stakeholders. However, upon closer examination of the stakeholder list, only four (4) interview participants are employees of RECLAIM facilities who are involved with the day-to-day operation and decision-making process of the facility. The other four (4) participants are attorneys, trade association representatives or consultants who were not involved in the day-to-day operation or a decision-making process at a RECLAIM facility. In essence, several conclusions and recommendations contained in this report were based on individuals who have no involvement with day-to-day decision-making at the RECLAIM facilities. EPA only interviewed four of the total 335 RECLAIM facilities to reach conclusions in this draft report.

The lack of statistically meaningful data is rather significant since EPA’s analysis of program performance relies mainly on the decision-making behavior by the operator. As stated by EPA on page 4 of this draft report, “this investigation focused in large part on the decision-making behavior by operators of the regulated sources, since it is these decisions that ultimately determine the outcome of the program.” To demonstrate AQMD concerns that inadequate sample size could lead to the wrong conclusion, we have provided examples in Attachment A of this letter.

- b) Insufficient Sample Facility Size Variation: Throughout the report, EPA attempted to distinguish the behavior and needs of large, medium and small RECLAIM facilities. However, of the four RECLAIM facilities interviewed, two

participants represent major utilities, one participant represents the largest refinery in the basin, and the last participant is a national corporation. Of the remaining four participants, two participants represent a trade association comprised mainly of large companies, one is a consultant for large utilities, and one is an attorney. None of these individuals have first hand, day-to-day operational knowledge to answer the questions posed by EPA regarding decision-making by regulated sources. It appears that information provided by these individuals cannot provide sufficient insight into the operation of medium and small businesses to make meaningful findings or recommendations.

### 3) Evaluation Process

- a) Balanced Information: We appreciate EPA's attempt to obtain input from various stakeholders for this evaluation. However, the questions designed for each group of stakeholders focused heavily on certain performance questions resulting in EPA's findings and recommendations being biased by that group's experiences and motivations. To be objective, EPA should review RECLAIM facility emission data, trade activities, trading prices, control equipment installation reports, etc., and evaluate them against the input provided by all interview participants to form conclusions. As shown in our specific comments in the attachment and in this letter, throughout this report EPA frequently relied on opinions of a few interview participants to form conclusions and recommendations regarding RECLAIM performance.

Additionally, the AQMD believes the technique of presenting partial comments from certain interview participants in combination with EPA comments may mislead readers. Although EPA attempted to clearly denote EPA's view, findings, and recommendations in italics, we frequently find no differentiation and that only opinions of selected participants and not all participants were included in the report. In many cases, there were contradicting opinions within each group and all points of view were not presented. The report can be more objective if all answers given by the participants are presented in the report along with EPA analysis of the information. In this way, readers can better understand various points of view and why EPA chooses to base its "observation" and make recommendations on certain information. As we have discussed, AQMD believes the manner in which the interview information is presented in Sections 5,6,7,8, and 10 can provide misleading information to the readers. This evaluation can play an important role in helping to shape the national market incentive policy and EPA should take the necessary time to present and document **all** data and information, provide objective analysis of those data, and explain the basis for relying on certain data to form conclusions and recommendations.

- b) Validity of Information: In many instances throughout the report, EPA made findings and cited comments from selected interview participants to support these findings without first verifying whether the opinions expressed are supported by facts or shared by other RECLAIM participants or stakeholders. In absence of supporting data or valid statistical sample, EPA should present the information as

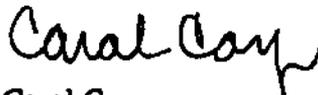
a view of an interview participant rather than as a finding on that topic. AQMD includes examples in the attachment to illustrate our concerns.

**4) Content and Structure of the Report**

- a) **Information Flow:** It is difficult to follow the report's objective in this current format. Currently, it is difficult for the reader to understand how the information in sections 6 and 7 factored into the performance questions. We suggest sections 5, 6, 7, and 8 be modified to coincide with the six performance questions. Each section should introduce the readers to the performance issues to be addressed in that section, data collected for evaluation, stakeholders interviewed for the performance questions raised in that section, the questions and answers used to evaluate performance, the variation of the answers obtained, the validity of the questions and answers, evaluation, discussion and the final conclusions reached by EPA. Sections 9 and 10 would provide a good summary of EPA's conclusions.
- b) **Presentation of Data:** As we indicated earlier, presentation of partial interview data to support various findings in each section is misleading. If EPA's intent is merely to present interview information, AQMD suggests all responses be included in the report, either in the appendix or in each relevant section.

Again, thank you for the opportunity to comment on this document. If further information is necessary, please contact me at (909) 396-2434, or Pang Mueller at (909) 396-2433.

Sincerely,



Carol Coy  
Deputy Executive Officer  
Engineering and Compliance

CC:BB:PM:skm

cc: Barry Wallerstein  
Jack Broadbent, EPA  
Barbara Baird  
Peter Mieras  
Elaine Chang  
Chung Liu  
Pang Mueller

Attachment

**Attachment A**  
**SCAQMD's Comments on EPA's Draft Evaluation of RECLAIM**

**General Comments**

1. AQMD urges the document be reformatted to specifically identify and distinguish stakeholder comments from EPA comments and conclusions. Chapters 5 through 8 contain items listed as “findings” which appear to actually be “stakeholder comments” and not EPA conclusions. These should be relabeled. We suggest the type of stakeholder should be identified to help readers understand the potential basis for their comments.
2. After each stakeholder comment, AQMD requests the opportunity to respond if it chooses.
3. Under “recommendations” in Chapters 5-8, it should be indicated whether the recommendation is from a stakeholder or from EPA. The type of stakeholder should be identified, e.g., RECLAIM facility, industry, broker, environmental group, regulator.
4. If Chapter 10 is EPA's recommendations, please clearly state this.
5. AQMD observes that the report relies largely on selected stakeholders' impressions of the program. The footnote on page 4 of this draft report indicated that EPA interviewed AQMD management and staff to gain perspective of the implementing agency. However, there is no reference to comments made by AQMD staff.

**Executive Summary** (page i)

The Executive Summary stated three objectives for this evaluation which are: program performance, lessons learned to improve program performance, and lessons learned that could benefit other programs. This chapter proceeds to make recommendations for program improvement without first providing a summary of its findings on the program performance. AQMD suggests the Executive Summary should address all three objectives. The report's audience should first have the benefit of understanding EPA's findings on the program before considering areas for program improvements.

**Lessons Learned for Application in RECLAIM** (page i and pages 83-87)

- It would also helpful if EPA can elaborate why it recommends that the changes be market-based and not any other types. If the reason is the concern over destabilization of the market, it would also be helpful to briefly describe how the market would be destabilized by regulatory changes other than those that are market-based.
- EPA recommends that AQMD provide more information on (1) the performance of the market, (2) the current state of the environment, and (3) expected economic and market conditions. We met with the Trading Working Group (comprised of brokers and RECLAIM facilities) several times after the RECLAIM amendments in May 2001. This group helped to identify information that is currently posted on our web-

site, and it is our impression that this group is satisfied that current information on the web-site meets their needs. If you are interested, you may access this information at:

[http://www.aqmd.gov/reclaim/rtc\\_main.html](http://www.aqmd.gov/reclaim/rtc_main.html) or  
[http://www.aqmd.gov/rules/reclaim/reclaim\\_home\\_page.html](http://www.aqmd.gov/rules/reclaim/reclaim_home_page.html)

Additionally, AQMD staff conducted a comprehensive review of the trading mechanism and interviewed a number of representatives of RECLAIM facilities, and the result of this study was reported to the Governing Board in May 2002. The Board letter, along with the attached report and appendices, can be accessed at <http://www.aqmd.gov/hb/020531a.html>.

- The statement regarding operational parameters and tracking of program operation at macro and micro levels in the third bullet is vague. Please provide clarification as to what comprehensive suite of performance parameters is recommended by EPA for identification and tracking that is not currently identified and tracked by the AQMD.
- Currently the RECLAIM program includes a temporary RECLAIM Air Quality Investment Fund and the certain mobile and area source credits approved by EPA into the State Implementation Plan (SIP). Credit Banking is not a current feature in the RECLAIM program.
- AQMD believes there are sufficient tracking and enforcement of RECLAIM credits in our current program. However, we are currently evaluating the feasibility and possible benefits of serializing credits. We are very interested in your view and would appreciate it if you would elaborate on how serializing credits will help RECLAIM facilities achieve their clean air goals and otherwise benefit the program.
- The report recommends that AQMD could attempt to (1) improve the permitting system, (2) improve the compliance system, and (3) conduct audits and inspections more quickly after the end of the trading year. Please elaborate on the specific areas of permitting and compliance that you feel need to be improved. In the last few years, we initiated the process to audit RECLAIM facilities much sooner than the previous years and provided permitting priority to facilities proposing installation of control equipment. If the current practices have not been adequate, we would appreciate your suggestion of a more appropriate course of action.

**Lessons for Consideration in Other Programs and Evolving National Policy (page ii)**

- *Lesson 1* “Market-based programs require significant planning, preparation, and management during development and throughout the life of the program.”

AQMD agrees with this comment.

- *Lesson 2* “Market information is a key factor affecting facility decision making.”

AQMD agrees with this comment. However, AQMD also believes that EPA has properly pointed out that there was a lack of long-term planning by facilities and that

facilities did not plan to install controls based on anticipated cost savings or profits from sale of excess credits. (See p. 60.) AQMD believes that this factor needs further study and that more active management by regulators, such as requiring compliance plans, may be necessary to prompt appropriate decision making.

- *Lesson 3 “Regulators should strive to create confidence and trust in the market by making a full commitment to the program and ensuring consistency in the market and their policies.”*

In support of this comment, EPA states “a belief on the part of many participants that AQMD would not allow the market forces to work (i.e., AQMD would bail facilities out or dissolve the program) discouraged the installation of controls.” (p.69.) AQMD is not aware of any instance in which this occurred. Rather, this is the claim of an attorney. This sentence should be deleted unless EPA has other evidence to support such a statement.

- *Lesson 4 “Unforeseen external circumstances can have dramatic impacts on market-based programs. Therefore, these programs must be designed to react quickly and effectively to unforeseen external factors.”*

EPA suggests having regulatory contingency plans in place to help cope with severe changes in the market. AQMD would like to know what kinds of measures EPA suggests and how they would work. EPA also suggests facilities could be encouraged to develop contingency plans to react more quickly to changing market conditions. AQMD supports this idea and solicits suggestions for methods of incentivizing such planning by facilities.

- *Lesson 5 “Periodic Evaluation, revisiting of program design assumptions, and contingency strategies are crucial to keeping the program on track.”*

This is a good suggestion for improving design elements of market incentive programs. However, most programs would likely have more than one factor influencing their performance. It may be useful to suggest an example showing possible interactions of multiple parameters.

- *Lesson 6 “Once programs are up and running, major regulatory changes may be disruptive. Therefore, any actions taken to change or stabilize the market should be incremental, and market-based, rather than programmatic, changes should be encouraged.”*

AQMD staff does not know of any RECLAIM experiences that would support this conclusion. AQMD staff believes there may be cases where programmatic rather than incremental change is needed. Also, not all changes necessarily will be “market-based,” as there may be cases where features that some consider to be elements of command-and-control programs, such as enforceable compliance plans, are needed to make the market work.

## Attachment A--SCAQMD's Comments on EPA's Draft Evaluation of RECLAIM

- *Lesson 7* “RECLAIM’s experience seems to demonstrate that cap and trade (CAT) can work with Clean Air Act (CAA) New Source Review (NSR). This may be a function of the types of sources included or the controls in place at many facilities. This lesson is contrary to the commonly reported federal view and should be further researched.”

AQMD agrees with this comment.

- *Lesson 8, p. 71.* “Regulators need to have a strong understanding of the regulated facilities and the factors impacting their decision-making.”

AQMD agrees with this comment.

### **Section 1. Introduction** (page 1)

- Second sentence in the first paragraph indicates that command-and-control regulations set specific facility-based standards. Please note that most AQMD regulations are equipment-based standards.
- Please make a minor correction to the citation number 2 in the footnote regarding industrial processes. Please note utility boilers and internal combustion engines are not industrial processes, they may be referred to as either combustion equipment or industrial equipment.
- In the second paragraph, it would be more accurate to replace “Facilities were assigned an allocation level by SCAQMD based on historical activity and current emissions control” with “NO<sub>x</sub> and/or SO<sub>x</sub> allocations were issued to RECLAIM facilities based on their historical activity levels and applicable emission control levels specified in the subsumed rules or in the AQMP.”
- Please delete “and industrial boilers” from the last sentence in the second paragraph since industrial boilers are not facilities.
- Under the evaluation methodology section on page 3, the report should also include the category of trade organization in the list of categories of stakeholders interviewed, since some individuals interviewed by EPA represented a trade group rather than a single facility.
- Under the structure of the report on page 5, EPA implies that chapters 5 through 8 incorporate EPA’s findings and recommendations. However, on page 23 of the report, it is stated regarding Chapters 5-8 “The recommendations in these sections are taken directly from these stakeholders and therefore do not necessarily reflect the views of either EPA or the research team.” This also appears to be true of many of the “findings” in these chapters. The “structure of the report” needs to be clarified.

## **Section 2. Regulatory Structure**

No comments at this time.

## **Section 3. Trading Program**

No comments at this time.

## **Section 4. Development of RECLAIM** (page 16)

The reference to the five assumptions made in the economic model was not included in the RECLAIM Volume III: Final Socioeconomic Report. Please provide the specific citation of the document used to conclude that these assumptions were used in designing the RECLAIM program.

## **Section 5. Decision-Making By Regulated Sources**

### **Long-Range Planning** (pages 24-26)

On page 24, EPA finds, “*Decisions about whether to install control technology or buy credits have been made by different levels of management as the RECLAIM program has changed over the year.*” Although six of the eight “Industry” interview participants did not share this view, EPA made the conclusion based on the answers provided by two participants. Unfortunately, the report included editorial changes that gave readers an impression that most of the RECLAIM facilities share this view. To illustrate this point, a paragraph from the report is shown below with identification of the statements made by interview participants. The added EPA language is bolded.

*“While the decision-making process is conducted differently by each company, **most stakeholders believed that, in general, the environmental compliance staff identifies the several options which could be relied upon to ensure compliance and then presents the options to upper-level management. (Participant IN-1)** However, several companies said that during the 1993-1995 time frame, decisions regarding implementing compliance measures were made by the companies’ upper-management (the president, vice-president, etc.) and hired consultants. This was due to the importance of managing allocations and the political consequences of the program as many companies were unsure whether RECLAIM was going to be successful. Between 1996-1999, more of the decision-making process was delegated to environmental compliance personnel in medium-and large-size companies. When the RTC price spike occurred in 2000, upper-management became involved in the decision-making process. Now that RTC prices have stabilized, environmental compliance personnel are beginning to make the decision.(Participant IN-3)”*

On page 25, EPA finds, “*Most large companies make an effort to integrate decision about control technology or process modifications into long-range planning.*” However, EPA further asserted that the uncertainty about the future direction of RTC demand and supply makes weighing compliance costs and control options difficult. Therefore, market

## Attachment A--SCAQMD's Comments on EPA's Draft Evaluation of RECLAIM

uncertainty discourages some stakeholders from investing in costly control technologies because of the risk involved. Again, EPA drew conclusions from the statements made by one interview participant. No other interview participants indicated that they were discouraged from investing in control technologies due to uncertainty in the market. On this page hearsay allegations by an environmental participant are repeated. There is no evidence to support the finding that facility managers made environmental decisions based on their financial performance.

On page 26, EPA finds, *"In general small and medium size companies conduct little, if any long-term planning that involves environmental concerns."* It would be interesting to know which stakeholder makes this statement since none of the interview participants has first hand knowledge of the day-to-day decision-making process at a small or medium facilities.

### Market Information (pages 26-28)

On page 26, EPA finds, *"Many participants said they did not have sufficient market information to make informed compliance decisions and to conduct long-range planning."* EPA contradicts itself in the subsequent paragraph stating that *"a few companies believe that the information base was not adequate for facilitating long-range decisions."*

On page 27, EPA finds, *"The RECLAIM market may have been affected by misinformation and manipulation."* Hearsay allegations of manipulation in the market by industry participants and brokers are repeated. The AQMD does not believe this is sufficient to support a "finding" that the "RECLAIM market may have been affected by misinformation and manipulation." Recently, there have been allegations that money was paid for credits not actually delivered to the buyer. However, this does not mean that market prices as a whole were adversely affected.

### Lead Time (page 28)

AQMD agrees that long-range planning is necessary to install control equipment due to significant lead-time in obtaining properly designed equipment from the time the order is placed. During the development of AQMD command-and-control rules, industry cited the lead-time of two to three years. The AQMD disagrees that delays in emission reductions are the result of permit processing lag time. As explained earlier, AQMD's permitting policy places priority on processing permits for emission control equipment.

### Recommendations (page 30-31)

*"SCAQMD could consider improving the amount of current market information that it makes available and making this information available more quickly."* See comments for Section 1 – Introduction and the cover letter from AQMD.

*"SCAQMD could investigate ways to provide information that would facilitate long-range planning and decision-making."* See comments in the cover letter from AQMD.

*“SCAQMD could consider serializing RECLAIM credits.”* See comments on the Executive Summary and in the cover letter from AQMD.

Facility Decisions and Action (pages 31-38)

On page 32, it is stated that, “When RECLAIM was implemented, many power producers who had ordered control equipment prior to RECLAIM cancelled their orders for SCRs and chose to purchase RTCs instead.” It is unclear whether this statement was made by a stakeholder with actual knowledge of the facts. If so, it would be important because it would rebut inferences in other findings that “lack of information” caused facilities not to be prepared for the crossover point. Power plants are sophisticated players who could easily have foreseen the crossover point, been aware of AQMD reports predicting crossover, as well as clearly understood that RECLAIM was designed to require installation of all Tier I controls by 2000, including SCR at power plants. This allegation supports the conclusion that the problem was caused by lack of planning by facilities rather than lack of information, and suggests the need for market-based programs to assure long-range planning by facilities.

On page 37 it is stated that the recent modifications to RECLAIM may inhibit innovation further. AQMD believes it is important to know what stakeholder made this claim and whether it was one of the parties who encouraged AQMD to amend the program. Also SCAQMD notes that the amendments encourage innovation in the control of mobile and area sources by allowing the use of credits from such sources in the program.

Also on page 37 it is stated: “Because companies must stick to their agreements, businesses will not be able to innovate after the compliance plan is developed.” AQMD strongly disagrees, since a compliance plan is easily amended.

Recommendation (Page 38-39)

*“SCAQMD could take several steps to encourage further technological innovation.”* As stated in the cover letter, AQMD is considering reducing allocations for RECLAIM facilities. However, we do not see supporting evidence that providing extra allocation would encourage innovation.

**Section 6: Enforcement and Compliance Under RECLAIM**

Enforcement Under RECLAIM

On page 40, the report stated that, *“adaptability and the types of steps called for are rarely necessary in a traditional CAC regulatory structure.”* It should be noted that during the period of high energy demands in California, other Air Pollution Control Districts also had significant problems with non-compliance at their respective power plants. Because most command-and-control rules do not limit increases due to production increase, they are less likely to need adjustment when energy or other production demands increase.

## Attachment A--SCAQMD's Comments on EPA's Draft Evaluation of RECLAIM

On page 41, the report stated that, *“there are hundreds of outstanding violations that have not been enforced. CARB’s evaluation of RECLAIM indicated that violation notices involving RECLAIM facilities are not settled in a timely manner – a study of twelve facilities showed that settlement ranged from seven to twenty-three months with an average settlement time of twelve months.”* The audit of each facility’s annual allocation cannot commence until after the close of the reconciliation period for each compliance year. The final reconciliation period extends for 60 days. Due to the complexity of information, the audit process may take several months before it is finalized. Consequently, the penalty assessment aspect of the enforcement process begins much later for RECLAIM cases than for all other enforcement cases.

ARB found in an earlier audit that the average settlement time for a RECLAIM violation was twelve months. ARB reviewed closed files from a time period in which NOV’s received in the Prosecutor’s Office during FY 96/97 were almost double those received in the prior fiscal year. This impacted settlement times. However, the addition of new staff has led to a restoration of the normal settlement time of six to nine months. The most recent statistics for FY 00/01 demonstrate that nearly half of all NOV’s were settled within six months.

On page 41, EPA finds, *“Failures with SCAQMD’s emissions monitoring systems have also increased enforcement costs and delayed the auditing of RECLAIM facilities.”* We disagree that instantaneous compliance information from facilities is necessary for effective determination of RECLAIM compliance. However, we agree that information technology would help improve communications and make information more readily available to RECLAIM facilities and AQMD. AQMD has made a number of improvements in its automation system to make trading information transparent and to allow RECLAIM facilities to check their data transmission status. Additionally, AQMD believes EPA erroneously identifies that random errors occur in our permit software. We found no evidence that the permit software generates “random errors.” We believe, however, that human errors can occur from time to time, as in any permit systems in use around the country.

On page 42, EPA finds, *“It can take several years for SCAQMD to audit facilities. As a result, facilities may hold onto extra RTCs in case the audit shows they are out of compliance.”* EPA should keep in mind that RECLAIM was designed to be a self-monitoring and reporting program. RECLAIM facilities need to track their own emissions and report them promptly and accurately to the AQMD. Like the command-and-control inspection program, AQMD staff will review compliance at the regulated facilities on a regular interval as determined appropriate for the type and size of these sources. RECLAIM facilities are required to report their emissions annually and enforcement action could be taken based on that report. Additional information or violations could be discovered during RECLAIM audits as they could be under command-and-control inspections. EPA is correct in pointing out that AQMD has improved its inspection program significantly as described in AQMD’s cover letter.

On page 42, the report stated, *“the surplus of credits made enforcement involvement by EPA an apparent non-issue since companies were able to remain in compliance without*

*having to significantly reduce emissions. Under CAC, EPA might have issued enforcement actions, but there have been many fewer cases of violations of permit limits under RECLAIM.*" AQMD disagrees that the reason for fewer violation notices being issued to RECLAIM facilities was due to a surplus of credits. By the nature of program design, emission limits for each piece of equipment under the subsumed command-and-control rules were removed and replaced with a single facility cap. As a result, RECLAIM facilities have greater flexibility to manage emissions between various pieces of equipment at their facilities to stay in compliance with their emission caps. This, therefore, reduces the chance of individual equipment being out of compliance.

On page 43, EPA finds, "*Deterrence aspects of the program are not well integrated in the market structure of the program.*" The penalty scheme authorized by the Health and Safety Code for air pollution violations utilizes a multiplier of total violation days applied to an ascending scale of maximum daily penalties based on culpability. Rule 2004(d) contains provisions for bumping up the total violation days that are unique to RECLAIM. The application of this formula will yield a maximum potential penalty that must be adjusted by the mitigation factors set forth in Health and Safety Code Section 42403. With respect to allocation exceedances for the 1999 and 2000 compliance years, this formula was applied to allocation shortfalls committed by two large electric generating facilities, resulting in combined settlements in the amount of 31 million dollars. Uncontrolled NO<sub>x</sub> sources in the energy sector contributed significantly during the California energy situation to driving up the price of RTCs. The sudden, very steep increase in the price of RTCs made compliance difficult for a number of smaller NO<sub>x</sub> sources, including so-called "structural buyers" that were included in the program even though they were at the best available level of control and were necessarily dependent upon purchasing RTCs to maintain compliance. The application of this formula to these sources would have resulted in astronomical penalties. For this reason, penalties were recovered utilizing an economic benefit approach. These sources were penalized \$5.00 or \$7.50 for every pound of excess emissions, depending on whether or not the source early-reported the exceedance. These RTC prices represent the increase in RTC price that, but for the energy crisis, would have been foreseeable by these sources as a function of the occurrence of the "crossover point" during this period, as program allocations "cross over" to become less than program emissions.

In addition to the assessment of penalties, these sources were required to install emission controls or to otherwise demonstrate future compliance with annual allocations. Of course, pursuant to Rule 2010, all excess emissions were required to be deducted from allocations in subsequent compliance years.

On page 45, the report stated, "*the current level of monitoring is not sufficient because there is still a heavy reliance on the use of emissions factors to estimate pollution levels. They also believe that the two-cycle compliance year makes it difficult to determine where facilities are vis-à-vis their allocation. As a result, it is difficult for SCAQMD staff and the public, including environmental groups, to determine whether companies are in compliance.*" To reduce cost burden to industry, particularly small businesses, RECLAIM allows the use of parametric monitoring and emission factors for large and small sources instead of the CEMs required for major sources. These sources comprise

only nine and seven percent of total RECLAIM NO<sub>x</sub> emissions respectively. Therefore, the use of emission factors has only a minor impact on the overall inventory of emissions from RECLAIM facilities. Furthermore, we do not believe there are difficulties in determining allocation compliance with two cycle credits because each unit of RTCs has an expiration date that is tracked.

On pages 45 through 47, the report repeated concerns raised by individuals interviewed regarding the burden of monitoring, reporting and recordkeeping (MRR) under RECLAIM. Such claims appear to contradict the previous concerns of insufficient monitoring due to reliance on emission factors. RECLAIM MRR was designed to reduce the financial burdens on small businesses operating smaller equipment. Many businesses are allowed to use the existing gas company meters in conjunction with emission factors to report emissions. AQMD would like to obtain further information on why EPA feels this monitoring method represents a financial burden to small facilities.

Furthermore, AQMD believes that the design of RECLAIM MRR provides equivalent flexibility as in the Acid Rain system. If RECLAIM facilities maintain their CEMS within a 10 percent accuracy range, the data substitution procedure for RECLAIM is the same as the Acid Rain program. It is possible that the Federal program is less punitive for inaccurate data. If equipment was not in operation for two consecutive quarters or more, RECLAIM allows 14 days for testing, which is similar to the federal program.

Missing Data (pages 46-47)

See comments included in the cover letter from AQMD.

Recommendations (pages 47-50)

*Expedite Monitoring and Inspection*

AQMD has made significant improvement to the RECLAIM inspection timeline as discussed in the cover letter. EPA should acknowledge this effort.

*Improving Emission Reporting System*

Daily reporting of emission data is an integral element of our enforcement program for large sources which comprise nine percent of RECLAIM NO<sub>x</sub> emissions. The data stored at AQMD can be used as evidence that discourages an attempt by anyone to falsify reported emissions. This is especially critical as credits become less available. It is difficult for AQMD to assess EPA's recommendation that AQMD relax reporting requirements to be similar with the quarterly reporting requirement of the Acid Rain program because it has proven to be an adequate compliance tool for EPA. To further consider this recommendation, it would be useful for EPA to describe the federal compliance program. In particular, AQMD would like to know (1) how frequently the facilities are inspected and audited for their reported emissions; (2) whether EPA has issued any notices of violation to Acid Rain facilities; (3) how has the compliance rate compared to RECLAIM; and (4) what are the reasons for any higher or lower compliance rates.

## **Section 7: Evaluation and Oversight**

No comments at this time.

## **Section 8: Market Performance**

### **Structure of the Market**

*Initial allocation was too high.*

AQMD disagrees with this finding as explained in detail in our cover letter.

*“Inter-sector trading would have allowed an additional source of credits during the price surge of 2000 which could have mitigated the rise in prices. However, some stakeholders believe that introducing inter-sector trading may be an inappropriate modification to the program.”*

Footnote 40 on page 59 indicates that users of credits under Rule 1610 settled with EPA and advocacy groups for “large monetary penalties.” The reference is misleading because the “large” penalties were paid mostly for a violation unrelated to Rule 1610, i.e., alleged violations of Rule 1142.

Footnote 44 on page 69 is internally inconsistent. At the same time as it states that “no projects have been implemented to date” under mobile and area source credit rules, it states that “since mobile source credits are so abundant, SCAQMD could consider requiring a greater offset ratio for such credits.” There is no evidence that such credits are overly abundant.

Finally, it is inaccurate to state that no projects have been implemented to date. While there has been only one application by a private person to generate RTCs under these rules, the AQMD has committed millions of dollars in power plant mitigation fees to contracts under these programs to generate credits to offset excess power plant emissions for compliance year 2001.

### **External Factors and Their Impact on the Market**

*“While it may be burdensome for new companies to enter the RECLAIM trading market, there have been a large number of facility modifications at existing RECLAIM facilities that indicate that the NSR structures in RECLAIM are working effectively.”*

AQMD disagrees that it is burdensome for new companies to enter the RECLAIM trading market. Our experience indicates that new facilities preferred to opt-in to RECLAIM because NO<sub>x</sub> and SO<sub>x</sub> RTCs are more readily available than the ERC counterpart under command-and-control. In fact, almost all of the new power plants elected to opt-in to RECLAIM.

## EPA Region 9 Responses to SCAQMD's Comments on the Draft Evaluation Report

EPA has reviewed SCAQMD's comments and provides the following responses to concerns raised therein. The reader should note that we categorized the comments received in general areas so that we could effectively respond to what we viewed are related topics. We have also attached the SCAQMD's comments as an appendix to our report.

- **Methodology and Data Analysis:** Regarding the methodology used and data analysis, EPA first notes that it is bound by the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 etc.) when it performs information gathering activities like those in this evaluation. EPA is limited in the number of sources of the same type from which it can gather information when performing its information collection activities under the Paperwork Reduction Act of 1995 (without seeking Office of Management and Budget approval). In accordance with this requirement, EPA identified individuals among environmental groups, regulatory agencies, industry representatives, and brokers to interview. These interviewees were identified based on their history with the RECLAIM program and the individual's likely ability to be representative of the variety of views held on RECLAIM program performance. In addition, those who could be identified as advocates for certain interests were selected based on our view that they would best represent a cross section of views of those represented. We believe the stakeholders we interviewed met these requirements within the constraints of the Paperwork Reduction Act of 1995. However, we also believe that, as SCAQMD has so clearly pointed out, additional work of this type would further refine the knowledge of RECLAIM's historical program performance. Those who are not limited as EPA was during our evaluation are encouraged to pursue this more thorough methodology.
- **Report Format:** EPA understands SCAQMD's views on the format of the report. Given the methodologies applied in this evaluation, EPA continues to believe that the format used is the best means to communicate the results of our efforts. In response to verbal comments SCAQMD made during discussions on July 31, 2002 and September 5, 2002, EPA has made changes to the report to address the issue of EPA conclusions. EPA conclusions appear in this report in italicized text.
- **Performance Question 1:** Among other supporting data used in answering performance question 1 are (1) Table 7-1 in the 1998 Three Year Audit and Program report, showing the 1993 development Report projections of \$182.2 million dollars in control equipment by the end of 1997 and (2) actual expenditures for the same period of \$39.8, shown on the next page, page 7-3. The same section contains the following statement: "It was also estimated that an average annual expenditure of \$45.6 million from 1994 through 1997 would occur for this purpose. The observed data for the past four years show that an average expenditure of at least \$4.6 million per year (capital cost only) was actually realized during the same period" (page 7-2). In discussions with the District and in our evaluation we described detailed quantitative analyses that could further address this issue, but the District indicated it had no interest in such an analysis. We feel the implications of the data in the May, 1998 Report were clear and, given sufficient interest, could have been validated by the analytical techniques suggested, either at the time (1998) or during our review of the program over the past year.

- **Performance Question 2:** Table 9-8 is from the Development Report’s environmental assessment in a discussion intended, per CEQA, to compare the actual environmental effects of various alternatives. “Table 9-8 compares the effects of each project alternative on mass NO<sub>x</sub> emissions.” (Page 9-72, emphasis added). Table 9-8 shows a 11% average annual reduction for RECLAIM, just as it shows as 12% reduction for Alternative A. Alternative A is the “No Project Alternative”, which is “a continuation of the existing command-and-control rules and regulations...”. (Page 9-3.) If, as the District maintains, the program has performed as well as expected and as it would have under command-and-control, yet has produced in practice a 3.2% rate of reduction, then a process (like SCAQMD’s current RECLAIM program evaluation process) should be used to provide the public with information with which to compare the alternative courses of action.

The Development Report’s implied 11% rate of decline has remained in widespread distribution for some time, for instance in the June, 2000 report prepared by the National Academy of Public Administration, “Crosscutting Analysis of Trading Programs” (Case Study on RECLAIM, Appendix F, page 110). Many stakeholders believe that the program was expected to attain an actual reduction in emissions above what actually occurred. We have drawn no conclusion as to the performance of the program with regard to state law.

- **Performance Question 5:** Since we were conducting an evaluation, we could not simply accept the “premise that they (trading programs) can achieve equivalent emission reductions”. As indicated in Question 1, we feel that in this case the premise is in some doubt. Therefore we have used the traditional metric of cost-effectiveness.
- **Missing Data Provisions:** EPA agrees with SCAQMD’s comment on the issue of missing data provisions, the report has been changed to reflect that “some stakeholders believe that SCAQMD could consider modifying the missing data provisions. For penalties incurred solely because CEMs data is not available, SCAQMD could require facilities to pay into a mitigation fund or could enable SCAQMD to resell RTCs attributable to the use of missing data provisions. This would prevent penalties levied against one facility from affecting the entire regulated community.” This change more accurately reflects the stakeholder views that we heard on this issue.
- **Compliance Plans:** EPA understands the concern that SCAQMD is raising with respect to compliance plans and agrees, in fact our position on this has been clear since our February 28, 1992 letter to the District.
- **Programmatic Changes:** EPA understands SCAQMD’s concerns regarding our suggestions on programmatic changes being incremental and market-based when they do occur. Our view is based on the idea that abrupt, non-market-based changes can cause confusion among participants as they tend to conflict with the existing market structure. This is not to say that SCAQMD’s recent program amendments were not the right approach, just that a more gradual approach informed by appropriate analysis of program performance parameters may be perceived as less disruptive - EPA agrees that this was not practical in the situation that RECLAIM found itself in.
- **Information Needs of the Market:** EPA has added references to SCAQMD’s current information needs databases to its report to reflect the current state of this issue.

- **Performance Parameters:** EPA suggests looking at performance parameters not just for the market as a whole, but also for individual source categories. The types of parameters may include both emission reductions and credit prices as well as other data that may be indicative of supply and demand among participants. These data do not necessarily have to be tracked by the SCAQMD, third parties may also have an interest in providing such analysis.
- **Credit Serialization:** EPA refers SCAQMD to its Acid Rain program website at <http://www.epa.gov/air/acidrain/index.html> for additional information on the serializing of credits.
- **Improvements in Permitting, Compliance Systems, and expeditious audits and inspections:** EPA has altered the report to reflect that there have been improvements in these areas over time.
- **SCAQMD Responses to Specific Stakeholder Views:** EPA understands SCAQMD's request and has offered the agency the opportunity to respond to specific stakeholder comments since July 9, 2002. To the extent that SCAQMD has provided responses to specific stakeholder comments in their September 20, 2002 letter, we have included their views and attached their comments as an appendix to our report.
- **Editorial Changes:** EPA has addressed the editorial changes that SCAQMD suggested.