

Over a Dozen Years of RECLAIM Implementation:

Key Lessons Learned in California's First
Air Pollution Cap-and-Trade Program

South Coast Air Quality Management District
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ACRONYM LIST

ACKNOWLEDGEMENTS

PREFACE

The intent of this paper is to provide insights into what has worked well and what, in hindsight, could have been done differently to improve program effectiveness during development and implementation of RECLAIM. District staff spent several years in the development of RECLAIM, and has 12 years of implementation experience. This paper provides an overview of the District staff's experience with the RECLAIM program. Many lessons have been learned through RECLAIM and other local programs which will benefit future regulatory efforts in the South Coast Basin and elsewhere.

This paper also shares information that has been gained in taking economic theory for a cap-and-trade program into design and implementation. Over a decade of real world experience in implementing one of the largest air pollution cap-and-trade programs in the United States allows District staff to offer many practical suggestions for future cap-and-trade programs.

The RECLAIM program is California's first air pollution cap-and-trade program, and encompasses most of the Basin's largest nitrogen oxides (NO_x) and oxides of sulfur (SO_x) stationary sources. It was developed to make significant progress in cleaning up the worst air in the nation. It is a multi-industry program with each facility having annual allocations and declining balances. Developed in the early 1990s, RECLAIM was seen as an innovation compared to previous command-and-control programs. Benefits included lower costs and greater flexibility for industry participants, and secured emission reductions with better emissions monitoring for environmental and community interests.

Some community, environmental, and environmental justice groups continue to believe that cap-and-trade programs slow overall pollution reduction efforts and may increase local pollution hot spots, or at a minimum, delay progress in some communities. However, the business community continues to strongly support cap-and-trade programs as a more economical and efficient way to achieve pollution reduction goals and a possible means to foster technology advancement. District staff, based on its overall experience with implementation of the RECLAIM program, continues to support the use of cap-and-trade programs, and believes that compliance flexibility is needed in a region with extreme air pollution problems. Such programs should be used in combination with traditional command-and-control approaches.

This document has an Executive Summary, two main parts (design and implementation), and a conclusion/recommendation section. Key lessons learned are highlighted in the Executive Summary and at the end of each chapter. This paper was written by District staff in the spirit of being frank about the program successes and problems.

EXECUTIVE SUMMARY

Introduction

This paper describes RECLAIM design and implementation and lessons learned that could provide valuable insight to those responsible for developing and implementing future cap-and-trade programs. After an overview of RECLAIM's background, the key lessons learned are summarized in this Executive Summary, with more detail provided in Parts One and Two.

Background

RECLAIM, the REgional CLean Air Incentives Market, was a landmark multi-industry cap-and-trade program adopted by the South Coast Air Quality Management District in 1993. Over 300 facilities are in the NO_x (Oxides of Nitrogen) market and 33 facilities are in the SO_x (Sulfur Oxides) market. RECLAIM was designed to match expected reductions required by the year 2003 from existing rules and commitments in the 1991 Air Quality Management Plan (AQMP). It replaced a command-and-control approach with facility caps and declining balances of allowable maximum emissions. RECLAIM was developed in the midst of an economic down-turn during the early 1990s. Facilities were allowed to base their allocations on production levels that existed prior to the recession.

Emission caps that decline over time ensure that reduction goals are achieved. In contrast, command-and-control rules establish a fixed emission rate, but do not limit mass emissions, so that economic growth can interfere with expected emissions reductions. Credits have a one-year life and no banking is allowed. Industry participants have more stringent

monitoring and reporting requirements than under command-and-control, but have flexibility to meet their annual caps in the most economical manner. Because facilities can trade emissions below their cap, or purchase credits if they need to, credits have monetary value, and emissions are now part of the economic 'bottom line'.

RECLAIM has many of the design features that economists recommend for a robust market:

- A large number of diverse industries;
- Clear reduction targets;
- Clearly defined trading unit
- "Offsets" – mobile and area source credit programs.

In addition, RECLAIM retained a new source review (NSR) element for a new equipment and modification of equipment with emission increases. This important element recognizes that it is a more cost-effective to control at the design phase than it is to retrofit existing equipment. Facilities modernizing equipment would have lower emissions and therefore require less credits.

There are several features of RECLAIM that have worked well, and the program has resulted in an additional 68 percent (27,643 tons) and 59 percent (6,073 tons) decrease in allowable emissions for NO_x and SO_x, respectively; and a 62 percent (15,758 tons) and 50 percent (3,611 tons) reduction in actual emissions for NO_x and SO_x, respectively since 1993. The program was designed, in aggregate, to match emission reductions projected for the facilities in the program for key milestone years (2000 and 2003) from the 1991 AQMP. It locked in an actual emissions cap, which provided more certainty for the environment than a command-and-control approach, which is based on emission rates per equipment. Under command-and-control, total

emissions can increase, even though allowable emission rates decrease, if there is growth at a facility or an industry. RECLAIM also secured reductions expected from rules that had not yet been written and may have required technology to be developed or to be transferred from other applications.

Except for the California power crisis in 2000 and 2001, compliance with facility caps has been very high (96 to 98 percent), and actual emissions, in aggregate, have typically been approximately 20 percent below allowable, or permitted, levels each year.

In hindsight, there are issues in the design and implementation that could have been done differently to avoid problems that have occurred. Probably the most difficult design challenge for any trading program is setting fair and appropriate allocations. RECLAIM was developed in the midst of an economic recession, so there were strong concerns that transitioning to a mass cap in lieu of emission rates should not restrict economic growth.

To accommodate business fluctuations, to recognize unique differences among facilities, to reward early reductions, and to provide flexibility, starting allocations for the year 1994 were based on reported annual emissions from 1987 to 1992, with the year chosen by each individual facility. This led to a starting point for the program that was higher than actual emissions, because each facility picked maximum production levels for the basis of their allocation. Other factors also increased the total starting point. **For example, many facilities amended prior emission reports (almost exclusively to increase emissions)** and traditional Emission Reduction Credits (ERCs) held by facilities were converted to RECLAIM Trading Credits (RTCs).

The program had set points (2000 and 2003) that were anchored to match the 1991 AQMP emission projections. However, high initial allocations led to a ready supply of credits until the year 2000, which resulted in a sense of complacency by many facilities and reduced the pressure to install controls. Models of the program assumed rational economic behavior, where facility owners and operators would add controls when it was to their economic advantage, but this did not always occur.

Until the power crisis, an ample supply of credits at year end and some short-term thinking by many corporate decision makers contributed to program emission exceedances seen in 2000 and 2001. This was the same time that the program was reaching the 'crossover' point, where actual emissions would be expected to exceed allocations unless emission reduction controls were installed at facilities.

When California experienced an energy crisis in 2000 and 2001, power generators began to put old, high emitting equipment back into service. Power plants quickly used their allocations and bought up available credits in the market. This resulted in rapid price increases, and a scarcity of credits for facilities that routinely purchased credits during the reconciliation period. There was not enough time for facilities to plan, budget, and install controls in order to meet their annual caps. The convergence of the power crisis and the crossover point contributed to the credit scarcity. In response to the power crisis, the District staff amended the RECLAIM program. A number of steps were taken to stabilize NOx credit prices, require controls on power plants and mitigation of excess emissions, as described in Part Two, Chapter 3.

RECLAIM implementation experience has reinforced the conclusion that the resources needed to support a cap-and-trade program (issuance of facility permits, certification of continuous emission monitors (CEMs), as well as development of new inspection and prosecution methods and guidelines, trading systems, and information management programs) are significant and must not be underestimated to assure program success.

Program Performance

The following information highlights key program performance elements over the last twelve years.

- **Emission Targets Achieved** – SO_x annual targets have been met every year. NO_x annual emissions have met the target every year except 2000 and 2001, when California experienced an energy shortage. Rule amendments required isolation of the power plants from the rest of the market, control equipment installation, and mitigation of excess emissions at power plants.
- **Additional Reductions Required**– In 2005, the program was amended to require an additional 22.5% reduction in NO_x allocations by 2011, based on advances in emission control technology.
- **Robust Credit Market** – There is a very active market for trading RECLAIM credits, with more than 863 million dollars in trading value and a volume in excess of 20,000 tons to date. The market has evolved over the years, with current trades including facilities, brokers, investors, foreign traders, and mutual funds.

- **Environmental Justice** – The program was designed to prevent any significant localized impacts by requiring air quality modeling for increases beyond starting allocations.

The body of this paper highlights key lessons learned for each main topic area that the District staff believes are important to consider in development of future cap-and-trade programs. Some of the main lessons learned and recommendations are summarized below.

Program Design

- Include extensive participation from all parties at all stages.
- Clearly define the objectives, goals, and required outcomes.
- Establish the criteria for inclusion early in the process.
- Establishing the baseline and emission reduction targets equitably is one of the most contentious and difficult parts of a trading program.
- Recognizing early reductions is important.
- Carefully consider which existing requirements, if applicable, are rolled into the overall program goals, rather than be left in place as source-specific requirements.
- Allow time to develop, test, and implement allocation methods.
- Tensions between capping emissions, fair allocations, and program goals need to be carefully balanced.
- Develop programs to implement requirements to ensure that emissions are properly characterized and the trades are valid.
- Consider resource implications and ensure that they are adequate.

- Develop mechanisms to recover agency costs.
- Streamline administrative processes and post trade information in as timely a manner as possible.
- Develop criteria and mechanisms for auditing program performance.

Legal Issues

- Cap-and-trade programs present unique enforcement issues.
- Enforcement of program requirements is critical to a successful program.
- Allocations or credits are not a property right.
- Trading by out-of-state or out-of-country participants presents special enforcement challenges.

Prosecution Issues

- Different types of violations and penalty provisions are needed for a market program.
- Requiring data and reports to be certified for accuracy facilitates admissibility at trial and provides enforcement flexibility for false statements.
- Evidentiary presumptions and burdens favoring the government are essential for successful prosecution of violations.

Information Management

- The complexity of a cap-and-trade program necessitates computer automation.
- The level of automation must consider cost, complexity, and time required for implementation.
- Automation design should be concurrent with the design of the

cap-and-trade program, where possible, to avoid costly retrofitting.

- Reliable and easily accessible electronic emission monitoring and reporting systems are essential for generating and collecting accurate information on actual emissions, which, in turn, is critical for determining compliance and ensuring success of a cap-and-trade program.
- Use technology to help provide information access to the regulated community, emission credit traders, and the public.

Part Two – Implementation

Early Implementation

- Fair allocations must be based on accurate emission inventory, a detailed methodology, and clear criteria for resolving disputes.
- All requirements must be conveyed in a comprehensive document (e.g. permit).
- Open and continued dialogue with all stakeholders helps in resolving issues.
- Mechanisms to refine program elements must be in place.
- Expert groups should be in place to help resolve unique technical issues.
- Adequate time and resources must be allocated for successful program implementation.

On-Going Implementation

- A uniform emission monitoring data set will allow for efficient checking.
- Train personnel and update procedures.

- CEMS installations need to be well planned, quality assurance steps need to be adhered to, and maintenance requires skilled personnel.
- Consistent and fair enforcement of provisions is essential and emission audit results need to be timely conveyed.

Mid-Course Corrections

- Extraordinary high demand on credits from a single market sector concurrently with the advent of the crossover point caused prices to skyrocket within a matter of months in RECLAIM.
- Emission controls cannot be installed in time to respond to a sudden surge in demand.
- Build in requirements that are automatically triggered to avoid such problems.

Market Issues

- Market participants do not always act in a logical manner.
- Timely trade information is vital to the market.
- Trade information can affect price.
- Safeguards against fraudulent trades must be instituted.
- The role of the investor must be balanced with credit availability.

Lessons Learned for Consideration in Future Trading Programs

This section distills the lessons learned in specific topic areas to the most critical overall elements to consider for future trading programs.

- **Resources and Time** - There must be adequate resources and time to design, implement, and monitor the program.
- **Foundation** - The technical, economic, and political foundations must be solid.
- **Engaged Stakeholders** - Early and frequent stakeholder involvement is critical – keep in mind the key interests and ensure that each group perceives some positive outcomes.
- **Equity and Fairness in Allocations** - Determining allocations is one of the most sensitive and difficult parts of program design.
- **Robust Emission Information** – Accurate emission quantification is necessary to ensure that the environmental benefits are realized and that reductions being traded are real.
- **Dispute Resolution** - An administrative mechanism is necessary to resolve differences.
- **Market Issues** - Market issues are critical design considerations – types and term of credits, whether banking is acceptable, types of markets, and who manages the trades.
- **Integration** - Integration of monitoring reporting and recordkeeping requirements, permitting, inspections, and tracking emissions and trading are critical to successful program implementation.
- **New Enforcement Tools** - Develop specific penalties and backstops for non-compliance.
- **Program Assessments** - Build in periodic program assessments and make program changes as easy as possible.
- **Planning** - Make sure participants plan ahead to avoid problems like those seen in RECLAIM due to the energy crisis. Allocations and ‘crossover’ points should be considered.
- **Environmental Justice** – Consider whether restrictions are necessary on

maximum credit purchases in lieu of emission reductions on site. Provide information to stakeholders on whether there are local impacts. If there could be local impacts, consider incentives for local reductions rather than credit purchases.

- **Balance** - Make sure other programs still have adequate resources and attention.

The rest of this paper provides more detailed information relative to the RECLAIM experience and lessons learned that can help in development of future trading programs.

On balance, District staff believes that the RECLAIM program has proven to be a valuable tool in reducing air pollution in the South Coast region.

PART ONE – RECLAIM DESIGN

Chapter One – Program Conception

Author: Jill Whynot

Feasibility Study

Introduction

In 1990, the District began a one year feasibility study to develop a concept for a trading program.

Throughout the Feasibility Study, a series of five working papers were developed. The first four papers set forth the framework for an emissions trading program, while the fifth evaluated the potential socio-economic and air quality impacts of the program. The five working papers were:

- Working Paper #1: Emission Reductions – “Establishing the Foundations”
- Working Paper #2: Permitting – “The Implementing Mechanism”
- Working Paper #3: Enforcement – “The Critical Element”
- Working Paper #4: Emissions Trading – “The Centerpiece”
- Working Paper #5: Air Quality Assessment and Socio-economic Impacts – “Implementation: Implications for the Basin”

Recommendations from these five working papers were refined and summarized to form the proposal for the RECLAIM program. In March 1992, the District initiated rule development.

Design Criteria

Throughout the Feasibility Study and rule development, program elements were consistently evaluated against five criteria:

1. **Enforcement** – The new program must provide a confidence level equal to or greater than the existing air pollution program.
2. **Emission Reductions (Air Quality Improvements)** – The new program must have emission reductions equal to or greater than the commitments in the rules and future control measures from the 1991 AQMP.
3. **Implementation Costs** – The new program must have lower costs than what was projected for the rules and control measures that it replaced.
4. **Job Impacts** – The new program must have less job impacts than projected in the 1991 AQMP.
5. **Adverse Public Health Impacts** – should not result from implementation of the program.

These principles were very helpful as the program and alternatives were discussed, developed, and ultimately adopted and implemented. Development included an extensive public process, which was important in shaping the program and gaining stakeholder acceptance. RECLAIM was also developed to meet all federal and state requirements, such as state and federal New Source Review and federal Economic Incentive Program Guidelines. The fundamental elements for reductions eligible for trades included that the reductions were real, quantifiable, surplus, and enforceable. This is accomplished through permit conditions and robust monitoring, reporting, inspection, and penalty provisions. The program includes annual and three-year evaluations that cover several key program features.

Rule Development Process

The rule development process for RECLAIM took about two and a half years. Steering and Advisory Committees met regularly with staff. In addition, 3-agency meetings (the District, CARB and EPA) were a regular feature as the rule development ensued. Seven working groups were also formed for NO_x and SO_x RECLAIM (some also had technical subcommittees):

- Administrative Structure (initially referred to as the Baseline Working Group);
- NO_x and SO_x Monitoring Protocols;
- Mobile Source Advisory;
- Trading Market;
- Enforcement and Penalties;
- Energy Impacts; and
- Socioeconomic and Environmental Impacts.

In total, there were over 50 meetings of steering and advisory committees and working groups. Two working groups related to volatile organic compound (VOC) trading were also formed, but these are not discussed here.

An active, open public process helps develop a better program

Rules

The initial program consisted of 12 rules, including:

- 2000 General (adopted October 1993, amended 6 times);
- 2001 Applicability (adopted October 1993, amended 5 times);
- 2002 Allocations for Oxides of Nitrogen (NO_x) and Oxides of Sulfur (adopted October 1993, amended 3 times);
- 2004 Requirements (adopted October 1993, amended 4 times);
- 2005 New Source Review for RECLAIM (adopted October 1993, amended 7 times);
- 2006 Permits (adopted October 1993, amended 2 times);
- 2007 Trading Requirements (adopted October 1993, amended 7 times);
- 2008 Mobile Source Credits (adopted October 1993);
- 2010 Administrative Remedies and Sanctions (adopted October 1993, amended 3 times);

- 2011 Requirements for Monitoring, Reporting, and Recordkeeping Oxides of Sulfur (SO_x) Emissions (adopted October 1993, amended 12 times); and
- 2012 Requirements for Monitoring, Reporting, and Recordkeeping Oxides of Nitrogen (NO_x) Emissions (adopted October 1993, amended 12 times).

Rules 2011 and 2012 also included extensive, detailed protocols for monitoring, recordkeeping and reporting. Most of these rules have been amended many times to address situations not envisioned when the rules were adopted, to improve enforceability, and to clarify intent. Parenthesis after each rule listed above indicates the number of rule amendments. Only Rule 2008 – Mobile Source Credits, remains in its original form.

Other rules were added later, to address the power plant crisis. These include:

- Rule 2009 Compliance Plan for Power Producing Facilities (adopted May 2001, amended once);
- Rule 2009.1 Compliance Plans for Forecast Reports for non-Power Producing Facilities (adopted May 2001); and
- Rule 2020 RECLAIM Reserve (adopted May 2001).

Several mobile source credit generation rules and one area source credit generation rule were also adopted to enable flexibility to use non-traditional emission reductions in RECLAIM. The intent was to provide a mechanism for federally approved reductions if such projects were more cost-effective than on-site reductions or RTC purchases. These rules included:

- 1612.1 Credits for Clean On-Road Vehicles (adopted March 2001);
- 1631 Pilot Credit Generation Program for Marine Vessels (adopted October 2002, amended once);
- 1632 Pilot Credit Generation Program for Hotelling Operations (adopted May 2001);
- 1633 Pilot Credit Generation Program for Truck/Trailer Refrigeration Units (adopted May 2001);
- 1634 Pilot Credit Generation Pilot Program for Truck Stop Electrification (adopted November 2001); and
- 2507 Pilot Credit Generation Program for Agricultural Pumps (adopted May 2001).

Lessons Learned

- Involve the public early and often to earn their trust. Freely share information on trades, emission reductions, and program implementation.
- Agency accountability is key to a successful program. Trading data should be readily accessible, such as via a website, and annual reports are needed to monitor the program process.
- Trading programs are very resource intensive to design, develop into regulations, translate into permits, and implement.
- The foundation of any trading program is robust monitoring, reporting, and recordkeeping. It is key to ensure that reductions are real and credits are valid.

- Compliance with annual targets is not enough. Compliance plans and quarterly reports from facilities help ensure that annual targets will be met.
- Effective inspection and enforcement are needed to ensure a high compliance level. Permit conditions are an effective mechanism for requiring the emission reductions and monitoring requirements.
- Closely monitor credit prices and develop mechanisms to react to unforeseen, sudden changes in the price and/or availability of credits.

Chapter Two – Key Design Features

Author: Jill Whynot

Basic Description

RECLAIM includes permitted stationary sources that emitted 4 tons or more of NO_x or SO_x in 1990 or any later year. Emissions are “bubbled” and each facility is given specific annual emission caps. The allocations were based on recent past peak actual emissions, adjusted for the beginning and ending years based on compliance with existing rules and future control measures in the 1991 AQMP that would have affected the equipment or process at the facility. This method was labor-intensive, but resulted in a more equitable distribution of emissions that had general support from industry. The market, as a whole, produced equivalent emission reductions expected from the AQMP for such sources, but each facility has the flexibility to design its best approach to meeting their declining emission cap, rather than reacting to specific command-and-control rules. The “incentive” portion of the program involves trading RTCs. RTCs are valid for one year, and expire after a 60 day year-end reconciliation period. Any facility that emits or will emit less than its cap in a given year may sell the extra credits. A facility that needs to increase production, add equipment, or needs more time to add control equipment may buy credits on the market. Certain mobile and area source credits were available for use for several years in RECLAIM.

Two-Cycle System

When RECLAIM was being developed, a team of consultants from the Pacific Stock Exchange and California Institute of Technology recommended a two-cycle approach, which was included in the program design. Initially, half of the facilities were designated as Cycle 1, and had allocations (RTCs) issued on a calendar year basis (credits valid January 1 through December 31 of each year). The other facilities had RTCs issued on a fiscal year basis, with issue dates of July 1 and expiration dates of June 30 each year. The intent was to provide better market signals by having reconciliation with annual emissions twice a year.

A once per year reconciliation for all facilities could have been more prone to market excesses or shortages and greater price fluctuations. RECLAIM did not include banking because of the need to match the AQMP key milestone years. Providing limited banking or borrowing in future trading programs may help establish a program with initial allocations closer to actual emissions.

Inclusion Criteria

A four ton per year emission threshold was the basis for inclusion in the program, although many industries were specifically excluded for various reasons (such as essential public services, restaurants and dry cleaners). This brought in large and medium facilities with a diverse industry base to foster a more robust market. RECLAIM includes opt-in provisions, but once a facility is in the program, it cannot revert back to command-and-control.

Facility Permits

A facility permit was generated for each facility to consolidate all requirements, including the amount of RTCs held each year. RECLAIM includes improved monitoring and reporting requirements which are included in the permits. The facility permit was also designed with Title V in mind.

Monitoring, Reporting and Recordkeeping

RECLAIM provided much more flexibility to industry participants than traditional command-and-control rules. To provide adequate enforceability with mass emissions at the facility level rather than equipment specific instantaneous concentration limits, significant enhancements were made to emissions monitoring, recordkeeping, and reporting requirements.

For NO_x, three tiers were set up for emission quantification and reporting requirements. The majority of emissions are from what is termed major sources, which are required to have CEMS. Major sources generally include combustion equipment with maximum rated capacity ≥ 40 mmBtU per hour, internal combustion engines $\geq 1,000$ bhp, gas turbines ≥ 2.9 megawatts and petroleum fluid catalytic cracking and tail gas units, very large kilns, and other high-emitting equipment.

Other tiers of monitoring include large sources (combustion equipment with lower annual heat input ≥ 10 and ≤ 40 mmBtU per hour, for example), which requires totalizing fuel meters and electronic monthly reporting. The smallest equipment is in the process unit reporting tier, which also requires a totalizing fuel meter or timer and quarterly mass reporting.

For SO_x, there are two tiers – major sources and process units. Monitoring and reporting requirements are similar to those for NO_x sources in the same tiers.

The rules for NO_x and SO_x monitoring, reporting, and recordkeeping include extensive, detailed protocols that cover CEMS, periodic reporting for large sources, source testing requirements, electronic reporting, and reference methods. Attachments to the protocols include detailed specifications for missing data, bias tests, equipment tune-ups, quality assurance and quality control, and CEMS performance.

Table I-1-1 summarizes monitoring requirements and reporting frequency for RECLAIM sources.

**Table I-2-1
Monitoring Requirements for RECLAIM Sources**

Source Category	Major Sources (NOx and SOx)	Large Sources (NOx only)	Process Units and Rule 219* Equipment (NOx and SOx)
Monitoring Method	Continuous Emission Monitoring System (CEMS)	Fuel Meter or Continuous Process Monitoring System (CPMS)	Fuel Meter and/or Timer
Reporting Frequency	Daily	Monthly	Quarterly

* Rule 219 equipment refers to equipment that does not require an AQMD permit. This is generally small, low-emitting equipment.

Missing Data Provisions

A set of substitution procedures, known as **Missing Data Procedures**, is incorporated into the RECLAIM rules to provide for determining emissions when actual emission data are not obtained by a CEMS or other greater monitors. **These procedures provided for very stringent, conservative, emission substitution procedures** at the beginning of the program when little or no valid CEMS data were available. This results in an incentive to correct problems quickly. During the initial years of the program when CEMS were being installed and certified, many facilities had substantial periods of missing data. This required retirement of many RTCs to cover the worst-case emissions that could have occurred. Due to the large initial allocations at the beginning of the program, possible over-estimates of emissions were readily covered by available RTCs. As monitoring instrumentation was installed and properly established, missing data in later program years is based on previous monitored data and now more accurately represents actual emissions likely to be occurring during monitor outages. Missing Data Procedures also use average CEMS data in cases where the CEMS have consistent performance and high data reliability. These data substitution procedures also provide added incentives to maintain the CEMS in good operating conditions.

Table I-1-2 shows the percent of reported emissions from missing data provisions in RECLAIM over time. **Note the very large percentages in the first year of program implementation, compared to relatively low use of missing data in more recent years.**

**Table I-2-2
Percentage of Reported Emissions Using Missing Data Provisions**

	Percent of Reported Emissions Using Substitute Data										
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
NOx	23%	20%	18%	7.3%	9.6%	6.5%	8.1%	3.4%	4.5%	8.3%	3.0%
SOx	40%	16%	16%	13%	20%	10.7%	11%	4.8%	4.7%	10.4%	3.6%

Inspections and Violations

RECLAIM was a significant change from traditional concentration-based command-and-control rules. It therefore required many changes to how field personnel conducted inspections and identified violations. In addition to new audit procedures, different types of violations and penalties now apply.

Program Assessments

An additional design feature that was added to RECLAIM was annual and periodic program assessments. The requirements for these assessments are in Rule 2015 – Backstop Provisions. This rule also lays out specific actions that are required in the event a program assessment shows that average credit prices are above a certain threshold or other events occur. Annual audits include:

- Emission reductions;
- Per capita exposure to air pollution;
- Facilities permanently ceasing operation;
- Job impacts;
- Average annual price of RTCs;
- Availability of RTCs;
- Toxic risk reductions;
- New Source Review permitting activity;
- Compliance issues, including facilities not meeting their annual cap;
- Emission trends and seasonal fluctuations;
- Emission control impacts on RECLAIM and non-RECLAIM sources; and
- Emissions associated with equipment breakdowns.

In addition, annual audits also review the effectiveness of enforcement and protocols. The District also conducted a comprehensive audit of the first three years of the program to evaluate the overall performance of RECLAIM against the following criteria:

- RECLAIM has produced the emission reductions required;
- RECLAIM has resulted in significant reduction to public health exposure to criteria air pollution and no significant increase in exposure to toxics;
- RECLAIM has not accelerated business shutdowns, job loss or shifts in the occupational structure of the region;
- The price of credits and trading activity demonstrates adequate supply and demand;
- Emission monitoring, recordkeeping, and penalty provisions have produced a strong compliance program and adequate deterrence of violations;
- RECLAIM is consistent with the provisions of the Federal and State Clean Air Acts (CAA);
- The emission factors used for allocations are consistent with any recent technology advancements;

- There have not been disproportionate impacts in terms of emission reductions for RECLAIM sources compared to sources that are not in RECLAIM;
- Whether RECLAIM should include mobile, area, and more stationary sources; and
- Control technology has advanced as much as projected under the AQMP.

Each audit is discussed at an AQMD Governing Board meeting as a public hearing item.

Periodic Assessments of BARCT

State law requires the District to periodically review the program to evaluate if additional allocation reductions are warranted to reflect advances in BARCT. The first such evaluation resulted in rule amendments in January 2005 to reduce the overall NO_x credits by over 20 percent (7.8 tons per day) by 2011.

An extensive evaluation was undertaken for each of the major categories of equipment in the program. Staff evaluated what controls or changes had been implemented by RECLAIM and non-RECLAIM facility operators, what rules are in place by any other local air district or state, and what technologies had been employed. Cost-effectiveness was also a consideration, as some districts had rules with lower emission limits than the rules subsumed by RECLAIM. However, the equipment covered was less controlled than the starting universe in RECLAIM, so the incremental reductions would not be cost-effective in RECLAIM. Another criteria that staff evaluated was whether a rule would be pursued in the absence of our cap-and-trade program. The evaluation resulted in rule amendments with nineteen categories identified with new BARCT levels. Emission reductions will be realized by applying an equal reduction to all allocations or RTC holdings from 2007 to 2011.

A review for SO_x BARCT is currently underway for potential rule amendments in 2008. Future credit programs should consider similar periodic technology reviews and additional reductions.

Chapter Three - Legal Issues

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Design Features

Introduction

Summary

Legal issues relative to RECLAIM that may be applicable to designing other future cap-and-trade programs include: what provisions are necessary to ensure that the program is enforceable; and how to ensure that program allowances or credits do not create a property right that would prevent government actions to reduce the number of credits available or to suspend or terminate any credits. In addition, in designing RECLAIM, the District had to take into consideration the requirements of the Federal CAA, as well as specific requirements of state law that were adopted to guide the design of market incentive programs. Finally, the District developed mobile source and area source credit programs, which presented their own legal issues.

Federal and State Air Quality Requirements

The Federal CAA requires the Environmental Protection Agency (EPA) to identify air pollutants, the emissions of which cause or contribute to pollution which may reasonably be anticipated to endanger public health or welfare. (CAA § 108; 42 U.S.C. § 7408). EPA must then establish national ambient air quality standards for such pollutants. Primary standards must be set at levels requisite to protect public health, allowing an adequate margin of safety. Secondary standards shall be set at levels requisite to protect the public welfare from any known or anticipated adverse effects associated with the presence of the pollutant in the ambient air (CAA § 109; 42 U.S.C. § 7409). Once EPA sets the ambient air quality standards, states are required to adopt and enforce plans to attain and maintain the standards. Such plans must include enforceable emissions limitations and other control measures as necessary to meet the requirements of the CAA (CAA § 110; 42 U.S.C. §7410). In addition, the CAA contains numerous specific requirements for controls to be included in the state implementation plan, some of which are specific to individual pollutants. This paper discusses Clean Air Act requirements that are of special concern under a cap-and-trade program, either because they need to be applied differently from how they are applied under a command-and-control regime, or because they remain applicable directly to sources under a cap-and-trade program, and cannot be modified, such as lowest achievable emission rate (LAER) or new source performance standards (NSPS).

State law also imposes specific requirements applicable to market-based incentive programs. In 1992, the Legislature enacted AB 1054 (Sher), now codified at Health & Safety Code § 39616. This statute applies to programs which are an element of a “district’s plan for attainment of the state or federal ambient air quality standards” (Section 39616(b)(1)). The statute requires a

market-based program to meet a number of specific requirements in comparison to the command-and-control rules in effect or which otherwise would have been adopted. It requires the District Governing Board to make findings, supported by substantiating information, that the program will result in an equivalent or greater reduction in emissions at equivalent or less cost, that the program will result in comparable levels of enforcement, and several other requirements. This statute was very useful in defining specific benchmarks that the program must meet in order to assure no adverse effects resulted from switching from a command-and-control program to a cap-and-trade program. This statute also called for a reassessment of the program within seven years to assure that the program still meets the statutory goals. Finally, the statute calls for a program reassessment if the cost of emission trading units exceeds a level predetermined by the District Governing Board.

Enforcement Issues

Enforcement issues were key to all stakeholders in the RECLAIM development process. The District and EPA were especially concerned to assure that the program provided adequate deterrence to prevent widespread violations, that the elements of a violation were clear, and that the program was designed so that violations could be prosecuted as effectively as under traditional command-and-control rules. Environmental groups, besides being interested in enforcement generally, supported program elements that would make compliance data available to members of the public. Industry representatives wanted to assure that compliance elements of the program did not present an undue economic burden.

Special enforcement challenges are presented by a cap-and-trade program under which compliance is no longer measured instantaneously by a concentration throughput, or emission limit. Instead, under RECLAIM, compliance was to be measured over a significant period of time—ultimately determined to be quarterly—and individual sources no longer had to comply with specific rule or permit condition limits. Compliance would be measured and reported by looking at the total mass emissions of the RECLAIM pollutant from the entire facility, measured over a daily, weekly, or quarterly period depending on the emissions potential of the individual equipment. This design feature necessitated the requirement for sophisticated pollution measuring and monitoring methods, which are discussed in a separate section. This section discusses the legal aspects of the program design that enhanced enforceability.

Credits Not Intended to Create Property Rights

As in the case of the acid rain trading program established under the 1990 Amendments to the Clean Air Act, the District and EPA wanted to make sure that by establishing a system of allowances or credits, which could be bought and sold in the open market, the District was not creating any kind of property right which would prevent the District from amending the rules, reducing allocations, or suspending or terminating credits. Indeed, the District needed the flexibility to abolish the program altogether if it was deemed not to be working. The District researched how to avoid creating a property right in the RECLAIM credits, and designed the program rules to make sure that such a right was not created.

Allocations or credits are not a property right

Mobile Source Credits

While RECLAIM was originally designed to allow trading of mobile source credits into the program, EPA never approved any of the District's early mobile source credit rules. As a result, RECLAIM facilities declined to use these credits, because they could be sued under the Clean Air Act. Not until the energy crisis of 2001 were the District and EPA able to develop federally-approved "pilot" mobile source credit rules. These rules included "sunset" provisions, generally five years from adoption. EPA also insisted on detailed monitoring, recordkeeping, and reporting requirements, as well as enforcement programs making the credit user as well as the credit generator, liable for any shortfalls.

Federal Clean Air Act Compliance

Reasonably Available Control Technology

Under the Federal CAA, states are required to submit to EPA plans which provide for the attainment and maintenance of the national primary ambient air quality standards. (CAA §110(a)(1), 42 U.S.C. §7410(a)(1).) These plans are required to provide for the implementation of all reasonably available control measures as expeditiously as practicable, including such reductions in emissions from existing sources in the area as may be obtained through the adoption, at a minimum, of Reasonably Available Control Technologies (RACT). (CAA §172(c)(1); 42 U.S.C. §7502(c)(1).)

RACT may be met on an aggregate basis

Under traditional command-and-control regulatory systems, RACT is generally established as an emissions limit applicable to each class or category of source, and potentially even on a source-specific basis. Under RECLAIM, however, it was proposed that individual sources would no longer be subject to specific emission limits; instead the entire facility would be subject to a mass emissions cap. Thus, the District needed to determine how RACT would apply under a cap-and-trade program.

The District consulted with EPA, and received a response in February 1992. EPA concluded that RACT may be met on an aggregate basis. In other words, RACT requirements would be deemed met if total emissions from sources subject to RACT did not exceed total emissions that would have occurred if RACT had been applied to specific sources. (RACT sources are defined by EPA as major sources and any sources for which EPA has established a "control techniques guideline" as authorized under the CAA.) EPA also advised that RACT sources may be included in an emissions "bubble" with sources that are not subject to RACT, such as mobile and area sources. However, RACT levels of emissions must be met within the universe of sources subject to RACT, without taking credit for reductions from non-RACT sources.

New Source Review Requirements

Under the Clean Air Act, new and modified major sources are subject to a requirement for emission reductions (offsets) which will be sufficient, together with other reductions in the area,

so as to represent reasonable further progress toward attainment (CAA §173(a)(1)(A); 42 U.S.C. §7503(a)(1)(A)). Under the 1990 amendments to the CAA, specific offset ratios are set depending on the area's ozone nonattainment status (CAA §182; 42 U.S.C. §7511a.). EPA explained that the Federal CAA does not require the necessary offsets to be provided by the individual new or modified source. Thus, offsets may be provided in the aggregate. However, EPA advised that section 173(c)(2) of the CAA limits offsets to emission reductions not "otherwise required by this Act." (42 U.S.C. §7503(c)(2).)

Also under the Clean Air Act, new and modified major sources must meet an emissions limit which is the LAER. (CAA §173(a)(2); 42 U.S.C. §7503(a)(2).) LAER is defined as the lower of either (1) the most stringent limit which is contained in the implementation plan of any state for such class or category of source, unless the source demonstrates that such limits are not achievable, or (2) the most stringent limit achieved in practice by such class or category of source. The District established the program so as to require that LAER be met for each new or modified source, and did not allow this requirement to be met on an aggregate basis.

Credit Availability

Under EPA's traditional guidance, all credits, which would include RECLAIM credits, must be quantifiable, surplus, enforceable, and permanent. In the context of RECLAIM, the concept of "permanence" needed to be considered in light of the specific structure of the program. The program was designed with a declining cap, meaning that each year, a facility's allocation would be reduced from the year before, until the program end point. For example, if a facility had 100 pounds of credit the first year, it might have 95 pounds the second year. As a result, credits could not be issued in the form of an authorization to emit a specific amount for an infinite time into the future, as with a traditional credit. Instead, credits were designed to represent the authorization to emit a discrete pound of emissions, but that pound could be emitted at any time during a particular compliance year. Each credit was defined to be only good for that one year period. The possibility of "banking" credits was discussed. However, it was decided that this would present too great a risk of facilities "hoarding" unneeded credits in the earlier years, to be used in later years when allocations were to be reduced, thus threatening progress towards attainment.

<p><i>Credits must be quantifiable, surplus, enforceable and permanent</i></p>
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Other Federal Requirements

EPA also advised the District that the Clean Air Act would allow the program to employ a mass emissions limit which is based upon a cumulative total over a longer period than one day. Ultimately, the period of cumulation for the mass cap was established at one quarter (3 months). However, EPA stated that it would have to be satisfied that this longer averaging period would produce equivalent emission reductions on a daily basis so as to satisfy RACT, and that the program would not result in large numbers of sources increasing their emissions all on one day, thus risking causing violations of the ozone standard.

The District designed the program so that individual sources or permit units were not relieved from their responsibility to comply with Federal NSPS affecting RECLAIM pollutants, since

these standards are specifically required by the CAA. Of course, RECLAIM does not relieve sources from the responsibility to comply with rules applicable to non-RECLAIM pollutants, such as air toxics rules.

State Law Applicable to Market-Based Incentive Programs

Introduction

During the period when the District was conducting its feasibility studies for the implementation of a marketable permits program, there was some concern that a market-based program could result in unintended adverse effects on the environment, covered facilities, or workers. As a result, the legislature enacted AB 1054 (Sher), now codified as Health and Safety Code section 39616, which required the District Governing Board to make seven specified findings, and

Set up benchmarks to monitor program performance

present information to substantiate the basis for the findings to CARB, which was required to ratify those findings in approving the program. While this statute appears to be limited to district programs that are part of the plan for attainment of state or federal ambient air quality standards, it provides some benchmarks that may be useful in the design of any future cap-and-trade programs.

Equivalent Emission Reductions

First and most important, the program must result in equivalent or greater emission reductions at equivalent or less cost compared to command-and-control rules in effect or which otherwise would have been adopted. To make this finding required determining what were the measures that would otherwise have been adopted. To do this, the District looked at its 1991 AQMP, which specified measures to be adopted in the future. Also, it was not possible to directly compare the emissions from each category of source under RECLAIM compared to under the AQMP, because a fundamental design feature of RECLAIM was that individual sources or permit units would no longer be subject to specific emission limits. Instead, compliance would be measured on a facility-wide basis, and measured on a mass basis rather than by looking at the emissions rate. Therefore, to make the comparison, the District calculated a projected emissions reduction line for the entire RECLAIM universe of sources which would be expected to occur under the AQMP. Then, the total of RECLAIM allocations were compared with the projected future AQMP emission levels, and RECLAIM was designed to match those levels.

One issue presented in this comparison is the fact that the AQMP projected emission levels were dependent on a specific forecast of growth. If growth turned out to be less than projected, emissions under the AQMP would be less than projected. If growth were greater than projected, emissions under the AQMP could exceed the projected emission reduction line. (In fact, that is one of the key advantages of RECLAIM: it imposes a mass emissions cap which must be met regardless of growth, whereas command-and-control rules limit emissions rates but do not limit total mass emissions.) In order to deal with this uncertainty, it was decided

A cap-and-trade program protects the environment from unanticipated growth

to always measure RECLAIM emissions against the AQMP projected emissions, regardless of the actual rate of growth.

In addition to requiring equivalent emission reductions, the law required that RECLAIM produce those reductions at equivalent or less cost than would otherwise occur under command-and-control. In order to make this finding, the District projected the costs of compliance with command-and-control rules into the future, and then developed an economic trading model, designed to predict the costs of RECLAIM into the future. A limitation of this analysis was that the RECLAIM program actually was designed to continue for a considerable time into the future, requiring emission reductions beyond those that would result from the application of known technologies. As a result, the model could not predict the costs of compliance using such future unknown technologies. Therefore, the District based its comparison on the costs of known technologies only. Because RECLAIM was designed to incentivize the use of the most cost-effective technologies first, the analysis demonstrated equivalent or less costs for the period covered by the analysis.

Equivalent Enforcement

Nearly as important as progress towards attainment was the requirement for a finding that the program would provide a level of enforcement and monitoring that was comparable with command-and-control measures that would otherwise have been adopted. As is discussed elsewhere in this paper, RECLAIM requires the use of detailed recordkeeping and sophisticated monitoring equipment capable of continuously measuring emissions at the largest sources. The

Programs based on mass emissions must have adequate resources for enforcement

economic model predicted that the additional costs of such monitoring would be more than offset by the savings due to employing the most cost-effective controls first. From the point of view of the facility,

additional monitoring was the price to be paid for the additional flexibility offered by the program. However, from the point of view of the District staff, an unanticipated consequence of RECLAIM was the enormous amount of resources it takes to adequately monitor and enforce compliance. Auditing of various reports and records became equally important as field enforcement. Auditing each facility could take weeks. Any program based on mass emissions needs to take into account the resource needs for adequate enforcement under this new method of measuring compliance.

Allocation Equity

AB 1054 required the District to assure that the program would provide a baseline methodology that gives credit to sources that have reduced their emissions prior to program implementation. The District accounted for this requirement by basing facility allocations on the facility's highest level of emissions during the most recent five years (adjusted for rule requirements going into effect in the interim). Thus, if a facility had voluntarily reduced its emissions in that time, it would still get the benefit of a higher allocation. This feature also accounted for the fact that there was a recession going on when the program was started, so lower recessionary levels of economic activity were not locked into the program. How to treat sources with pre-program

How to deal equitably with early reductions is a key issue

“early reductions” would be a key issue in designing any cap-and-trade program which is based on total mass emissions.

Socioeconomic Impacts

The District was also required to make a finding that the program would not result in a greater loss of jobs, or more significant shifts from higher to lower skilled jobs, on an overall district wide basis, than that which would exist under command-and-control. As the program has continued, the District has annually determined the job losses attributable to RECLAIM, and has seen negligible impact.

AB 1054 required that the program not result in disproportionate impacts, measured on an aggregate basis, on stationary sources included in the program compared with permitted sources outside the program. The District’s socioeconomic analysis demonstrated compliance with this requirement. In subsequent litigation brought by the metal-melting industry, the court ruled that the district’s socioeconomic analysis was required to predict effects only to the extent that data were available. The fact that the District could not foresee all effects of the program into the far future did not mean the District could not adopt the program.

Other State Law Issues

The law required the program to promote the privatization of compliance and the availability of data in computer format, and required the District to endeavor to allow facilities to keep electronic or computer records rather than mechanical records such as strip charts. A key part of RECLAIM was the computerization of recordkeeping and reporting. Indeed, the largest sources report their emissions directly to the District through electronic means.

The District was required to determine that the program did not delay, postpone, or hinder compliance with the California Clean Air Act, requiring all feasible measures to be adopted in efforts to attain the state ambient air quality standards. In addition to looking at total emission reductions, as in the first finding, this finding required the District to assure that the program met the specific population exposure reduction requirements of the California Clean Air Act. Initially, this finding was supported by modeled projections of future emissions and exposure levels. Over time, it resulted that exposures were reduced much more rapidly than required by the California Clean Air Act.

Program Reassessment

AB 1054 required the above findings to be made as of program adoption. Thus, the initial findings were necessarily based on projections into the future. Therefore, AB 1054 also required a retrospective look at the program, by requiring the initial findings to be ratified within seven years of initiation of the program. If the District was unable to ratify these findings, it was to make any necessary adjustments to the program.

Finally, the law required the District to reassess the program if the price of credits exceeded a predetermined level, which the Board established at \$25,000 per ton. The Board has also

established a \$15,000 per ton price level at which the staff would be required to conduct an evaluation of the compliance and enforcement aspects of RECLAIM, and propose any recommended amendments to the program necessary to maintain enforceability. That price was based on the predicted cost of installing control technology. The statute does not give any guidance as to what aspects of the program need to be reassessed, but leaves that decision to the discretion of the Board. In the past, credit prices exceeded this level only during the energy crisis, when dramatically higher activity levels at power plants (and resulting higher emissions levels), caused prices to rapidly spike. The District responded by temporarily removing power plants from the RECLAIM credit market, allowing them to mitigate their emissions exceeding their available credits by paying mitigation fees which were used to reduce emissions from other sources, such as mobile sources and agricultural equipment. In addition, the District required power plants to install additional controls, in a sort of “hybrid” approach with a command-and-control element overlaid over the market-based program. The District found this necessary because facilities did not foresee that the program was reaching a “crossover point” (at which emissions would equal or exceed allocations) in sufficient time to install controls. To assure that future planning was adequate, the District also required the largest facilities in the RECLAIM program to file a demonstration regarding how they would comply in the future by using either RECLAIM credits or by installing emission control technology.

Enforceability Issues

Enforceability of Trades

EPA played an active role in the District’s consideration of enforcement issues relative to RECLAIM. Relative to RECLAIM credits, EPA advised that the District should make sure that the District maintained accurate, reliable information regarding the issuance and trading of credits. Other stakeholders also had an interest in such accurate information being available, since they needed to be able to rely on such information to conduct their trading activity. The District adopted several measures to facilitate accurate data gathering. First, the rules provided that the District’s records were the “official and controlling record” of RECLAIM trading credit status and trades. No trade could occur without being registered with the District. Also, the District required both the seller and the buyer to jointly file the registration of an RTC. As a result, no one could attempt to trade a credit without the seller’s knowledge.

To assure that trades could be carried out, the rules require that the amount traded be debited from the seller’s account before a transfer could be registered. Thus, if insufficient credits are available, the trade can not be registered and would have no legal effect. While state law already prohibits falsification of documents required by District rules, the RECLAIM rules went further

Accurate, well documented emission tracking information is key to program integrity

by prohibiting the making of any false statement in connection with a proposed or actual credit transaction. Thus, if a person falsely represented

to a buyer that he owned credits, he could be prosecuted even though no statements were ever made to a District representative. Finally, even though the actual transfer of credits was not to occur until a point in the future, the District required parties to report forward or contingent contracts within five days of their execution. This provision, added later during the program’s

implementation, was designed to help parties understand the true status of the market and current prices.

Sufficiency of Penalties

The fact that program compliance was measured on a quarterly basis also presented enforcement issues. If it were held that there could only be one violation of the emissions cap per quarter, then the maximum penalty for a single violation would be inadequate to deter future intentional violations. Thus EPA insisted that the cap be defined in such a way as to assure there would be an adequate number of source-days of violation to provide deterrent value. The District addressed this by providing in the rules that a violation would occur for each and every day in any year in which an exceedance of the cap occurred, except to the extent that a facility was able to prove that on any particular day or days, the cap had not been exceeded. The burden was placed on the facility to make that demonstration; otherwise 365 violations would be presumed.

In addition, it was recognized that it would be possible for a facility to have very large exceedances occurring on only a few days at the end of the accounting period, and that the maximum daily penalty might not in such cases provide sufficient deterrence. Therefore, the District rules provided that in addition to the daily violations, there would be an additional violation for every 1000 pounds of emissions exceeding the cap. It was also recognized that as RTC prices rose, existing penalties might no longer be sufficient. Thus, the rules provided that if the average price of RTCs exceeded \$8,000 per ton, there would be an additional violation for every 500 lbs of exceedance.

As noted earlier, accurate facility monitoring, recordkeeping, and reporting is far more important under a mass cap program than under command-and-control, because it is impossible to

Different penalty provisions are needed for a cap-and-trade program

determine compliance by a simple inspection or source test. Therefore, the rules provided for penalties for submitting inaccurate reports. As in the case of the mass cap exceedance, one violation per quarterly report was

not considered sufficient, so the rules provided that there would be a violation for each day in the quarter for which an inaccurate report was filed.

Additional Remedies for Violations

In addition to civil and criminal penalties for violations, the program was designed to provide further deterrence to exceeding the cap, as well as to include features to “make the environment whole” following a violation. The most important of these was the provision that if a facility exceeded its cap, the amount of the exceedance would be deducted from the facility’s allocation for the year following the determination of exceedance. This would provide a direct economic impact on the facility, requiring it to “make up for” the exceedance by buying future year credits. It also meant that total available RTCs, and thus potential emissions, would be reduced by the amount of the exceedance.

The rules also provided that the District could impose additional conditions on the facility permit which are deemed necessary to prevent future violations. Pursuant to existing rules, such

conditions could be appealed to the District Hearing Board. The rules also allowed the District to petition the Hearing Board to actually revoke a facility's permit for violation of the cap. This is a drastic remedy which was expected to be reserved for deliberate and recalcitrant violators. Finally, the rules provided for an administrative penalty of \$500 per day of violation. This could be imposed only after giving the facility a due process opportunity for administrative hearing. This remedy has not been used, since it has turned out that the small violations for which it was designed can be adequately handled by the civil settlement process for a small penalty.

Variance and Breakdown Provisions

One key aspect in which the RECLAIM program differs from a command-and-control rule is that the rules provided that no variance could be obtained from the requirement to comply with the mass cap. This provision was also added into state law. For other district rules, a facility may obtain a variance, or permission to violate a district rule for a limited time, if the violation is due to conditions beyond its reasonable control, and other specified findings are made by the Hearing Board. This provision would have created an enormous loophole, preventing the program from reaching its objectives of reducing mass emissions year-by-year. And it was considered unnecessary, since in the absence of specific control technology requirements, a facility can always comply by either purchasing credits or reducing operations.

Variances from the cap should not be allowed

One flexibility provision was included in the rules, which allows a facility to exclude emissions occurring during a breakdown from its cap if the facility complies with breakdown rules. EPA later concluded that this provision potentially threatened the program's emission reduction objectives. Rather than delete this flexibility, the District revised the rules to require staff to account for all such emissions at the end of the compliance year, and if they exceeded the "compliance margin" (amount by which available RTCs exceeded emissions) then the excess emissions would be deducted from those facilities that had emissions excluded due to a breakdown or would be made up by RTCs, which are valid for the next compliance year and obtained by the District. So far, emissions have always been substantially under allocations, except during the power crisis.

Missing Data Provisions

Because accurate emissions monitoring was so important, it was necessary to design the program so as to ensure adequate incentives for installing and properly operating monitoring equipment. Also, it was necessary to devise some method of accounting for any unrecorded emissions

Missing data provisions are needed for cases where monitoring equipment is not working

occurring when monitoring equipment was not operating, to determine whether the cap had been violated. These two problems were handled by the

so-called "missing data" provisions. Under these provisions, for periods of time when monitoring equipment was not operating properly, the facility was required to report emissions at the highest level that had previously been monitored. If there was no prior data, such as before required equipment was installed, emissions were required to be reported based on an assumption that the equipment was operated at its maximum rated capacity, at 100% activity level, and using uncontrolled emission factors.

These assumptions were considered environmentally protective, since they would be assuming the “worst-case” in terms of potential emissions from the source. In addition, since the facility would have to offset such assumed emissions with RTCs, which cost money, the missing data provisions created a significant incentive to timely install the required equipment and keep it operating properly at all times. However, facilities were very unhappy with these provisions, especially in the early years if monitoring equipment had not been timely installed, and the worst-case assumptions applied. In order to assure that the missing data procedures worked as designed, the rules provided that there could be no variance from these procedures.

Out-of-State Traders

Just recently, a novel enforcement issue was presented when a purchaser from outside the U.S. applied to register a trade. Staff was concerned with the difficulty of carrying out an enforcement action against a rule violator located in the Isle of Man. As a result, the proposed purchaser was required to designate a California agent for service of process, the designation to be effective for at least four years after the trade, and to stipulate to jurisdiction and venue in the Superior Court of Los Angeles County. These provisions have been added to the rules for all out-of-state traders. If future cap-and-trade programs include foreign or even out-of-state participation, care will need to be taken to ensure enforceability over those participants. This problem is less severe in RECLAIM than it might be for other markets, since ultimately a RECLAIM credit must be used in the RECLAIM universe of facilities, and is worthless if not so used, so the program provides a built-in incentive to continue complying with RECLAIM trading provisions.

Enforcement provisions for out-of-state or out-of-the country traders are needed

RECLAIM Trading Credits Were Not to Create a Property Right

Introduction

Since RTCs were intended to be bought and sold, in order to facilitate compliance with the cap, they were obviously intended to have monetary value. However, the District and EPA needed to be able to amend the program in the future so as to reduce the total credits available, or to suspend or terminate credits. Indeed, it was necessary to retain the flexibility to abandon the program altogether if it was not working satisfactorily and return to a command-and-control system. Therefore, it was necessary to assure that in creating RTCs, the District did not create a property right which would require compensation in the event that regulatory actions reducing or removing their value occurred. Both state and federal laws dealing with credits address these issues to some extent.

Allowances or credits are not a property right

State and Federal Legal Background

The state Health and Safety Code does not contain provisions dealing with the nature of credits under a mass cap program, but it does contain general provisions requiring the districts to create credits which may be banked and used to offset future increases in emissions. The statute specifically provides that “the system is not designed to recognize any preexisting right to emit air contaminants...” (H&S section 40709). Furthermore, section 40710 provides that “certificates evidencing ownership of approved reductions issued by a district shall not constitute instruments, securities, or any other form of property.” However, the law does appear to recognize the right to “own” such credits.

In contrast, the Federal CAA does not discuss the nature of emission reduction credits traditionally used as offsets for increased emissions from new or modified stationary sources. However, it explicitly deals with the status of allowances issued under the federal Acid Rain program established pursuant to the 1990 Amendments. As stated in section 403(f), (42 U.S.C. section 7651b(f)), “an allowance allocated under this subchapter is a limited authorization to emit sulfur dioxide in accordance with the provisions of this subchapter. Such allowance does not constitute a property right.” And under Title V, although the Clean Air Act itself does not speak to the issue, the EPA regulations require that every Title V permit contain a provision specifying that the Title V permit does not convey any property rights (40 C.F.R. section 70.6).

Supreme Court Precedent and Design of Rules

Under Supreme Court rulings, the existence of a property right normally depends on the terms of applicable state laws. (*Board of Regents v Roth*, 408 U.S. 564, 577 (1972).) The Court has also set forth the proposition that a compensable property right is not involuntarily created when government makes clear in a statute that it does not intend to create a property right (*United States v. Fuller*, 409 U.S. 488 (1973)). Also, language expressly reserving the right to repeal or amend the law in question militates against the creation of a property right (*Bowen v. Public Agencies Opposed to Social Security Entrapment*, 477 U.S. 41 (1986)). The District kept these precedents in mind in drafting regulatory language for the RECLAIM program.

First, the RTC is defined in a manner similar to the allowance under the federal Acid Rain program. An RTC is defined in Rule 2001 as “a limited authorization to emit a RECLAIM pollutant in accordance with the restrictions and requirements of District rules and state and federal law.” Second, the District explicitly reserved the right to amend the program or revise credits. Under Rule 2007, the District reserves the right to amend the rules, and specifically states that nothing in the rules limits the District’s right to condition, limit, suspend, or terminate RTCs, or the authorization to emit represented by the facility permit. Finally, Rule 2007 expressly disclaims any intent to create a property right. The rule specifies that an RTC shall not “constitute a security or any other form of property,” but it may be used as collateral or security for indebtedness. If future cap-and-trade programs are created, similar provisions should be included in the rules to protect the government’s right to amend the program in the future.

Incorporating Mobile Source Credits

Background

As originally adopted, RECLAIM included provisions for including credits generated by reductions from mobile sources into the trading program. This was consistent with state law, H & S § 40440.1, which was also adopted in 1992 as part of AB 1054. That section provides for allowing trading of “quantifiable reductions in emissions from a significant number of different sources, including mobile, area, and stationary...”

When RECLAIM was adopted, the District’s only mobile source credit rule was Rule 1610, allowing generation of credits from scrapping older, dirtier passenger vehicles. Subsequently, the District adopted Rule 1612, allowing the generation of credits from the use of low-emission vehicles that generates reductions beyond those required by law; Rule 1613 (credits for truck stop electrification); Rule 1620 (credits for clean, off-road mobile equipment); and Rule 1623 (credit for clean lawn & garden equipment). Unfortunately, none of these rules were ever

All credit programs must be federally approved if the program is subject to the CAA

approved by EPA into the state implementation plan required by law (SIP). When a rule is federally enforceable, besides

EPA enforcement, any member of the public can sue a facility violating that rule. The federally-approved version of RECLAIM did not include the original mobile source credit rules.

Accordingly, certain environmental groups sued some facilities that were using mobile source credits for violating the SIP-approved version of RECLAIM. The net result of these lawsuits was that RECLAIM facilities were unwilling to take the risk of using mobile source credits.

Pilot Credit Generation Rules

During the California energy crisis beginning in the year 2000, District staff worked with EPA to develop approvable mobile source credit rules, based on the urgent need to increase credit supply because power plants had greatly increased their consumption of credits, driving up credit prices dramatically. EPA was only willing to consider “pilot” rules that would “sunset” in five years. Eventually, the District adopted and EPA approved “pilot” credit-generation rules for heavy-duty captive vehicles (Rule 1612.1), repowering of diesel fueled marine vessels (Rule 1631), use of shore power by marine vessels at berth instead of diesel powered auxiliary engines (Rule 1632), electrification of truck/trailer refrigeration units (Rule 1633), and truck stop electrification (Rule 1634). Rule 2507, credit generation for agricultural equipment, was also adopted.

“Surplus” Requirement

EPA’s concerns regarding mobile source credits were basically three-fold. First, the credits had to be “surplus,” meaning that the reductions had to go beyond any reductions required by an applicable law. EPA was concerned that CARB or EPA might adopt rules in the future that would require the kinds of reductions for which the rules allowed credits. To prevent this, EPA insisted that the rules contain a “sunset” provision whereby District, CARB and EPA would evaluate each source category and

The program must include a determination whether to allow credits for reductions resulting from other laws

determine whether the reductions called for by the rules remained “surplus.” If the evaluation was not performed, or the evaluation determined that credits were no longer surplus, the issuance of credits would be suspended.

Enforcement Programs

EPA also included specific requirements for enforcement, above and beyond the availability of civil and criminal penalties for violation of the rules. If there were any shortfall in the generation of credits, the applicant must make it up by providing compensatory RTCs or mobile source credits. Importantly, if the credit generator failed to do so, the credit user became responsible for making up the shortfall. This provision was necessary because under the pilot rules, credits were issued before the reductions were actually generated, upon approval of the plan for generation.

Mobile source credit programs present enforcement and design challenges

Each rule also contained extensive monitoring, recordkeeping, and reporting requirements to assure that any credits issued were real and quantifiable. For sources that are not “captive,” such as marine vessels, extensive provisions to assure that the emission reductions credited actually occurred within the District were included in the rules. In the case of marine vessels, they were required to install global positioning systems, which monitor the vessel’s location. The rules all included a 10% discount of each credit, to be retired for the benefit of the environment. The rules only authorized the issuance of NO_x credits. (Other pollutant reductions were to be retired for the benefit of the environment.) Finally, the credits could only be used in RECLAIM, not for traditional stationary source NSR offsets, and not in lieu of compliance with any other rules.

Applicability to Future Trading Programs

In designing a mobile source element of a trading program, it likely will be necessary to include detailed, enforceable monitoring, recordkeeping and reporting requirements to assure that such credits are real and quantifiable. The program design will need to determine whether to grant credits to reductions that are not specifically required by the program, but which are the result of changes required by other laws, such as criteria pollutant control programs. Also, the program rules will need to specify whether all credits must result from reductions accruing within California. If so, provisions for assuring this occurs, such as GPS systems, may be required.

Prosecution Experience

Design Considerations

The design considerations for successful prosecution of RECLAIM violations centered on three objectives: (1) presumptions regarding missing data and violation time periods should favor the environment and government; (2) issues arising from inconclusive evidence should be preempted by imposing on the violator the burden to demonstrate compliance for all times relevant to the enforcement case; and (3) certification of data and reports should facilitate the admissibility of

RECLAIM documents in civil penalty prosecutions and provide flexibility for prosecuting false statements.

Presumptions and Burdens

Four critical presumptions favoring the government were built into the enforcement design of the program. First, in the event of monitoring failures, missing data provisions were included to provide a default worst case calculation for curing gaps in the recording and submittal of quarterly or annual emissions data. These provisions ensure that the violator, not the environment, bears the consequences of missing data. Second, in the event that a facility violates the prohibition of emissions in excess of the facility's quarterly or annual allocation, there is a presumption that the facility is in violation for each day of the compliance year (365 days). The burden falls on the violator to establish the number of days, or such lesser period as can be established, that the cumulative facility emissions were less than the annual emission allocation. Third, in the event that an inaccurate (and uncorrected) quarterly certification of emissions is submitted, there is – in effect – an irrefutable presumption that each day in the quarter constitutes a single, separate violation. And fourth, in the event that a facility exceeds a concentration limit, as established by a source test, the days of violation are presumed to include the date of the source test and each and every day thereafter until the facility establishes that continuous compliance has been achieved.

Admissibility and Enforcement Flexibility

In the RECLAIM program, various documents, such as quarterly and annual emission reports, require certification for accuracy by the highest ranking facility official with responsibility for the subject matter of the certification. This certification requirement provides evidentiary advantages and enforcement flexibility – all of which enhances the government's ability to successfully prosecute RECLAIM violators. Relative to evidentiary advantages, the requirement to certify documents helps to identify the person ultimately responsible for the accuracy of the

Requiring data and reports to be certified for accuracy facilitates admissibility at trial, and provides enforcement flexibility

document; it helps to lay the foundation for the introduction of the document by unambiguously identifying its business purpose; and it helps to introduce evidence of the absence of a document by

showing that an individual or facility would be expected to have prepared such a document.

Relative to enforcement flexibility, the certification requirement enhances options for both civil and criminal prosecution for false statements by easing the burden to prove intent and materiality -- key elements for either civil or criminal prosecution.

Certification requirements provide several advantages when introducing documents as evidence in enforcement proceedings. First, the signature requirement helps to identify the person ultimately responsible for the accuracy of the information in the document. This helps in identifying the individuals to depose or call at trial regarding a certain document. Second,

Evidentiary presumptions and burdens favoring the government are essential for successful prosecution of violations

certification also helps lay the foundation for introduction of the document by unambiguously identifying its business purpose. It is also easier to introduce evidence of the *absence* of a

document that must be certified and submitted by showing that an individual or company would be expected to have prepared such a document (Cal. Evid. Code 1272). Third, the certification requirement helps overcome a hearsay objection by establishing that a certified document is a particularly trustworthy business record because, when there is a punishment for inaccurate information in a document, an individual will be expected to use more care in its preparation (Cal. Evid. Code 1271).

Lessons Learned

- It is important to understand which federal and state laws apply.
- Programs based on mass emissions must have adequate resources for enforcement.
- The program must include a determination whether to allow credits for reductions resulting from other laws or programs.
- Enforcement provisions for out-of-state or out-of-country traders are needed.
- Mobile source credit programs present unique design and implementation challenges.
- Variances from the annual cap should not be allowed.
- Missing data provisions are needed for cases where monitoring equipment is not working.
- Evidentiary presumptions and burdens favoring the government are essential for successful prosecution of violations.
- Requiring data and reports to be certified for accuracy facilitates admissibility at trial, and provide enforcement flexibility for false statements.

Chapter Four – Establishing Baselines and Reduction Targets

Author: Jill Whynot

One of the most difficult and contentious parts of RECLAIM development was establishing the initial allocations and the reductions required programmatically and at the facility level. Determining a fair, equitable formula that recognized early reductions and did not overly restrict a facility's ability to rebound from the economic recession was very resource intensive and controversial.

Setting allocations is extremely controversial

Many different conceptual designs were explored, and when stakeholders agreed in principle to an approach, that sentiment often changed when details were provided about what that particular method translated to on a facility-specific basis.

The District went with a facility-specific reduction approach, which addressed some of the equity issues, but took significant resources to develop and implement. Staff spent hundreds of hours determining what emission factors per specific equipment were appropriate for the program start

Make sure that the overall program targets are met for key years

point, and what emission factors should be used for anchoring the end point for the year 2000. Ultimately, the rules allowed facilities to choose a peak production year

from 1989 to 1992 for the 1994 allocations, and a peak year from 1987 to 1992 for the year 2000 allocation. The peak production throughput was applied with the specific emission factor for each piece of equipment, and then the mass total became the basis for the facility 1994 allocation.

A similar approach was used for the 2000 facility allocations, however, the sum of each facility allocation was larger than the projected actual emissions in the 1991 AQMP for the year 2000. To bring the total in line with the AQMP, all facilities had a small percentage decrease applied to the sum that was calculated for them. From 2000 to 2003, the 1991 AQMP projected additional emission reductions, largely based on a control measure that had a fifty percent reduction from all combustion equipment. Since the details were not available on which equipment would reduce, and at what rate, each facility shared equally in the overall reduction from 2000 to 2003. Where facilities generated and held existing ERCs, those ERCs were converted to additional RTCs and added to allocations.

There was an extensive process that occurred during rule development and after the rules were adopted where many facilities, realizing that their past emission reports were to be the basis of future allocations, amended prior year reports to enhance their allocations. Staff also met on an individual basis with most of the facilities to review the calculations.

Allocations and Reductions Required

In hindsight, several of these design features contributed to over allocation of the program in the first several years. The RECLAIM program design intentionally led to higher allocations than

actual emissions during the first few years of the program because of concerns that facility production fluctuates from year to year and not wanting to lock in production levels during a recessionary period. Letting each facility pick a peak year for the basis of 1994 and 2000 allocations, **allowing correction of prior year emission reports to increase allocations,** and addition of existing ERCs held by RECLAIM facilities contributed to the inflated start point. The anticipated crossover point was five to six years after the program started.

Consider basing allocations on average prior activity levels rather than peak activity levels, to avoid over-allocation in early years

District staff did not expect that the amount of over-allocation would be as high as what occurred. The first year of the program there were 37 percent unused RTCs. In the second year there were 28 percent unused RTCs, in spite of the large use of RTCs to cover stringent emission estimates required under missing data procedures. Except for 2000 and 2001, the typical amount of unused RTCs each year is about 20 percent.

Reductions for the year 2000 were based on peak production levels and emission factors specific to the type of equipment or process. The year 2000 emission factors included rules that were subsumed by, or rolled into, RECLAIM that had future effective compliance dates and control measures from the 1991 AQMP.

Rules with future compliance dates included several rules that had been adopted by the District Governing Board and had been determined to be technically feasible and cost-effective. Other rules were considered to be technology forcing. Many of the 1991 AQMP measures would have been contentious during rule making and the amount and timing of these reductions were less certain than the rules with future adoption dates.

District staff recommends that future cap-and-trade programs carefully evaluate which rules to roll into the program. Rules on the books with future control requirements based on known, cost-effective technology for major emitters may be best left in place. This would have largely avoided the power plant problems seen in 2000 and 2001 with RECLAIM, as Rule 1135 -

Rules with near-term compliance dates may be better left in place

Emissions of Oxides of Nitrogen from Electric Power Generating Systems, if it had remained in effect, would have required Selective Catalytic Reduction (SCR) on power

plants by the year 2000. The market incentive approach would work well for existing rule requirements based on technology-forcing rules and rules yet to be written.

RECLAIM reduction targets focused on NO_x and SO_x rule and control measures only. Concurrent NO_x benefits from existing and planned energy efficiency requirements, for example, were not considered. Future cap-and-trade programs should avoid giving credit for emission reductions that would occur under other regulatory requirements (local, state or federal) or natural industry trends. The term “anyway” credit was used to describe this effect relative to many of the concepts raised for potential mobile and area source credit generation. An example of this is electric forklifts. No credit rule was developed for electrification of forklifts because this was clearly happening to a large degree due to other factors that benefited facility operators.

District staff recommended that allocations be issued to facilities rather than auctioning them and also did not follow the model used in the Acid Rain program of holding back a small amount of the available allocations for an auction by the government. District staff did not want to add such an administrative process. As discussed in other parts of this paper, the rules were carefully crafted to avoid giving allocations the status of property rights.

Lessons Learned

- Recognizing early reductions are important.
- Allow time to develop, test and implement allocation methods.
- There are tensions between capping emissions, fair allocations and program goals that need to be carefully balanced.
- Consider using an average production level over a three to five year period as the basis for allocations, rather than allowing each facility to pick a peak production year.
- Limit the amount of time allowed (if any) for amending past emission reports to reduce the total amount of allocations.
- For a cap-and-trade program that replaces existing and future emission reduction commitments, carefully consider the value of leaving technologically feasible and cost-effective requirements in place. Use the market mechanism primarily for compliance requirements that are yet to be defined or have a longer time horizon.
- Avoid giving credit for reductions that would occur anyway due to other rules or programs.

Chapter Five – What Makes a Robust Market?

Author: Jill Whynot

There are several key features that help make a market work well. These are briefly described in this chapter.

In terms of design, it is generally advantageous to have a market with a large number of participants from varied industries. This helps maximize the economic advantages of a market as control costs will vary from industry to industry and from facility to facility within an industry.

For NO_x RECLAIM, initially 390 facilities were included at the start of the program. This represented six percent of the NO_x emitting facilities, but included 65 percent of the permitted stationary source emissions. For SO_x RECLAIM, 85 percent of the emissions from permitted stationary sources were included from about four percent of the facilities. There were facilities from a wide range of industries and they had very different reduction profiles. Many of the SO_x facilities are also in NO_x RECLAIM. This design helped to secure large emission reductions, make a more robust market, and had a manageable number of participants.

In any market, there are a variety of factors that influence decisions. Some facilities in RECLAIM that operate consistently below their allocation do not choose to sell credits to others.

This can be a corporate decision to retire unused credits as a good will gesture or can also be a strategy to avoid helping competitors. It has also been our experience that some facilities have more sophisticated staff that can function better in a market environment. A cap-and-trade program with a declining balance requires a different mind set than command-and-control. Facilities have not always made the wisest decisions with respect to buying or selling credits.

Market behavior is influenced by many factors

Any market needs both buyers and sellers. Future trading programs should consider whether it will be acceptable for outside parties (not facilities) to purchase and sell credits. The RECLAIM market has evolved over time, which has resulted in some interesting trading experiences and a few enforcement problems.

Credits need to be fungible, or easily exchangeable, in order for trading to occur smoothly. Program designers will need to decide whether credits are issued for a discrete time period, such as one or more years, whether credits can be borrowed or banked, and how/if credits in the future can be traded. For RECLAIM, credits have a specific one year life, but in many cases infinite streams of credits are purchased to cover a facility's long-term needs. In addition, many different forms of trades have been seen with RECLAIM, such as forward contracts, contingent rights, and mutual funds. Recently, foreign traders have become involved in the market, which presents some unique enforceability issues.

A market functions well when the underlying rules are clearly established. Parties need to clearly understand the nature of credits, such as the time period for which they are valid and can

be traded or used, how trades are to be processed and registered, and what each party's responsibilities are.

Administrative procedures should be as streamlined as much as possible to facilitate trades without delays. Good tracking and accounting mechanisms are also important to ensure that the system stays in balance and that credits are only used once to cover emissions.

Information is one of the most critical elements of a market. Facilities need to have time to plan in advance whether they will purchase credits to meet their needs or will invest in control equipment or other methods to reduce below their allocation and recoup some or all of the costs by selling credits. Electronic posting of trade information in a timely manner is also essential for market price signals and to provide cost information upon which facility operators can make decisions.

A good market can be run by government, by a designated third party, or by one or more entrepreneurs providing that service. For RECLAIM, the latter was developed, as the District did not want to be involved in that aspect of the market. It was less complicated for the District to be the sole registrar for credit trades and to set up the rules and systems to track credit trades and prices and to make that information available on a bulletin board system.

Information on market activities helps program participants make better decisions

Any market system needs good tracking and transparency of information. In addition, frequent and careful monitoring of prices and availability will help ensure that any necessary adjustments are identified and made to reduce the likelihood of problems.

Lessons Learned

- Market behavior is influenced by a variety of factors.
- Market participants do not always behave in a logical manner.
- Streamline administrative processes and post trade information as quickly as possible.
- Timely and accurate information helps with both compliance and market function.

Chapter Six – Information Management Needs

Authors: Chris Marlia and Roberta Lewis

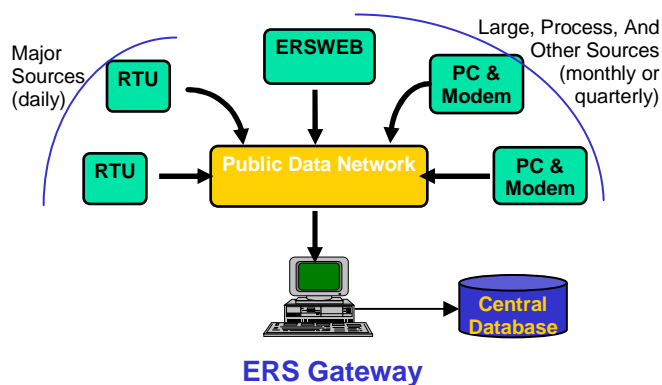
The need for automation in the RECLAIM program was understood from the beginning primarily because of the complex interaction between the new regulatory components introduced by RECLAIM. IM staff worked very closely with RECLAIM implementation staff to automate as much of the process as practical, considering schedule and potential costs. Since the introduction of the RECLAIM program, several rules have been added to Regulation XX and most of the rules have been amended, some as many as 12 times. This fluidity in the rule specifics has been necessary to ensure the program delivers on pollutant reductions as well as overall cost savings, but small rule changes can have large impacts on automated systems. IM focused on the most stable business processes first such as electronic emission reporting. Evolving business processes, such as annual emission reporting and compliance reconciliation activities, needed to stabilize before the automation effort could provide a workable system.

Automate stable business processes first, and add others later, as processes stabilize

Key elements in the automation of RECLAIM include electronic emission reporting, the facility permit system that captures device-based data, the trading system that tracks emission credit trading, and a centralized database that stores all of the data from all automated systems in a single repository.

Electronic emission reporting is one of the most critical elements in the RECLAIM automation process. All sources report emission data electronically; source type determines if the data is submitted daily, monthly or quarterly. The data pathway from CEMS to Remote Terminal Units (RTU) to the AQMD's central station for electronic emission reporting, the Emission Reporting System (ERS), was established very early in the design and development process and the process has remained relatively unchanged. The facilities submit daily emission data as transactions (debits and credits) that can be summarized and aggregated over various time periods for comparison to the available annual allocation. The following figure illustrates the electronic monitoring and reporting for RECLAIM.

Figure I-6-1
Emissions – Electronic Monitoring and Reporting



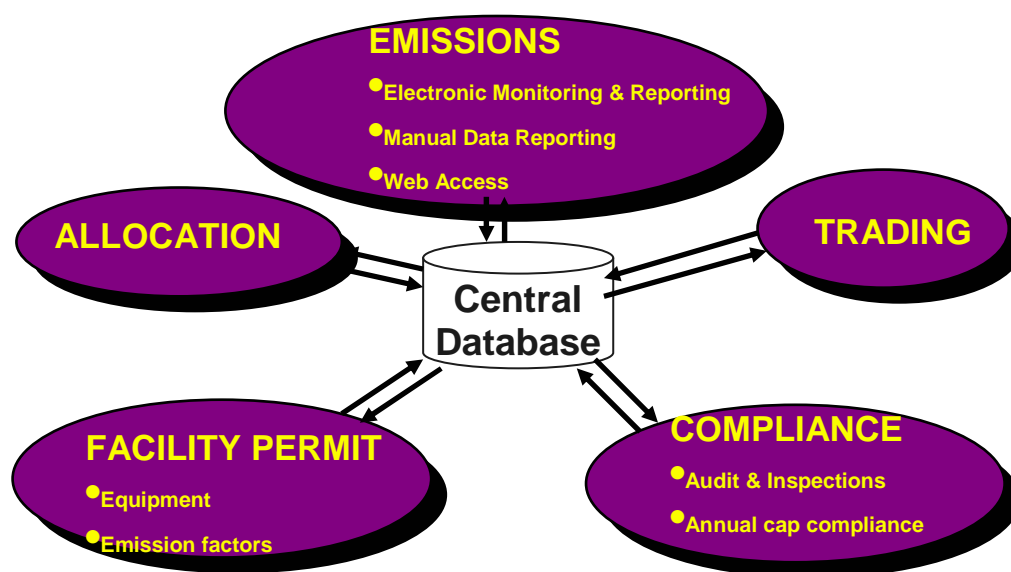
The facility permit required a paradigm shift in the information collected for permitted sources. Under RECLAIM, existing equipment-based permits were replaced with facility permits. Additional information for every emission source within the facility, including permit conditions and other permit parameters, need to be collected and brought into the centralized database. Facility permits are printed from the data-based information.

Balance automation needs with cost, complexity, and time constraints

The goal of an efficient trading market and the prerequisites that are attendant on that goal (simplicity, accessibility and enforceability) require an information dissemination system that makes important market information readily available to all market participants. In addition, trading credits that are transferred between entities must be certifiable and official ownership must be recorded. The RTC system has gone through several manifestations, starting with a trading database in Microsoft Access where many of the concepts for electronic tracking of trading credits were developed. This system encompasses the RTC Listing, an important requirement of the RECLAIM rules. The RTC Listing is essentially the account ledger for RTCs, recording all debits and credits for each facility or RTC-holding entity. The RECLAIM Bulletin Board System (BBS) was developed to provide information regarding trades and available credits to the regulated community.

Perhaps the most critical element in the automation of the RECLAIM rules is the centralized data repository which puts all of the data collected by each individual system in a single place. The central repository is a relational data base maintained on a central networked server and can be accessed by all RECLAIM software applications and scripts. Figure I-6-2 illustrates the information tracking structure for RECLAIM.

Figure I-6-2
RECLAIM Information Tracking Structure



In addition to building systems that specifically support RECLAIM and its regulatory components, AQMD's infrastructure was strengthened over time and this helped to facilitate RECLAIM automation. During RECLAIM's early years, the data network backbone was upgraded to 100 mbps, a high-speed router was added, dynamic IP addressing was implemented, and the network was segmented into Virtual Local Area Networks (VLAN). Later, connections from the hubbed closets to the central hub were upgraded to multi-mode fiber and wiring in the computer room was upgraded to fiber optic cable. Finally, the network hardware was upgraded to Gigabit Ethernet technology and all of the wiring from the network closets to the desktop was upgraded to at least Category 5 copper. All of this effort improved network performance and fault tolerance, essential when collecting information from and providing information to outside users.

Similarly, centralized servers that support the central database and RECLAIM applications have been upgraded and desktop systems have been gradually improved over time to improve performance for the users of mission-critical applications.

Lessons Learned

- Staff developing and implementing the market program must work closely together with information technology staff from the beginning.
- The program design should consider the amount of automation needed for the program to be practical, but also consider cost, complexity, and time required for implementation.
- Automate stable business processes first and allow evolving business processes to stabilize prior to automation.
- Build up and strengthen the computing infrastructure (network, servers, desktop, etc.) as part of the program development to ensure smooth implementation and successful functioning into the future.

Chapter Seven – Other Considerations for Future Trading Programs

Author: Jill Whynot

Why Wasn't a VOC RECLAIM Program Successful?

NO_x and SO_x RECLAIM were adopted in 1993, although there were significant issues raised by industry and environmental groups. One of the reasons that industry supported the program was that it replaced many existing rules with future effective dates that had relatively high compliance costs. It was perceived that RECLAIM would provide flexibility to meet emission reductions targets without the prescriptive approach inherent in command-and-control regulations. RECLAIM also included many control measures from the AQMP which would not require individual rule development efforts if these requirements were added into RECLAIM.

One of the features that appealed to environmental groups was that RECLAIM locked in emission levels and reductions, although the program was initially started with high allocations. Improved accountability through enhanced monitoring, recordkeeping and reporting was also a design feature that had positive environmental implications.

District staff spent significant efforts in developing a similar cap-and-trade program for VOCs. VOC RECLAIM ultimately did not go forward, due to challenges with monitoring and recordkeeping and potential implications for toxic emissions, as products were reformulated and as facilities purchased credits in lieu of reductions.

One of the key differences for VOCs, as compared to NO_x and SO_x, was that there were fewer rules with future effective compliance dates that would have been folded in for VOC RECLAIM than what was the case for NO_x and SO_x. This provided much less incentive for industry participants to accept a mass cap and declining balance. Add to this the enhanced monitoring systems that would have been required and concerns about whether there would be shifts in, or less reductions, in toxic emissions associated with VOCs in solvents and coatings in a trading program, and VOC RECLAIM was a program that was not brought forward.

Other Factors to Consider

There are several other factors that should be considered for future cap-and-trade programs. The environmental justice community may have concerns about the ability to substitute local controls for reductions that occur in another part of the state, the nation, or internationally. Program designers should consider if there should be a minimum level of reductions at a facility before participating in purchasing credits, or whether it is a global issue and trading should occur freely to encourage the most cost-effective reductions.

Tracking trades and reductions to ensure compliance will be challenging for all reductions, and even more so for reductions that occur outside of California or in another country. It will be very important that protocols are standardized and that the level of monitoring and quality control is high in order to have good confidence in the trading program and the reductions that occur.

Offset ratios to cover some of the uncertainty that may exist with reductions in other parts of the country or the world could be considered.

In some cases, there will be concurrent criteria pollutant reductions in future cap-and-trade programs, resulting from requirements already in place under other regulations. Consideration of whether and how to deal with credits in these circumstances will be needed. In addition, inter-pollutant exchange rates will have to be defined. These complex issues should be clearly articulated in the regulations developed to clarify what is allowed and provide the structure to enable or disallow these types of credits.

For a future greenhouse gas cap-and-trade program, careful consideration should be given to maximizing synergies with criteria pollutant programs. Since both criteria pollutant reductions and climate protection are important, it is critical that programs are coordinated well to avoid any delay in progress.

PART TWO – RECLAIM IMPLEMENTATION

Chapter One – Early Implementation

Authors: Carol Coy and Danny Luong

Contributors: Fortune Chen, Chris Hynes, Don Nguyen, Paul Park, Cathy Ragland, Sandys Thomas and Susan Tsai

Initial implementation of the RECLAIM program presented many resource-intensive challenges not fully anticipated during the rule development process. Transition from command-and-control permits and compliance processes to the cap-and-trade program raised issues in a number of key areas requiring special attention of the participating facilities, as well as District staff.

Allocation Reviews

One of the most important components of RECLAIM is the annual allocations for the facilities in the program. The District staff and RECLAIM facilities recognized the significance of allocations and started the development of allocations during the rule development phase, prior to formal adoption of the program. These early developments led to refinements of the allocation methodology, including base year activity and emission factors to be used. Development of the allocation methodology relied heavily on, and highlighted the importance of, previously reported emissions and the related calculations. The availability and accuracy of existing production rate and emission data is crucial to the determination of fair and consistent allocations.

Most facilities worked closely with District staff to compile the data necessary for allocation determinations prior to the start of RECLAIM. Some of these efforts continued after the start of RECLAIM in the form of **updating prior emission reports** to rectify situations that the facilities believe were erroneous. Staff relied upon the provisions in the rules to guide these activities.

RECLAIM facilities were issued facility permits that contained their annual allocations. Facilities that did not agree with the allocations filed appeals to safeguard their legal rights to have the allocations amended while working with District staff to resolve discrepancies.

Rules establishing allocations must specify a clear calculation methodology

Agreement was reached between the facilities and the District in almost all cases without going through an actual hearing. This end-result could not have been achieved if the rules did not include the clear calculation methodology, prescribed emission factors, and the exact production bases to be used.

The allocations of approximately 150 facilities have been revised after RECLAIM was adopted, based on updated information. Not all revisions were made in response to facility requests; some were the results of staff review of facility allocation calculations. The primary reasons for adjusting a facility's allocation included correction of an emission factor, re-apportionment of fuel usage, changing the peak activity year, and **amendment of previously submitted emissions data by facilities**. In cases where facilities claimed that their emission reports contained errors,

they were required to provide positive proof of production records or emission data from test results, and to submit amendments to the emissions reports. **Some requests to change emission reports and amend allocations were received as late as 1999** - five years after the start of the program. RECLAIM rules do not have a time limit for changes to allocations. Even though it is more difficult for facilities to provide positive proof as time progresses, it is also more challenging for the District to verify the data. A time limit for submitting requests for changes would have prevented a prolonged process and uncertainty. Some industries raised concerns about the amount of reductions proposed in the 1991 AQMP and how that translated into their annual allocations. In response to the above concerns, Rule 2015 included provisions to evaluate the ending emission factors for six specific source categories: glass melting furnaces; gray cement kilns; steel slab reheating, flat rolled product annealing and flat rolled product galvanizing furnaces; metal melting furnaces; hot mix asphalt operations; and petroleum coke calcining. Based on the Rule 2015 technology review, allocations adjustments were made for some of these facilities. This evaluation is another example where clear rule provisions can be adopted to guide further development after the rules are adopted.

Consider limiting the length of time that allocation changes can be made

Permitting

Traditional permits for individual emission sources are not designed to carry facility level requirements. A new facility permit was designed to identify and itemize all emission sources within a facility, specify emission limits and operating conditions, list MRR requirements, and specify annual allocations for the facility.

The facility permit was designed with standardized permit conditions and other features to simplify the administrative process for the District. The structure and content of the facility permit was developed with the specific intent of achieving the following goals:

- Convey all regulatory requirements;
- Support reporting requirements;
- Streamline permitting and data searching;
- Apply conditions in a consistent and standardized manner;
- Automate permit generation; and
- Accommodate Title V federal operating permit requirements.

When RECLAIM was adopted, existing permits were prepared manually, and the contents were not stored electronically. Therefore, a new system was designed and developed to enter and store data needed to compile the facility permit. Unlike the case of allocation determination, design work on facility permit was started fairly late in the development of RECLAIM. This compressed time frame required staff to simultaneously design the layout of the permit, develop the interface for inputting data, and collect all the existing permits for each facility. An earlier start to this effort would have allowed much smoother implementation. Additional time would have allowed training of non-technical staff to enter existing data into the system and allow engineers to review and correct content of the draft permits prior to sending them out.

Allow time for development and implementation of new permit requirements

Each facility was issued a draft facility permit for its review and comment. Staff worked with facility representatives to verify and correct the content before the final permit was issued at the start of the RECLAIM program. The facility permit has proved to be vital in conveying requirements to operators. It also serves as a very useful tool for compliance determination. The data collected and stored in electronic format allows much more comprehensive data search and analysis.

Process for Resolving Issues

Issues raised under Hearing Board petitions involved all aspects of the facility permits, including allocations, permitted equipment, and operating conditions. Most issues were resolved during extensive individual meetings between facility representatives and agency staff without going through actual hearings.

In general, issues arose because of lack of understanding of a set of complicated new requirements, ambiguity in the rule language, and the complexity of implementing MRR provisions in a wide variety of actual industrial settings. An extensive outreach program was the key to resolving implementation issues. The District hosted numerous public workshops, training seminars, open forums, and other meetings to help facility operators and consultants understand RECLAIM provisions. In addition, specialized working groups were established to resolve technical issues, such as CEMs and emission reporting. Where difficulties or circumstances unique to a particular operation were raised, staff would provide one-on-one help. During the first year of the program, District staff visited each facility to answer questions and verify installation and proper operation of fuel meters. District staff also periodically mailed information on the program, including notification letters informing RECLAIM facilities of upcoming compliance dates.

During the first three years of the RECLAIM program, District staff produced 17 Rule Interpretations and Implementation Guidance documents to help clarify specific requirements. These documents were distributed to RECLAIM facilities for their reference. In other cases, rule amendments were necessary to address implementation issues or situations that were not apparent during rule development. In the first three years of the program, the Governing Board approved eight amendments, ranging from minor corrections, to changes in monitoring requirements and emission factors used for calculating allocations.

Implementation requires dedicated staff resources for facility assistance, outreach, and rule interpretation

Internally, an administration team was formed to coordinate operations throughout the District as they relate to RECLAIM. This team was responsible for the consistent application of the rule requirements and acted as the clearinghouse for RECLAIM-related issues. In addition to addressing issues raised by sources, the team's priority was to train District staff on RECLAIM

provisions. Since RECLAIM represented a significant departure from traditional command-and-control regulations, extensive training of permitting engineers and field inspectors was conducted. The training areas consisted of:

- Structure and provisions of RECLAIM;
- Conversion of equipment-based permits to a facility permit;
- Use of standardized permit conditions;
- Conversion of throughput to emission limits;
- New standards for New Source Review (NSR);
- New monitoring, reporting and recordkeeping requirements;
- RECLAIM inspection procedures; and
- RECLAIM audit procedures.

Formal implementation guidance documents and training help ensure consistent interpretation and application of program rules

A RECLAIM Compliance Guideline document was developed in order to provide direction to District inspectors on the proper enforcement actions for RECLAIM violations. These training materials and the availability of a central clearinghouse assured that the provisions were consistently discharged and all sources were regulated in the same manner.

Certifying Compliance with MRR Provisions

RECLAIM facilities were released from compliance with traditional command-and-control rules only when they were fully compliant with MRR provisions under RECLAIM. This assured no regulatory gap. One of the most significant new MRR requirements was the installation of CEMS on major sources. Besides detecting both concentration and exhaust flow rates from a major source, CEMS automatically perform calculations that will yield daily mass emissions and perform data substitution if valid data are not collected.

A one-year period was allowed under RECLAIM to certify CEMS for major sources. During this interim period, production rates, such as fuel consumption rates, of sources were monitored. Emissions were calculated using a conservative approach based on emission factors which represented uncontrolled situations.

Retrofitting monitoring systems into existing exhaust stacks presented major challenges for some sources. RECLAIM rules were amended to allow delayed compliance dates as late as the end of 1997, four years from the initial implementation date.

Unlike the Acid Rain Program, which only dealt with one specific industry, RECLAIM covers the full spectrum of industrial facilities located in the Basin. The Acid Rain Program included a detailed listing of all parameters that may affect emissions. RECLAIM had to encompass the wide variety of industrial processes, so the range of parameters to be monitored could not be defined. The lack of a uniform data monitoring approach prevented the development of a tool that can be used to automatically confirm the accuracy of the emission calculation prior to actual CEMS operation.

Over the course of RECLAIM implementation, CEMS technical issues arose which delayed certification of many CEMS.

To address these issues and further assist facilities in complying with major source monitoring requirements, a standing working group on RECLAIM CEMS Technical Issues was formed to provide a forum in which facility representatives, consultants and District staff could discuss and work out technically sound and reasonable solutions. Although the working group was open to any interested party, the issues it has addressed tend to be associated mainly with refineries implementing CEMS requirements. This difficulty is due to the variability of the fuel used in refinery equipment as compared to natural gas, the operational variability of much of the affected equipment, and the fact that many of the sources in older refineries were never constructed with CEMS monitoring in mind. The working group created subcommittees to deal with issues related to:

Working groups can assist with implementation issues

- pre-certification testing and information requirements for CEMS;
- post-certification testing requirements for routine (foreseeable) repairs or replacements of portions of the CEMS, vendor pre-certification of analyzers, and data submittal formats for semiannual and annual assessment testing; and
- certification of total sulfur compound monitoring systems.

A significant number of issues were resolved through clarifications and Technical Guidance Documents. These resolutions were the result of cooperative and open discussions of the issues at hand and creative approaches to bring about technically sound solutions.

Lessons Learned

- Accurate emission inventory is crucial to developing fair and consistent allocations.
- Detailed and precise allocation methodology needs to be spelled out.
- Specify time limits and procedures for refining allocations.
- Compile all requirements into a centralized document.
- Recognize the necessary changes to existing systems and start early.
- Allocate adequate resources for both new and existing programs.
- Open dialogue is key to implementation success.
- Criteria for determining compliance need to be well understood both internally and externally.
- Set up procedures to allow for improvement of the program.
- Accurate and verifiable emission determination is crucial to a market incentive program.
- Include an adequate length of time in an implementation phase to assure proper emission measurements are established as new monitoring instrumentation is installed.
- Be aware of unique situations that present technical challenges to properly monitor emissions.
- A well-defined data substitute scheme must be in place to account for the inevitable periods when valid emission data cannot be obtained.

Chapter Two – On-Going Implementation

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Throughout the existence of the program, the RECLAIM Administration Team was maintained to coordinate operations of the various divisions within the District in response to issues related to RECLAIM. Its duties include interpreting rule requirements, responding to inquiries, staff training, tracking emissions, processing RTC trades, resolving issues, drafting rule interpretations, and proposing amendments to RECLAIM rules. This team is essential to ensure consistent application of RECLAIM provisions.

Permitting

District staff annually re-issues part of the facility permit dealing with the allocations to document facility annual emission targets and to reflect a facility's allocation at the start of the compliance year reflective of facility RTC purchases and sales, as well as exceedance deductions or other adjustments. In addition to the re-issuance of the facility permit for allocation changes, the District staff also re-issues the facility permit, as needed, due to the following:

- Addition, modification or removal of equipment;
- Modification of source classification (major, large, process unit), which impacts the MRR requirements, or changes in fuel usage or heat input limitations;
- Emission factor or concentration limit changes;
- Alternate MRR requirements; and
- Administrative changes – such as information on responsible official, contact names, and change of operators, etc.

The permit database formed the basis for receiving emissions by individual pieces of equipment. This is the first time ever that emissions from individual sources are identified with the sources and linked to each other. This allows District staff to efficiently conduct emissions audits as data from permits can be cross-checked with data from emission reports.

Emission Audits

District staff has been conducting annual emission audits at each and every RECLAIM facility since the start of the program. These audits verify compliance with MRR requirements and where errors are found, the emissions are corrected prior to determining compliance with the facility annual allocations.

Auditing MRR records from RECLAIM facilities required significant adjustments to the existing field compliance inspection procedures. Even though inspectors were accustomed to collecting

and reviewing operational data, they had to be trained on reviewing data generated by CEMS and on the various mass emission calculation methods specified under RECLAIM. RECLAIM sources are categorized into major sources, large sources, or process units based on their size and emission potential. Different MRR requirements are applicable to different source classifications. In addition, a wide variety of emission sources from different industries are included in RECLAIM. There are also different types of monitors and record retention equipment used by facilities. The lack of uniformity in the data collected prevented the development of an all-encompassing emission calculation tool that can be employed from facility to facility. As a result, emission audits have to be tailored to each individual facility and performed by inspectors assigned to the facility.

District inspectors are trained to follow general auditing steps and use a standardized audit forms developed for this purpose. Engineers are available to assist inspectors with data and calculation procedures. The general auditing steps consists of pre-audit preparation, field inspection and audit, data gathering, post-inspection emission review, and results. Emission reviews can be subdivided into two types – CEMS data and other.

Real time emissions data are collected by CEMS every few seconds and are averaged to yield 15-minute and hourly data. These data are totaled to provide daily mass emissions. Since the calculation is performed by a computer system, a random spot check of several days is sufficient to determine if the system is set up to properly calculate emissions. Missing Data Procedures are required when CEMS are not operating properly.

Emissions from non-major sources are mainly dependent on the amount of fuel consumed and a permitted emission limit or factor. Therefore, the emission audit is focused on verifying fuel consumption records for individual pieces of equipment. Large sources are required to keep monthly fuel data and process units are required to keep quarterly fuel data. Verification of fuel consumption by each piece of equipment can also be quite challenging in cases where there are numerous sources of different categories. Where fuel consumption data are found to be inaccurate, facilities are required to provide proof of accuracy for the fuel meters. Inaccurate fuel meters are required to be repaired or replaced. Data obtained from inaccurate fuel meters are substituted with Missing Data Procedures.

Audits are a necessary part of compliance verification

Audits completed by field inspection teams are reviewed to assure that RECLAIM provisions were consistently applied, emissions calculations are complete, and to verify compliance determination with facility annual allocations. This final step is necessary because facility allocations change constantly due to emission debits and RTC transactions. This step has also helped raise the quality of the audits generated by inspectors.

Audits conducted by District staff revealed many different problems related to MRR requirements. The most common causes can be attributed to human errors and the most significant emission impacts are related to failure of CEMS. Human errors include math errors, inaccurate records, untimely records or report submittal, and late source tests or Relative Accuracy Test Audits (RATA) for CEMS. Some of these errors are introduced when personnel

changes occur at a facility and could be prevented by consistent training of facility staff responsible for RECLAIM compliance. CEMS failures include programming bugs within the computers, analyzer failures, daily calibration not properly performed, and failure to report daily emissions. Failure to capture valid data by the CEMS results in the emissions being determined using rule-prescribed Missing Data Procedures. Since CEMS are used on sources with the highest emission potential, their failure results in the most significant emission impact for a facility. In response, most RECLAIM facilities with CEMS employ specialized staff to properly maintain the CEMS.

Formal facility representative training requirements should be considered as part of program design to help increase understanding of, and compliance with, program protocols

RECLAIM rules require that daily emission reports for major sources have to be submitted within a specified time frame. If daily emission reports have not been submitted on time, emissions have to be substituted with Missing Data Procedures. These daily reports are generated by the CEMS and automatically transmitted to the District Central Station computer. RECLAIM facilities encountered numerous data transmittal problems in the early stages of RECLAIM. Facilities closely monitored these transmission problems and resolved them as they arose. However, these problems would also occur over weekends and holidays when facilities were not fully staffed. In response, RECLAIM rules were amended to allow limited occurrences in a year during which daily reports using actual emission data can be submitted late. In addition, the District developed an on-line web page, Web Access to Electronic Reporting System (WATERS), that provides facilities a listing of emission reports received. This system allows facilities to identify and correct reporting problems prior to data submission deadlines.

WATERS was further enhanced to assist facilities in reporting emissions from non-major sources. This helps eliminate issues related to composing electronic emission reports and report transmissions for non-major source emissions. Prior to this development, some smaller facilities without major sources employed third parties to transmit electronic emission reports to the District. These facilities lack the technical resources to handle computer issues. The enhancement of WATERS helped facilities eliminate operating costs and gain assurance that they are meeting the reporting requirements.

CEMS Accuracy Verification and Re-Certification

Nearly 80 percent of emissions under RECLAIM are from major sources, which are monitored by CEMS. Therefore, the accuracy of these emission data is of utmost importance in determining if RECLAIM is achieving its emission goals. In order to assure the highest accuracy, several checks are imposed on CEMS – initial certification and re-certification when modified, daily calibration checks, routine quality assurance and quality checks (QA/QC), and a semi-annual relative accuracy test audit (RATA).

Prior to installing a CEMS, the facility operator is required to obtain approval of its monitoring plan which describes all aspects of the expected emissions, the CEMS set up, the testing protocols, and all QA/QC procedures. Once the CEMS installation is complete, the whole

system is required to go through a rigorous certification test to demonstrate that the CEMS can operate automatically and yield accurate data. Once a CEMS has been tested, the operator may certify its accuracy and submit the result for District approval. In the interim, the CEMS is considered to be “provisionally certified,” and can be used to determine emissions while the test results are reviewed by the District. In addition, the operator must conduct daily calibration and implement all QA/QC procedures. Once certified, a semi-annual RATA is required of most CEMS. CEMS that have been tested to yield better accuracy (less than 7.5 percent deviation) may extend the RATA due date to 12 months.

Very detailed specifications are required for monitoring equipment

CEMS certifications and test reviews are conducted by District staff highly specialized in emission source testing methods. CEMS certifications are issued with detailed descriptions of CEMS components identified by serial numbers. Any changes to the identified components require the CEMS to be re-tested to assure accuracy. The test required depends on the actual components replaced. Replacement of major components, such as analyzers, requires a full-blown certification test. This rigorous testing scheme helps guarantee that the CEMS can provide accurate data. However, due to the wide variety of electronic equipment used and non-uniform data set as previously discussed, the data acquisition component of the CEMS is not checked within the certification process.

After overcoming the initial certification issues, improvements in RATA results were made. In recent years, RATA results show that CEMS are passing at an almost 100 percent rate. There have been issues with RATA not performed within required deadlines. Most of these issues were due to either human error of not scheduling the test in time, or delays caused by unexpected downtime of equipment. Data obtained by CEMS that do not pass daily calibrations or have missed RATA are considered invalid and emissions have to be substituted. In addition, CEMS are highly sophisticated equipment that requires a specialist to keep them in proper operating condition. Most facilities have an on-site instrument specialist for the maintenance of their CEMS. Recent issues with CEMS mainly concern the low stack concentration found in some exhaust stacks. With the advent of NO_x emission controls and lowered allocations, NO_x concentration levels are approaching the lower detection limit of the test method used to prove the accuracy of CEMS. District staff worked with EPA to approve new testing methods to allow testing to be conducted for these low concentration exhaust streams.

Source Testing and Emission Verification

Monitoring of large sources and process units is largely covered by the use of fuel meters. However, there are special installations that require actual stack flow monitors, for example, a thermal oxidizer that consumes minimal fuel and draws most of its heat input from the waste stream. In addition, RECLAIM rules require that concentration limits on large sources and process units to be periodically tested to show compliance with permit limits.

Source testing is required to be conducted according to pre-approved source test protocols and by personnel that are approved through the District Laboratory Approval Program (LAP). Standard

source test protocols have been issued for testing of commonly found equipment. Four standard protocols were developed for boilers, furnaces, heaters, and internal combustion engines. These standard protocols are accepted in lieu of pre-approved source test protocols. In addition, a previously approved protocol can be re-used to test the same source.

Common problems associated with source testing of large sources and process units include late or missing tests, tests conducted not in accordance with an approved test protocol, and non-compliant test results. Late and missing tests and testing without approved protocols are the results of human errors and late scheduling. RECLAIM rules prescribe procedures when source tests show non-compliance. In cases where tests show emission levels above emission limits, in addition to incurring a violation each day after the test was conducted, emissions from the source have to be calculated using the higher tested level until the equipment is tested again and shown to be in compliance. In cases where tests show that flow monitors are not accurate, monitors are required to be re-calibrated and re-tested after they are installed. Emissions in the meantime are calculated pursuant to Missing Data Procedures.

Violations

RECLAIM violations typically fall into five basic categories: Allocation; Monitoring; Recordkeeping; Reporting; and Operational. Each type of violation presents unique challenges for a prosecutor – some of which may be avoided during program design, but some of which are inherent in any cap-and-trade program.

Initial Allocation Violations

Impact on Prosecutions

In the first years of the RECLAIM program, there were virtually no prosecutions for exceeding an allocation. The initial allocations were generous so companies did not have higher emissions than their allocations. In addition, in the early years of RECLAIM, RTCs were so plentiful that, even if a company expanded its operations or otherwise increased its production significantly, RTCs could be purchased for little cost.

Expect that there will be allocation disputes and provide an administrative process for resolution

Impact on Penalties

Early allocation violations garnered relatively modest penalties. These violations were invariably due to the use of emission factors that had not yet been approved by the District, or were the result of using missing data provisions to calculate emissions because the facility was experiencing difficulty with its new monitoring or reporting systems.

Impact on the Hearing Board

Because variances from allocation exceedances were prohibited, the impact on the Hearing Board was limited to permit appeal disputes concerning the accuracy of the allocation contained in the RECLAIM facility permit. Facilities claimed that the allocation baseline was drawn from years in which their annual emissions were (for various reasons) under-reported in the annual

emission reporting form that is filed with the District every year. Ultimately the District allowed these facilities to correct all prior data on which the allocation was based, but required these corrections to be certified, and obligated these facilities to pay all back emission fees and late payment penalties.

On-Going Allocation Violations

As the RECLAIM program progressed beyond its initial years, allocations became more representative of actual emissions at the facilities. At this point, certified monitoring systems were in place and there were far less disputes over emission factors or other allocation issues. Accordingly, allocation violations were rigorously enforced and penalized. However, a new set of problems were presented.

“Enforcement Lag”

Audits of RECLAIM facilities are comprehensive, complicated, and time-consuming. The audit cannot be initiated until after the end of a compliance year, including its final reconciliation period of 60 days. The audit itself may take months of work by an inspector, who must then prepare findings, organize supporting evidence, and write a final report. By the time the audit has gone through its supervisory reviews, the prosecutor may be handed a case that is based on an audit that was commenced one or more years earlier. This “enforcement lag” may greatly reduce the time period for reviewing, investigating, and settling the matter or filing a criminal or civil complaint to prosecute the violation. If the violation warrants criminal prosecution, the one year criminal statute of limitations may have already been exceeded.

Build in procedures to minimize enforcement lag for audit processes

Impact on Prosecutions

In a civil prosecution, the statute of limitations runs three years after the District “knew or should have known” about the violation. If the allocation violation resulted from errors made over a long time period, such as the use of improper emission factors, the statute may be deemed to have commenced running from the first date that the emission factor was referenced in a report to the District, as opposed to when the District conducted its audit of the facility. The District interprets the running of the statute to commence as of the date that the audit was finalized and a letter was sent to the facility informing it of its violation and the deduction taken from its allocation account. This interpretation, however, has not been tested in court.

Rolling Violations

RECLAIM regulations provide that, when an allocation is exceeded, the excess emissions will be deducted from the facility’s allocation for the subsequent year. However, since the audit is rarely, if ever, completed in time for the deduction to be taken from the allocation for the compliance year following the violating year, the District, at first, allowed companies to account for the excess emissions over several years following the audit findings. This would prevent the audit determination from putting a facility in violation of the following year’s allocation before it was even notified of the results of the audit. This situation became known as a “rolling”

violation. However, this practice was challenged in a lawsuit against the District, which asserted that RECLAIM rule language required the excess emissions to be made up in a single year (i.e. the year following the exceedance). As part of a settlement agreement, the District agreed to strictly require that, in the event of an allocation violation, the excess emissions must be made-up in the year following the determination of the exceedance, even if that results in a negative allocation balance to the company. The problem of rolling violations, therefore, is significant and, in the worst cases, can jeopardize the existence of a RECLAIM facility.

Impact on Prosecutions and Penalties

A negative allocation balance places a facility in the position of not being able to operate for a single day without violating its allocation. These businesses must purchase credits immediately, and in substantial quantity, in order to continue production. In doing so, a facility may exhaust its financial resources. In such cases it has been difficult to assess the appropriate penalty because the financial burden of the penalty on the violator is a factor required by statute to be considered in assessing penalties.

The rules should be clear as to whether a source may or may not make up an allocation exceedance over a multi-year period

Scarcity and Affordability of Trading Credits

A market-based program should anticipate different scenarios that may cause credits to become scarce and/or unaffordable. One such scenario in the RECLAIM program was the 2000/2001 California energy crisis. In what now appears to be a deliberate scheme to manipulate the California energy market, electrical generation was taken off-line at critical times, thus driving

Be prepared for external market forces or manipulation that may affect the availability or affordability of credits

demand up and creating a need for increased electrical generation. Southern California power plants are RECLAIM sources and could not meet the increased demand without purchasing additional credits in order to not exceed their allocations as

many had not yet installed available retrofit emission control equipment. This made RECLAIM credits both increasingly scarce and unaffordable for many facilities. Consequently, there were a number of smaller RECLAIM sources that could not afford to purchase needed credits.

Impact on Prosecutions and Penalties

To address this situation, energy companies were required to comply with all RECLAIM requirements, notwithstanding the need to “keep the lights on.” Structural buyers and other affected sources were placed under an Order for Abatement, which allowed the sources to continue operation under conditions imposed by the Hearing Board. Penalties for these violations were assessed under a special penalty policy based on the reasonably foreseeable RTC price for the compliance year in which the allocation violation occurred.

Real Cases, Real Stories: The California Energy Crisis

The 2000/2001 California energy crisis had a significant impact on the RECLAIM prosecution program. Manipulation of the California energy market led to abnormally high demand for electrical generation, which led to high demand for NO_x RTCs from the utility sector in 2000.

The utility sector purchased 60% of the NO_x RTCs expiring in December 2000. NO_x RTCs increased from approximately \$1,800 per ton in 1999 to over \$45,000 per ton in 2000.

Both the Los Angeles Department of Water and Power (LADWP) and AES Alamosa, LLC (AES) – major electrical generators in Southern California – believed that the power crisis, as managed by the California Independent System Operator (ISO), relieved them of their compliance responsibilities under RECLAIM. In various meetings with these facilities in 2000, the District was told that both sources intended to operate as necessary to meet energy demand, without paying any penalties and without suffering any future allocation deduction for any allocation exceedances. Adding to this pressure on the program was the Governor's declaration of a state of emergency that directly affected the District's enforcement authority over these sources.

The compliance issues were resolved by placing the LADWP under an Order for Abatement that would allow the department to exceed its annual allocation under conditions imposed by the AQMD Hearing Board. A \$14 million dollar penalty (in the form of environmental projects) was negotiated for the anticipated allocation violation. This limited the facility's flexibility in selling excess energy to the ISO for use by consumers around the state. The situation with AES, which was operating daily in violation of its annual allocation, was resolved by imposing mitigating conditions on its permit as allowed by the RECLAIM rules. In addition to the allocation exceedance deduction to offset the excess emissions, AES agreed to pay a \$17 million dollar cash penalty for its RECLAIM violation.

The rapid inflation of RTC prices severely affected a number of industrial sources that either found it economical or unavoidable to rely on RTCs for compliance with RECLAIM instead of relying on the installation of NO_x controls. Because prices increased dramatically over a relatively short period of time, facilities did not have enough time to add controls before the end of their compliance year. The District issued a special penalty policy for these violations utilizing an economic benefit approach. These companies were required to pay a penalty based upon the RTC price reasonably foreseeable prior to the energy crisis, which was determined to be \$7.50 per pound; make up all exceedances; and install any feasible NO_x controls. This approach recovered the economic benefit of the violation and made the environment whole, while avoiding extensive business closures. Any other approach would have made these companies victims of energy market manipulation and would not have served the interests of justice.

Fraudulent Trading Practices

Fraud must be anticipated in the design of a trading program. Significant damage to the program and to individual facilities may be caused by the making of false statements.

Impact on Prosecutions and Penalties

Clearly the harshest penalties for fraud based on false statements must be imposed on the party who knowingly sells or trades invalid credits. These cases are either subject to maximum civil penalties or referred for criminal prosecution. The more difficult cases concern facilities that traded in apparent good faith, not realizing the trade involved invalid credits. In these cases,

companies purchased credits that were never delivered. The consequences of such fraudulent transactions placed the company in violation of its current allocation and forced the company to repurchase valid credits. These cases require careful review to determine the extent to which the company knew or should have known that it was in danger of placing itself in violation when it participated in the trading transaction. Compliance history, emission reports, and internal company documents will reveal this information and dictate how substantial the civil penalty needs to be in order to ensure future compliance.

Real Cases, Real Stories: Fraud in the RECLAIM Market

Fortunately, RECLAIM has experienced only one case of fraudulent trading practices. This matter, which as of this date is a pending federal criminal prosecution, involved a prominent individual who participated in the design of the RECLAIM trading program and who participated in a credit exchange business during the implementation of the program. This business engaged in an extensive scheme to defraud facilities and individuals that trade in RTCs or allegedly on RTC sales for RECLAIM compliance.

This scheme spanned more than four years and involved the fabrication of contracts, the forgery of signatures, and the impersonation of corporate executives. The business was operated as a shell game or “Ponzi scheme,” obtaining millions of dollars from clients that were supposed to be held in trust pending the closing of RTC sales and subsequently using those funds to pay off earlier debts of the enterprise.

This scheme came to light when inconsistencies in trading practices in RTC trades administered by the business were noticed by District staff. The business was issued a Notice of Violation for making false statements in connection with various RECLAIM trading transactions. After further investigation by the District, the matter was submitted to the U.S. EPA Criminal Investigation Division, which, after review and investigation, referred the matter to the U.S. Department of Justice for criminal prosecution.

Over 20 RECLAIM facilities were affected in some way by this fraudulent activity. A number of these companies were substantially harmed by paying for credits that were never delivered and then having to pay for those credits again in order to remain in compliance. And while all of the allocation exceedences caused by this criminal activity were made up from future allocations, the “black eye” this caused to the RECLAIM program has left a legacy of lasting harm.

Late Entry Facilities

Some businesses entered into the RECLAIM program more than a year or two after program implementation. These were businesses that located to the Basin after RECLAIM had been adopted and those that unsuccessfully challenged their inclusion in RECLAIM. Allocations for these facilities were determined as if they had been in the program from the start, which meant that some of these late-entering sources were subject to a steep declining allocation balance without the advantage of a generous initial allocation. Some of these companies found themselves in violation in the first year, usually due to problems with monitoring and reporting requirements (which resulted in the imposition of missing data provisions, putting them over their allocation.).

Impact on Prosecutions and Penalties

Penalties in these cases depended heavily on the facts that led to the violations, understanding that some temperance was appropriate due to the facility's inexperience with the program.

Monitoring Violations

Accurate emissions monitoring is the backbone of any cap-and-trade program. In order to be certain that annual emission caps are not being violated, it is imperative that monitoring systems be certified, tamper-proof, calibrated, and maintained. Accordingly, the RECLAIM program relies on the use of certified CEMs, sealed fuel meters, and equivalent technologies to monitor emissions from RECLAIM facilities. In addition, there are requirements for regular testing and calibration of monitoring equipment.

Impact on Prosecutions

Monitoring requirements give rise to a panoply of potential violations – from failing to timely recertify a CEMs to using the wrong kind of fuel meter. Since monitoring requirements generally go hand-in-hand with reporting requirements, these violations are relatively easy to establish and prove, up to and including the number of days of violation.

It is imperative that monitoring systems be certified, tamper-proof, calibrated, and maintained

Impact on Penalties

Penalties for monitoring violations need to be high enough to ensure that there is no incentive to disconnect the monitoring rather than show actual emissions during a period of facility upset or unusually heavy production. It is to be expected that monitoring systems will sometimes fail, and RECLAIM rules provide for this eventuality by giving facilities time to make repairs and more reasonable missing data provisions to apply during that brief period of time. Penalties, therefore, need to be designed to deter deliberate tampering with monitoring systems in order to take advantage of potentially reporting more favorable emissions.

Impact on the Hearing Board

The Hearing Board is authorized to grant variances from monitoring requirements provided that all statutory requirements are met. Since, by law, the Hearing Board can not grant a variance from either the annual allocation or missing data provisions, care must be taken to ensure that a variance is granted from limited requirements. For example, the Hearing Board may grant a variance from the requirement to operate only with a certified CEMs; however, it should be sure to emphasize that the variance does not relieve the petitioner from calculating emissions using missing data and that the petitioner must comply with its allocation.

Real Cases, Real Stories: Missing Data

Missing data is a critical program safeguard, but two cases – Exxon Mobil and Shultz Steel – illustrate the advisability of some discretion for ameliorating the effects that missing data can have on the market as well as individual companies.

The Mobil refinery is a RECLAIM facility that operates a number of major sources requiring CEMs monitoring systems. Mobil experienced programming bugs with the Data Acquisition System, or DAS, that is the reporting software for the CEMs data. The software problems made it necessary for Mobil to operate under variance for two years, which provided time for Mobil to eventually solve the problems but did not affect the application of missing data, which resulted in massive NOx emissions (over one million pounds) in excess of its annual allocations for both years. In order to avoid a serious shock to the NOx RTC market – had the exceedances been deducted from a single compliance year and thus forcing Mobil to purchase equivalent RTCs – the District negotiated multi-year deductions from Mobil's RECLAIM allocation.

The application of missing data can also threaten the existence of an individual company. In the case of Shultz Steel, many of its fuel meters failed to operate or to operate accurately, resulting in the application of missing data covering several compliance years. The resulting exceedances were in excess of 100,000 pounds. The company was placed under an order of abatement that set forth a multi-year deduction schedule, plus the installation of low NOx burners. These measures allowed the company to remain in business.

But, as stated earlier, the exercise of enforcement discretion with respect to missing data was challenged in a lawsuit against the District, with the District agreeing to not spread out exceedances over multiple compliance years. In designing future trading programs, careful consideration should be given to authorizing some procedure for the exercise of discretion in cases where the market or individual companies might experience disastrous consequences.

Recordkeeping Violations

Records to substantiate emissions data, conduct of tests, and filing of reports must be kept on-site and made available in the event of an inspection. Prosecutions of these types of violations do not present any unusual or special challenges.

Reporting Violations

Next to monitoring, reporting is the most important element to ensure compliance with a cap-and-trade program. RECLAIM requires a range of reporting, from daily electronic reporting of emissions from major sources to the final annual emissions report. Reporting must be timely and accurate.

Next to monitoring, reporting is the most important element to ensure compliance with a cap-and-trade program

Impact on Prosecutions

Reporting must be timely and accurate. Prosecution of violations is relatively straight forward.

Impact on Penalties

Reporting violations may be minor, such as failing to report emission from small sources electronically for a day or two because of technical problems; or more significant, such as filing an inaccurate annual report because the facility was using unapproved emission factors, thereby concealing an allocation violation. Penalties will vary accordingly.

Lessons Learned

- Equipment data logically stored in an electronic database supports efficient data compilation.
- Computer application development is resource intensive.
- Inspection staff needs to be re-trained to perform technical emission reviews.
- A uniform data set would allow efficient checking of emission reports.
- An oversight team can help coordination and ensure consistent program implementation.
- Smaller facilities are less sophisticated and need technical assistance.
- Facility training on an annual basis should be considered.
- Rigorous verification of CEMS accuracy, thorough plan check and approval, and specialized staff is needed.
- Skilled technical staff is needed to maintain proper operation of CEMS.
- Monitoring equipment and testing procedures need to keep pace with advances in emission controls.
- Periodic verification of monitoring equipment for smaller sources is also needed.
- Specialized staff is needed to review and approve source tests
- Emission calculation methodology during non-compliant periods needs to be specified.
- Expect that there will be allocation disputes and provide an administrative process for resolution.
- If an audit process is utilized for annual compliance determinations, build in procedures to minimize enforcement lag.
- The rules should be clear as to whether a source may or may not make up an allocation exceedance over a multi-year period.
- Be prepared for external market forces or manipulation that may affect the availability or affordability of credits.
- Fraud must be anticipated in the design of a trading program.
- It is imperative that monitoring systems be certified, tamper-proof, calibrated, and maintained.
- Next to monitoring, reporting is the most important element to ensure compliance with a cap and trade program.
- Clear guidelines for enforcement action provides for consistent applications of rule provisions.
- Regulated sources need to have timely audit results.

Chapter Three – Mid-Course Corrections

Authors: Carol Coy and Danny Luong

Contributors: Fortune Chen, Chris Hynes, Don Nguyen, Paul Park,
Cathy Ragland, Sandys Thomas and Susan Tsai

In 2000 and 2001, the California energy market experienced a period of high power demand and rolling blackouts. During this period, there was a shortage of power supply. As a result, many power producing facilities within the Basin increased their power generation. The corresponding increases in NO_x emissions caused a sudden surge in the NO_x RTC prices that adversely impacted other RECLAIM participants and the overall emission reductions of the program.

RTC prices started to increase rapidly in June of 2000. Over the summer of 2000, emissions from power producing facilities increased sharply when compared to emissions from same facilities in 1999. The District Governing Board directed staff to examine the RECLAIM program and recommend actions to stabilize RTC prices.

As a result, staff submitted a report, Potential Backstop Measures to Stabilize NO_x RECLAIM Trading Credit Prices, to the District Governing Board in January, 2001.

Plan for the inevitable – mid-course corrections will be needed

At the same time, the Governor of California declared a state of emergency in response to the power crisis. In May 2001, the District's Governing Board adopted RECLAIM rule amendments to reduce the RTC demand from power producing facilities and to stabilize the sharply increasing NO_x RTC prices.

Amendments to Reduce RTC Demand from Power Producing Facilities

Prior to 2000, most power generating units at power producing facilities were not retrofitted with NO_x emission reduction equipment. Therefore, a significant increase in emissions resulted when these power generating units were forced to run full-time during 2000. The rule amendments isolated the power producers from the rest of the RECLAIM market. An Emission Mitigation Program was established to fund emission reduction projects to offset the increased emissions from power producing facilities. In addition, power producing facilities were required to submit plans to install BARCT on all existing power generating units by the end of 2004.

Table II-3-1 shows the emission comparison for power plants and other facilities in compliance year 2000 and 2005. The table includes RTCs held, initial allocations and the differences for each category. The substantial reduction in emissions from power plants is illustrated in the shaded boxes.

**Table II-3-1
Power Crisis – Emission Comparison**

	Compliance Year 2000				
	Non-Power Producing Facilities		Power Producing Facilities		All Facilities
	(a)		(b)		
	RTCs Held	Initial Allocations	RTCs Held	Initial Allocations	
Allocations [tons]	12,345	14,895	4,852	2,302	17,197
Emissions [tons]	13,703		6,788		20,491
Difference [tons] (Exceedance)	-1,358	1192	-1,936	-4,486	-3,294

	Compliance Year 2005				
	Non-Power Producing Facilities		Power Producing Facilities		All Facilities
	(a)		(b)		
	RTCs Held	Initial Allocations	RTCs Held	Initial Allocations	
Allocations [tons]	10,457	10,779	2,027	1,705	12,484
Emissions [tons]	9,111		445		9,556
Difference [tons] (Exceedance)	1,346	1,668	1,582	1,260	2,928

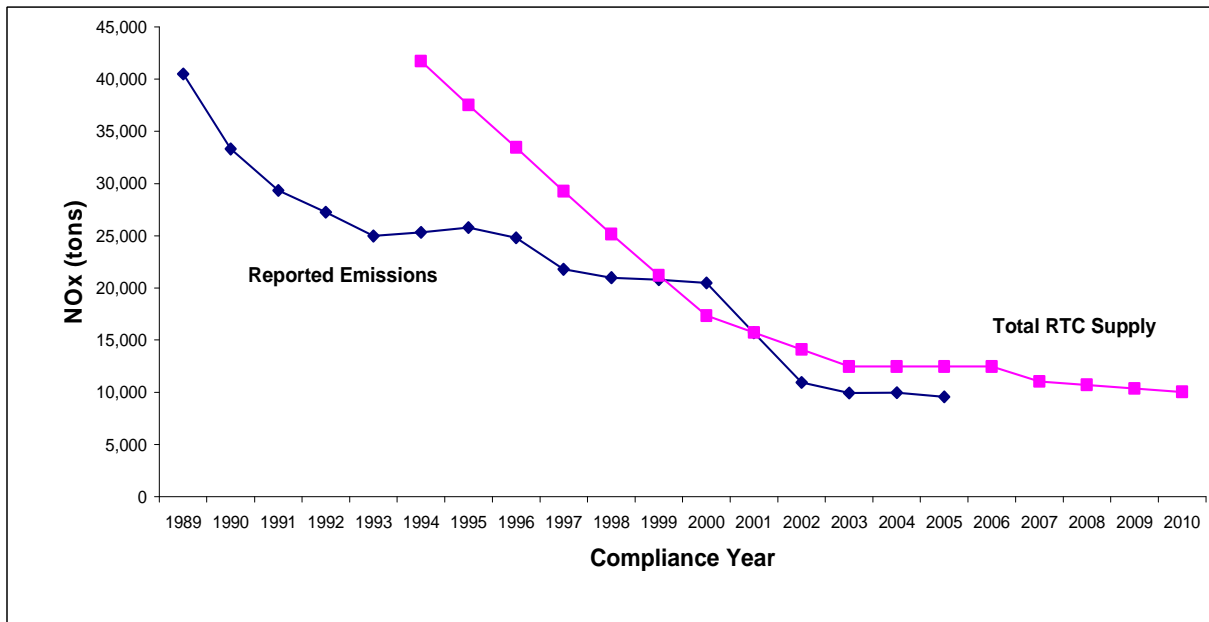
Table II-3-2 shows the percentage of unused NOx RTCs for each year of the program, from 1994 through 2005. It illustrates the generous initial allocations and the effect of the power situation and mid-course correction. It also illustrates the fact that actual emissions have decreased by over 60 percent since program inception.

**Table II-3-2
Annual NOx Emissions for Compliance Years 1994 through 2005**

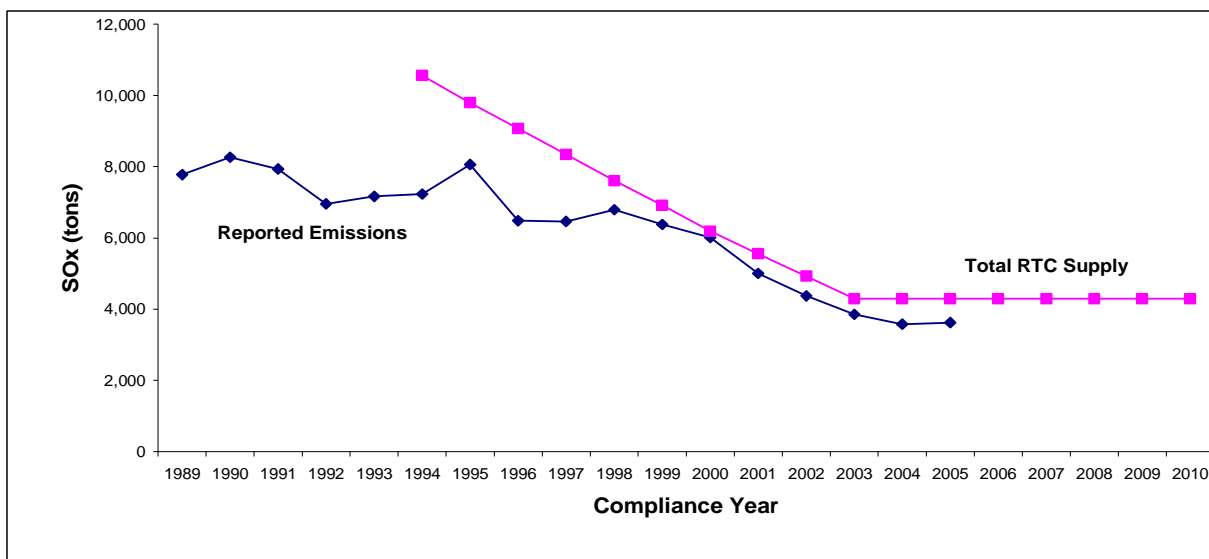
	Annual NOx Emissions (tons)	% Change from 1994	Total NOx RTCs (tons)	NOx RTCs Left Over (tons)	NOx RTCs Left Over (%)
1994	25,314	0.0%	40,127	14,813	37%
1995	25,764	1.8%	36,031	10,267	28%
1996	24,796	-2.0%	32,017	7,221	23%
1997	21,786	-13.9%	27,919	6,133	22%
1998	20,982	-17.1%	24,678	3,696	15%
1999	20,775	-17.9%	21,013	238	1.1%
2000	20,491	-19.1%	17,197	-3,294	-19%
2001	15,721	-37.9%	15,693	-28	-0.18%
2002	10,943	-56.8%	14,044	3,101	22%
2003	9,942	-60.7%	12,484	2,542	20%
2004	9,953	-60.7%	12,477	2,524	20%
2005	9,556	-62.3%	12,484	2,928	23%

Figures II-3-3 and II-3-4 illustrate the reported NOx and SOx emissions from 1989 to 2010 and available RTCs for each year of the program.

**Figure II-3-3
NOx Emissions and Available RTCs**



**Figure II-3-4
SOx Emissions and Available RTCs**



Other Amendments Affecting Non-Power Producing Facilities

The May 2001 amendments also required non-power producing facilities with annual NO_x emissions greater than 50 tons per year to file compliance plans to show how annual allocations through the year 2005 will be met. These facilities could install BARCT, purchase RTCs, or both. RTC purchases had to be secured prior to approving the compliance plan. Facilities with annual NO_x emissions between 25 and 50 tons were also required to submit a compliance forecast report. These forecast reports were meant to be planning tools for facilities to look forward and plan for annual allocation compliance. However, provisions of these forecast reports, unlike those of the compliance plans, were not enforceable.

Amendments Affecting the Market and RTC Supplies

In 2001, six rules were adopted to allow pilot credit generation programs for on-road vehicles, heavy-duty yard hostlers, marine vessels, ship hoteling operations, truck trailer refrigeration units, truck stops, and agricultural pumps. These rules provide the protocols for generating emission reductions from mobile and area sources. These pilot generation rules were subsequently approved by EPA. Several projects were funded by the District with funds from the emission mitigation program. These projects were to re-power marine vessels and to replace diesel powered agricultural pumps with electrical pumps. Only one project, using the marine vessel rule, was initiated by a private party. However, that party applied the emission reductions to another District mobile source program in lieu of reductions to be obtained from rideshare plans, as allowed by Rule 2202 - On-Road Motor Vehicle Mitigation Options.

Amendments were also made to RTC trade requirements to address concerns regarding availability of trade information. RECLAIM rules were amended to require:

- Trade registrations be submitted within five business days of reaching an agreement;
- Actual owners of RTCs traded be identified; and
- Forward contracts and contingent rights to trade be reported within five days of reaching an agreement.

Lessons Learned

- Closely monitor the status of the program.
- Ensure adequate mechanisms are available to allow for timely program changes.
- Emission controls cannot be installed in time to respond to sudden market up-swings.
- Built-in command-and-control requirements should be automatically triggered when substantial problems occur to avoid long lead times needed for emission control installation.
- Make alternative sources for generating emission reductions available.

Chapter Four – Market Issues

Authors: Carol Coy and Danny Luong

Contributors: Fortune Chen, Chris Hynes, Don Nguyen, Paul Park, Cathy Ragland, Sandys Thomas and Susan Tsai

Each RTC is denoted as one pound of NOx or SOx emissions allowance with a specific expiration date and one-year life, and can be traded anytime through the end of the 60-day reconciliation period following the expiration date. Each facility is issued allocations for all future years, which provides the participating facilities with knowledge about their future emission reduction requirements. With known emission goals, a facility can plan for future operations. It can either plan for additional emission reductions or secure any required RTCs through trades. Thus, the trading aspect of RECLAIM is a key element in enabling facilities to achieve RECLAIM compliance at minimum cost with maximum flexibility.

The RTC market has been active since the inception of the RECLAIM program in 1994. The RECLAIM market recorded a total of over 500,000 tons RTCs traded at a total value exceeding 863 million dollars. Figures II-4-1 and II-4-2 illustrate the distribution of RTCs traded in terms of volume and value. Any person may choose to participate in the RTC trading market. In addition to RECLAIM facilities, brokers and investors have been active participants of the market. Lately, mutual funds and foreign entities have also invested in RTCs.

**Figure II-4-1
Total Quantity of NOx RTCs Traded**

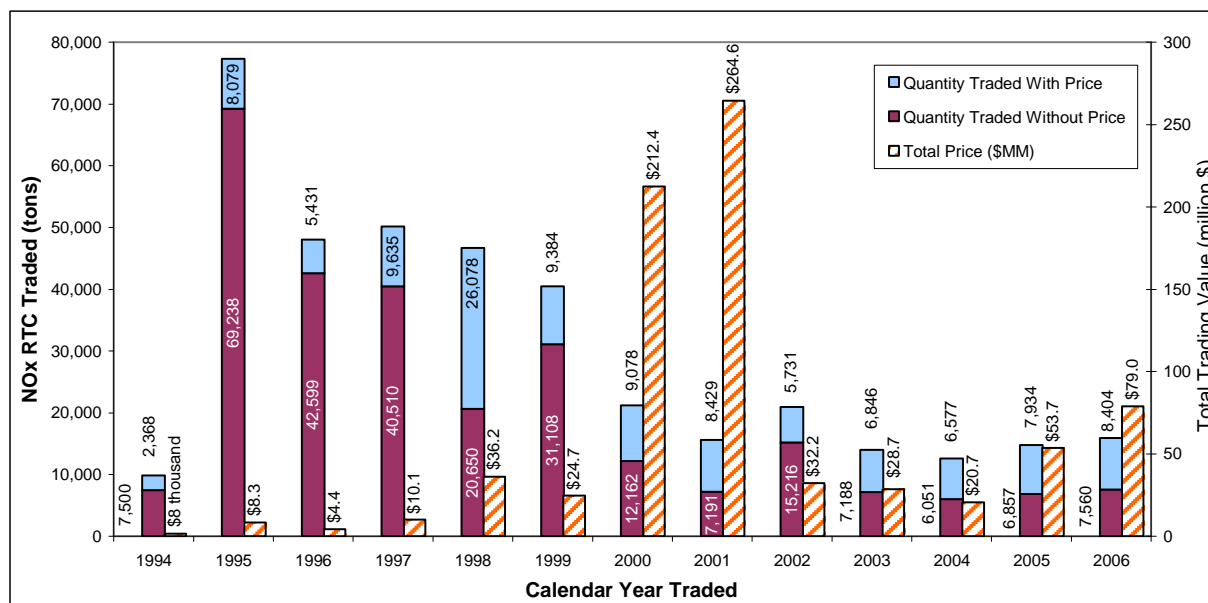


Figure II-4-2
Total Quantity of SOx RTCs Traded

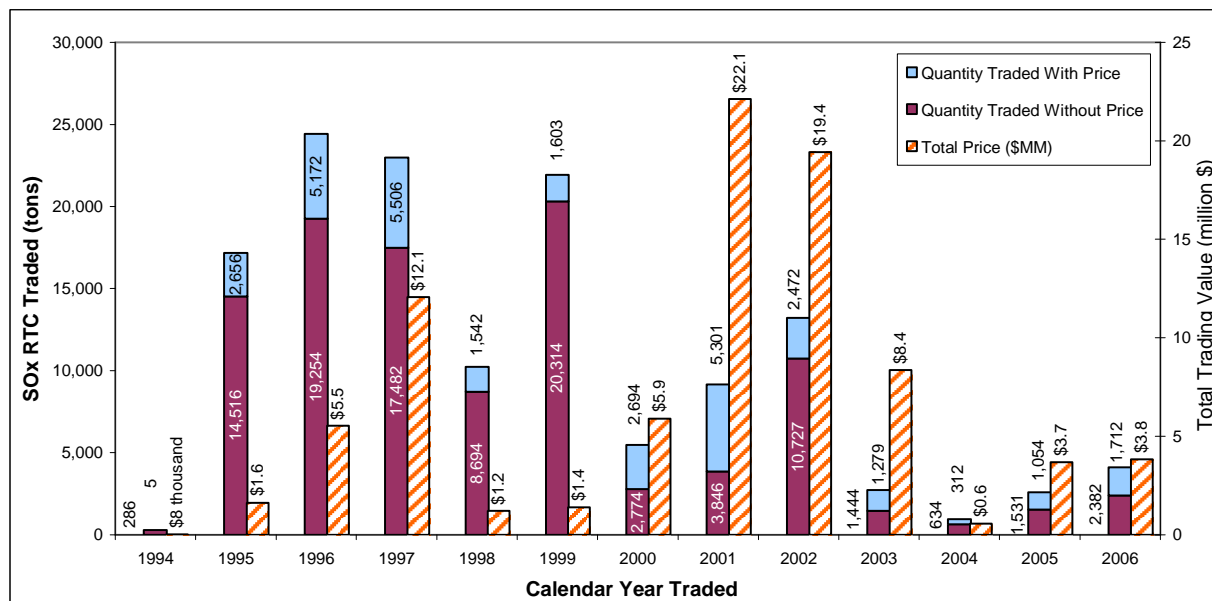
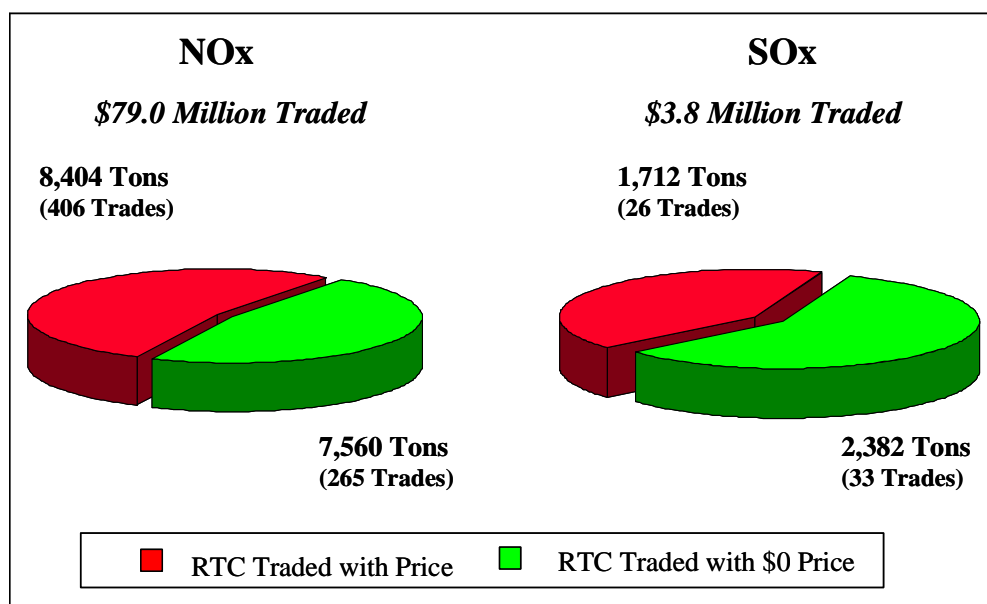


Figure II-4-3 illustrates trading activity in 2006 and illustrates that a large portion of trades do not have a price reported. This occurs with transfers to brokers for subsequent sale and between facilities under common ownership.

Figure II-4-3
Calendar Year 2006 Trading Activity



Figures II-4-4 and II-4-5 illustrate yearly average prices for NOx and SOx RTCs, respectively, for 1994 through 2006. Each line denotes prices that were seen in that compliance year for all trades. After 2005, credits beyond the year 2010 started to be traded. The spike for NOx prices in 2000 and 2001 is clearly evident.

Figure II-4-4
Yearly Average Prices for NOx RTCs 1994 through 2006

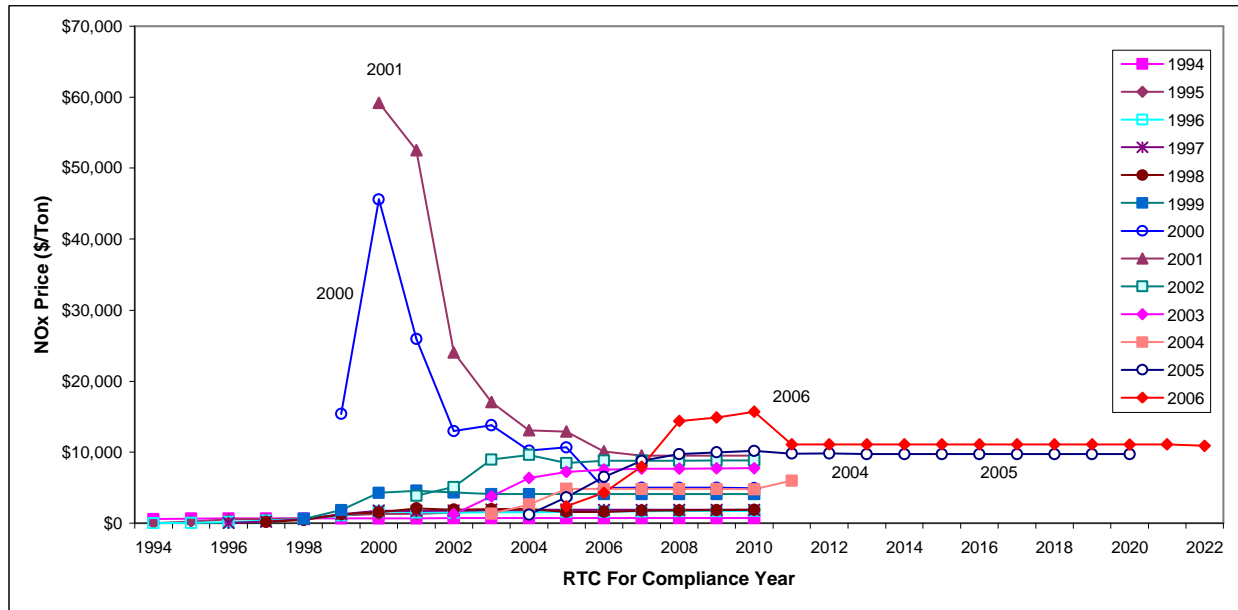
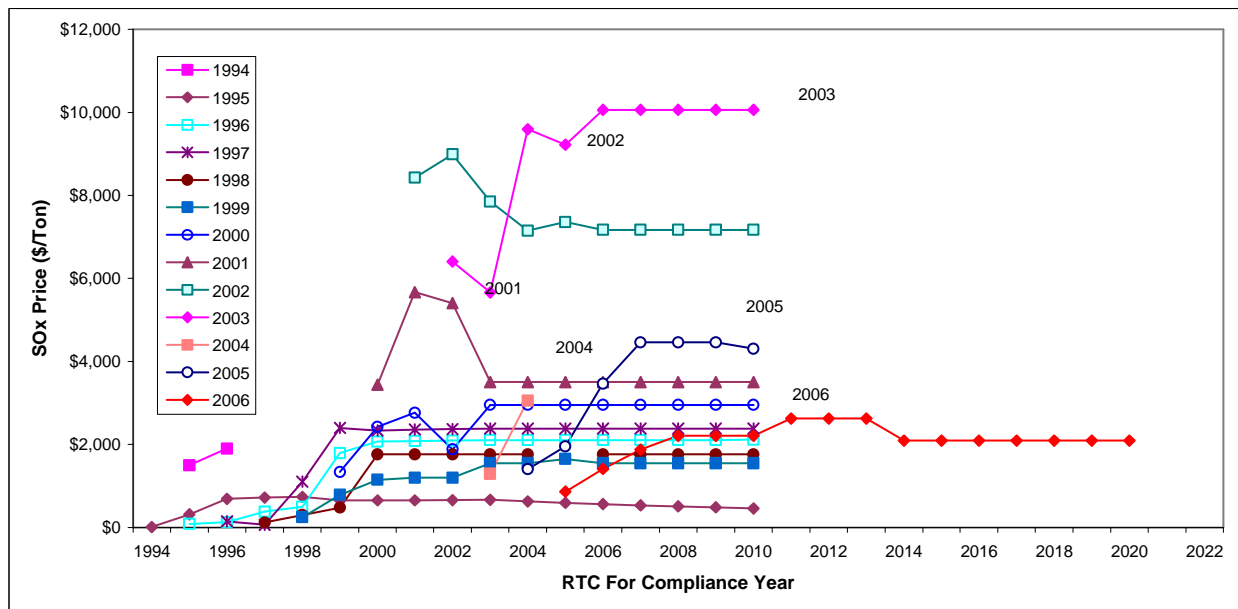


Figure II-4-5
Yearly Average Prices for SOx RTCs 1994 through 2006



Tracking Mechanisms

RTCs issued are entered into the RTC Listing, which is the official record of ownership, maintained exclusively by the District. Under the RTC Listing, RTCs are further differentiated by pollutant, zone (i.e. Coastal or Inland), cycle, and expiration year. The RTC Listing is set up with a double entry system – each transaction is always reflected by a debit and a credit entry. Pursuant to RECLAIM rules, RTCs ownership is not transferred unless it is registered in the RTC Listing.

When trading RTCs, the buyer and seller are required to jointly file a transfer registration identifying the type and quantity of RTCs being traded. Data on the trade registration are then entered into the RTC trading program. The trading program checks all rule requirements and ascertains that the seller has sufficient RTCs in its account for sale. If all requirements are met, the RTC Listing is updated with the transfer by debiting the seller account and crediting the buyer account with the traded amount of RTCs.

Tracking mechanisms are key to program enforcement

Under the Acid Rain Program, allowances are tracked by serial numbers. The RECLAIM program does not follow that practice.

A serial number system, if incorporated at the start of the program, tracks the origin of the credits in cases of fraud or unauthorized transactions. However, the use of it does not prevent fraudulent practices by private parties. Serializing credits after trades have occurred is not practical.

Authenticating Trades

A buyer of RTCs must have an account before they can own credits. An officer of the entity registering for an account must designate authorized representatives who can trade RTCs on their behalf. The signatures of these authorized representatives are also collected at the time of account establishment. As part of the trade approval process, each trade registration submitted to the District is verified to ensure that the authorized signatures are valid. Internally, each trade is reviewed and approved by three separate staff members. Trade confirmation letters are signed by the executive in charge of the division. The signed confirmation letters of the RTC transfer are mailed to both the buyer and seller for their records and serve as notifications that RTC transfer occurred. These are the steps taken to safeguard against mistakes or fraudulent transactions being registered.

Take steps to safeguard against mistakes or fraudulent trades

Trends in RTC Trades

The District has always taken a hands-off policy on the RTC market, unlike the Acid Rain Program which retains a small portion of allowances for a year-end auction. Initially, RTCs trades were generally held between two RTC holders or brokered through a third party or agent. In a brokered transaction, the seller escrows the RTCs by transferring them without price into the broker's account, then the broker will transfer the RTCs to the buyer's account after certain trade conditions are met (e.g. transfer of funds into the broker account). Later, swap trades started to

occur where, rather than exchanging money, RTCs were bartered for other emission reduction instruments such as RTCs of another expiration period or contaminant (e.g. NO_x for SO_x) or ERCs of another contaminant. In the early stage of RECLAIM, some entrepreneurs emerged but they did not result in significant transactions (one investor sold RTC certificates as commemoratives).

After the deregulation of power plants in California, some energy traders started purchasing and holding RTCs because some electricity generation contracts included requirements to offset emissions from power generators. The spike in RTC prices during the California power crisis highlighted RTCs as an investment commodity. Since then, mutual funds and private investors started to trade RTCs. Unlike other market participants, these traders have no obligation to

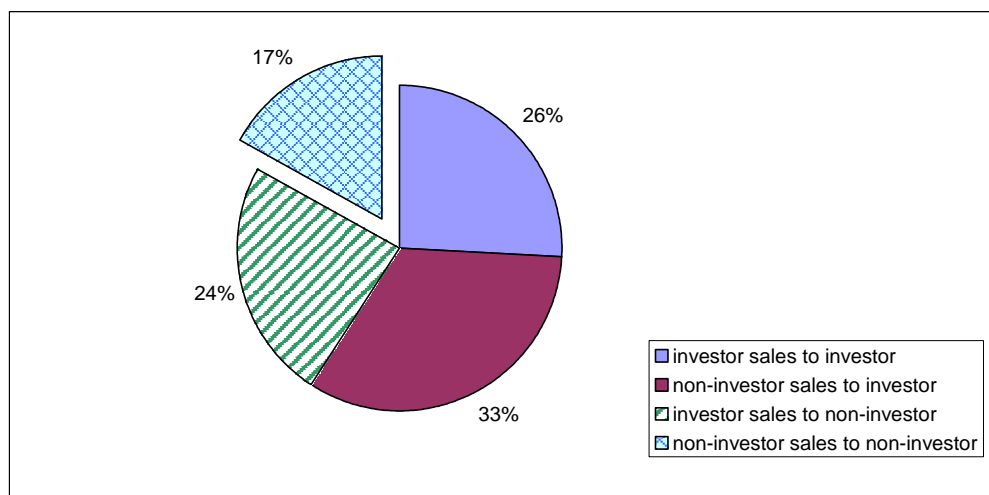
Trading markets evolve over time

offset emissions and are in the market strictly for profit. At about the same time, financial risk-hedging activities, such as trade options and forward contracts, started to emerge. Trade options are contingent rights to buy or sell a set of RTCs at a pre-agreed price. Forward contracts are agreements to trade a set of RTCs at a set price at a future date. Last year, foreign entities started to invest in RTCs. Their participation introduced new potential jurisdictional issues. The District responded by requiring that parties that do not reside in California consent to California law and the jurisdiction of California courts. The focus of these investors is mainly in RTCs valid for future years, as prices for these credits are the most speculative.

The main objective of investors in a market is to seek profit through trading. On the other hand, investors can provide the capital needed to produce the commodity and, in this program, install control equipment. This is part of the market mechanism that was envisioned to motivate additional emission reductions that may not otherwise occur. However, the issue of hoarding can be of concern. If the supply of future RTCs is controlled by investors, the functioning of the market as a means to sustain economic growth can be affected.

Figure II-4-6 illustrates the different parties involved in buying and selling of NO_x RTCs, in 2006.

Figure II-4-6
Shares of Investor-Involved Trades Based on Value Traded



Trade Reporting

Initially, RECLAIM rules did not regulate when RTC trades had to be registered. Traders registered trades as they deemed appropriate. As a result, there were many RTCs held under brokers' account and trading of these RTCs were not reported until the eventual buyer wanted to have the RTCs registered under their account. In the interim, brokers acted as the keeper of the RTCs and some trades were not reported to the District. The delayed or missed trade reports were identified as one of the contributing factor to the sudden jump in RTCs price during the California power crisis. Market prices were increasing, but that information was not reported to the District because the transactions were never recorded. This practice also played a part in the one known case of fraudulent trades committed by a broker.

RECLAIM rules were amended in 2001 in response to the price spike caused by the California power crisis. Among other amendments, changes to the market included requirements for reporting RTC trades within five business days of trade agreement and reporting trade agreements related to options and forward contract. At the same time, the District committed to provide more timely trade information and instituted procedures to post trade information on the District website as trade registrations are processed. In addition, the website also contains scanned reports of options and forward contracts, and the names of authorized trading representatives. This information is identified as essential to the efficient functioning of the market.

Timely trade reporting is recommended to better monitor prices and provide market information

RTC price is essential information in the market. RECLAIM rules require the District to monitor price and conduct program evaluations if annual average RTC prices rise above a preset level. The registered prices for RTCs are averaged on annual basis. Several market activities complicate what is seemingly a straightforward price calculation. Trades via brokers are the most common type of trades. These trades result in two registrations – one between the seller and the broker and a second one between the broker and the buyer. To avoid double-counting of sales price and skewing the price average, the transfers between sellers and brokers are reported without price and the actual transaction prices are reported in the second sets of trades.

Another type of trade that can skew the market price is swap trades, where RTCs are exchanged for a wide variety of other goods in place of money. In order to include the values of the swapped RTCs, the trading partners are required to report an agreed-upon value of the RTCs. The reported values in these trades may not reflect the real market value of the RTCs and may be a source of misinformation.

Some trades involve the transfer of the rights to a stream of RTCs starting a certain year and extending infinitely in time. These streams of RTCs are referred to as “infinite-year RTC blocks”. Prices for infinite-year block RTCs are often negotiated as price per pound for the whole block instead of a price per pound per year. When reporting prices for these blocks of RTCs (\$/pound/year), it is up to the trading partners to decide on how many years to spread the value of RTCs based on the price per pound of RTCs paid. This often leads to arbitrary annual prices and does not reflect the market price of the individual year RTC. The District is currently

conducting a review of the average price calculation so as to isolate the effect of these infinite-year RTC block trades from the annual average RTC prices.

Buyers of RTCs often seek to conceal their identity when shopping for RTCs. This concealment of identity is especially critical if a buyer is purchasing a large quantity of RTCs. These buyers will need to purchase from several sellers over a long period of time in order to acquire the sufficient amount of RTCs needed. If that need is known, the buyer may have to pay a premium for the necessary RTCs. Therefore, buyers tried to conceal their identity by securing options and forward contracts. Recent rule amendments have allowed confidentiality of the parties, but require trade information be submitted to the District within 5 days of an agreement, to enable better market signals.

Lessons Learned

- Make trade information available as early and completely as possible.
- Consider different price thresholds for long-term credits.
- Set up safeguards against forged or fraudulent trades.
- Serializing credits, if desired, needs to be incorporated prior to the start of trading.
- Consider setting up safeguards against credit hoarding.

Chapter Five – Information Management

Authors: Chris Marlia and Roberta Lewis

The RECLAIM program has four information streams:

- Facility permit;
- Emission credit trading;
- Emission monitoring and reporting; and
- Compliance.

Automated systems aid in compiling and tracking data from all of these information streams and maintaining this data in a central database helps to bring the information streams together. Automation also allows some of the data to be accessible by outside users, including the regulated community and the public.

Effective information management systems help program tracking, enforcement, and trades

Facility Permit

The facility permit format developed for RECLAIM captures device-based information for all sources – major, large, process units, and other – within the facility bubble. All of the permit parameters that define the emissions from each device within the facility are stored in the central database. This information provides a direct link to the actual emissions that are tracked through the monitoring and reporting requirements of RECLAIM.

The facility permit system is a custom client-server application on the central database that provides data entry and print capabilities for permit processing engineers to generate facility permits for RECLAIM and Title V facilities. The application consists of two modules, a front-end for entering and capturing facility permit data into the central database during permit processing and for administering the data, and a printing module that extracts facility permit data from the central database and places it into the correct location within the facility permit format.

Trading

The RECLAIM BBS, an electronic bulletin board, provides a convenient place for facilities and their brokers to post notices of emission credits available or needed and to view trade information. The BBS is a custom personal computer-based application that is accessed externally through a modem over the telephone network. The data on the BBS is refreshed daily from the trading data stored in the centralized database. Much of the activity on the BBS involves searching the database for information about trades, price of credits, etc. The RECLAIM BBS will be migrated to a web application in the near future.

Trading data is collected from the RTC Transaction Registration form and entered into the RECLAIM Trading Credits system, an electronic trade registration system. The RTC system is a custom client-server application on the central database. All emission credit trades made within RECLAIM market must be registered in the RTC system which:

- Identifies credits available for trade and tracks ownership;
- Tracks all transfers of credits;
- Provides an on-line three-tier approval process for all trades;
- Prints RTC certificates; and
- Produces audit and activity reports.

A summary spreadsheet showing all registered trades for the past 90 days can be accessed from the District web site. The data are updated daily from the trading information in the central database entered through the RTC system.

Information management programs need to be dynamic to evolve with program

Emission Monitoring

All facilities within the RECLAIM universe are required to submit emissions data electronically. The reporting frequency (daily, monthly, quarterly) is dependent on the type of source: major, large, process unit, or other. Data quality (e.g., device identification number, reporting period, submission date, etc.) is checked before the data is transferred into the central database.

The Emission Reporting System (ERS) enables electronic reporting of NO_x and SO_x emissions from RECLAIM facilities using telecommunications technology. The ERS consists of a series of custom software applications that, together, receive electronic emissions data submissions from RECLAIM facilities over the phone lines, send a receipt back to the facility if the data is acceptable, and transfer the data to the central database for processing. Facilities can also electronically submit modifying emission transaction records to correct erroneous transmissions within a quarter through the end of the quarterly reconciliation period.

All RECLAIM facilities have access to their electronic data through the District web site. The Web Access to ERS (WATERS) is a custom web-based application on the central database that allows facilities to retrieve and view via the Internet all electronically-reported RECLAIM data that have passed the acceptance checks and been transferred into the central database. Through WATERS, the facilities can also confirm that their electronic transmission of data was successful.

The RECLAIM rules also require facilities to submit quarterly and annual summary reports of emissions:

- Quarterly Certification of Emissions Report (QCER); and
- Annual Permit Emission Program Report (APEP).

These reports require an authorizing signature and are submitted on paper forms. The summary emission data is entered into the Manual Reporting System (MRS), a custom client-server application on the central database. District inspectors use this information for auditing the electronic data and determining compliance. Summary reports of NO_x emission data and allocations are available on the web.

Compliance

Audit reports are produced from the quarterly and annual emission summaries produced by the MRS. The audit data are reviewed for correlation with aggregated electronic data submissions and conformance with submittal due date requirements. Exceedance of an allocation feeds back into the system to reduce the following year's allocation.

Lessons Learned

- Centralize data storage to simplify automated interaction between the various program elements.
- Electronic emission monitoring and reporting is the automation backbone for determining compliance in a market-based program.
- Provide the regulated community online access to the emission data reports they have submitted electronically.
- Provide an electronic forum, updated regularly, where credit holders and brokers can view accurate, up-to-date trade information and post notices for emission credits available or needed.

PART THREE – CONCLUSIONS AND RECOMMENDATIONS

Developing a cap-and-trade program is a very challenging endeavor. Properly designed, this type of market incentive program can secure emission reductions that are inflation-proof (i.e. locked in despite economic growth) and certain. Appropriate allocations, robust monitoring, and carefully monitored trading are critical for achieving real emission reductions.

It is difficult to develop program rules that major stakeholder groups will support, because the viewpoints of various industry sectors, environmental and community groups, and the needs of the regulatory agency are often diverse. Finding the right balance between the interests requires significant time and resources, and innovative approaches.

District staff, based on its overall experience with RECLAIM program implementation, continues to support the use of well designed cap-and-trade programs, which can be used effectively in combination with traditional command-and-control approaches to reduce air pollution.

This section includes summaries of the RECLAIM experience and general recommendations for future cap-and-trade programs. With over a dozen years of implementing RECLAIM, District staff has a number of observations and recommendations to offer that may help in the design and implementation of future cap-and-trade programs.

Conclusions

On balance, District staff believes that the RECLAIM program has proven to be a valuable tool in reducing air pollution in the South Coast region. After more than a decade of implementation, there are several elements that District staff recommends as general considerations for future cap-and-trade programs.

Summary of the RECLAIM Experience – What Worked Well

Program Emission Reduction Objectives Achieved

RECLAIM locked in a cap and declining balance that has been met every year except for 2000 and 2001, with the convergence of the crossover point and the California energy crisis. The program met all statutory requirements upon adoption and in subsequent years when updates were required pursuant to Health and Safety Code §39616. Compliance with annual allocations each year has been very high (96 to 98 percent), since the energy crisis. Significantly more stringent monitoring provisions have led to better emissions information.

From 1994 to 2005, additional emission reductions of 43 tons per day of NO_x and 10 tons per day of SO_x have been realized from hundreds of facilities that started the program already well controlled through decades of source-specific, command-and-control regulations. This represents a 62 percent and 50 percent net decrease in actual emissions of NO_x and SO_x,

respectively, in spite of Basin-wide employment growth of 26 percent in that same time period. RECLAIM locked in emission reductions from many rules that had yet to be written, which may have been contentious or controversial to develop.

Credits Were Not to Create a Property Right

To preserve flexibility to amend the program, suspend or terminate credits, or even abolish the program if it is not working, it is necessary to design the credit not to constitute a property right. This is done by including appropriate rule language in the credit definition, and reserving the right to amend or terminate credits or the program.

Offsets: Mobile Source Credits

To provide increased program flexibility, pilot credit generation rules for mobile and area source credits were designed. Such programs can provide a “safety valve” by creating the opportunity to add additional credits into the system. Some have argued that this threatens the integrity of the cap. Unique enforcement issues included assuring that these credits remain surplus over time, that the reductions occurred within the District, and that adequate monitoring and recordkeeping occurs. Finally, because these credits were issued based on commitments for future reductions, the rules required that any shortfall be made up by the credit generator, and failing that, by the credit user.

Periodic Technology Reviews and Allocation Adjustments

In 2005, a BARCT assessment resulted in rule amendments to reduce RTCs by over 20% by the year 2011 to reflect the current level of technology available for the types of equipment in NOx RECLAIM. Such periodic assessments would be valuable for future cap-and-trade programs.

An extensive evaluation was undertaken for each of the major categories of equipment in the program. Staff evaluated what controls or changes had been implemented by RECLAIM and non-RECLAIM facility operators, what rules were in place by any other local air district or state, and what technologies had been employed. Cost-effectiveness was also a consideration, as some districts had rules with lower emission limits than the rules subsumed by RECLAIM. However the equipment covered was less controlled than the starting universe in RECLAIM, so the incremental reductions would not be cost-effective in RECLAIM. Another criteria that staff evaluated was whether a rule would be pursued in the absence of our cap-and-trade program. The evaluation resulted in rule amendments with 19 emission categories identified with new BARCT levels. Reductions will be realized by applying a greater than 20 percent reduction to all allocations or RTC holdings by the year 2011. A review for SOx BARCT is currently underway for potential rule amendments in 2008.

Summary of the RECLAIM Experience – What Could Have Been Improved

The following sections describe aspects of the program that have been problematic or could have been done differently.

Over-Allocation at Program Start-Up

The RECLAIM program design intentionally led to higher allocations than actual emissions during the first few years of the program because of concerns that facility production fluctuates from year to year and there was a desire not to lock in production levels during a recessionary period. Letting each facility pick a peak year for the basis of 1994 and 2000 allocations, allowing correction of prior-year emission reports to increase allocations, and addition of existing ERCs held by RECLAIM facilities contributed to the inflated start point. The anticipated crossover point was five to six years after the program started.

District staff did not expect that the amount of over-allocation would be as high as what occurred. The first year of the program there were 37 percent unused RTCs. In the second year there were 28 percent unused RTCs, in spite of the large use of RTCs to cover conservative emission estimates required under missing data procedures. Except for 2000 and 2001, the typical amount of unused RTCs each year is about 20 percent.

Delayed Installation of Control Equipment

Initial over-allocation led to an abundant supply of inexpensive credits for the first few years of the program, which likely substantially lessened the pressure to install control equipment from program participants. Many facility operators became complacent and accustomed to purchasing RTCs at the end of the compliance cycle to cover their emissions. In addition, some facility managers exhibited short-term thinking and intentionally delayed capital expenditures for emission reduction projects in order to increase profits in the near-term.

RECLAIM subsumed rules with future compliance dates that had already been adopted, including requirements for refineries and power plants. Many critics of RECLAIM point to the delayed installation of SCR at power plants as one of the key contributing factors to the lack of availability of RTCs during the California energy crisis in 2000 and 2001. However, RECLAIM may not have been the cause of such delay, although it made such delay easier. Since many power plant operators were aware of pending sales of their facilities as a result of electricity deregulation, they chose not to follow through on purchase orders for SCR to delay that capital expense.

District staff recommends that future cap-and-trade programs carefully evaluate which rules to roll into the program. Rules on the books with future control requirements based on known, cost-effective technology for major emitters may be best left in place. This would have largely avoided the power plant problems seen in 2000 and 2001 with RECLAIM, as Rule 1135 - Emissions of Oxides of Nitrogen from Electric Power Generating Systems, if it had remained in effect, would have required Selective Catalytic Reduction (SCR) on power plants by the year 2000. The market incentive approach would work well for existing rule requirements based on technology-forcing rules and rules yet to be written.

Not all RECLAIM facilities relied primarily on credit purchases. Some facilities implemented process changes, added controls, and deployed cleaner equipment more frequently as a means to manage emissions. Early equipment replacement is also a strategy that facilities used to reduce

overall emissions. More robust emission information and higher attention given to emissions also contributed to reductions at many facilities. However, some contend that technology advancement may not have occurred at the same rate as what would have happened under command-and-control. Overall program reductions included expected reductions from many control measures in the 1991 AQMP that would have been scrutinized closely in the rule development process and may not have fully materialized. Therefore, it is difficult to fully quantify this aspect of the program.

Summary of the RECLAIM Experience – General Observations on Implementation, Administration, and Enforcement

Implementation

Initial implementation of the RECLAIM program presented many resource-intensive challenges not fully anticipated during the rule development process. Transition from command-and-control permits and compliance processes to the cap-and-trade program raised issues requiring special attention of the participating facilities, as well as District staff.

Once the cap-and-trade program rules were adopted, the rule development process was far from being finished. Many rule amendments have been necessary to make the program clearer, more enforceable, more flexible, and to reflect the evolution of market participants and types of trades. In addition, standardized implementation guidelines needed to be developed for all aspects of the program.

Formal implementation guidance documents and training help ensure consistent interpretation and application of program rules. Significant ongoing training is needed for agency staff and the participants in the program. This is a perpetual process, as the program evolves over time. Also, it has been District staff's experience that facility personnel and responsibilities change over time and in many cases the replacement person does not receive adequate training.

A centralized administration team is highly recommended to ensure consistency and to identify necessary changes to the guidance documents and rules.

Resources

The resource requirements for a cap-and-trade program are very significant. Future programs need to recognize this and plan for these changes. Computer systems to support the new program are one example where significant time, funds, and staff are needed to make sure that the program implementation goes smoothly and that the information needed to ensure compliance is accurate and available.

Outsourcing

Care should be taken when considering whether some aspects of the program management can be handled outside of the agency responsible for the program. Credits represent a large amount of money, which has a potential to lead to fraud and/or abuse. Check out credentials carefully

and include tight oversight for any outsourced functions. The ultimate responsibility for the program resides with the agency that developed it and problems can cast a shadow on an agency's program.

Missing Data

As discussed in this paper, it is critical to have good procedures for missing data. This provides an incentive to get and maintain the proper systems, and also deters turning off systems in periods of equipment upset or high production. Monitoring systems need sufficient time for installation and de-bugging, so missing data procedures should take this into account.

Recommendations for Future Cap-and-Trade Programs

The following sections describe District staff's recommendations for future cap-and-trade programs. The intent is to help avoid some of the difficulties encountered in RECLAIM and to further ensure enforceable programs that can deliver real, verifiable emission reductions to meet environmental objectives.

Specific Topic Areas

Time for Implementation

District staff suggests that adequate time be allowed before a new program starts. This will allow a smoother transition, better trained staff and program participants, and time to install monitoring equipment.

Ability to Change the Regulatory Structure Midstream

When RECLAIM was developed, the District staff carefully constructed the rules to make sure that RTCs were not property rights. RTCs can be reduced or revoked, and the program could be suspended, if warranted. However, future cap-and-trade program developers should keep in mind that there are such significant resources that go into implementation of these programs that it is impractical to reverse directions and return to a command-and-control program.

For example, RECLAIM required significant changes to the permit and information management systems that cost millions of dollars and tremendous staff resources. To change these major systems is not trivial. In addition, reinstating previously subsumed rules and developing all the rules to implement each control measure in the AQMP would take years.

For facilities, it could also be a large burden if a cap-and-trade program did not work and a return to command-and-control was required. Consider a facility that installed some controls, but did not go fully to the BARCT level under a command-and-control rule that was subsumed into RECLAIM. That facility could have very expensive costs to make an incremental reduction in their control system to reach BARCT. Other facilities that purchased a stream of credits to take

care of future needs would also have that investment voided if RECLAIM RTCs were all suspended.

The problems which would be presented by trying to revert to a command-and-control system only highlight the need to carefully design the cap-and-trade program.

Avoid Over-Allocation

As described previously, RECLAIM started with very generous allocations. The anticipated crossover point was five to six years after the program started. Overall emissions in key years matched, by design, but actual emission reductions in the early years may have been less than what might have occurred under command-and-control.

Other ways to prevent locking in recessionary activity levels while not causing as much over-allocation should be considered. For example, facilities could be required to use their average activity levels for the last five years rather than their highest level. Additionally, allocations could be set at levels closer to actual emissions, but perhaps with a program set-aside of credits which could be accessed by facilities upon a demonstration that their activity levels exceeded baseline by a specified amount.

Avoid Lack of Planning

A cap-and-trade program gives facilities the ability to consider emissions and reduction strategies as part of their long-term plans. However, in RECLAIM, many facilities did not do adequate planning and were caught without enough time to install controls to react to the energy crisis. RECLAIM rules were amended to require BARCT from power plants and compliance plans from the larger facilities to reduce the likelihood that such a problem could occur in the future. Future cap-and-trade programs should consider having a 5- or 10-year plan from participants and their progress should be closely monitored. Economic theories behind cap-and-trade programs assume that rising market prices for trading credits, occurring as allocations are reduced over time, will provide a market “signal” to facilities that it may be more economical to obtain reductions by installing controls, rather than by purchasing credits. The assumption is that necessary controls will then be installed. However, this model does not account for the lag time between receiving the “signal” from market prices and actually obtaining reductions from installing controls, due to the time needed to obtain permits and construct the control equipment. Since RECLAIM also experienced a nearly instantaneous spike in RTC prices as a result of the power crisis, it is difficult to determine whether this inherent “lag time” would have caused a credit shortage even in the absence of a power crisis. However, this “lag time” presents another reason to require compliance plans to assure that facilities are adequately planning ahead.

Enforceability Issues Must be Considered in Program Design

Designing a cap-and-trade program with enforcement in mind will help develop a more successful program. For example, penalties must be sufficient to provide adequate deterrence, including separate violations for each day of the compliance period, and additional penalties based on the amount of exceedance. In addition, the need to preserve the integrity of the cap, as

by precluding variances, must be balanced against the desire for a “safety valve” for unforeseen extreme circumstances. To preserve flexibility to amend the program, credits should not constitute property rights. Trading credits must be reliable, and provisions for enforcement against out-of-jurisdiction traders must be included.

Enforcement must not be viewed as an afterthought that can be handled after the program is up and running. Before any credits are issued, it must be clear to everyone what constitutes a violation; how the violation will be enforced; what evidence and presumptions will prove the violation; and what general and tailored penalties will be assessed for a violation. Design consideration must also be given to unique enforcement situations that may arise in the implementation phase of the program. If an audit process will be used to demonstrate compliance, there will be an “enforcement lag” that will separate the time period of the violation from the time period of the prosecution of the violation. The effects of this lag must be acknowledged and minimized. If allocation exceedances cannot be made up without creating a negative credit balance, or if credits become scarce or unaffordable, enforcement discretion may be needed to avoid business failures. And if fraud occurs in the purchase, transfer, or registration of credits – and this must be anticipated – requirements must be built into the design of the program to expose fraud at the earliest opportunity to limit its harmful effects.

Mobile source credits may present unique enforcement issues, such as assuring the reductions are surplus, that the reductions occur in the required geographic area, and that any shortfall is made up, either by the credit generator or credit user.

The following sections provide information on some specific topics that relate to enforceability.

Penalties

A key design feature of RECLAIM is to assure that penalty provisions will adequately deter intentional or negligent violations. Because a violation of the cap would only occur at the end of each quarterly reconciliation period, there was concern that a maximum of four violations per year might not provide adequate deterrence value, even at maximum penalties. Therefore, the RECLAIM rules provided that a violation of the cap would constitute a violation for each day in the year in which the cap is exceeded unless the source proves on which days it had not exceeded the cap. An additional violation was established based on the number of pounds by which the cap was exceeded. Finally, the program required deduction of the amount of the exceedance from future allocations, which imposes substantial cost, thus providing additional deterrence as well as an environmental benefit.

Trading

A robust trading market requires that credits be reliable and that fraud be deterred. RECLAIM required that all trades be registered with the District, the seller and buyer jointly register a trade, and that credits be deducted from the seller’s account before a trade could be registered. Trades were required to be reported within 5 days of occurrence.

The rules also prohibited the making of any false statement in connection with a trade. Finally, during program implementation, out-of-state and even out-of-country traders began participating in the market. The rules were amended to require these traders to designate a California agent

for service of process, and stipulate to jurisdiction and venue in the Los Angeles County Superior Court.

Variations

The program prohibited variations from the cap or from missing data provisions. The concern was that if a variation could be received, the cap would be rendered uncertain and unenforceable. However, during the extreme circumstances of the California energy crisis, creative enforcement mechanisms were needed to avoid shutting down certain companies that could not afford credits, or in some cases obtain them at any price. Thus, the need to preserve the integrity of the cap must be balanced with the desire for a “safety valve” for unforeseen extreme circumstances.

Implementation and Ongoing Training

Formal implementation guidance documents and initial and ongoing training help ensure consistent interpretation and application of program rules. Future cap-and-trade programs should include periodic training and certification of individuals responsible for compliance at facilities. This will enhance compliance rates and avoid problems seen with staff turnover.

What Reductions Qualify for Credits

Future cap-and-trade programs should also avoid giving credit for emission reductions that would occur under other regulatory requirements (local, state or federal) or natural industry trends.

Emission Auditing

Resources are also needed to ensure the integrity of the emissions reported under the program. In order for a program to be accepted after implementation, it must be shown that the reductions are real and permanent. Therefore, the program must not only have clear and concise ways to calculate emissions, it must also have robust recordkeeping protocols to substantiate the emissions reported. The agency must also be diligent in field verification that emissions were determined correctly and be able to substantiate, with actual data sufficient to convince all stakeholders, that the data is dependable. Additionally, periodic progress reports on the program are also essential to provide assurance that the emission reduction goals are achieved. This requires the goals and criteria for measuring progress to be clearly defined from the onset of the program.

Automation

Automation in a cap-and-trade program is necessary because of the complex interaction between the regulatory components, including more stringent emissions monitoring, facility-based permitting that captures device-based data, emission credit trading, and the need to bring all elements together to confirm compliance with allocations. The degree of automation incorporated must be practical, however, considering both schedule and costs, and requires close consultation between the program designers and information technology staff. The key is to focus on the most stable business processes first and allow evolving business processes to

stabilize before fully automating. Fluidity in the cap-and-trade rules is to be expected as the program evolves over time, but small rule changes can have large impacts on automated systems.

Equally important, the program designers must take into account the degree of automation that is achievable. For example, many related existing systems and business processes needed to be altered in order to support the sophisticated level of automation originally envisioned for RECLAIM, including incorporation of device-level data in Hearing Board processes, permit modification and renewal, NC and NOV, etc. However, resources were insufficient for making the changes in these other areas that were necessary to support the full RECLAIM automation needs. The level of automation that was developed for RECLAIM has helped to make the program successful but falls short of the initial conceptual vision.

The key elements in RECLAIM automation include:

- Electronic emission reporting for all sources, large and small,
- A facility permit system that captures device-based data,
- A trading system that tracks all emission credit trading, and
- A centralized database that stores all data from each component in a single repository.

General Recommendations

The following key lessons learned are offered for consideration for development of future cap-and-trade programs. For convenience, sections of the paper that provide more information relative to these ideas are referenced.

Resources and Time - There must be adequate resources and time to design, implement, and monitor the program.
(I-1, II-1, II-2, II-5)

Foundation - The technical, economic, and political foundations must be solid.
(I-1, I-3)

Engaged Stakeholders - Early and frequent stakeholder involvement is critical – keep in mind the key interests and ensure that each group perceives some positive outcomes.
(I-1)

Equity and Fairness in Allocations - Determining allocations is one of the most sensitive and difficult parts of program design.
(I-1, I-2, II-1)

Robust Emission Information – Accurate emission quantification is necessary to ensure that the environmental benefits are realized and that reductions being traded are real.
(I-1, II-1, II-2, II-4, II-5)

Dispute Resolution - An administrative mechanism is needed for settling differences (such as allocation issues) and minimizing lawsuits.

(I-2, II-1)

Market Issues - Market issues are critical – types and term of credits, whether banking is acceptable, types of markets, and who manages the trades are important design considerations.

(I-2, I-5, II-4, II-5)

Integration - Integration of monitoring reporting and recordkeeping (MRR), permitting, inspections, and tracking emissions and trading are critical to successful implementation.

(I-2, I-6, II-5)

New Enforcement Tools - Develop specific penalties and backstops for non-compliance.

(I-2, I-3, II-2)

Periodic and Program Assessments - Build in periodic program assessments against key benchmarks, such as Health and Safety Code §39616. Make program changes as easy as possible.

(I-1, I-2, II-3)

Planning - Make sure participants plan ahead to avoid problems like those seen in RECLAIM due to the energy crisis. Allocations and ‘crossover’ points should be considered.

(I-2, I-4, II-3)

Environmental Justice – Consider whether restrictions are necessary on maximum credit purchases in lieu of emission reductions on site. Provide information to stakeholders on whether there are local impacts. If there could be local impacts, consider incentives for local reductions rather than credit purchases.

(I-1)

Balance - Make sure other programs still have adequate resources and attention.

Acronym List

AB32	Assembly Bill 32
APEP	Annual Permit Emission Program
AQIP	Air Quality Investment Program
AQMP	Air Quality Management Plan
BARCT	Best Available Retrofit Control Technology
Basin	South Coast Air Basin
BBS	Bulletin Board System
BTU	British Thermal Unit
CAA	Clean Air Act
Cal. Evid.	California Evidence
CARB	California Air Resources Board
CEM	Continuous Emission Monitor
District	South Coast Air Quality Management District
EPA	Environmental Protection Agency
ERC	Emission Reduction Credit
ERS	Emission Reporting System
Fed. Reg.	Federal Register
IP	Internet Protocol
ISO	Independent System Operator
LAER	Lowest Achievable Emissions Rate
LAP	Laboratory Approval Program
MDP	Missing Data Provisions
MRR	Monitoring, Recordkeeping, and Reporting
MRS	Manual Reporting System
N/C	Notice to Comply
NO _x	Oxides of Nitrogen
NOV	Notice of Violation
NSPS	New Source Performance Standards
NSR	New Source Review
PC	Personal Computer
QA/QC	Quality Assurance/Quality Checks
QCER	Quarterly Certification of Emissions Report
RACT	Reasonably Available Control Technology
RATA	Relative Accuracy Test Audit
RECLAIM	Regional Clean Air Incentives Market
RTC	RECLAIM Trading Credit
RTU	Remote Terminal Unit
SCR	Selective Catalytic Reduction
SIP	State Implementation Plan
SO _x	Sulfur Oxides
U.S.	United States
VLAN	Virtual Local Area Network
VOC	Volatile Organic Compound
WATERS	Web Access to Electronic Reporting System

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