

APPENDIX E

**ESTIMATED MSERC AND ASC CREDIT
GENERATION METHODOLOGY**

**ESTIMATED RTC DEMAND AND SUPPLY
METHODOLOGY**

Estimated Credit Generation Methodology Rule 1612.1, and Proposed Rules 1631, 1632, 1633 and 2507

Implementation of Rule 1612.1 and Proposed Rules (PR) 1631, 1632, 1633, and 2507 is expected to provide incentives to sources to generate NO_x emission reductions. Estimates were made to quantify the potential supply of NO_x MSERCs or ASCs that could reasonably occur through implementation of Rule 1612.1 and the four proposed rules. The assumptions used to estimate the potential supply of credits are designed to reflect a reasonable assumption of potential NO_x MSERCs and ASCs that will be available to RECLAIM facilities from implementing these credit generation rules. The estimated supply of NO_x MSERCs and ASCs used in this analysis is not based on the potential demand for these credits through the RECLAIM program or implementation of the proposed RECLAIM AQIP or Mitigation Fee Program. If the market demand for the NO_x MSERCs and ASCs is high, the generation of these credits may increase. The following discussion summarizes the methodology, assumptions and the potential supply of NO_x MSERCs and ASCs that could reasonably occur through implementation of credit rules that were used for the CEQA analysis.

Methodology

The following summarizes the methodology used to estimate the potential supply of credits from Rule 1612.1 and the four proposed credit generation rules:

- Step 1. Estimate total number of sources for each rule.
- Step 2. Estimate the emission reductions per generating source, such as per repowered marine vessel, replaced vehicle.
- Step 3. Project reasonable participation rates for each rule that could occur annually through implementation of the rule or proposed rules. Projections were based on the emission reduction potential of the source category (number of sources available), any future requirements, and estimated cost-effectiveness of generating emission reductions.
- Step 4. Develop projected supply of credits for each rule based on estimated emission reductions per generating source and the annual participation rates.

Step 1: Total Number Sources

For Rule 1612.1 and the four proposed rules, the total number of sources for each category was estimated. The “Total Number of Sources” in Table 1 represents the total inventory of sources for each source category that could potentially generate emission reductions. For Proposed Rule 1632, the “sources” are the number of calls per year that a ship will visit the port or harbor for hotelling. A percentage of the total number of sources was used to determine the potential supply of credits since it is unreasonable to assume 100 percent participation.

Table 1
Total Number of Sources

Rule	Total Number of Sources
R1612.1 – Class 7 or 8 Vehicles	81,900
R1612.1 – Refuse Trucks	1,000
R1612.1 – Yard Hostler	1,000
PR 1631 – Repowering Tug, Work, and Crew Boats	50
PR1632 - Fuel Cells for Hotelling	4,300
PR1633 - Truck and Trailer Refrigeration	17,900
PR 2507 - Agricultural Pumps	200

Step 2: Emission Reductions Per Source

The emission reductions per source are based on an estimated baseline and optional emission factor multiplied by an average activity level. For Rule 1612.1 and the four proposed rules, the NO_x emission reductions per source are summarized in Table 2.

Table 2
Emission Reductions Per Source

Rule	NO _x Reductions per Source (Tons/Year)
R1612.1 –Class 7 or 8 Vehicles	0.133
R1612.1 –Refuse Trucks	0.403
R1612.1 –Yard Hostler	0.480
PR 1631-Repowering Tug, Work, and Crew Boats)	9.000
PR1632-Fuel Cells for Hotelling	0.611
PR1633-Truck and Trailer Refrigeration	0.067
PR 2507-Agricultural Pumps	3.280

Rule 1612.1

For Rule 1612.1 Class 7 or 8 vehicles, the emission reductions per vehicle are estimated to be 0.133 tons per year based on 30,800 miles per year per vehicle and an emission factor difference of 4.0 – 2.5 g/bhp-hr = 1.5 g/bhp-hr; and conversion factor of 2.6 bhp-hr/mile. Emission reductions per refuse truck are estimated to be .403 tons per year based on 10,400 gallons per year; emission factor difference of 4.4 – 2.5 g/bhp-hr = 1.9 g/bhp-hr; and conversion factor of 18.5 bhp-hr/gal. Emission reductions per yard hostler are estimated to be 480 tons per year based on 3,500 hours per year and engine size of 152 hp, and a load factor of 0.43. Based on an emission factor difference of 6.9 – 2.5 g/bhp-hr = 4.4 g/bhp-hr was used.

Proposed Rule 1631

For PR 1631, the emission reductions per marine vessel repowering are estimated to be 9 tons per year. This is based on an average baseline of 15.5 g/bhp-hr, an optional emission factor of 5.7 g/bhp-hr, an average fuel consumption of 42,842 gallons per year, and a brake

specific fuel consumption of 19.9 bhp-hr/gal (SCAQMD Marine Vessel Emission Inventory Study – 1996).

Proposed Rule 1632

For PR 1632, the emission reductions per ship calling to the port or harbor for hotelling using a fuel cell substation are estimated to be 0.611 tons per year. This is based on the total emission reductions for all hotelling operations (2,611 tons per year) divided by the total number of calls per year (4,275 calls per year). This assumes that ships are hotelling for 48 hours per call.

Proposed Rule 1633

For Proposed Rule 1633, the emission reductions for use of an electric standby unit to power truck or trailer refrigeration units is 0.067 tons per year per truck or trailer refrigeration unit. This is based on the total emission reductions for all truck and trailer refrigeration units (1,204 tons per year) divided by the total number of truck and trailer refrigeration units (17,900 truck or trailer units).

Proposed Rule 2507

For PR 2507, it is assumed that the emission reductions per replacement of a diesel engine to an electric motor to power an agricultural pump are 3.28 tons per year. This is based on an emission factor difference is 11.0 g/bhp-hr – 0.0g/bhp-hr = 11.0 g/bhp-hr and a diesel engine size of 208 HP which is replaced with an electric motor that is 150 HP, operating 2,000 hours per year at a load factor of 0.65.

Step 3: Emission Reductions Per Source

Table 3 summarizes the annual participation rates for Rule 1612.1 and the four proposed rules. The annual participation rates presented in Table 3 and used in the CEQA analysis do not account for the potential demand for credits from the RECLAIM program or implementation of the AQIP and Mitigation Fee Program. The potential demand from these programs could increase the participation rates presented in Table 3. The participation rates are for each individual rule and represent the amount of participation per year. Each year represents the additional participation that can be expected above the previous year(s) estimates.

Table 3
Annual Participation

Rule	Estimated Participation Rate Each Year				Total % by 2004
	2001	2002	2003	2004	
R1612.1 -Class 7 or 8 Vehicles	1.0%	2.0%	0.0%	0.0%	3.0%
R1612.1 -Refuse Trucks	1.0%	2.0%	0.0%	0.0%	3.0%
R1612.1 -Yard Hostler	0.5%	1.0%	1.0%	0.0%	2.5%
PR 1631-Repowering Tug, Work, and Crew Boats	15.0%	30.0%	10.0%	0.0%	55.0%
PR1632-Fuel Cells for Hotelling	0.0%	10.0%	10.0%	0.0%	20.0%
PR1633-Truck and Trailer Refrigeration	5.0%	10.0%	10.0%	0.0%	25.0%
PR 2507-Agricultural Pumps	0.7%	1.4%	1.4%	0.0%	3.6%

For PR 1632, it is assumed that a longer lead time is needed to develop and implement a fuel cell substation for marine vessel hotelling operation, thus participation does not begin until 2002. For Rule 1612.1 and the other three proposed rules, it is assumed that only half of the anticipated annual participation would occur in 2001, to account for adoption of the proposed rules and actual implementation of projects.

Key assumptions for the annual percent participation:

- **Rule 1612.1 (Class 7 or 8 Vehicles or Refuse Trucks)** - Assumes that 20 percent of the 10 percent of vehicles that would be replaced per year would participate, representing 2 percent per year of the total inventory of vehicles. Since new standards are in effect post-2002, assumed no additional participation post 2002.
- **Rule 1612.1 (Yard Hostlers)** - Assumes that 10 percent of the 10 percent of yard hostlers that would be replaced per year would participate, representing 1 percent per year of the total inventory of yard hostlers.
- **PR 1631 (Repowering Tug, Work and Crew Boats)**- Higher percentage is assumed based on the cost-effectiveness of the reductions from this source category.
- **PR 1632 (Fuel Cell Hotelling)** - Assumes that 10 percent of ships calling or coming to the ports or harbors for hotelling would use the fuel cell substation.
- **PR 1633 (Truck and Trailer Refrigeration)** - Assumes that 10 percent of trucks and trailers with refrigeration units equipped with an electric standby mode and will use electric power at the distribution center in lieu of diesel auxiliary engines.
- **PR 2507 (Agricultural Pumps)** - Assumes that 10 percent of the 14 percent of diesel engines (assuming a useful life of 7 years) that would be replaced per year would participate, representing 1.4 percent per year of the total inventory of agricultural pumps.

Step 4: Estimated Supply of Credits for CEQA Analysis

Table 4 summarizes the estimated supply of credits from implementation of Rule 1612.1 and Proposed Rules 1631, 1632, 1633, and 2507.

Table 4
Estimated Supply of Credits ¹

Rule	Total Units	Estimated Supply (Tons per Year)			
		2001	2002	2003	2004
R1612.1 –Class 7 or 8 Vehicles	81,869	109	327	327	327
R1612.1 –Refuse Trucks	1,000	4	12	12	12
R1612.1 -Yard Hostler	1,000	2	7	12	12
PR 1631-Repowering Tug, Work, and Crew Boats)	50	68	203	248	248
PR1632-Fuel Cells for Hotelling	4,275	0	261	522	522
PR1633-Truck and Trailer Refrigeration	17,900	60	181	301	301
PR 2507-Agricultural Pumps	217	5	15	25	25
Total	NA	248	1006	1447	1447

¹ Does not account for potential high demand from RECLAIM facilities or proposed RECLAIM AQIP or Mitigation Fee Program.

Estimated RTC Demand and Supply Methodology

The following presents the assumptions and methodology for estimating RTC demand and supply for RECLAIM facilities through 2005. The methodology was used to construct Tables 3-1, 3-2, 4-6, and 4-7 (presented in Chapters 3 and 4, respectively). The tables are reproduced here followed by an explanation of each row of the tables. The method of allocating the NOx credits estimated to be obtained by Regulation XVI and Regulation XXV credits is also provided.

Table 3-1
Potential RTC Supply and Demand for Power Producing Facilities \geq 50 MW
Without Project Implementation
 (tons per day)

		2001	2002	2003	2004	2005
Demand	Baseline NOx Emission Projections	19.63	19.58	20.24	20.86	21.39
Supply	Emission Reductions from Current Retrofit Projects	5.12	10.99	10.98	10.96	11.29
	CARB Emission Bank	1.17	1.74	1.74		
	Utility Operator Offsets				1.74	1.74
	RTC Holdings	6.71	6.61	5.45	5.80	5.78
Anticipated RTC Demand		6.63	0.24	2.07	2.36	2.58
Anticipated RTC Demand without Additional Deductions			6.87	8.94	11.30	13.88

Methodology for Table 3-1 – Estimated Demand and Supply for Power Producing Facilities $>$ 50 MW without Implementation of Proposed Project (i.e., Existing Setting)

Demand

Baseline NOx Emissions: growth at 7%, 7%, 3%, 3% (CEC projection) starting with actual emissions from 2000 and first two months of 2001

Supply

Emission Reductions from Current Retrofit Projects: based on applications already submitted to SCAQMD

CARB Emission Bank: portion of 1.81 tons per day of NOx emission reductions from CARB Emission Bank established pursuant to Governor's Executive Order D24-0 and funded by projects previously completed (for new equipment at existing power producing facilities)

Utility Operator Offsets: offsets provided by utility operators after CARB Emission Bank sunsets (i.e., offsets provided beginning 2004 Compliance Year)

RTC Holdings: based on actual holdings of power producing facilities

Demand - Supply = Shortfall (positive number) or Surplus (negative) of RTCs Exceedances (RTC shortfall) carries forward to the next year

**Table 3-2
Potential RTC Supply and Demand for RECLAIM Universe
Other than Power Producing Facilities ≥ 50 MW
Without Project Implementation
(tons per day)**

		2001	2002	2003	2004	2005
Demand	Baseline NOx Emission Projections	44.17	43.95	44.62	44.92	45.23
Supply	CARB Emission Bank	0.64	0.07	0.07		
	Utility Operator Offsets				0.07	0.07
	Emission Reductions - Level 1		8.80	16.41	16.56	16.73
	Emission Reductions - Level 2		1.15	2.17	2.19	4.77
	RTC Holdings – RECLAIM Facilities	32.81	30.27	26.89	26.60	26.41
	RTC Holdings - non-RECLAIM Facilities	2.10	1.26	1.62	1.56	1.77
	Anticipated RTC Demand	8.62	2.40	-2.54	-2.06	-4.52
	Anticipated RTC Demand should Violations Occur		11.02	8.48	6.42	1.90

Methodology for Table 3-2 – Estimated Demand and Supply for Non-Power Producing Facilities without Implementation of Proposed Project (i.e., Existing Setting)

Demand

Baseline NOx Emissions: growth at starting with actual emissions from 1999 and growth rates according to the 1997 AQMP by 2-digit SIC code categories (includes new power producing facilities)

Supply

CARB Emission Bank: portion of 1.81 tons per day of NOx emission reductions from CARB Emission Bank established pursuant to Governor's Executive Order D24-0 and funded by projects previously completed (for new power producing facilities)

Utility Operator Offsets: offsets provided by utility operators after CARB Emission Bank sunsets (i.e., offsets provided beginning 2004 Compliance Year)

Level 1 Emission Reductions from controls listed in the White Paper on Stabilization of NOx RTC Prices (SCAQMD, 2001a), Table 3.5 and part of Table 3.6

Level 2 Emission Reductions from controls listed in the White Paper on Stabilization of NOx RTC Prices, Table 3.6

RTC Holdings: based on actual holdings of non-power producing facilities and other non-RECLAIM facilities

Demand - Supply = Shortfall (positive number) or Surplus (negative) of RTCs
Exceedences (RTC shortfall) carries forward to the next year

Table 4-6
Potential RTC Demand and Supply for Power Producing Facilities ≥ 50 MW
- Assuming Proposed Project Implementation -
(CEQA Air Quality Scenario)
(tons per day)

		2001	2002	2003	2004	2005
Demand	Baseline NOx Emission Projections	19.63	19.58	20.24	20.86	21.39
Supply	Emission Reductions from Current Retrofit Projects	5.12	10.99	10.98	10.96	11.29
	CARB Emission Bank	1.17	1.74	1.74		
	Utility Operator Offsets				1.74	1.74
	RTC Holdings	6.71	6.61	5.45	5.80	5.78
	Compliance Plan Emission Reductions			0.58	1.66	1.68
	Mitigation Fee Credits	0.06		1.52		1.50
	Surplus Credits from Reg. XVI Sources	0.03	0.24	0.76	0.70	0.75
	Anticipated RTC Demand	6.54	0.00	-0.79	0.00	-1.35
	Anticipated RTC Demand without Additional Reductions Assumed			5.75		4.40

Methodology for Table 4-6 – Estimated Demand and Supply for Power Producing Facilities >50 MW assuming Implementation of Proposed Project

Demand

Baseline NOx Emissions: growth at 7%, 7%, 3%, 3% (CEC projection) starting with actual emissions from 2000 and first two months of 2001

Supply

CARB Emission Bank: portion of 1.81 tons per day of NOx emission reductions from CARB Emission Bank established pursuant to Governor's Executive Order D24-0 and funded by projects previously completed (for new equipment at existing power producing facilities)

Utility Operator Offsets: offsets provided by utility operators after CARB Emission Bank sunsets (i.e., offsets provided beginning 2004 Compliance Year)

Emission Reductions from Current Retrofit Projects: based on applications already submitted to SCAQMD

CARB Emission Bank: emission reductions from CARB Emission Bank established pursuant to Governor's Executive Order D24-0 and funded by projects previously completed

Utility Operator Offsets: offsets provided by utility operators after CARB emission bank sunsets (i.e., offsets provided beginning 2004 Compliance Year)

RTC Holdings: based on actual holdings of power producing facilities

Compliance Plan Reductions: reductions realized by control of utility boilers and peaking units required by January 1, 2003 and January 1, 2004 respectively

Mitigation Fee credits: funded as needed with credits generated by Reg. XVI / Reg. XXV rules (see Method of Allocating Reg. XVI / Reg. XXV Credits below)

Surplus Credits from Reg. XVI sources: some portion of credits left after AQIP and Mitigation Fee programs are funded as needed (see Method of Allocating Reg. XVI / Reg. XXV Credits below)

Demand - Supply = Shortfall (positive number) or Surplus (negative) of RTCs

Exceedences (shortfall) carries forward to second year until 2003 (2001 rolls to 2003, 2002 to 2004, 2003 to 2005, then returns to carrying exceedences to next year)

Table 4-7
Potential RTC Demand and Supply for RECLAIM Universe
Other than Power Producing Facilities ≥ 50 MW
- Assuming Proposed Project Implementation -
(CEQA Air Quality Scenario)
 (tons per day)

		2001	2002	2003	2004	2005
Demand	Baseline NOx Emission Projections	44.17	43.95	44.62	44.92	45.23
Supply	CARB Emission Bank	0.64	0.07	0.07		
	Utility Operator Offsets				0.07	0.07
	Emission Reductions - Level 1		8.80	16.41	16.56	16.73
	Emission Reductions - Level 2		1.15	1.15	1.15	1.15
	RTC Holdings - RECLAIM Facilities	32.81	30.27	26.89	26.60	26.41
	RTC Holdings - non-RECLAIM Facilities	2.10	1.26	1.62	1.56	1.77
	AQIP Credits	0.59	0.58	0.96	0.98	1.01
	Surplus Credits from Reg. XVI Sources	0.03	1.98	0.76	2.32	0.75
	Anticipated RTC Demand	8.00	-0.16	-3.24	-4.32	-2.66
	Anticipated RTC Demand should Violations Occur		7.84	4.60	0.28	-2.38

Methodology for Table 4-7 – Estimated Demand and Supply for Non-Power Producing Facilities assuming Implementation of Proposed Project

Demand

Baseline NOx Emissions: growth at starting with actual emissions from 1999 and growth rates according to the 1997 AQMP by 2-digit SIC code categories (includes new power producing facilities)

Supply

CARB Emission Bank: portion of 1.81 tons per day of NOx emission reductions from CARB emission bank established pursuant to Governor's Executive Order D24-0 and funded by projects previously completed (for new power producing facilities)

Utility Operator Offsets: offsets provided by utility operators after CARB emission bank sunsets (i.e., offsets provided beginning 2004 Compliance Year)

Level 1 Emission Reductions from controls listed in the White Paper on Stabilization of NOx RTC Prices, Table 3.5 and part of Table 3.6

Level 2 Emission Reductions from controls listed in the White Paper on Stabilization of NOx RTC Prices, Table 3.6, not expected to increase after 2002 due to addition of MSERCs/ASCs and since surplus credits will be available

RTC Holdings: based on actual holdings of non-power producing facilities and other non-RECLAIM facilities

RECLAIM AQIP Credits: funded from credits generated by Reg. XVI / Reg. XXV sources (see Method of Allocating Reg. XVI / Reg. XXV Credits below)

Surplus Credits from Reg. XVI / Reg XXV Sources: additional Reg. XVI / Reg. XXV credits (see Method of Allocating Reg. XVI / Reg. XXV Credits below)

Demand - Supply = Shortfall (positive number) or Surplus (negative) of RTCs
Exceedences (shortfall) carries forward to the next year

Method of Allocating Regulation XVI and Regulation XXV Credits

1st: fund RECLAIM AQIP as needed by new power producing facilities, new facilities post-1993, and < 6 ton NOx per year facilities

2nd: divide remaining credits by 2 and fund Mitigation Fee Program as needed. If not needed, this amount was not listed on the table as Mitigation Fee credits, but was used to fund the open market for RECLAIM and listed as surplus credits, either on Table 4-6 or 4-7.

3rd: divide any remaining credits by 2 and use half for power producing facilities and half for broader RECLAIM market