

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

**Final Socioeconomic Assessment For
Proposed Rule 1127 – Emission Reductions From Livestock Waste
August 2004**

Executive Officer

Barry R. Wallerstein, D.Env.

Deputy Executive Officer

Planning, Rule Development, and Area Sources

Elaine Chang, DrPH

Assistant Deputy Executive Officer

Planning, Rule Development, and Area Sources

Laki T. Tisopulos, Ph.D., P.E.

Planning and Rules Manager

Susan Nakamura

Author:

Patricia Kwon, Air Quality Specialist

Reviewed By:

Sue Lieu, Program Supervisor

Kurt Wiese, District Counsel

Frances Keeler, Senior Deputy District Counsel

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Governing Board

CHAIR: WILLIAM A. BURKE, Ed.D.
Speaker of the Assembly Appointee

VICE CHAIR: S. ROY WILSON, Ed.D.
Supervisor, Fourth District
Riverside County Representative

MEMBERS:

MICHAEL D. ANTONOVICH
Supervisor, Fifth District
Los Angeles County Representative

JANE CARNEY
Senate Rules Committee Appointee

WILLIAM S. CRAYCRAFT
Councilmember, City of Mission Viejo
Cities Representative, Orange County

BEATRICE J.S. LAPISTO-KIRTLEY
Mayor, City of Bradbury
Cities Representative, Los Angeles County, Eastern Region

RONALD O. LOVERIDGE
Mayor, City of Riverside
Cities Representative, Riverside County

JAN PERRY
Councilmember, City of Los Angeles
Cities Representative, Los Angeles County, Western Region

BILL POSTMUS
Supervisor, First District
San Bernardino County Representative

JAMES W. SILVA
Supervisor, Second District
Orange County Representative

CYNTHIA VERDUGO-PERALTA
Governor's Appointee

DENNIS YATES
Councilmember, City of Chino
Cities Representative, San Bernardino County

EXECUTIVE OFFICER:
BARRY R. WALLERSTEIN, D.Env

EXECUTIVE SUMMARY

A socioeconomic analysis was conducted to assess the impacts of Proposed Rule (PR) 1127—Emission Reductions from Livestock Waste. Proposed Rule 1127 (PR 1127) calls for the reduction in ammonia, VOC and PM10 emissions from dairy farms in the district. A summary of the analysis and findings are presented below.

<p>Elements of Proposed Rule</p>	<p>Proposed Rule (PR) 1127—Emission Reductions from Livestock Waste—requires operators of dairy farms and manure processing operations to implement best management practices (clearing corrals and manure stockpiles four times per year). In addition, PR 1127 requires that when manure is disposed of in the District, it goes to (1) approved agricultural land within the South Coast Air Quality Management District (SCAQMD) or (2) a manure processing operation. Emission reductions in 2006 will be 7.3 tons per day of ammonia and 2.6 tons per day of VOC as a result of this proposed rule, dairy relocation, and water quality regulations. Farms with fewer than 50 cows, heifers and/or calves or those with contractual agreements to relocate their operations and cattle outside of the district prior to January 1, 2007, would be exempt from the proposed rule. The compliance date of the proposed rule varies from 2004 to 2006, depending on the rule element.</p>
<p>Affected Facilities and Industries</p>	<p>Based on the 2002 data, out of the 314 dairy farms (SIC 0241) in the Basin with approximately 205,000 milking cows, there were 125 dairy farms in Riverside County (40%) and 189 dairy farms in San Bernardino County (60%). There were also three manure processing operations (SIC 4953) in San Bernardino County affected by the proposed rule.</p>
<p>Assumptions of Analysis</p>	<p>The proposed rule will affect only the 19% of total manure produced that is currently processed by open windrow composting, due to the closure of the open windrow composting facility in 2006. It is assumed that the disposal of the remaining total manure produced (81%) would not be affected by PR 1127 as these disposal options could continue under the proposed rule. For this analysis, it is assumed that fabric in-vessel composting is the compliance option under the proposed rule. The cost of fabric in-vessel composting is evaluated against the options of shipping in or out of the Basin and land spreading under the future baseline. It is assumed that the total amount of manure disposed for all options will remain at the current level throughout the analysis period. It is also assumed that increasing the clearing of stockpiles from two times to four</p>

	times a year will not affect the disposition of manure but will result in an additional cost of approximately \$87,000 per year for all dairy farms.
Compliance Costs	Implementation of PR 1127 using fabric in-vessel composting would result in a savings of \$2.01 million to a cost of \$3.54 million annually, on average, between 2006 and 2015. As indicated in the rule staff report, the most likely scenario is the use of fabric in-vessel composting relative to shipping in the Basin, which would result in a cost of \$3.54 million. These costs will be borne solely by the dairy industry (SIC 0241). Changes in compliance costs to the dairy farms will be absorbed by the dairy sector and will not be passed down to consumers since the dairy farms have no control over their product prices.
Regional Economic Impacts	A macroeconomic analysis was performed to assess the overall job impacts of the proposed rule on the entire local economy based on the annual savings of \$2.01 million and annual cost of \$3.54 million. Overall it is projected that 27 to 89 jobs would be gained annually, on average, between 2006 and 2015. The trucking sector has the highest share of jobs (12 jobs) forgone and the services sector has the highest share of jobs (36 jobs) gained annually during this period.

INTRODUCTION

Proposed Rule 1127 (PR 1127) requires operators of dairy farms and manure processing operations to implement best management practices, including clearing corrals and any stockpiles four times per year. Additionally, PR 1127 requires operators to remove manure to (1) approved agricultural land within the district, (2) a location outside the district, or (3) a manure processing operation. Approximately 10.6 tons of ammonia and 3.6 tons of VOC would be reduced daily in the district as a result of this proposed rule. Farms with fewer than 50 cows, heifers and/or calves or those with contractual agreements to relocate their operations and cattle outside of the district prior to January 1, 2007, would be exempt from the proposed rule. Farms outside of the South Coast Air Basin (SCAB) but within the district (e.g., Coachella Valley) would be exempt from manure processing requirements.

LEGISLATIVE MANDATES

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

AQMD Governing Board Resolutions

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

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

On October 14, 1994, the Board passed a resolution which directed staff to address whether the rules or amendments brought to the Board for adoption are in the order of cost effectiveness as defined in the AQMP. The intent was to bring forth those rules that are cost effective first.

Health & Safety Code Requirements

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

- Type of Affected Industries
- Impact on Employment and the Economy of the district
- Range of Probable Costs, Including Those to Industries
- Emission Reduction Potential

- Necessity of Adopting, Amending or Repealing the Rule in Order to Attain State and Federal Ambient Air Quality Standards
- Availability and Cost Effectiveness of Alternatives to the Rule

Additionally, the AQMD is required to actively consider the socioeconomic impacts of regulations and make a good faith effort to minimize adverse socioeconomic impacts. H&SC Section 40728.5, which became effective on January 1, 1992, requires the AQMD to:

- Examine the type of industries affected, including small businesses
- Consider Socioeconomic Impacts in Rule Adoption

H&SC Section 40920.6, which became effective on January 1, 1996, requires that incremental cost effectiveness be performed whenever more than one control option is available to meet emission reduction requirements for a proposed rule or amendment relating to ozone, carbon monoxide (CO), oxides of sulfur (SO_x), oxides of nitrogen (NO_x), and their precursors. Incremental cost effectiveness is defined as the difference in costs divided by the difference in emission reductions between one level of control and the next more stringent control. The law also requires that the findings of the incremental cost effectiveness analysis be presented at a public workshop or a public consultation session on the proposed rule.

Since the proposed rule does not result in significant adverse environmental impacts, no alternatives have been proposed in the Environment Assessment.

REGULATORY HISTORY

Dairy farmers in the SCAB have been subject to several water quality regulations. From 1972 to 1994 Santa Ana Regional Water Quality Control Board (SARWQCB) regulated dairy farms by issuing individual waste discharge permits. In 1994, SARWQCB adopted a General Waste Discharge Requirement, Order No. 94-7, to have two desalters and a Chino Basin co-composting facility process the manure coming from concentrated feeding operations such as the dairy farms. The desalters and the co-composting facility were unable to treat all of the manure produced and dairy farms continued to stockpile and land apply manure to local cropland from 1994 to 1999. SARWQCB then passed Order No. 99-11 to comply with the Federal Clean Water Act. Order 99-11 required dairy farms to minimize groundwater contamination by cleaning corrals and removing stockpiled manure every 180 days, to have at least two clean days per year free of stockpiled manure, and to prohibit the application of manure in the Chino Basin. Dairy farms were required to prepare manure manifests of manure hauled offsite and an annual manure disposal report to SARWQCB. Order 99-11 forms the basis of PR1127 requirements.

AFFECTED FACILITIES

PR 1127 will affect dairy farms and manure processing operations. There are three manure processing operations (SIC 4953—refuse systems) in the basin consisting of one co-composting facility and two anaerobic digesters in San Bernardino County. According to SARWQCB, out of 314 dairy farms (SIC 0241) in 2002 in the basin with approximately 205,000 milking cows, there were 125 dairy farms in Riverside County (40%) and 189 dairy farms in San Bernardino County

(60%).¹ Historically the rate of decline of the dairy industry has been about 2% per year from 1993 to 2001. The 2002 SARWQCB data indicated a 10% reduction in the number of dairy farms between 2001 and 2002. Milk Producers Council (MPC) believes that dairy farms will continue to leave the Basin at an accelerated rate, with 50% of the existing dairy farms leaving in the next five years. A map of the dairy farms is shown in Figure 1.

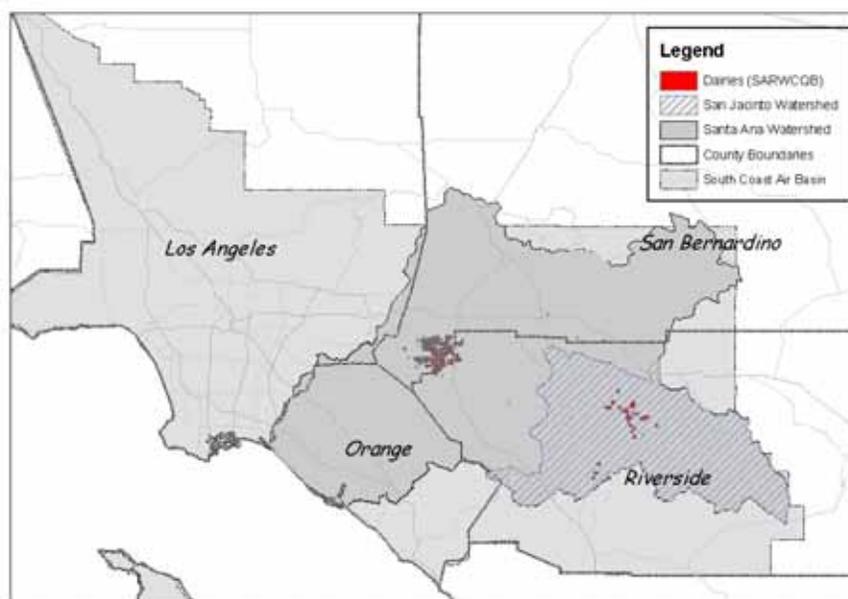


Figure 1—Dairy Farms in South Coast Air Basin

Industry Profile

According to dairy industry representatives, the average dairy in the SCAB is medium sized and has a herd size of 800 cows, seven full-time employees and 30 contract service employees.² Table 1 summarizes the characteristics of dairy farms in the SCAB. Full-time and part-time employees are mainly engaged in milking and feeding the cows, while contract employees range from veterinarians, breeders, mechanics, suppliers, and manure haulers. The majority of dairy farms in the Basin are Dutch owned (55%), followed by Portuguese (20%), French and Spanish Basque (20%), and Hispanic/other (5%).

Table 1—Characteristics of Chino Basin Dairy farms

Size of Dairy	Number of Cows	Number of Farms	# Full-Time Employees	# Contract Employees
Small	< 600 cows	116	3-4	12-15
Medium	600 – 999 cows	117	7	30
Large	≥ 1,000 cows	81	10-14	90

Source: Nathan De Boom, Milk Producers Council

¹ Based on “Results of 2002 Annual Report of Animal Waste Discharge Analysis.” May 8, 2003. Santa Ana Regional Water Quality Control Board.

² Milk Producers Council and Western United Dairywomen represent the majority of dairy farmers in the SCAB.

AQMD Survey Data

In December 2003, the AQMD staff sent a mail survey to 200 dairy farms on the Milk Producers Council's mailing list. Sixty-one farmers responded to the survey, with 11 farmers citing that they were no longer in business in the district. This equated to a 31% response rate. Appendix 1 has the original survey and the cover letter. Complete survey results are shown in Appendix 2.

AQMD survey data indicated that 36% of the dairy farms were in Riverside County and 64% of the dairy farms were in San Bernardino County. On average dairy farms surveyed have been in business for 24 years, own 1,034 adult cows and 503 heifers, and have eight employees. Sixty-four percent of the dairy farms owned their own land and the remaining 36% leased their land. While 54% of farmers cited plans to relocate (mostly to San Joaquin Valley), 42% of farmers did not know their future plans for their dairy farms for the next 10 years.

More dairy farms in Riverside County owned their land compared to those in San Bernardino County. More dairy farms in San Bernardino County felt that environmental regulations affected their competitiveness to a great extent than dairy farms in Riverside County. In general, however, there were more similarities than differences between farms in Riverside and San Bernardino Counties. Table 2 summarizes these results.

Table 2—Survey Responses by County

Responses to Survey Questions	Number of Farmers Responding		
	RV & SB County (n=49)	RV County (n=17)	SB County (n=32)
Dairy farms that own their own land	64%	82%	53%
Environmental regulations affect competitiveness greatly	66%	80%	50%
Percentage of farms with 1,000 or more cows	56%	76%	47%
Capital improvements of \$100,000 or more in past 10 yrs	28%	47%	19%
Willingness to pay any additional costs above usual manure disposal costs	72%	88%	70%
Dairy farm is breaking even in the past 10 years	44%	53%	41%
Dairy farm is making a profit in the past 10 years	40%	35%	44%
Take out loan when dairy is unprofitable	50%	47%	50%
Anaerobic digestion perceived as most environmentally beneficial manure disposal method	34%	40%	31%

n is number of respondents.

Economic Information

EPA's affordability criterion based on the percentage of revenue spent on environmental compliance ranges from 2% - 5%. Forty-eight percent of dairy farms fell within this criterion while 50% of dairy farms spent over 5% of their total revenue on environmental compliance. Thirty percent of the dairy farms installed capital improvements every 5-10 years and 40% installed capital improvements every 10 or more years.

Manure Disposal Methods

Sixty-four percent of surveyed farms disposed of manure within the Riverside and San Bernardino Counties, followed by 18% out of Basin and 18% to a composting facility. Almost three-quarters of those surveyed (72%) said they used only one manure disposal method. For farmers who used more than one manure disposal method, most farms also sent manure to a composting facility (10%).

Own vs. Lease Land

Farmers who owned their own land were more able to invest in capital improvements and generally able to absorb additional costs from environmental regulations and manure disposal than farmers who leased their land. Dairy farmers who owned their land were more likely to have made significant economic investments in their farms and were able to remain more competitive than dairy farmers who leased their land. Survey responses are below in Table 3.

Table 3—Survey Responses by Land Ownership

Responses to Survey Questions	Number of Farmers Responding	
	Own Land (n=32)*	Lease Land (n=18)
Capital improvements every 5-10 years	38%	17%
Capital improvements of \$50,000 or more in past 10 years	56%	39%
Don't know future plans for dairy farm	45%	35%
Take out loan when dairy is unprofitable	45%	65%
Ship manure within RV-SB counties	61%	77%
Anaerobic digestion perceived as most environmentally beneficial manure disposal method	27%	53%
Willingness to pay any additional costs above usual manure disposal costs	70%	88%
Environmental regulations affect competitiveness greatly	60%	88%

*n is number of survey respondents

Small Businesses

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

The SBA's definition of a small business uses the criterion of gross annual receipts (ranging from \$0.5 million to \$25 million), number of employees (ranging from 100 to 1,500), or assets (\$100 million), depending on industry type. The SBA definitions of small businesses vary by 4-digit SIC code. The cutoff for the dairy farm sector is \$0.5 million in gross annual receipts.

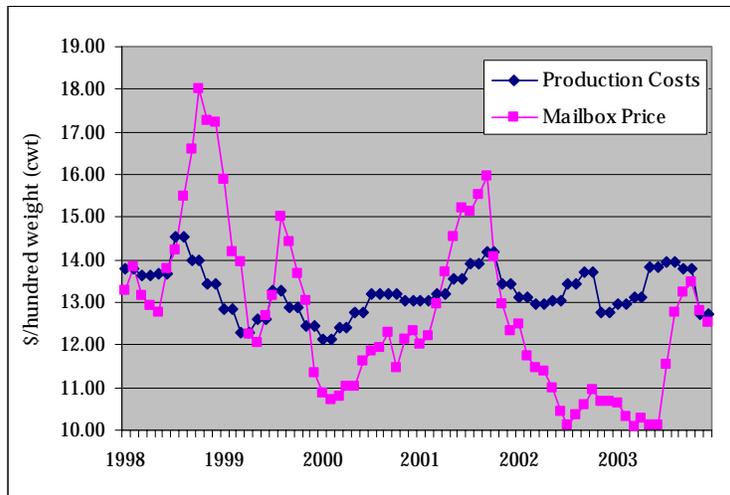
The CAAA classifies a facility as a "small business stationary source" if it: (1) employs 100 or fewer employees, (2) does not emit more than 10 tons per year of either VOC or NOx, and (3) is a small business as defined by SBA.

Dun and Bradstreet data has employment and gross revenue information on 146 out of the 314 facilities. According to the AQMD definition of a small business, 81 facilities out of 146 would be classified as small businesses. Based on SBA’s definition of a small business, 111 facilities would be small businesses. It is not possible to determine the number of facilities that would be classified as small businesses based on the CAAA definition since AQMD’s AER database currently does not include agricultural sources.

Dairy Industry Pricing Structure

Prices that dairy farmers receive for the different classes of milk are set by California Department of Food and Agriculture (CDFA). Hence dairy farmers are unable to pass on additional milk production costs to consumers. These additional costs would be absorbed by dairy farms as an increased cost of doing business in the SCAB. Milk is typically sold in hundred pound units (cwt). The average price for all classes of milk and milk products paid to dairy farmers by wholesalers is referred to as the mailbox milk price. The mailbox price includes adjustments made to the pool prices for milk set by U.S. Department of Agriculture.³ In December 2003, the mailbox milk price was \$12.54 per cwt while the production cost index was \$12.71 per cwt.⁴ There are no published revenue figures for dairy farms. However, based on CDFA data dairy farms in the Basin are estimated to have generated \$570 million in revenue and \$664 million in production costs in 2003, resulting in an estimated loss of \$94 million.⁵ The loss was due to the excess milk production in California. Figure 2 shows the trends of milk production indices and mailbox prices in Southern California since 1998.

Figure 2—Southern California Milk Production Costs and Mailbox Price 1998-2003



Source: Information from CDFA, Dairy Marketing Branch, Cost of Production Annuals 1998-2003

³ The mailbox price is calculated by adding up total receipts from the adjusted gross, quality payments, component premiums, yield premiums, seasonal bonuses and monthly distributions of cooperative earnings and subtracting marketing costs and assessments including haul and stop charge, cooperative dues, equity deductions, federal assessments, state assessments, and inspection fees. Further information on milk pricing can be obtained from the CDFA website (www.cdfa.ca.gov/dairy).

⁴ California Department of Food and Agriculture, Dairy Marketing Branch. Milk Pricing Newsletter. Milk production index and mailbox price are calculated by CDFA on a monthly basis.

⁵ Revenue and production costs are estimated based on published CDFA data from their website. Revenue is calculated by multiplying the 2003 Riverside and San Bernardino County milk production by the average mailbox milk price for 2003. The difference between the estimated production costs and revenue is the estimated loss.

COMPLIANCE COSTS

Presently, manure is disposed by shipping and local land application of manure within the Basin (58%), shipping and land application of manure out of the Basin with backhaul benefit (21%), anaerobic digestion (2%), and open windrow composting (19%). Under this analysis it is assumed that the proposed rule will affect only the 19% of total manure produced that is currently processed by open windrow composting, due to the closure of the open windrow composting facility in 2006. As shown in Table 4, total costs range from \$7.50 per ton of manure disposed for shipping in the Basin to \$32.00 per ton of manure disposed for shipping out of the Basin without backhaul benefit. Backhauling refers to the practice of using the return trip of a manure hauling for transporting other goods back to the dairy farmer, such as transporting feed. In addition, it is assumed that the disposal practices of the remaining total manure produced (81%) would not be affected by PR 1127 as these disposal options could continue under the proposed rule.

Dairy farms pay tipping fees to manure processing facilities and incur transportation costs of hauling manure. Tipping fees are charged to farmers for spreading manure on crop lands (shipping in or out of the Basin) or for the recovery of capital costs and operating and maintenance costs of manure processing technologies. Tipping fees and hauling costs for shipping manure in and out of the Basin were provided by outside sources. For fabric in-vessel composting, the tipping fee was calculated by AQMD staff based on outside estimates for site construction, equipment cost, filters and bags, specialized labor, land acquisition, and revenue from compost sales (\$10/ton). A ten year equipment life and a four percent real interest rate were assumed in the calculation.

Table 4—Manure Disposal Options

Manure Disposal Options	Tipping Fee (\$/ton)	Hauling Cost (\$/ton)	Total Cost (\$/ton)
Shipping in Basin ⁶	\$1.50	\$6.00	\$7.50
Shipping out of Basin (backhaul benefit) ⁷	\$1.50	\$14.50	\$16.00
Shipping out of Basin (no backhaul benefit) ⁷	\$1.50	\$30.50	\$32.00
Fabric In-Vessel Composting ⁷	\$16.74	\$6.00	\$22.74

Sources: Inland Empire Utilities Agency, Milk Producers Council, CTI System, Ag Bag International

Costs of transporting manure are calculated based on the average distances of dairy farms from manure processing facilities. For in-basin transportation, the average mileage is 15 miles. For out of basin transportation, the average mileage is 170 miles to the San Joaquin Valley.

Future Baseline Options in Absence of PR 1127

The only open windrow composting facility will close down in 2005 in compliance with Rule 1133.2—Emission Reductions from Co-Composting Operations. PR 1127 would enable the manure processed at the open windrow facility to be processed through fabric in-vessel composting. However, in the absence of PR 1127, manure that is currently processed by the open windrow composting facility (19%) could only be disposed by shipping in the Basin or

⁶ Reference: Milk Producers Council.

⁷ References: CTI System, Ag Bag International.

shipping out of the Basin (with or without backhaul benefit). Sending the 19% of total manure produced to an anaerobic digester or to an enclosed Rule 1133.2 composting facility is not feasible because these options are currently at their capacity.

Option under PR 1127

For the purpose of this analysis, it is assumed that the 19% of total manure produced that is processed via open windrow composting will be processed by fabric in-vessel composting. The use of fabric in-vessel composting is an impact of the proposed rule since PR 1127 (f)(1)(C) allows the use of fabric in-vessel composting by exempting dairy farms and related operations from Rule 1133.2. The use of fabric in-vessel composting would result in greater emission reductions than open windrow composting and be more affordable than the construction of enclosed composting facilities or anaerobic digesters. It is assumed that the amount of manure being sent to fabric in-vessel composting will remain at the present level throughout 2015 based on the contractual agreements between dairy farmers and processing facilities in order to make the investment on fabric in-vessel composting cost effective.

Framework and Assumptions for Cost Analysis

Other disposal options such as shipping in or out of the Basin would not be impacts of the proposed rule since they could occur in the absence of PR 1127. Therefore, the cost analysis will focus on the comparison of fabric in-vessel composting under PR 1127 to those options under the future baseline for the 19% of total manure produced that is currently processed through open windrow composting (Figure 3).

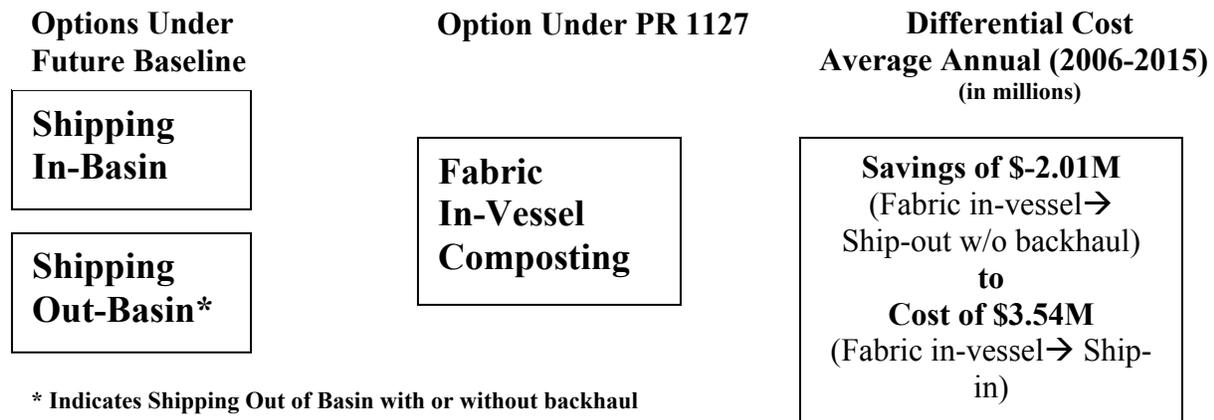


Figure 3—Framework for Cost Analysis

It is assumed that increasing the clearing of stockpiles from two times to four times a year will not affect the disposition of manure but will result in additional costs. Two additional clearings per year will result in a cost of approximately \$87,000 per year for all dairy farms. These clearings will be performed by manure haulers as part of their job in removing manure stockpiles from the dairy farms.

Other rule provisions such as best manure management practices, dairy registration, and recordkeeping are not expected to impose additional costs. Dairy registration and recordkeeping would be consistent with what has been required by SARWQCB. The three manure processing operations are not expected to incur additional costs from the proposed rule because no additional controls are required.

Costs of PR 1127

The last column of Figure 3 shows a range of costs for fabric in-vessel composting under PR 1127 relative to those under the future baseline. Between 2006 and 2015 the total average annual cost of PR 1127 ranges from a savings of \$2.01 million to a cost of \$3.54 million. As indicated in the rule staff report, the most likely scenario is the use of fabric in-vessel composting relative to shipping in the Basin, which would result in a cost of \$3.54 million.

REGIONAL ECONOMIC IMPACTS

The potential job and socioeconomic impacts of implementing the proposed rule were projected through the use of the Regional Economic Models, Inc. (REMI) model. The REMI model is an economic and demographic forecasting and simulation model designed to examine the economic and demographic effects resulting from policy initiatives or external events in a local economy. The REMI model used in this analysis contains historical economic data of the four county region from 1969 to 2001. An analysis period from 2006 to 2015 was used, since the proposed rule will begin to take effect in 2006. The analysis looks at the two scenarios used in the cost analysis, comparing fabric in-vessel composting to the future baseline options. Scenario 1 compares fabric in-vessel composting to shipping out of the Basin and is based on the annual savings of \$2.01 million. Scenario 2 compares fabric in-vessel composting to shipping in the Basin and is based on the annual cost of \$3.54 million.

Scenario 1—Fabric In-Vessel Composting relative to Shipping out of the Basin without backhaul

Relative to shipping manure out of the Basin without backhaul benefit, fabric in-vessel composting under PR 1127 will have a lower hauling cost, thus lowering demand for the trucking industry (SIC 4212), and higher tipping fees, thus increasing the demand for the services of manure processing operations (SIC 4953). On the other hand, the additional cost resulting from more frequent clearing of manure corrals and stockpiles slightly increases demand for trucking services. The net savings to dairy farmers resulting from fabric in-vessel composting is simulated through an increase in farm income. Overall, it is projected that 27 jobs would be gained annually, on average, between 2006 and 2015. The services sector would have the highest share of jobs gained (16 jobs) and the trucking sector the highest share of jobs forgone during this period (12 jobs).

Scenario 2—Fabric In-Vessel Composting relative to Shipping in the Basin

Relative to shipping manure in the Basin, the option of fabric in-vessel composting will have higher tipping fees, thus increasing the demand for the services of manure processing operations.

The additional cost resulting from more frequent clearing of manure corrals and stockpiles slightly increases demand for the trucking sector. The net cost to dairy farmers resulting from fabric in-vessel composting is simulated through a decrease in farm income. Overall, it is projected that 89 jobs would be gained annually, on average, between 2006 and 2015. The services sector has the highest share of jobs gained (36 jobs) annually during this period.

Table 7 summarizes the estimated job impacts of the proposed rule by industrial sector. The additional cost of PR 1127 is not projected to have impacts on farm employment. This is because milk production and milk prices are set by the U.S. Department of Agriculture and the California Department of Food and Agriculture. Changes in production costs at the local level would not affect milk production, thereby resulting in no corresponding changes in farm employment.

Table 7—Job Impacts of PR 1127 by Industry

Industry	Scenario 1—Fabric In-Vessel Composting Relative to Ship Out Basin w/o Backhaul				Scenario 2—Fabric In-Vessel Composting Relative to Ship In Basin			
	2006	2010	2015	Average Annual (2006-2015)	2006	2010	2015	Average Annual (2006-2015)
Manufacturing	6	5	4	5	16	11	9	12
Durables	5	4	3	4	14	10	8	10
Non-durables	1	1	1	1	2	2	1	2
Non-Manufacturing	30	22	18	22	92	73	62	73
Mining	0	0	0	0	0	0	0	0
Construction	8	5	4	5	18	13	10	13
Trucking	-13	-12	-10	-12	2	2	1	2
Public Utilities	3	3	3	3	8	8	8	8
Finance, Insurance & Real Estate	2	1	1	1	3	2	1	2
Retail Trade	8	6	5	6	7	5	4	5
Wholesale Trade	3	2	2	2	7	5	4	5
Services	20	16	14	16	44	36	31	36
Agric, Forestry, Fish	1	0	0	0	1	1	1	1
Others	1	0	0	0	1	1	1	1
Government	0	1	1	1	1	4	6	4
Grand Total	36	27	21	27	108	89	75	89

RULE ADOPTION RELATIVE TO THE COST-EFFECTIVENESS SCHEDULE

On October 14, 1994, the Governing Board adopted a resolution that requires staff to address whether rules being proposed for adoption are considered in the order of cost-effectiveness. The 2003 Air Quality Management Plan (AQMP) ranked, in the order of cost-effectiveness, all of the proposed control measures for which costs were quantified. It is generally recommended that the most cost-effective actions be taken first. The proposed rule implements Control Measure WST-01—Emission Reductions from Livestock Waste—from the 2003 AQMP. Cost-effectiveness for WST-01 was estimated in the 2003 AQMP to be \$2,000 to \$7,000 per ton and was found to be

cost-effective. Cost-effectiveness for ammonia as calculated in the rule staff report was \$2,400/ton for ammonia, \$6,770/ton for VOC, and \$1,770/ton for ammonia and VOC.

APPENDIX 1
COVER LETTER AND DAIRY FARM SURVEY

«NAME»
«STREET»
«CITY», «ST» «ZIP»

November 20, 2003

Dear «NAME»:

The South Coast Air Quality Management District (SCAQMD) is surveying dairies in the South Coast Air Basin regarding their manure disposal methods. This survey has been developed with input from the Milk Producers Council. The purpose of this survey is to obtain information regarding current manure disposal methods and to identify other methods that are technically and economically feasible that will help to reduce air pollution.

Upon completing the attached survey, please mail the survey to Patricia Kwon at 21865 Copley Drive, Diamond Bar CA 91765 or fax the survey to SCAQMD at (909) 396-3324 by Friday December 19, 2003. We appreciate your time and effort in responding to this survey. If you have any questions, please call Patricia Kwon at (909) 396-3065.

Sincerely,



Laki T. Tisopulos, Ph.D., P.E.
Assistant Deputy Executive Officer
Planning, Rule Development, and Area
Sources

Attachment

Dairy Farmer Survey

1. Which county are you located in?
 - a. Los Angeles
 - b. Riverside
 - c. San Bernardino
2. How long have you been in business locally? _____ years
3. How many adult cows and heifers/calves are at your dairy?
 - a. _____ adult cows
 - b. _____ heifers/calves
4. Do you own or lease your land?
 - a. Own
 - b. Lease
5. How many full-time employees are working at your dairy? _____
6. How frequently do you put capital improvements (i.e., permanent structures or buildings that last at least 10 years) on your dairy land?
 - a. Every year
 - b. 1-4 years
 - c. 5-10 years
 - d. More than 10 years
7. Approximately how much total capital improvements have you invested in during the past 10 years?
 - a. < \$10,000
 - b. \$10,001 - \$50,000
 - c. \$50,001 - \$100,000
 - d. > \$100,000
8. What is the percentage of total revenue spent on environmental compliance costs (i.e., manure disposal, water quality regulations, etc.)?
 - a. 0% - 2%
 - b. 2% - 5%
 - c. 5% - 10%
 - d. 10% or more
9. For the past 10 years (or the length of time in business), how has your dairy done economically?
 - a. Generally the dairy has been making a profit
 - b. Generally the dairy has been breaking even
 - c. Generally the dairy has been losing money

10. During periods when your dairy has not been generating profits, what are you most likely to do?
 - a. Use accumulated savings or capital to maintain dairy operations
 - b. Take out a loan to maintain dairy operations
 - c. Consider selling the dairy
 - d. Other _____

11. Which manure disposal method(s) do you currently use and what are the costs per ton for each disposal method (approximately)?

a. Shipping within RV-SB counties	_____ %	\$ _____/dry ton
b. Shipping out of RV-SB counties	_____ %	\$ _____/dry ton
c. Ship to digester	_____ %	\$ _____/dry ton
d. Ship to composter	_____ %	\$ _____/dry ton
e. Other _____	_____ %	\$ _____/dry ton

12. If cost were not a factor, which manure disposal method do you feel is most environmentally beneficial?
 - a. Shipping within RV-SB counties
 - b. Shipping out of RV-SB counties
 - c. Ship to digester
 - d. Ship to composter
 - e. Other _____

13. If there is additional cost incurred for sending manure to an anaerobic digester, what additional amount per dry ton would you be willing to pay above your usual manure disposal costs?
 - a. \$0/ton
 - b. \$2.50/ton or less
 - c. \$2.5 - \$5/ton
 - d. Greater than \$5/ton

14. To what extent do you feel that environmental regulations affect your ability to be competitive with other dairies outside of the two-county area?
 - a. Not much
 - b. Don't know
 - c. A great deal

15. What are your future plans for dairy farming in RV-SB counties for the next 10 years?
 - a. Expand dairy
 - b. Downsize dairy
 - c. Relocate. If relocating, where? _____
 - d. Don't know

 Thank you for your participation. Please mail the survey to Patricia Kwon at South Coast Air Quality Management District, 21865 Copley Drive, Diamond Bar CA 91765 or fax the survey at

(909) 396-3324. If you have questions, please contact her at (909) 396-3065. Data in this survey will be kept confidential and will not be shared with any other agencies. If you would like the overall survey results, please provide an email/mail address.

Name: _____

Email: _____

Mailing Address: _____

APPENDIX 2
RESPONSES OF DAIRY FARM SURVEY

In November 2003 a survey of dairy farmers was sent to the Milk Producers Council’s mailing list. Sixty-one farmers responded to the survey with 11 farmers citing they were no longer in business in the district, giving a 31% survey response rate. The results of the survey as presented as follows:

Number of respondents

Survey Question

n=49 Question 1--Which county are you located in?
 17 RV
 32 SB

n=49 Question 2--How long have you been in business locally?
 Ranges from 4-48 years, with an average of 24 years.

Years in Business	Number of Dairy Farms
0-5	1
6-10	3
11-15	10
16-20	3
21-25	9
26-30	9
31-35	9
36-40	3
41-45	1
46-50	1

n=49 Question 3a--How many adult cows?
 Ranges from 0-2300 adult cows, with an average of 1,034 cows.

Number of Adult Cows	Number of Dairy Farms
0-249	1
250-499	1
500-749	3
750-999	7
1000-1249	17
1250-1499	9
1500-1749	4
1750-1999	4
2000-2249	0
2250-2499	1
≥ 2500	2

n=49 Question 3b--How many heifers?
 Ranges from 0-1900 heifers, with an average of 503 heifers.

Number of Heifers	Number of Dairy Farms
0-249	8
250-499	14
500-749	11
750-999	3
1000-1249	5
1250-1499	2
1500-1749	2
1750-1999	3
2000-2249	1
≥ 2250	0

n=50 Question 4--Do you own or lease land?

32 Own land
 18 Lease land

n=50 Question 5--How many full-time employees?
 Ranges from 1-22 employees, with an average of 8.

Number of Full-Time Employees	Number of Dairy Farms
0-4	1
5-9	15
10-14	24
15-19	6
20-24	3
25-29	1
≥30	0

n=50 Question 6--How frequently do you put in capital improvements?

3 Every year
 12 1-4 years
 15 5-10 years
 20 More than 10 years

n=50 Question 7--How much in total capital improvements over the past 10 years?

7 < \$10,000
 18 \$10,000 - \$50,000

11	\$50,001 - \$100,000
14	> \$100,000
n=49	Question 8--What percentage of total revenue was spent on environmental compliance?
3	0% -2%
21	2%- 5%
16	5%-10%
9	>10%
n=50	Question 9--For the past 10 yrs, how has your dairy done economically?
20	Making a profit
22	Breaking even
8	Losing money
n=48	Question 10--During periods when your dairy has not been profitable, what are you most likely to do?
18	Use savings to maintain dairy operations
25	Take out a loan
3	Consider selling dairy
2	Other
n=48	Question 11 a--Which manure disposal methods do you currently use?
32	Shipping within RV-SB counties
9	Shipping outside RV-SB counties
0	Ship to digester
4	Ship to composter
2	Spread on own crop land
1	No method used
n=45	Question 11 b--Percentage of manure disposed by this method.
5	50%
1	55%
2	75%
1	80%
36	100%

n=35 Question 11c--Cost per ton of this manure disposal method.
 Ranges from \$2.50 to \$18.42/ton, average is \$7.31/ton.

Cost (\$/ton)	Number of Dairy Farms
0 - 2.50	1
2.51 - 5.00	5
5.01 - 7.50	18
7.51 - 10.00	8
10.01 - 12.50	1
12.51 -15.00	1
15.01 - 17.50	0
17.51 - 20.00	1

n=9 Question 11d--Which other manure disposal methods do you use?

- 0 Shipping within RV-SB counties
- 2 Shipping outside RV-SB counties
- 3 Ship to digester
- 5 Ship to composter
- 0 Spread on own crop land

n=9 Question 11e--Percentage of manure disposed by this method.

- 1 20%
- 2 25%
- 1 45%
- 5 50%

n=7 Question 11f--Cost per ton of this manure disposal method.
 Ranges from \$5.00 to \$13.00/ton, average is \$7.64/ton.

Cost (\$/ton)	Number of Dairy Farms
2.51 - 5.00	1
5.01 - 7.50	4
7.51 - 10.00	1
10.01 - 12.50	0
12.51 -15.00	1

n=47 Question 12--If cost were not a factor, which disposal method do you feel
 is most environmentally beneficial?

- 9 Shipping within RV-SB counties
- 9 Shipping outside RV-SB counties
- 17 Ship to digester
- 8 Ship to composter

3	Spread on own crop land	
n=47	Question 13--Is there an additional cost per dry ton that you would be willing to pay above your usual manure disposal costs?	
36	\$0/ton	
11	\$2.50/ton or less	
0	\$2.50 - \$5.00/ton	
0	Greater than \$5.00/ton	
n=47	Question 14--How much do you feel that environmental regulations affect your competitiveness?	
3	Not much	
11	Don't know	
33	A great deal	
n=48	Question 15--What are your future plans for your dairy in Riverside or San Bernardino County for the next 10 years?	
0	Expand dairy	
0	Downsize dairy	
27	Relocate	
	--San Joaquin	9
	--Northern California	1
	--Not in California	3
	--Elsewhere	5
	--Did not answer	9
21	Don't know	
1	Stay at same size	

REFERENCES

California Department of Food and Agriculture, Dairy Marketing Branch. California Cost of Production Annual. 1997-2003.

California Department of Food and Agriculture, Dairy Marketing Branch. Milk Pricing Newsletter. Monthly issues January 2002 – December 2003.

California Department of Food and Agriculture, Dairy Marketing Branch. 2002 Mid Year Review. 2002-2003.

California Department of Food and Agriculture, Dairy Marketing Branch. Dairy Information Bulletin. January 2003.

Inland Empire Utilities Agency, Planning Department. Fax to Mary Woods. October 29, 2002.

Inland Empire Utilities Agency. Phone conversation with John Gundlach. October 24, 2002.

Inland Empire Utilities Agency. Visit to RP-5 Digester with John Gundlach. November 14, 2002.

Inland Empire Utilities Agency website. Specifications on RP-1 and RP-5 Pilot Anaerobic Digesters. 2002.

Marquez, Art. Phone conversation. Chino Basin dairy farmer. December 5, 2002.

Milk Producers Council. Phone conversations with Nathan DeBoom. December 19, 2002; January 7, 2003; January 28, 2003; February 5, 2003.

Regional Economic Modeling Inc. Conversation with George Treyz. January 16, 2003.

Santa Ana Regional Water Quality Control Board. 2000-2002 Annual Reports.

Santa Ana Regional Water Quality Control Board. Fact Sheet on Order No. 99-11—General Waste Discharge Requirements for Concentrated Animal Feeding Operations Within the Santa Ana Region. 2001.

Santa Ana Regional Water Quality Control Board. Phone conversation with Adam Fischer. December 11, 2002.

South Coast Air Quality Management District. Preliminary Draft Staff Report. Proposed Rule 1127—Emission Reductions From Livestock Waste. November 15, 2002.

Sterngold, James. “Urban Sprawl Benefits Dairy farms in California.” *New York Times*. October 22, 1999.

Tetra Tech ASL. Chino Basin Organics Management Strategy Business Plan. Prepared for Inland Empire Utilities Agency. May 2001.

Tetra Tech. Task 1—Survey of Current Livestock Waste Management Practices in the South Coast Air Basin. January 2002.

Tetra Tech. Task 2—Literature Survey and National Programs. Livestock Waste Management Practices Survey and Control Option Assessment. May 2002.

Tetra Tech. Task 3—Preliminary Draft Report. Livestock Waste Management Practices and Control Options Assessment. 2002.

Tetra Tech. Task 4—Feasibility Assessment of Emission Control Effectiveness for Potential Waste Management Practices Reducing Ammonia and VOCs. Livestock Waste Management Practices and Control Options Assessment. 2003.