

**Revisions to RULE 74.11.1
LARGE WATER HEATERS AND SMALL BOILERS
Revisions to RULE 74.15.1
BOILERS, STEAM GENERATORS AND PROCESS HEATERS**

BACKGROUND

The specifications for proposed Rule 74.11.1 originated in the 1987 Ventura County Air Quality Management Plan (AQMP) as Oxides of Nitrogen (NO_x) Control Measure N-19 (Natural Gas Fired Commercial Water Heaters). The measure required all units sold in Ventura County to meet an emission limit of 40 nanograms of NO_x per joule of heat output (ng/j). The control measure N-19 was carried forward to the 1991 AQMP as Control Measure N-102 (Boilers, Steam Generators and Water and Process Heaters Less Than 1 MMBtu's in Size). Control Measure N-102 was once again carried forward to the 1994 AQMP. Staff felt that a key requirement in developing N-102 was concurrent development in the South Coast Air Quality Management District (SCAQMD). The development of Rule 74.11.1 began after the adoption of a SCAQMD Rule 1146.2 on December 12, 1997.

Rules 74.11.1 and 74.15.1 overlap in the control of units in the 1,000,000 BTU/hr to 2,000,000 BTU/hr heat input capacity. The reason for this appears in the Staff Report for Rule 74.11.1 dated August 31, 1999:

In mid-1998, staff made the decision to expand the applicability of the proposed rule to units with an input capacity of up to 2,000,000 BTU/hr. This was done to further the similarity between the proposed rule and SCAQMD Rule 1146.2. Rule 74.15.1 already requires units between 1,000,000 BTU/hr and 2,000,000 BTU/hr to meet a NO_x limit of 30 ppm; however, that rule applies primarily to existing units. Proposed Rule 74.11.1 will apply to new units only. Staff believes that, since both rules require a NO_x limit of 30 ppmv, no conflict will occur.

In subsequent years, there have been problems implementing the two rules. For this reason, staff is

proposing to revise the applicability of Rule 74.11.1, a point-of-sale rule, to units less than 1,000,000 BTU/hr capacity. Rule 74.15.1 will continue to apply to units equal to or greater than 1,000,000 BTU/hr and less than 5,000,000 BTU/hr.

Another issues have come up over the years as well. Some operators have complained about the cost of a biennial source test on small boilers. On the other hand, staff has noted a number of units significantly out of compliance during source tests. Also, other local air districts are requiring periodic NO_x and carbon monoxide (CO) screening analyses. These issues are considered in the proposed revisions.

For this revision of Rule 74.11.1, staff felt that a key requirement was a commitment to the process from the SCAQMD. Revised Rule 1146.2 creates a new market for low-NO_x residential water heating equipment in Southern California; the rule requires smaller units to meet a 14 ng/j NO_x limit and larger units to meet a 20 ppm NO_x limit. Ventura County will expand on that market. Since the 20 ppm NO_x limit for larger units took effect on January 1, 2010 in the SCAQMD, it has become clear that complying units are available. The 14 ng/j NO_x limit for smaller units went into effect on January 1, 2012.

Equipment Users

Large water heaters and small boilers are used primarily in commercial operations. According to staff estimates (based on data received in October, 1997, from the Gas Company and US Census data), there are 2708 commercial units between 75,000 BTU/hr and 2 million BTU/hr in Ventura County. This includes 107 units greater than 1 million BTU/hr and equal to 2 million BTU/hr with District Permits to Operate.

PROPOSED REVISIONS

Rule 74.11.1

As noted above, in order to create a market for low NOx large water heaters and small boilers that is as broad as possible, the emission limits recommended for Rule 74.11.1 are the same as those in SCAQMD Rule 1146.2. In addition, the proposed future effective dates for each new NOx limit in amended Rule 74.11.1 (January 1, 2013 and January 1, 2014) are intended to allow existing non-complying water heater inventory to be sold through.

Section A, Applicability

As noted above, staff is proposing to revise the applicability of Rule 74.11.1 to units less than 1,000,000 BTU/hr capacity. The change will take place on January 1, 2013, to coincide with other revisions. The change will eliminate the overlap in applicability between this rule and Rule 74.15.1. Also, as a point-of-sale rule, it will better align with District permit requirements; units less than 1 million BTU/hr are exempt from permit.

In addition, staff proposes to amend the Section A to specify that the rule applies only to natural gas-fired equipment. Also, the section will specify that the rule applies to equipment "with a rated heat input capacity greater than or equal to 75,000 BTU/hr." This will better align the rule with existing Rule 74.11, *Residential Water Heaters*. The changes appear as follows:

Until January 1, 2013, the provisions of this rule shall apply to any person selling, offering for sale, or installing, a new natural gas-fired water heater, boiler, steam generator or process heater with a rated heat input capacity greater than or equal to 75,000 BTU/hr and less than or equal to 2,000,000 BTU/hr in Ventura County.

After January 1, 2013, the provisions of this rule shall apply to any person selling, offering for sale, or installing, a new natural gas-fired water heater, boiler, steam generator or process heater with a rated heat input capacity greater than or equal to 75,000 BTU/hr and less than 1,000,000 BTU/hr in Ventura County.

Section B, Requirements

In order to implement revised NOx emission limits, two new subsection will be added. The existing subsections will continue to apply until the specified

implementation date. After that date, the new subsections will apply, as follows:

2. After January 1, 2014, no person shall sell, offer for sale, or install in Ventura County any new unit with a rated heat input capacity of greater than or equal to 75,000 BTU/hr and less than or equal to 400,000 BTU/hr that does not meet the following criteria:

a. Oxides of nitrogen emissions shall not exceed 14 nanograms per joule of heat output (32.5 pounds per billion BTU), or 20 parts per million, and

b. The unit is certified in accordance with Section C.

Subsection B.2.a shall not apply to units specifically designed to heat swimming pools, hot tubs or spas. For such units, oxides of nitrogen emissions shall not exceed 40 nanograms per joule of heat output (93 pounds per billion BTU), or 55 parts per million.

Note that pool heaters and similar equipment are exempt from the new, lower NOx limit in Subsection B.2.a, and will retain the existing NOx limits. Pool heaters are exempt from SCAQMD Rule 1146.2 because complying equipment is not cost-effective.

4. After January 1, 2013, no person shall sell, offer for sale, or install in Ventura County any new unit with a rated heat input capacity of greater than 400,000 BTU/hr and less than or equal to 1,000,000 BTU/hr that does not meet the following criteria:

a. Oxides of nitrogen emissions shall not exceed 20 parts per million and carbon monoxide emissions shall not exceed 400 parts per million, and

b. The unit is certified in accordance with Section C.

Note that several new requirements previously included in Subsection B.4 are no longer present. Because the rule will apply to units less than 1 million BTU/hr capacity, Permits to Operate not required. As such, requirements for initial installation tune-ups, annual tune-ups, and annual NOx and

CO screening analyses are unenforceable. Similar requirements, however, will appear in Rule 74.15.1

Note also that parts per million (PPM) measurements are by volume and made at three percent oxygen on a dry basis. There may appear to be a discrepancy between the ng/j NO_x limits in Section B and the concentration (ppm) limits. The concentration limits are based on an assumed thermal efficiency of 76 percent. This adjustment reflects both the efficiency benefit of a ng/j limit and the relative difficulty of determining ng/j, which requires both an emission and energy measurement. Although many units manufactured today have a thermal efficiency greater than 76 percent, no emission limit correction factor for higher efficiency units is suggested for the rule. Such a correction factor would complicate the rule unnecessarily.

Section C, Certification

The original text of this section (now C.1) specifies a certification method for applicable equipment. New Subsection C.2 is added as an alternative to C.1, allowing equipment certified in the South Coast AQMD to be certified by comity in Ventura County.

2. **The requirements of Subsection C.1 notwithstanding, applicable equipment certified by the South Coast Air Quality Management District in accordance with the requirements of SCAQMD Rule 1146.2, adopted May 5, 2006, shall be considered certified for use in Ventura County.**

Section D states that any model certified for sale in Ventura County must be marked as such. The certification status of a unit must appear on both the permanent nameplate and the packaging. The model number must also appear; "date of manufacture" is being added. District staff will assume that a unit offered for sale without the necessary certification status declaration is non-complying.

Section F, Definitions

For clarification, a definition of "New Unit" is being added, as follows:

3. **"New Unit": Any applicable water heater, boiler, steam generator or process heater sold, offered for sale, or installed after January 1, 2014, for units subject to the requirements of Subsection B.2 or January 1, 2013, for units subject to the requirements of Subsection B.4.**

Rule 74.15.1

Rule 74.15.1 applies to units with a rated heat input capacity equal to or greater than 1 million BTU/hr and less than 5 million BTU/hr. The rule also requires "high use units" (those with an annual heat input rate of equal to or greater than 1.8×10^9 BTU) to perform a source test every two years. For some operators, the cost of a full source tests on relatively small units is excessive. The proposed revisions to Rule 74.15.1 will address this issue.

Section B, Requirements

Staff proposes to add new Subsection B.4 to address source testing and screening requirements. The 24 month source test schedule in Subsection B.1 will be moved to Subsection B.4.a and applied to units greater than 2 million BTU/hr capacity. Initial source tests for new units will also be required.

- a. **Units with a rated heat input capacity of greater than 2 million BTU/hr, and subject to the provisions of Subsection B.1, shall test for compliance upon initial installation and then not less than once every 24 months.**

Source testing for Subsection B.1 units with an input capacity equal to or greater than 1 million BTU/hr and less than or equal to 2 million BTU/hr will occur once every 48 months, as described in Subsection B.4.b. Initial source tests for new units will also be required. The revised schedule will begin upon adoption of the revised rule.

- b. **Units with a rated heat input capacity of less than or equal to 2 million BTU/hr, and subject to the provisions of Subsection B.1 or B.2, shall test for compliance upon initial installation and then not less than once every 48 months. The first source test on this test schedule shall be 48 months after the last source test conducted prior to (date of adoption).**

A requirement for an annual screening analysis is being added in Subsection B.4.c. Screenings will occur in years that a full source test, as described Subsections B.4.a and B.4.b, is not required. Subsection B.4.a units will alternate screenings and source tests; Subsection B.4.b units will perform three screenings for every one source test.

- c. All units shall perform an annual screening analysis of NOx and CO emissions unless a source test specified in either Subsection B.4.a or B.4.b is required that year. The operator shall notify the APCD by telephone 24 hours prior to any screening analysis.**

The tune-up requirements for "low use" units, or units with an annual heat input rate of equal to or greater than 0.3×10^9 BTU and less than 1.8×10^9 BTU, is renumbered as Subsection B.3 but is otherwise unchanged.

New Subsection B.2 lowers the NOx emission limit for units equal to or greater than 1 million BTU/hr and less than or equal to 2 million BTU/hr to 20 ppm. This is the same limit that applies to units of this size in SCAQMD Rule 1146.2 and was previously proposed for Rule 74.11.1, as follows:

- 2. After January 1, 2013, no person shall allow the discharge into the atmosphere, from any new boiler, steam generator, or process heater with a rated heat input capacity of equal to or greater than 1,000,000 BTU/hr and less than or equal to 2,000,000 BTU/hr, oxides of nitrogen emissions in excess of 20 ppmv. Carbon monoxide emissions shall not exceed 400 ppmv. In addition, each device shall be certified by the South Coast Air Quality Management District in accordance with the requirements of SCAQMD Rule 1146.2, adopted May 5, 2006.**

Except to clarify that the exemptions in Section C apply to all Section B requirements, there are no changes to Section C, Exemptions.

Section D, Recordkeeping Requirements

Subsection D.2 is being revised to require the submittal of tune-up reports within 45 days instead of 12 months. Staff believes that 45 days is a reasonable amount of time to prepare a report.

- 2. Any person subject to the provisions of Subsection ~~B.2.a~~ B.3.a shall submit a report to the Air Pollution Control Officer (APCO) within ~~twelve (12) months~~ forty-five (45) days after achieving first compliance with Subsection ~~B.2.a~~ B.3.a. Reports shall continue to be submitted every twelve (12) months. ~~This~~ The report shall verify that each tune-up has been performed and the results were satisfactory. The report shall**

contain all information and or documentation that the APCO may determine, in writing, to be necessary.

New Subsection D.3 requires reports for NOx and CO screening analyses within 45 days.

- 3. Any person subject to the provisions of Subsection B.4 c shall submit a report to the APCO within forty-five (45) days after achieving first compliance with the subsection. Reports shall continue to be submitted every twelve (12) months. The report shall contain all information and or documentation that the APCO may determine, in writing, to be necessary.**

Section E, Test Methods

New Subsection E.4 is being added to establish requirements for the portable analyzer used in the screening analyses required in Subsection B.4.c. After considering a requirement for analyzer maintenance using an SCAQMD protocol, staff is now requiring maintenance according to manufacturer's specifications. Training from an approved source is still required.

- 4. Screening analyses required pursuant to Subsection B.4.c shall be performed using a portable analyzer calibrated, maintained, and operated in accordance with the manufacturer's specifications or as approved in writing by the APCO. Portable analyzer operators shall undergo training, as approved in writing by the APCO, on the operation and maintenance of the analyzer.**

Section F, Violations

New Subsection F.4 is being added to address non-complying screening analysis results. Staff takes the position that screening analyses, while accurate when performed correctly, are not equivalent to a full source test and should not be treated as such. For this reason, staff recommends a series of grace periods before a violation is attached to the results of a screening analysis. This gives the operator time to correct a problem and re-screen. The following is proposed as Subsection F.4:

- 4. An applicable unit shall be in violation if, according to a screening analysis, it is operated out-of-compliance with the requirements of either Subsection B.1 or B.2 as follows. An out-of-compliance screening**

analysis shall be reported to the District within seven (7) calendar days. The unit shall be corrected and a second screening analysis or source test performed within fourteen (14) calendar days of the initial screening analysis. The results of the second analysis shall be reported to the District within seven (7) days. If the unit remains out-of-compliance, a violation has occurred.

According to this schedule, a non-complying screening must be reported within seven days. However, the clock for correction and re-screening starts at the conclusion of the initial, non-complying screening, regardless of when it is reported. The re-screening results must be reported within seven days. Once a violation is attached, further corrective actions will be negotiated with the District.

Section G, Definitions

A definition of "Alternative Fuel," as referenced in Section C, Exemptions, and a definition of "New Unit" is proposed as follows:

- 1. "Alternate Fuel": Any fuel that is not natural gas.**
- 4. "New Boiler, Steam Generator or Process Heater ": Any applicable unit sold, offered for sale, or installed after January 1, 2013.**

The remaining definitions in Section G are renumbered.

DISCUSSION

The proposed revisions began as a reaction to complaints from operators about the cost of source tests for boilers under 2 million BTU/hr input capacity. In addition, the overlap in applicability between Rule 74.15.1 and Rule 74.11.1 needed to be addressed. After an initial attempt to make most of the changes in Rule 74.11.1, the current proposal shifts most changes to Rule 74.15.1. The latter rule allow units equal to or less than 2 million BTU/hr and subject to emission limits (per Subsection B.1, with a heat rate equal to or greater than 1.8×10^9 BTU/year) to source test once every 48 months. All "B.1" units over 2 million BTU/hr will continue to source test every 24 months. Tune-ups will continue to be required for units with heat rates under 1.8×10^9 BTU/year.

In addition, staff felt that the NO_x and CO screening analysis required in Santa Barbara County APCD Rule 361 could be incorporated into a rule. The NO_x and CO screening would be done with approved portable analyzers. Both SBCAPCD and EPA maintain a list of approved analyzers on their websites.

The primary revisions to Rule 74.11.1 include a 20 ppm NO_x limit for newly installed equipment, beginning either January 1, 2013 or January 1, 2014. Also, the rule will apply only to units less than 1 million BTU/hr. This fits in well with the point-of-sale aspect of the rule since permits to operate are not required for boilers under 1 million BTU/hr.

Staff has discovered that non-compliance problems extend to new equipment, so an initial installation

source test is being added to Rule 74.15.1. Such tests have been required by permit condition for many years. Because permits are not required, a similar provision in Rule 74.11.1 would be unenforceable.

Similarly, screening analysis requirements are being added only to Rule 74.15.1. Screening will be done only on units required to source test per Subsection B.1. Although the revised 48 month source testing schedule for equipment with a rated heat input capacity of equal to or greater than 1,000,000 BTU/hr and less than or equal to 2,000,000 BTU/hr will make source testing less frequent, a less-expensive screening analyses on off years is expected to increase compliance. Because an increase in compliance is speculative, the quantity of emission reductions expected cannot be estimated.

Complying Equipment

As of January 1, 2012, all provisions of SCAQMD Rule 1146.2 have been implemented. As a result, many complying water heater and small boiler currently exist. SCAQMD maintains a long list of certified equipment.² Currently, 86 individual brands and hundreds of models are certified in both categories; Type 1 (< 400,000 BTU/hr, complies with 14 ng/J) and Type 2 (> 400,000--2,000,000 BTU/hr, complies with 20 ppm NO_x @ 3% O₂)

The proposed 20 ppm NO_x limits noted above are proposed for all units subject to Rule 74.11.1 and units equal to or greater than 1,000,000 BTU/hr capacity and less than 2,000,000 BTU/hr capacity in

Rule 74.15.1.B.2 As noted above, the District issues Permits to Operate for units equal to or greater than 1,000,000 BTU/hr capacity. Currently, 107 units under 2,000,000 BTU/hr are permitted. Based on available source test data, the average NOx emission concentration for these units is 18.08 ppm at 3 percent oxygen. 68 percent of the tests are less than

20 ppm and 32 percent are above 20 ppm. Because many existing boilers are in compliance with the proposed NOx limit, and many manufacturers offer complying equipment, staff concludes that compliance with the proposed 20 ppm limits will not be significant issue in Ventura County.

EMISSIONS / COST-EFFECTIVENESS

**Rule 74.11.1
 Emission Reduction – New Limits**

An important part of estimating the emission reduction from the proposed revisions is to estimate of the number of large water heaters and small boilers in Ventura County. Since most units are used in commercial operations, *Economic Census Summary Statistics for Ventura County* from the US Census Bureau³ were used to estimate the number of commercial businesses. This NAICS-based data, for both 1997 and 2007, reports "economic establishments," or businesses, in the county. Between 1997 and 2007, a 29 percent increase in the number of businesses occurred (Appendices A-B). Staff assumes that each business is likely to have at least one large water heater or small boiler. If we assume that the same percentage increase will occur between 2007 and 2012, a total increase of 43 percent will occur.

According to the Gas Company in December, 1996, there were 1422 large water heaters (from 75,000 BTU/hr to 400,000 BTU/hr) and 397 small boilers (between 400,000 BTU/hr and 1 million BTU/hr) in the county, for a total of 1819 applicable units. Assuming a 43 percent increase for a total 2012 estimate of 2601 applicable units. In addition, 107 small boilers between 1 million and 2 million BTU/hr currently hold District Permits to Operate. Therefore, a total of 2708 large water heaters and small boilers are currently in use in the county (Appendix C)

To estimate emissions, it is assumed that all existing units are meeting the requirements of the current version on Rule 74.11.1. This means that all existing large water heaters between 75,000 and 400,000 BTU/hr capacity emit NOx at no more that 40 ng/j, which is equal to about 93 pounds of NOx per billion BTUs of natural gas burned (93 lb/10⁹ BTU). The proposed NOx emission rate of 14 ng/j is equal to 32.5 lb/10⁹ BTU. (These estimates are based in a conversion factor of 1 lb/mmBTU = 430 ng/j)⁴

Existing small boilers between 400,000 and 2 million BTU/hr capacity currently emit NOx of 30 ppm, which is equal to about 37 lb/10⁹ BTU. The proposed NOx limit of 20 ppm is equal to 32.5 lb/10⁹ BTU.

As noted in Appendix C, the 1996 Gas Company data provides fuel use totals for groups of units between 75,000 BTU/hr and 1 million BTU/hr. Energy use in California has been flat for several decades. However, for this estimate, 2012 fuel use is estimated to be a 43 percent more than 1996, as follows:

Capacity Range	Quantity	MBTU per year
75,000 – 400,000	2033	405,947,439
400,001 – 1,000,000	<u>568</u>	<u>466,558,670</u>
Total	2601	872,506,109

For small boilers between 1 million and 2 million BTU/hr, staff assumed operation at capacity for 15 hours per day, 5 days a week and 50 weeks a year. At 3750 hours per year and using the actual capacity of each of the 107 units, fuel use is estimated at 688,913,000 MBTU/year. Unit efficiency is assumed to be 76 percent.

Revised Rules 74.11.1 and 74.15.1.B.2, which apply to units from 75,000 BTU/hr to 2 million BTU/hr capacity, also apply only to new units and are point-of-sale rules. Assuming a 10 percent replacement rate, a total of 271 units are expected to be replaced annually in Ventura County. On this basis, NOx emission reductions are calculated as follows:

**Large Water Heaters (75,000 - 400,000 BTU/hr)
 Emissions Reductions**

$$(405,947,439 \text{ MBTU})(93-32.5)(0.76)*1000/((10^9)*(2000)) =$$

9.3 tons per year (tpy) NOx

Small Boilers (400,000 – 2,000,000 BTU/hr)

Emissions Reductions

(1,155,471,670MBTU)(37-32.5)(0.76)*1000/((10⁹)*(2000)) =

2.0 tpy NOx emissions at 30 ppm countywide

Therefore, NOx will be reduced from large water heaters and small boilers at **11.3** tons per year.

Cost-Effectiveness – New Limits

Much of the cost information used in this analysis is from the South Coast AQMD Staff Report for the 2006 revision to Rule 1146.2.⁵ Since this data was collected in 2006, the analysis may change as new information is collected.

The cost-effectiveness analysis is based on the following assumptions:

1. Ten percent of existing units will be replaced each year. New units are not included.
2. After one initial expenditure, each low-NOx unit will reduce NOx for 10 years.

Cost effectiveness for various size ranges appears in Table 1. These estimates are less than the District guideline of \$18,000 per ton NOx reduced.

For large water heaters under 100,000 BTU/hr capacity and meeting the 14 ng/j NOx limit, complying water heater costs are expected to increase an estimated \$150 per unit. This is based on cost increase reports for residential water heaters that comply with the 10 ng/j NOx limit in Rule 74.11, *Residential Water Heaters*.

For large water heaters between 100,000 BTU/hr and 300,000 BTU/hr capacity, SCAQMD estimated an cost increase of about \$1000 per unit. For units between 300,000 BTU/hr and 400,000 BTU/hr, the cost increase was estimated at about \$3000. This discrepancy relates to a requirement for ASME certification in certain situations. Uncertified equipment may be less expensive.⁶

Conversely, the SCAQMD cost increase for units between 400,000 BTU/hr and 1,000,000 BTU/hr is very low; in fact, some complying units are shown to be less expensive than existing units. Staff has set the cost increase for this category at approximately \$150 per unit. Complying units between 1,000,000 BTU/hr and 2,000,000 BTU/hr capacity are estimated to increase in cost by about \$1000 per unit, based on SCAQMD estimates.⁷

**Rule 74.15.1
 Emission Reduction – Screening Analyses**

The screening analysis requirements proposed for Rule 74.15.1 apply only to units required to source test per Subsection B.1. Although the revised 48 month source testing schedule for equipment with a rated heat input capacity of equal to or greater than 1,000,000 BTU/hr and less than or equal to 2,000,000 BTU/hr will make source testing less frequent, less-expensive screening analyses on off years may increase compliance. Because an increase in compliance is speculative, the quantity of emission reductions expected cannot be estimated.

**Table 1
 Cost-Effectiveness of Proposed Emission Limit Revisions
 Rule 74.11.1 and Rule 74.15.1**

Capacity (BTU/hr)	NOx Limit	Annual Quantity	Incremental Cost (\$)	Annual Cost (\$)	10 Yr Life NOx Reduced (t/y)	Cost Effectiveness (\$/ton)
Large Water Heaters						
75,000 - 100,000	14 ng/j	117	150	17,610	436.8	403
100,000 - 300,000	14 ng/j	61	1000	60,489	85.6	7,237
300,000 - 400,000	14 ng/j	25	3000	76,362	68.2	11,198
Small Boilers						
400,000 - 1 MM	20 ppm	57	150	8,515	8.0	13,722
1 MM - 2 MM	20 ppm	15	1000	15,301	25.8	5,936

Cost-Effectiveness – Screening Analyses

Without an emission reduction estimate, cost-effectiveness (in dollars per ton of emissions reduced) cannot be calculated. However, an annual screening analysis is estimated to cost between \$100 and \$200 dollars. A full source test costs between

\$2,000 and \$3,000, depending on the complexity. Therefore, a switch from biennial source testing to quadrennial source testing and screening analyses on off years for units between 1,000,000 BTU/hr and 2,000,000 BTU/hr is expected to significantly reduce operating costs.

SOCIOECONOMIC IMPACT

Assembly Bill 2061 (Polanco)[H&S § 40728.5], which went into effect on January 1, 1992, requires that the APCD Board consider the socioeconomic impact of any new rule or amendment to an existing rule if air quality or emission limits are affected. Both proposed Rule 74.11.1 and 74.15.1 impose emission limits and may affect air quality in Ventura County, so the requirements of the bill must be evaluated. Each rule is evaluated separately.

Rule 74.11.1

The Board must evaluate the following socio-economic information on revised Rule 74.11.1:

- (1) *The type of industries or business, including small business, affected by the rule or regulation.*

Rule 74.11.1 will primarily affect commercial users of small boilers in Ventura County. It is not possible to predict any other type of new source to which Rule 74.11.1 will apply.

- (2) *The impact of the rule or regulation on employment and the economy of the region affected by the adoption of the rule or regulation.*

The adoption of Rule 74.11.1 is expected to have no impact on employment in and the economy of Ventura County. The proposed rule is a point-of-sale rule, where new, low-NOx units replace obsolete standard units gradually over time. Approximately 2700 applicable units exist in the county. The cost-effectiveness of the proposed rule is favorable. While new lower-NOx units will be more expensive than existing units, this additional expense is expected to have no effect on either employment in or the economy of the region.

- (3) *The range of probable costs, including costs to industry or business, including small business, of the rule or regulation.*

Complying equipment may cost between \$150 and \$3,000 per unit more than existing equipment. For the proposed NOx emission limits, the cost-effectiveness varies from \$403 to \$13,722 per ton of NOx reduced. This is consistent with the District's cost-effectiveness guideline of \$18,000 per ton of NOx reduced. See Table 1 above.

- (4) *The availability and cost-effectiveness of alternatives to the rule or regulation being proposed or amended.*

Complying equipment for the proposed 14 ng/j NOx limit in Subsection B.2 has been available in the SCAQMD since January 1, 2012. Complying equipment for the proposed 20 ppm NOx limit in Subsection B.4 has been available in the SCAQMD since January 1, 2010. No alternatives are available.

- (5) *The emission reduction potential of the rule or regulation.*

After full implementation in 2022, the total estimated total NOx emission reduction for both proposed NOx limits is estimated to be 11.3 tons per year.

- (6) *The necessity of adopting, amending, or repealing the rule or regulation in order to attain state and federal ambient air standards pursuant to Chapter 10 (commencing with Section 40910).*

By reducing NOx emissions, adoption of proposed Rule 74.11.1 will assist in the District's progress towards attainment and maintenance of the federal and California ambient air quality standards.

Rule 74.15.1

The Board must evaluate the following socio-economic information on revised Rule 74.15.1:

- (1) *The type of industries or business, including small business, affected by the rule or regulation.*

Rule 74.15.1 will primarily affect commercial users of small to medium size boilers in Ventura County. It is not possible to predict any other type of new source to which Rule 74.15.1 will apply.

- (2) *The impact of the rule or regulation on employment and the economy of the region affected by the adoption of the rule or regulation.*

The adoption of Rule 74.15.1 is expected to have no impact on employment in and the economy of Ventura County. Requirements for initial installation source tests and annual screening analyses are being added, but some quadrennial source testing is also proposed, reducing costs. A 20 ppm NOx limit for new boilers equal to or less than 2,000,000 BTU/hr is being proposed and is cost-effective. The additional expense of these new requirements is expected to have no effect on either employment in or the economy of the region.

- (3) *The range of probable costs, including costs to industry or business, including small business, of the rule or regulation.*

For new units with a rated heat input capacity of equal to or greater than 1,000,000 BTU/hr and less than 2,000,000 BTU/hr, complying equipment may cost between \$150 and \$3,000 per unit more than existing equipment. For the proposed NOx emission limits, the cost-effectiveness for this group is \$5,936 per ton of NOx reduced. This is consistent with the District's cost-effectiveness guideline of \$18,000 per ton of NOx reduced. See Table 1 above.

It is not possible to calculate an emission reduction for the proposed revisions to the source testing requirements and the new screening analysis requirement. Without an

emission reduction estimate, cost-effectiveness cannot be calculated. However, annual screening analyses are estimated to cost between \$100 and \$200 dollars. Full source tests cost between \$2,000 and \$3,000, depending on the complexity. Therefore, the proposed source test and screening analysis revisions are expected to significantly reduce operating costs.

- (4) *The availability and cost-effectiveness of alternatives to the rule or regulation being proposed or amended.*

Complying equipment for the proposed 20 ppm NOx limit in Subsection B.2 has been available in the SCAQMD since January 1, 2010. No alternatives are available. The cost effectiveness of the proposed source test and screening analysis revisions cannot be determined.

- (5) *The emission reduction potential of the rule or regulation.*

If 11 boilers equal to or greater than 1,000,000 BTU/hr and less than 2,000,000 BTU/hr are replaced each year, 1.29 tons per year of NOx will be reduced. The requirement for an initial installation source test and an annual screening analysis in years when no source test is required may catch non-compliance situation earlier than the existing version of Rule 74.15.1. NOx emissions are expected to be reduced. However, it is impossible to anticipate when this will happen. Therefore, it is not possible to make an emission reduction estimate for the proposed source test and screening analysis revisions.

- (6) *The necessity of adopting, amending, or repealing the rule or regulation in order to attain state and federal ambient air standards pursuant to Chapter 10 (commencing with Section 40910).*

Although some NOx emissions reductions cannot be predicted, all emission reductions expected from adoption of proposed Rule 74.15.1 will assist in the District's progress towards attainment and maintenance of the federal and California ambient air quality standards.

ENVIRONMENTAL IMPACTS OF METHODS OF COMPLIANCE

California Public Resources Code Section 21159 requires the District to perform an analysis of the reasonably foreseeable environmental impacts of the methods of compliance. The analysis shall take into account a reasonable range of environmental, economic, and technical factors, population and geographic areas, and specific sites.

The analysis must include the following information on the proposed rule:

- (1) *An analysis of the reasonably foreseeable environmental impacts of the methods of compliance.*

Rule 74.11.1 and Rule 74.15.1.B.2 are point-of-sale rules, where new, low-NO_x units replace obsolete standard units over time. Since units become obsolete at different rates and low-NO_x units are expected to become obsolete at the same rate as standard units, no additional waste is expected to appear in landfills. In addition, old water heaters and small boilers are frequently recycled. The new low-NO_x units are expected to cause no adverse environmental impacts.

Other revisions to Rule 74.11.1 and Rule 74.15.1 are expected to have no environmental impacts.

- (2) *An analysis of the reasonably foreseeable mitigation measures.*

Since no adverse environmental impacts are expected, no mitigation measures are proposed.

- (3) *An analysis of the reasonably foreseeable alternative means of compliance with the rule or regulation.*

No alternatives are proposed. As shown in the staff report, there are a number of manufacturers supplying equipment that complies with the proposed rule. Manufacturers are expected to continue to develop complying equipment, increasing competition and decreasing costs.

The above analysis under Public Resource Code Section 21159 further demonstrates that there is no reasonable possibility that the adoption of proposed Rule 74.11 will have a significant effect on the environment due to unusual circumstances.

CEQA Requirements

Staff concludes that the adoption of proposed Rule 74.11.1 and proposed Rule 74.15.1 is within the scope of the categorical exemptions from the California Environmental Quality Act (CEQA) under state CEQA guideline Sections 15307, Protection of Natural Resources, and 15308, Protection of Environment, and that no exception to these categorical exemptions apply.

ANALYSIS OF EXISTING REGULATIONS

California Health & Safety Code Section 40727.2(a) requires districts to provide a written analysis of existing regulations prior to adopting, amending or repealing a regulation. Section 40727.2(a) states:

In complying with Section 40727, the district shall prepare a written analysis as required by this section. In the analysis, the district shall identify all existing federal air pollution control requirements, including, but not limited to, emission control standards constituting best available control technology for new or modified equipment, that apply to the same equipment or source type as the rule or regulation proposed for adoption or modification by the district. The analysis shall also identify any of that district's existing or

proposed rules and regulations that apply to the same equipment or source type, and all air pollution control requirements and guidelines that apply to the same equipment or source type and of which the district has been informed pursuant to subdivision (b).

Proposed Rule 74.11.1 applies to large water heaters and small boilers rated 75,000 BTU/hr through less than 1 million BTU/hr input capacity. No known state or federal air pollution control regulations apply to this equipment. Units subject to this rule do not require District Permits to Operate.

Proposed Rule 74.15.1 applies to small and medium sized boilers rated at greater than or equal to 1 million BTU/hr through less than 5 million BTU/hr

input capacity. No known state or federal air pollution control regulations apply to this equipment.

All units subject to this rule require District Permits to Operate.

INCREMENTAL COST-EFFECTIVENESS

Health and Safety Code Section 40920.6 requires the performance of an incremental cost-effectiveness analysis for a regulation that identifies more than one control option to meet the same emission reduction objectives. 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 level of control.

Rule 74.11.1 and Rule 74.15.1 regulate the supply of applicable units in Ventura County; in doing so, it require large water heater and small boiler users only

to purchase a complying unit. Large water heaters and small boilers have been subject to NO_x emission control since 1993. The proposed revisions reduce the NO_x emission limit for these units.

For this rule, complying equipment is currently available in the SCAQMD. Implementation of the proposed limits in Ventura County depends in the availability of complying equipment. Therefore, no alternate control option is available and an incremental cost-effectiveness analysis is not necessary.

MEETINGS AND COMMENTS

Air Resources Board
January 26, 2012

Section B.1. The oxides of nitrogen (NO_x) emission level requirement in this section is not being proposed to be changed. However, boilers meeting a NO_x limit of 9 or 12 ppm (forced-fired versus atmospheric units, respectively) are readily available from manufacturers. Because your district is required to adopt Best Available Retrofit Control Technology, Air Resources Board staff strongly suggest that the NO_x limit in this section be revised from the current 30 part per million (ppm) (corrected to 3 percent O₂) to be at least as stringent as less than 9 or 12 ppm (corrected to 3 percent O₂) based on the type of boiler. A final compliance date should be based on the unit being a new or modified unit versus an existing unit.

We have analyzed implementation of the 9 ppm or 12 ppm NO_x limits for boilers equal to or greater than 2 million BTU/hr capacity and less than 5 million BTU/hr capacity and found it to be infeasible at this time. While a few manufacturers offer complying equipment, we do not believe there is a sufficient quantity of equipment available for full implementation.

As noted in Table 2, only one manufacturer offers new boilers in the entire heat input range covered by this rule. Several offer no units between approximately 3.3 million BTU/hr and 5 million BTU/hr, and two offer no units between 2 million and approximately 3.3 million. We stipulate that

Table 1 is not exhaustive and other complying equipment may be available. However, in addition to those listed, a number of other manufacturers were reviewed; none offered complying equipment in the appropriate sizes.

In the SCAQMD, most forced-draft units in this size range and in use after January 1, 2012, are required to comply with the 9 ppm NO_x limit in SCAQMD Rule 1146.1. Nevertheless, we feel that a greater quantity of complying equipment will make the transition easier in Ventura County. We will reevaluate Rule 74.15.1 after 2014. In addition, we expect the 9 ppm NO_x limit in this size range to become BACT in the near future.

Staff appreciates ARB's suggestion that the proposed 12 ppm or 9 ppm limits apply only to new or modified equipment, since, as shown in [Appendix D], it is not cost-effective to retrofit units in this size range. According to our records, up to 65 boilers greater than 2 million BTU/hr capacity and less than 5 million BTU/hr capacity could be effected by the lower limits. While avoiding retrofits would be much less costly for the regulated community, we are reluctant to impose requirements that differ substantially from those in SCAQMD Rule 1146.1, which requires retrofits.

However, the latest proposed revision to Rule 74.15.1 includes a 20 ppm limit for new equipment rated at equal to or greater than 1,000,000 BTU/hr and less than 2,000,000 BTU/hr. There is a significant

Table 2
Manufacturers Offering Complying Boiler Equipment
For NOx Limits of 12 ppm and 9 ppm

Company	Description	Atmospheric Units - 12 ppm		All other Natural Gas Units, 9 ppm	
		BTU/hour Rating	Missing Capacity	BTU/hour Rating	Missing Capacity
Boilers					
Ajax Boiler	Low Nox FDraft			250,000 - 21,000,000	None
Ajax Boiler	Premix	500,000 - 7,500,000	None		
Ajax Boiler	Atlas Series			500,000 - 3,000,000	2,000,001 to 5,000,000
Burnham	MPC			500,000 - 3,657,000	3,657,001 to 5,000,000
Cleaver Brooks	CBEX Elite			3,347,900 - 6,695,800	2,000,000 to 3,347,899
Laars	Rheos Plus	1,200,000 - 2,400,000	2,400,001 to 5,000,000		
Muria	LX 100			3,347,900	Any size not 3,347,900
Superior Boiler	Arrowhead			334,790 - 3,347,900	3,347,901 to 5,000,000
Burners Only					
Alzeta	Microstar			2,000,000 - 3,500,000	3,500,001 to 5,000,000
Johnson Burners	A Series			1,673,950 - 20,087,400	None
Power Flame	Nova Plus			2,000,000 - 64,000,000	None

quantity of complying equipment available by virtue of SCAQMD Rule 1146.2.

Public Workshop
January 31, 2012

The most significant issue discussed at the workshop was the requirement in Rule 74.11.1.F.4 and 74.15.1.E.4 requiring compliance with the SCAQMD *Combustion Gas Periodic Monitoring Protocol* for portable analyzer operation and maintenance. It was felt that the detailed requirements of the protocol will increase the cost of a screening analysis to near source test levels. Staff offered to replace the protocol with other requirements that will insure operational accuracy of the portable analyzers. Several attendees offered to look into other requirements.

The analyzer training requirement in the above subsections was also discussed. Staff stated that the APCO will decide on the veracity of any training program suggested by an operator.

Another issue raised was the need for a definition of the term "new unit" in Rule 74.11.1. Staff offered to include a definition. Also, a request to simplify the phrase "annual heat input rate of equal to or greater than 0.3×10^9 BTU" in Subsection B.4 was made.

It was noted that, because Rule 74.11.1.B.2 and B.4, both new subsections, state that "no person shall sell, offer for sale, install, or operate" applicable new units, the added tune-up and screening analysis

requirements cannot apply to all units in that size range, as intended. The subsections only apply to new units. Staff stated that these requirements may require a separate subsection that addresses both new and existing units. Also, enforcement of the initial tune-up requirement for units over 400,000 BTU/hr and under 1,000,000 BTU/hr (74.11.1.B.4.c) will be impossible because permits to operate are not required. Staff will have no way of knowing when units in this size range are installed.

Air Resources Board
March 26, 2012

ARB's comment is a verbatim repeat of the January 26, 2012, comment. The District response has not changed.

On March 14, 2012, ARB emailed a list of ten boilers and process heaters in the 2 million BTU/hr to 5 million BTU/hr size range required by the San Joaquin Valley APCD to meet either 9 ppm or 12 ppm NOx limits. Of these, two additional boiler manufacturers (Fulton and Camus) who market 9 ppm NOx boilers in this size range came to light. One other process heater manufacturer indicated that low-NOx equipment is available. For others, there is either no information or no evidence that the installed units are not one-off experiments.

There is evidence that SJVAPCD knew there was no equipment available when they revised Rule 4307 in 2008. In the October 16, 2008, board package, the staff report says on page 8 that "...burner technology

that can meet 9 ppmv NOx is emerging." In the cost-effectiveness analysis for Rule 4307 on page C-6, it says; "Costs for new units or replacement units that are installed after the final compliance dates and must meet a 9 ppmv or 12 ppmv NOx limit were not specifically analyzed."

As noted above, the District does not believe there is a sufficient quantity of complying equipment available at this time for full implementation of a 9 and 12 ppm NOx limit in Rule 74.15.1. The pending large market for equipment that complies with the 9 ppm NOx limit in SCAQMD Rule 1146.1 will make the transition easier in Ventura County. We will reevaluate the situation after 2014.

Natural Resource Company
March 26, 2012

NRC commented that thermal fluid heaters, used in the oil production industry, are subject to a 30 ppm NOx limit in both the South Coast AQMD and the San Joaquin Valley APCD. SCAQMD defines a "Thermal fluid heater" as "a process heater in which a process is heated indirectly by a heated fluid other than water." Thermal fluid heaters deliver high temperature energy to either single or multiple users. In a closed loop system, pressures can remain low and thermal fluid temperatures can reach an excess of 700°F. Sizes range from 400,000 Btu/hr to 75,000,000 Btu/hr input capacity.

SCAQMD Rule 1146.1 specifically exempts "Thermal Fluid Heaters" from the 9 ppm NOx limit; the NOx limit defaults to 30 ppm. There is no exemption from the 12 ppm NOx limit for atmospheric units; this could mean that thermal fluid heaters do not use atmospheric burners. SJVAPCD Rule 4307 specifies lower NOx limits for certain categories of units. Although thermal fluid heaters are not specifically mentioned, Table 2 specifies a 9

ppm NOx limit for "A new or replacement unit that is one of the following:...a unit in an oilfield or refinery..." This general requirement would apply to thermal fluid heaters. Based on other information on complying equipment in use, it appears that no exemption exists in the San Joaquin Valley.

Both SCAQMD Rule 1146.1 and SJVAPCD Rule 4307 were last amended in 2008. In 2012, at least two manufacturers that specialize in process heaters say that low-NOx systems are available to meet SCAQMD limits. On this basis, it is unlikely that thermal fluid heaters, or any but the most specialized process heater, will require an exemption from future proposed 9 ppm, 12 ppm, or 20 ppm NOx limits.

Advisory Committee
March 27, 2012

The Advisory Committee considered the proposed revisions with few substantive comments. Discussion centered on the operation of the rule, how enforcement would take place, and the difference between source tests and screening analyses.

A change to Rule 74.15.1.F.4 was recommended and included in the rule, as follows:

- 4. ...The unit shall be corrected and a second screening analysis or source test performed within fourteen (14) calendar days of the initial screening analysis. The results of the second screening analysis shall be reported to the District within seven (7) days...**

In addition, a correction to Rule 74.15.1.D.3 was discussed and included. The proposed revisions to Rules 74.11.1 and 74.15.1 were unanimously recommended to the Air Pollution Control Board.

REFERENCES

1. Santa Barbara County Air Pollution Control District, *List of Approved Portable NOx/CO Analyzers*, <http://www.sbcapcd.org/eng/boiler/analyzers.htm>
2. South Coast Air Quality Management District, *Rule 1146.2 Certified Equipment List*, <http://www.aqmd.gov/rules/doc/r1146/r1146table.html>
3. U.S. Census Bureau, *Economic Census Summary Statistics for Ventura County*, <http://www.census.gov/epcd/ec97/ca/CA111.htm> (1997), http://factfinder.census.gov/servlet/IBQTable?_bm=y&-ds_name=EC0700A1&-geo_id=05000US06111 (2007)
4. *Technical Support Document: Energy Efficiency Standards For Consumer Products: Residential Water Heaters*, U.S Department of Energy, Assistant Secretary, Energy Efficiency &

Renewable Energy, Building Research and Standards Office, Washington, DC 20585, December 2000, Chapter 7, Markup, Page 7-8

Management District, Planning, Rule Development, and Area Sources, April, 2006

5. Barcikowski, Wayne, *Staff Report: Proposed Rule 1146.2 – Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters*, South Coast Air Quality

6. *ibid.*, page 3-3

7. *ibid.*, page 3-4

8. Correspondence from Reese Martin, Southern California Gas Company, December 30, 1996

Appendix A
Economic Census Summary Statistics for Ventura County
For 1997 from the US Census Bureau

NAICS code	Description	Establishments	
21	Mining (not published for counties)	N	
22	Utilities (not published for counties)	N	
23	Construction (not published for counties)	N	
31-33	Manufacturing	1,008	
42	Wholesale trade	1,088	
44-45	Retail trade	2,348	
48-49	Transportation & warehousing (not published for counties)	N	
51	Information (total not published for counties)	N	
52	Finance & insurance (not published for counties)	N	
53	Real estate & rental & leasing	672	
54	Professional, scientific, & technical services	Taxable	1,597
		Exempt	13
55	Management of companies & enterprises (not published for counties)	N	
56	Administrative & support & waste management & remediation services	698	
61	Educational services	Taxable	93
		Exempt	8
62	Health care & social assistance	Taxable	1,591
		Exempt	222
71	Arts, entertainment, & recreation	Taxable	214
		Exempt	34
72	Accommodation & foodservices	1,201	
81	Other services (except public administration)	Taxable	875
		Exempt	155
Total Employer Establishments		11,817	

<http://www.census.gov/epcd/ec97/ca/CA111.HTM>

Appendix B
Economic Census Summary Statistics for Ventura County
For 2007 from the US Census Bureau
 (Release date – 7/1/2011)

NAICS code	Description	Establishments
21	Mining (not published for counties)	N
22	Utilities (not published for counties)	N
23	Construction (not published for counties)	N
31-33	Manufacturing	954
42	Wholesale trade	1,024
44-45	Retail trade	2,766
48-49	Transportation & warehousing (not published for counties)	N
51	Information (total not published for counties)	N
52	Finance & insurance (not published for counties)	N
53	Real estate & rental & leasing	1051
54	Professional, scientific, & technical services	Taxable 2,597
		Exempt 17
55	Management of companies & enterprises (not published for counties)	N
56	Administrative & support & waste management & remediation services	1112
61	Educational services	Taxable 183
		Exempt 19
62	Health care & social assistance	Taxable 2,118
		Exempt 199
71	Arts, entertainment, & recreation	Taxable 371
		Exempt 37
72	Accommodation & foodservices	1,602
81	Other services (except public administration)	Taxable 1031
		Exempt 165
Total Employer Establishments		15,246

http://factfinder.census.gov/servlet/IBQTable?_bm=y&-ds_name=EC0700A1&-geo_id=05000US06111

Appendix C
Amended Water Heater Use Information from
Southern California Gas Company
12/30/96⁸

Boiler And Water Heater Rating	Number of Boilers and Water Heaters	Number of Boilers and Water Heaters	Percent- age of Total	Total Throughput 1996	Total Throughput 2011(+ 43%)	Average Unit Throughput 2011
BTU/hr	1996	2011(+ 43%)		MBTU/year	MBTU/year	MBTU/year
Less Than 75,000						
75,000 to 100,000	821	1,174	42.63	113,166,530	161,828,138	197,111
100,001 to 200,000	242	346	12.56	33,875,061	48,441,337	200,171
200,001 to 300,000	181	259	9.40	55,349,838	79,150,268	437,294
300,001 to 400,000	178	255	9.24	81,487,899	116,527,696	654,650
Subtotal	1422	2,033			405,947,439	
400,001 to 500,000	87	124	4.52	40,213,782	57,505,708	660,985
500,001 to 600,000	48	69	2.49	37,214,913	53,217,326	1,108,694
600,001 to 700,000	71	102	3.69	50,752,016	72,575,383	1,022,188
700,001 to 800,000	74	106	3.84	54,410,344	77,806,792	1,051,443
800,001 to 900,000	42	60	2.18	27,964,740	39,989,578	952,133
900,001 to 1 MM	75	107	3.89	115,709,009	165,463,883	2,206,185
Subtotal	397	568			466,558,670	
< 1 MM to 2MM(1)	107	107	5.56	688,913,000	688,913,000	6,438,439
					1,155,471,670	
TOTAL	1,926	2,708	100	1,299,057,132	1,561,419,109	-----

(1) 1996 data for this group is unknown. 2012 estimate is included for comparison only

Appendix D
Cost-Effectiveness Analysis form Burner Retrofits
 To achieve a NOx Limit of 9 ppmv in Rule 74.15.1

Assumptions: \$45,000 capital cost (parts and labor), capital recovery factor of 0.123 based on a 10 year loan at 4% interest, no increase in O&M. Based on actual emission and test results.

Facility Number	Facility Name	Size (mmbtu hour)	Equipment Description	Emission Controls	Average NOx (ppm)	Reduction Required (%)	NOx Reduction (TPY)	Cost Effectiveness (\$/ton)
00033	La Conchita Oil & Gas	4.6	Rheem Superior Heater		24.46	63.21	0.235	\$23,559
00150	Hill Canyon WWTP	2.5	Superior MS13-X-300-W125	FGR	18.01	50.03	0.111	\$49,925
00160	Paramount Citrus	4.0	Bryan RV 400	LNB FGR	22.25	59.55	0.011	\$495,713
00161	Oxnard Lemon Co.	4.15	Miura LX-100		21.34	57.83	0.033	\$170,167
00473	Maple Leaf Bakery	4.2	Sellers Ygnis 100-HP-SH-LN390	LNB	20.27	55.60	0.156	\$35,396
00473	Maple Leaf Bakery	4.2	Sellers Ygnis 100-HP-HS-LN390		21.52	58.18	0.164	\$33,827
00478	Ventura Youth Corr. Facility	2.5	Ajax WFD-2500	LNB	23.74	62.09	0.041	\$135,317
00478	Ventura Youth Corr. Facility	2.5	Ajax WFD-2500	LNB	26.12	65.54	0.044	\$125,263
00478	Ventura Youth Corr. Facility	4.18	Webco	LNB ExFGR	18.37	51.01	0.043	\$128,125
00478	Ventura Youth Corr. Facility	4.18	Webco	LNB ExFGR	23.91	62.36	0.026	\$209,341
00478	Ventura Youth Corr. Facility	4.18	Webco	LNB ExFGR	18.68	51.82	0.024	\$232,716
00659	Hyatt Westlake Plaza Hotel	3.46	Parker MM48815 GO-3456	Low NOx	20.89	56.92	0.053	\$104,698
00659	Hyatt Westlake Plaza Hotel	3.46	Parker MM48815 GO-3456	Low NOx	16.54	45.59	0.042	\$130,722
00691	Astrofoam Molding Co.	4.83	Parker		16.20	44.44	0.098	\$56,758
00997	Naval Base Ventura County	2.5	Ajax SA-60	LNB	43.02	79.08	0.010	\$575,599
00997	Naval Base Ventura County	4.5	Ajax WNG-4500	LNB	13.50	33.33	0.001	\$3,773,864
01017	Mandalay Onshore Facility	4.0	Amine Reboiler		77.00	88.31	0.101	\$54,646
01188	Record Technology Inc.	4.2	Muire LX-100G		22.43	59.88	0.078	\$70,992
01291	Skyworks Solutions, Inc.	2.16	Parker, T216L	LoNOx	15.40	41.56	0.024	\$227,319
01291	Skyworks Solutions, Inc.	2.97	Parker, 2970L	LoNOx	19.15	53.00	0.046	\$119,061
01381	Amgen Inc.	3.0	Cleaver Brooks FLX 700 300 16	LNB ExFGR	21.12	57.39	0.038	\$145,466
01381	Amgen Inc.	3.0	Cleaver Brooks FLX 700 300 16	LNB ExFGR	25.53	64.75	0.052	\$106,095
01381	Amgen Inc.	3.0	Rite Engineering 300 WG	LNB ExFGR	23.84	62.25	0.046	\$120,225
01381	Amgen Inc.	3.0	Rite Engineering 300 WG	LNB ExFGR	23.50	61.70	0.026	\$216,758
01381	Amgen Inc.	3.5	Ajax WPG 3500	LNB ExFGR	23.06	60.97	0.043	\$129,760
01492	Platform Gilda	4.0	Uniflux Mobiltherm 600		19.47	53.78	0.100	\$55,408
07674	CalMat Company	4.5	HDI-500 Oil Heater	LNB	12.40	27.42	0.013	\$413,940
Average					23.40			\$294,099