FSM_BL1: Large Residential and Commercial Space Heating

Brief Summary:
Regulation 9, Rule 4 regulates NO_X emissions from central furnaces in the size range typically found in single-family homes. This measure addresses larger furnaces rated above 175,000 BTU per hour that are found in multi-family residential buildings and large commercial spaces.

Purpose:
This measure seeks to reduce NO_X emissions from large residential building central furnaces, and from commercial space heating. While the intent of this measure is to reduce NO_X emissions, in a broader context, the Air District is working with local governments and others to phase out the use of fossil fuel-based technologies in buildings, as part of the Air District's large-scale effort to reduce greenhouse gas emissions (see measure BL2: Decarbonize Buildings). When it is not feasible to install a non-fossil fuel-based furnace, this measure explores ensuring that in the future, large furnaces use Best Available Control Technology (BACT). This measure explores options for establishing maximum allowable NO_X emission levels for large size furnaces.

Source Category:
Stationary Source – large space heating furnaces (above 175, 000 BTUs)

Further Study Measure Description:
While smaller central residential and commercial furnaces in this and other air quality jurisdictions have been regulated for many decades, larger space heating applications have not been regulated anywhere in the state. Specifically, regulation of central furnaces in the Bay Area has been restricted to residential and commercial furnaces with a heat capacity of less than 175,000 BTU per hour (Rule 9-4), requiring a 40 ng/joule NO_X limit since the 1980s. Rules with these same limits are also in place in the South Coast Air Quality Management District (AQMD) (Rule 1111) and the San Joaquin Valley Air Pollution Control District (APCD) (Rule 4905) jurisdictions.

While there are no adopted rules in any of these three air districts that limit NO_X emissions from larger devices, these devices are subject to permit requirements. For example, in the Bay Area, natural gas combustion devices must be permitted if they are larger than 10 million BTU per hour (MM BTU/hr). The South Coast AQMD requires permits for large commercial furnaces with a heat input rating or more than 2 MM BTU/hr; these units are subject to new source review and a BACT NO_X limit of 30 ppmv at 3 percent oxygen (about 21 ng/joule).

As described above, the Air District has no direct experience in limiting NO_X emissions from furnaces in the size range covered by this measure. As part of this measure, Air District staff will investigate appropriate future NO_X limit for space-heating gas furnaces larger than 175,000 BTU/hr, and will coordinate development and adoption of consistent NO_X limits and certification methods for these devices with the South Coast AQMD, San Joaquin Valley APCD and other air districts. Staff may also investigate a state-wide model rule that will be developed

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cooperatively, or under the auspices of the California Air Resources Board (ARB) or the California Air Pollution Control Officers Association (CAPCOA).

Sources:

1. Bay Area Air Quality Management District, Regulation 9, Rule 4
2. South Coast Air Quality Management District, Rule 1111
3. San Joaquin Valley Air Pollution Control District, Rule 4905.

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FSM_SS1: Internal Combustion Engines

Brief Summary:
This measure is based on San Joaquin Valley Air Pollution Control District (SJVAPCD) Rule 4702 which appears to have lower NO_x emission limits for some categories of internal combustion (IC) engines, compared to BAAQMD Regulation 9-8. Rule 4702 also applies to smaller engines than Regulation 9-8.

Purpose:
Further emission reductions of NO_x from IC engines.

Source Category:
Stationary IC engines.

Further Study Measure Description:
San Joaquin Valley APCD Rule 4702 was significantly revised in 2011 to incorporate new emission limits for IC engines. [The latest, November 2013 amendment of SJVAPCD Rule 4702 was entirely editorial and administrative.] The analogous BAAQMD rule – Regulation 9-8 – was last amended in 2007.

The differences between SJVAPCD Rule 4702 and BAAQMD Regulation 9-8 may be summarized as follows:

1) SJVAPCD Rule 4702 has standards for agricultural and non-agricultural engines, while BAAQMD Regulation 9-8 exempts agricultural engines entirely.

2) SJVAPCD Rule 4702 applies to engines as small as 25 bhp, while Regulation 9-8 applies to engines larger than 50 bhp. It should be noted that the South Coast AQMD Rule 1110.2 (September 2012) applies only to engines larger than 50 bhp.

SJVAPCD Rule 4702 does not set emission limits for engines in the 25 to 50 bhp size range. Instead, it requires that engines sold in this size range comply with EPA's New Source Performance Standards (NSPS) for both spark-ignition and compression ignition engines (40 CFR 60, Subparts JJJJ and IIII, respectively), and only if the engines are not used in agricultural operations. This requirement is also not applicable to leased engines. Because Rule 4702 does not require existing engines in the 25 to 50 bhp size range to meet any particular standard, and does not require that existing engines be phased out, SJVAPCD claimed no emission reductions for engines in the 25 to 50 bhp size range and also concluded that "there is no cost associated with adding engines between 25 bhp and 50 bhp" [to rule 4702].

The 2011 BAAQMD emissions inventory includes an element for "reciprocating engines / liquid fuel (area)" which includes all engines rated 50 bhp and less which do not require permits. The total NO_x emissions for this inventory element is 0.27 ton/day. This emission figure is not based on direct data about engines rated less than 50 bhp that are operated in the Bay Area since neither BAAQMD, nor any other agency, requires permits or registration of such engines. Also, this total emission figure includes emissions from engines rated less than 25 bhp.

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Typically, for engines and other combustion devices such as boilers, smaller devices are more numerous than larger devices. Therefore, if all engines rated less than 50 bhp have total emissions of 0.27 ton/day, engines rated 25 to 49 bhp might reasonably be expected to have about half of these emissions, or no more than 0.14 ton/day NO_x. The staff report for the 2007 amendments to Regulation 9-8 estimated NO_x emission reductions of 45 percent to 71 percent for each category of engine for which new emission limits were imposed. Assuming the highest reduction (71 percent) could be achieved on engines rated 25 to 49 bhp, the resulting NO_x emission reduction would be slightly less than 0.1 ton/day. So, even making these conservative assumptions, the potential NO_x emission reduction appears to be marginal, and realization of this reduction would require that older engines be replaced on an accelerated basis. If the requirement applied only to new engine sales, without applying to existing engines, then the quantifiable emission reductions would be negligible. In other words, Rule 4702's provisions with regard to small engines do not represent a significant improvement beyond the current provisions of BAAQMD Regulation 9-8.

3) SJVAPCD Rule 4702 imposes lower NO_x limits than BAAQMD Regulation 9-8 for engines larger than 50 bhp, and includes emission limits for agricultural engines that BAAQMD Regulation 9-8 exempts entirely. SJVAPCD regulates spark-ignition and compression-ignition engines in different ways. For spark-ignition engines, the differences in these rules may be summarized as follows:

Table 1: Spark-Ignition NO_x Limits in SJVAPCD Rule 4702 and BAAQMD 9-8 (at 15% oxygen)

Application	SJVAPCD 4702	BAAQMD 9-8
Agricultural (spark-ignition), installed after 6/16/05	•Rich-burn: 90 ppmv •Lean-burn: 150 ppmv	•Unregulated •Unregulated
Agricultural (spark-ignition), installed on or before 6/16/05	CARB certified to be <0.6 g/bhp-hr for NO_x and VOC (combined)	•Unregulated •Unregulated
Non-Agricultural (spark-ignition), phase 1: 1/1/12 thru 1/1/17	•Rich burn, waste gas: 50 ppmv •Rich burn, fossil fuel: 25 ppmv •Lean-burn, all fuel: 65 ppmv	•Rich burn, waste gas: 70 ppmv •Rich burn, fossil fuel: 25 ppmv •Lean burn, waste gas: 70 ppmv •Lean burn, fossil fuel: 65 ppmv
Non-Agricultural (spark-ignition), phase 2	•Rich burn, waste gas: 50 ppmv •Rich burn, ≤4,000 hr/yr: 25 ppmv	No change from phase 1

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	•Rich burn, all others: 11 ppmv •Lean burn, waste gas: 65 ppmv •Lean burn, ≤4,000 hr/yr: 65 ppmv •Lean-burn, all others: 11 ppmv	

For compression-ignition engines, SJVAPCD Rule 4702 and BAAQMD Regulation 9-8 use completely different regulatory schemes. BAAQMD Reg 9-8 simply applies a NO_x limit of 180 ppmv (at 15 percent oxygen) to engines rated 51 to 175 bhp, and a limit of 110 ppmv to larger engines.

To understand SJVAPCD's regulatory scheme for compression-ignition engines, it is necessary to understand US EPA's emission limits for non-road compression-ignition engines, which are generally known as the "Tier" standards. US EPA imposed a set of emission limits (Tier 1 through Tier 4). These limits applied to new, compression ignition engines. Each tier was in effect for 3 or 4 years and during that time, was phased in for different engine size ranges. Because each tier was phased in over a period of years, on any date different tiers may have been in effect for different engine size ranges. In 2014 and 2015, the "final" Tier 4 limits are being implemented. Each tier applies only to engines manufactured while that tier is in effect, and each subsequent tier reduces the emission limits. The tier limits do not apply to existing engines and therefore the emission reductions associated with the tier limits are realized as pre-Tier 1 engines are retired, as well as Tier 1, Tier 2 and Tier 3 engines. Under this federal scheme, eventually only Tier 4 engines will remain in service. SJVAPCD Rule 4702 requires that existing engines (agricultural and non-agricultural) meet specific EPA tier requirements, and addresses pre-Tier 1 differently than later engines. For pre-Tier 1 engines, depending on the engine size, Rule 4702 requires compliance with either Tier 3 or Tier 4 emission limits or a NO_x limit of 80 ppmv. For Tier 1 and Tier 2 engines, Rule 4702 requires compliance with Tier 4 limits by no later than 2018. For Tier 3 and Tier 4 engines, Rule 4702 has no other requirements.

Considering Table 1 for spark-ignition engines and the discussion of both districts' treatment of compression-ignition engines, SJVAPCD has more stringent standards than BAAQMD because:

1) SJVAPCD imposes emission limits on spark-ignition, agricultural engines while BAAQMD does not,

2) While current emission limits for non-agricultural engines are similar at both districts, SJVAPCD has adopted a next phase of emission limits for these engines that are significantly lower, although these limits apply only to engines that operate more than 4,000 hr/yr, and

3) For compression-ignition engines (agricultural and non-agricultural) SJVAPCD requires existing engines to eventually comply with either US EPA Tier 3 or Tier 4 emission limits or an 80 ppmv NO_x limit, while BAAQMD has a NO_x limit of either 110 or 180 ppmv NO_x (depending on engine size, all at 15% oxygen). These NO_x limits are equivalent to 2.5 and 3.7 g NO_x/bhp-hr, respecitively, according to the 2007 staff report for Regulation 9-8 amendments.

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A final factor to consider in comparing SJVAPCD and BAAQMD requirements is that, for compression-ignition engines, CARB has issued an ATCM that imposes emission limits on virtually all stationary, compression-ignition engines in California. The final compliance date for the ATCM is 12/31/2015, although this date is extended for recently-installed and relatively low-emitting engines. Although the main purpose of the ATCM was to reduce toxic diesel PM emissions, the ATCM imposes combined NO_x and non-methane volatile organic compound (MHC) limits for new, emergency and prime-use engines. For existing, emergency and prime-use engines, the ATCM simply requires that NO_x and NMHC emissions not increase over "baseline" levels.

The potential areas for improvement in BAAQMD Regulation 9-8 that are discussed above were anticipated in the 2007 staff report for the last amendments to Regulation 9-8. The staff report indicates that:

• For spark-ignition and compression-ignition engines, the 2007 emission limits represented "the most stringent demonstrated retrofit control technology available".

• For compression-ignition engines, the new limits "incorporate the most stringent future-effective EPA standards", which refers to the "Tier" standards.

• With regard to agricultural engines, the staff report indicates that CARB data was used to estimate total annual NO_x emissions of 0.076 ton/day, and that these emissions did not justify including agricultural engines in the rule.

Based on the discussion above, BAAQMD will:

1) No action to reduce NO_X emissions from agricultural engines, based on the previous emission estimates for these devices in the 2007 Regulation 9-8 staff report. However, because the BAAQMD emissions inventory does not have an element for stationary, agricultural IC engines, the inventory should be improved in this area.

2) As discussed above, SJVAPCD Rule 4702 imposes a low 11 ppmv NOx limit on high-use, non-agricultural, spark-ignition engines (>4,000 operating hr/yr). The 2007 Regulation 9-8 staff report considers spark-ignition engines used >100 hr/yr to be "prime" engines and imposed a NOx limit ranging from 25 to 70 ppmv. SJVAPCD further identified "high-use" engines where SCR would be cost-effective and imposed an 11 ppmv limit on these engines. Neither the 2007 Regulation 9-8 staff report, nor the BAAQMD base-year 2011 inventory identifies high-use engines in the Bay Area. However, even after implementation of the emission controls in Regulation 9-8, prime spark-ignition engines would still have a total NOx emission inventory of 2.6 ton/day (based on the emission and emission reduction data in Table 12 of the 2007 staff report). Therefore, depending on how many of these engines are "high-use", further NOx controls might be justified.

Sources:

1. San Joaquin Valley APCD: Final Draft Staff Report with Appendices for Revised Proposed Amendments to Rule 4702, August 2011.
2. BAAQMD: Staff Report for Proposed Amendments to Regulation 9-8, July 2007.
3. BAAQMD: Base Year 2011 Emissions Inventory.

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FSM_SS2: Boilers, Steam Generator and Process Heaters

Brief Summary:
This measure is based on Measure D.1.2 from the 2012 San Joaquin Valley Air Pollution Control District (APCD) $PM_{2.5}$ Plan. Measure D.1.2 examined the possibility of further emission reductions from Boilers, Steam Generators and Process Heaters from 2MM to 5 MM BTU/hr in size through San Joaquin's Rule 4307.

Purpose:
Further reductions of oxides of nitrogen (NO_X) emissions from small boilers, steam generators and process heaters.

Source Category:
Combustion

Further Study Measure Description:
Air District Regulation 9, Rule 7 regulates all Bay Area boilers, steam generators and process heaters with a rated heat input above 2 MM BTU/hr, while San Joaquin has a rule specifically for the size category of 2MM to 5MM BTU/hr.

Rule 9-7 was last amended in 2011. For devices rated above 2 to 5 MM BTU/hr (both new and existing), Rule 9-7 imposes a 30 ppmv NO_X limit at 3% oxygen, and requires certification of models by manufacturers and registration of installed devices by owner or operators. The 30 ppmv limit was effective on January 1, 2013 with multi-unit facilities able to extend full compliance by as much as 2 years to January 1, 2015.

San Joaquin Rule 4307 also imposes a 30 ppmv NO_X limit for existing devices, but has more stringent limits of either 12 or 9 ppmv for new or replacement devices (atmospheric and non-atmospheric devices, respectively). Both limits for new devices have been in effect in San Joaquin since 2010. The question presented by this measure is whether to reduce the current 30 ppmv NO_X limit in Rule 9-7 for new devices.

As of July 2014, San Joaquin has certified only a single compliant device, so it is unclear if devices that comply with the 12 and 9 ppmv limits are generally available. South Coast AQMD's Rule 1146.2 applies to boilers, steam generators and process heaters in a smaller size category (above 400,000 to 2MM BTU/hr) and South Coast maintains an extensive list of certified devices on their website. These smaller devices are certified for an emission limit of 20 ppmv NO_X.

Further actions the Air District could take include verifying the actual commercial availability of boilers, steam generators and process heaters in the size range above 2MM BTU/hr with certified NO_X emission rates less than 30 ppmv. Depending on the availability of lower-NO_X devices, estimate potential emission reductions and cost-effectiveness of a reduced NO_X limit for new devices in this size range.

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Source:

1. San Joaquin Valley Unified APCD 2012 PM2.5 Plan, Control Measure D.1.3: “Boilers, Steam Generators and Process Heaters-0.075 MM BTU/hr to less than 2.0 MM BTU/hr”.

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FSM_ SS3: GHG Reductions from Non Cap-and-Trade Sources

Brief Summary:
This measure will use quantitative analysis to evaluate greenhouse gas (GHG) reduction opportunities from stationary sources that are not covered under the California Air Resources Board's (ARB's) Cap-and-Trade Program.

Purpose:
The purpose of this measure is to complement the State's Cap-and-Trade program by achieving GHG emission reductions from stationary sources within the Bay Area that do not fall under the Cap-and-Trade program

Source Category:
Small-scale stationary sources not covered by the State Cap-and-Trade program.

Further Study Measure Description:
At the state level, the California Global Warming Solutions Act of 2006 (AB 32) requires a 20 percent reduction in the State's GHG emissions below 1990 levels by 2020. The first AB 32 Scoping Plan identified a cap-and-trade program as one of the strategies California would employ to meet the State's GHG reduction goals. ARB's Cap-and-Trade program established a cap on GHG emissions from certain categories of sources, set to decline approximately 3 percent each year beginning in 2013. Facilities subject to this cap are able to trade allowances to emit GHGs in order to minimize compliance costs.

The Cap-and-Trade program includes exemptions such as fugitive emissions from certain industrial processes, and facilities with emission levels below the reporting threshold of 25,000 MT CO_2e/yr. In the Bay Area, there are over 5,700 stationary sources that emit GHGs. Of these, approximately fifty exceed this reporting threshold. This figure indicates that there is an opportunity to explore options for reducing stationary source emissions outside of the Cap-and-Trade program. Preliminary analyses indicate that the bulk of these emissions occurred in the biofuel, natural gas distribution, sewage treatment, and landfills sectors. At the regional level, the Air District has adopted a GHG reduction target of 80 percent below 1990 levels by 2050. In an effort to complement ARB's climate work and meet its own goals, Air District staff will analyze GHG data for Bay Area stationary sources not covered under ARB's Cap-and-Trade program. These analyses can help the Air District prioritize its climate protection efforts by highlighting Bay Area stationary sources having the largest emissions not covered under Cap-and-Trade. Further analysis of the data may uncover new rulemaking opportunities.

Sources:

1. Assembly Bill No. 32: California Global Warming Solutions Act of 2006
2. California Air Resources Board's Cap-and-Trade Program: http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm
3. California Air Resources Board's Greenhouse Gas Inventory Data: http://www.arb.ca.gov/cc/inventory/data/data.htm

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FSM_SS4: Methane Exemptions from Wastewater Regulation

Brief Summary:
The Air District's regulation regarding waste water, Regulation 8, Rule 8, currently does not apply to methane emissions. As outlined in SS16, the Air District proposes to evaluate and eliminate methane exemptions in Regulation 8 where feasible and relevant.

Purpose:
This measure seeks emission reductions of methane, a powerful greenhouse gas (GHG). Removing the methane exemption from Rule 8-8 may also improve the rule enforceability.

Source Category:
Stationary Sources – waste water systems

Further Study Measure Description:
Regulation 8, Rule 8 currently applies to "wastewater collection and separation systems that handle liquid organic compounds from industrial processes." The regulation applies to oil/water separators and air flotation (AF) devices and associated equipment, but does not apply to "secondary treatment" processes downstream of the separator and AF device. Methane is excluded in the definitions of both "Organic Compound" and of "Critical Organic Compound." The term "Organic Compound" is used in the vapor leak standard for separators and the required efficiency of abatement devices. The concentration of "Critical Organic Compounds" is the basis for the exemption in 8-8-112 for refinery and non-refinery separators, and for associated records.

A draft scoping paper for the amendment of Rule 8-8 was prepared in early 2015. In the scoping paper, Air District staff assumed that add-on controls, such as thermal oxidizers, could be installed on various parts of the wastewater system to combust methane. However, rule development on Rule 8-8 was suspended because methane concentration data at Bay Area refinery wastewater systems suggested that concentrations were too low to justify such add-on controls. Instead, additional research and testing will be required to identify significant methane sources farther upstream in the process, where methane concentrations may be higher.

The Air District will conduct research and testing to identify significant methane sources in the refinery wastewater collection systems, and to determine how these sources may be minimized or controlled. In addition, the Air District will seek to better understand methane emissions from non-refinery wastewater systems, such as those used in publicly owned treatment works (POTWs), and quantify potential emission reductions for methane, as well as for volatile organic compounds (VOC), in order to determine if Reg. 8-8 should be expanded to additional non-refinery sources. See WR1: Limit GHGs from POTWs for more detail.

Sources:
1. BAAQMD Regulation 8, Rule 8

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FSM_SS5: Controlling SSMM Emissions

Brief Summary:
Existing Air District regulations and permit conditions limit criteria pollutant emissions from equipment at chemical plants, bulk terminals, and petroleum refineries. However, most requirements apply to routine operations and have exemptions from emissions limits during startup, shutdown, maintenance, and malfunction (SSMM) events. This measure would consider further addressing emissions from SSMM events.

Purpose:
Reduce NO_X, PM/PM_{10}/$PM_{2.5}$, SO_2, VOC, and TAC emissions by considering implementing requirements to minimize SSMM emissions through abatement technology, equipment design considerations, revised activity scheduling, or planned redundancy.

Source Category:
Equipment at chemical manufacturing plants, bulk terminals, and petroleum refineries that undergo SSMM activities.

Further Study Measure Description:
Other than malfunctions, SSMM activities may be either planned or unplanned. Planned SSMM activities may result in unplanned SSMM events. Depending on the activity, emissions from SSMM activities can be significant (a single refinery turnaround in 2015 lasted 56 days and emitted 180 tons of VOC and 394 tons of SO_2).

Planned SSMM activities include:

- Process unit de-inventory
- Process unit depressurization
- Equipment cleaning, purging, repair, rebuild
- Equipment installation or removal
- Catalyst installation or removal
- Refractory installation, repair, or removal

Unplanned SSMM activities include:

- Plant upset
- Equipment failure

Emissions during SSMM activities may result from bypassing control devices, purging vessels, pressure relief valve venting, flaring, or usage of temporary combustion sources (e.g. diesel generators, steam boilers, thermal oxidizers, etc.).

During maintenance periods, a petroleum refinery flare or flare gas recovery system may have limited capacity or availability and flare gas loading can exceed the capacity of the flare gas recovery system. Such “high loading” events can cause upsets to entire facility operations.

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Several Air District regulations limit emissions from some SSMM activities but there is no comprehensive SSMM rule that applies to all SSMM activities.

Regulation 8, Rule 10 limits organic compound emissions from process vessel depressurizing but does not apply when either the internal pressure or internal organic compound concentration (regardless of mass) is low.

Regulation 8, Rule 28 limits organic compound emissions from pressure relief devices at petroleum refineries and chemical plants. However, this rule does not apply to devices handling heavy liquids (e.g. diesel, jet fuel, gas oil, etc.).

Regulation 12, Rule 12 requires minimizing flaring events through facility-developed flare minimization plans. However, there is a large variation in the specificity and comprehensiveness of each refinery plan. In addition, refineries are required to notify, determine, and report the cause of only large flaring events.

Title 40 of the Code of Federal Regulations Part 63 (National Emission Standards for Hazardous Air Pollutants for Source Categories), Subpart A (General Provisions) includes requirements to develop a startup, shutdown, and malfunction plans. However, these plans only apply to those sources that are subject to a NESHAP rule.

Techniques to reduce or eliminate SSMM emissions include:

- Implementing a management of change/SSMM process
- Optimal scheduling (scheduling to minimize emissions)
- Implementing best practices
- Permanent or temporary emission control technology
- Usage of lower emitting equipment (e.g. scrubbers)
- Implementing redundancy for critical equipment
- Using vapor recovery rather than combustion technology

In order to investigate controlling these emissions, the Air District will:

- Complete study on SSMM emissions.
- Complete study of regulatory efforts on largest, most cost effective SSMM emission reductions and mitigation steps.
- Explore the number, types, and durations of SSMM activities and events at chemical manufacturing plants, bulk terminals, and petroleum refineries in the Air District.
- Explore potential design, equipment, scheduling, and process variability considerations that affect SSMM emissions.
- Estimate potential emission reduction and costs.

Sources:

1. Air District Regulation 8, Rule 10

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2. Air District Regulation 8, Rule 28
3. Air District Regulation 9, Rule 10
4. Air District Regulation 12, Rule 12
5. Title 40 Code of Federal Regulations Part 63 Subpart A
6. Texas Administrative Code Title 30 Part 1 Chapter 115 Subchapter D Division 1 (Process Unit Turnaround and Vacuum-Producing Systems in Petroleum Refineries) Rule 115.312 (Control Requirements)
7. SCAQMD Rule 1123 (Refinery Process Turnarounds)
8. SJVUAPCD Rule 4454 (Refinery Process Unit Turnaround)

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FSM_SS6: Carbon Pollution Fee

Brief Summary:
The measure would explore options for placing a fee on fossil fuels based on the carbon intensity of the fuel.

Purpose:
Placing a fee on the carbon pollution generated by fossil fuels creates an incentive to all those that consume these fuels – individuals, businesses, industry – to reduce use. This reduction in consumption would reduce emissions of criteria pollutants, toxic air contaminants and greenhouse gases (GHGs) not only because less fuel is combusted but also because less fuel is processed and manufactured in response to reduced demand.

Source Category:
Consumption of fossil fuel for all uses – e.g., heating, fueling vehicles, manufacturing.

Further Study Measure Description:
A carbon pollution fee, or carbon tax, is a form of carbon pricing that assesses a fee on fuel based on the carbon content of that fuel. Since the carbon content of every form of fossil fuel - and thus the CO_2 emissions from burning these fuels - is precisely known, a carbon tax is, in fact, a tax on the CO_2 emissions from burning fossil fuels. For example, since generating a unit of energy (Btu) from coal produces 30 percent more CO_2 than a Btu from oil, and 80 percent more CO_2 than a Btu from natural gas, a carbon fee could follow these proportions and tax coal more heavily than oil, and much more heavily than natural gas. Fuels that do not require combustion for power generation, and thus do not result in emissions of CO_2 (e.g., wind, solar), would not be taxed.

A fee on carbon pollution creates broad incentives to encourage decision-makers in all areas of society – individuals, businesses, and industry - to reduce fossil fuel consumption and thus CO_2 emissions. These reductions would take place as a result of a range of changes in behavior, from conservation to fuel substitution to technological innovation. In addition, a carbon fee creates incentives at every link in the chain of decision and action — from individuals' choices and uses of vehicles, appliances, and housing, to businesses' choices of new product design, capital investment and facility location.

It should be noted that there are currently two existing fee programs in place in the Bay Area associated with GHG emissions. Specifically, since 2008, the Air District has imposed a GHG fee - the first in the nation - on permitted facilities based on the facility's annual CO_2e emissions. The funds raised are used to recover the costs of climate protection activities from the Air District's core programs including environmental review, air pollution regulations and emissions inventory development. In addition, California's Cap and Trade Program, which began in 2012, sets a firm and declining cap through 2020 on GHG emissions from major sources. This cap is translated into tradable emission allowances that are auctioned or allocated to covered sources; this system establishes a price signal to drive long-term GHG reductions.

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There are numerous factors that are critical in the design of a carbon fee that would require further study, including the appropriate level of the fee and how the revenues should be spent. It would be quite useful to study carbon fee efforts worldwide – some successful and on-going and some flawed and short-lived – to learn the lessons from these experiences. For example, British Columbia's carbon tax introduced in 2008 was North America's first economy-wide carbon pricing policy and is widely regarded as a success. Among the design elements that have contributed to its success are the facts that the tax: (1) is revenue neutral (i.e., taxes are returned to those taxed via individual and corporate income tax cuts and low-income tax credit) and (2) was phased in, giving individuals and businesses time to adapt. In contrast, Australia's national carbon tax was approved in 2012, but then repealed in 2014. The failure of this tax was in part tied to the program's lack of transparency as well as uncertainty surrounding how the tax revenues would be spent.

Implementation of a carbon pollution fee would require approval by the California Legislature by one of two avenues. One approach is for the Legislature to impose a carbon tax on the Bay Area by way of a 2/3^{rds} majority vote. The second way is for the Legislature, via a simple majority, to approve regional legislation enabling such a tax to be implemented in the Bay Area. This legislation would then require approval by 2/3^{rds} of the voters in the Bay Area. There is precedent for this second approach. Specifically, in 1997, MTC was granted authority by the Legislature for a regional gas tax of up to 10 cents/gallon, although MTC has not placed this measure on the ballot. Given the need for legislative and/or voter approval, further development of this measure may require a survey or other research to gauge the public's opinion of a carbon pollution tax.

This further study measure takes a broader view of pollution-based taxing than that described in transportation control measure TR11: Value Pricing. TR11 is limited in scope to a transportation fuel-based tax, and does not address fuel and energy use related to manufacturing and industry, or building energy use. The Air District will work with MTC on implementation of TR11, but will also explore options for economy-wide carbon-based pricing through this further study measure.

Sources:

1. Carbon Tax Center, http://www.carbontax.org/.
2. Center for Climate and Energy Solutions, 2015, *Market Mechanisms: Understanding the Options.*
3. Clean Energy Canada, 2015, *How to Adopt A Winning Carbon Price: Top Ten Takeaways from Interviews with the Architects of British Columbia's Carbon Tax*.
4. Eberhard, Kristin, 2014, *All the World's Carbon Pricing Systems in One Animated Map*, http://daily.sightline.org/2014/11/17/all-the-worlds-carbon-pricing-systems-in-one-animated-map/.
5. Sustainable Prosperity, 2012, *British Columbia's Carbon Tax Shift: The First Four Years – Research Report*, University of Ottawa.

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FSM_SS7: Vanishing Oils and Rust Inhibitors

Brief Summary:
Research VOC reductions from vanishing oils and rust inhibitors.

Purpose:
Reduce VOC emissions.

Source Category:
Stationary Source

Further Study Measure Description:
Vanishing oils are lubricants used in metalworking (such as cutting oil) or other oil used in manufacturing. Rust inhibitors are fluids used to inhibit, protect or prevent corrosion on metal surfaces. Vanishing oils and rust inhibitors are used in various metal working operations at facilities and operations such as aerospace, machine shops (job shops), steel mills, auto rebuild, screw machine operations, steel tubes (pipes) manufacturing, steel springs manufacturing, maintenance operations, and captive machine shop operations (captive machine shops are machine shops located inside of another type of business that supports the business, but is not the primary aspect of that business). The South Coast AQMD adopted Rule 1144 in 2009 to reduce VOC emissions from vanishing oils and rust inhibitors. The South Coast Rule 1144, does not apply to oils and inhibitors that have a flash point of less than 200^{o}F. It sets an interim VOC limit for rust inhibitor at 300 grams VOC per liter of material, and a final limit for both inhibitor and oil at 50 grams VOC per liter of material. The staff report projects emissions reductions of 2.7 tons per day (tpd) from a 3.2 ton per day inventory. BAAQMD inventory for rust preventives is 1.7 tpd of VOC emissions. Businesses using these materials include machine shops (job shops), aerospace facilities, steel mills, auto part rebuilders, screw machine shops, steel tube (pipe) manufacturers, steel spring manufacturers and captive machine shops located inside of other types of businesses. Staff will investigate the emissions from this sector to determine the feasibility of establishing regulatory limits that would achieve emissions reductions in a cost-effective manner.

Source:
1. South Coast AQMD Rule 1144, Staff Report, SCAQMD, March 6, 2009

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FSM_SS14: Dryers, Ovens and Kilns

Brief Summary:
This further study measure would investigate potential further emission reductions of nitrogen oxide (NO_X) from combustion devices that are currently exempt from the requirements of Regulation 9, Rule 7: *NO_X and CO from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters*, specifically, devices in the category of "kilns, ovens, and furnaces used for drying, baking, heat treating, cooking, calcining, or vitrifying" (9-7-110.6).

Purpose:
Further emission reductions of NO_X, an ozone and fine particulate matter ($PM_{2.5}$) precursor.

Source Category:
Area sources – dryers, ovens and kilns

Further Study Measure Description:
Regulation 9-7 is a non-industry-specific rule that applies NO_X and CO emission limits to a broad range of combustion devices, but generally exempts "kilns, ovens, and furnaces".

In December 2005, the San Joaquin Valley Air Pollution Control District (SJVAPCD) adopted Rule 4309 to limit emissions of NO_X from dryers, dehydrators and ovens with a rated heat input of 5 MM BTU/hr or more. Rule 4309 was fully implemented in December 2008.

In December 2008, the South Coast Air Quality Management District (SCAQMD) adopted Rule 1147 to limit NO_X emissions from combustion devices, including "ovens, dryers, dehydrators, heaters, kilns, calciners, [and] furnaces" among others. Rule 1147 was fully implemented in July 2014.

The Air District's 2011 emissions inventory includes emissions from natural gas-fired devices of this type under 3 sub-categories for Combustion – Other External Devices:

"Natural gas (point source)" referring to permitted devices: 3.50 ton/day NO_X
"Natural gas (area source), industrial" referring to non-permitted devices: 2.94 ton/day NO_X
"Natural gas (area source), commercial" referring to non-permitted devices: 2.41 ton/day NO_X

Air District staff estimates that over 90 percent of the NOx emissions from dryers, overs and kilns in the 2011 stationary source (permitted) inventory either have been addressed by Regulation 9-13 (adopted in 2012 to address Lehigh Cement) or were evaluated for further control (with no further control proposed as of this date) in Regulation 9-14. Therefore, further study should focus on area (non-permitted) sources. For area sources, Air District staff will refine the NO_X inventory to determine if NO_X emissions from the "kilns, ovens, and furnaces" sector justifies further action, and if so, to determine an appropriate methodology.

Sources:

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1. SJVAPCD Rule 4309, December 15, 2005
2. SCAQMD Rule 1147, September 9, 2011

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FSM_ SS9: Omnibus Rulemaking to Achieve Continuous Improvement

Brief Summary:
This measure seeks to accelerate the pace of greenhouse gas (GHG) emission reductions in the Bay Area by exploring the feasibility of broad-sweeping, or "omnibus," rulemaking. Omnibus rules could achieve larger GHG emission reductions by targeting multiple sources and/or sectors simultaneously. However, the complexity associated with omnibus rules might present significant challenges to the socioeconomic and environmental analyses required for good rulemaking.

Purpose:
The purpose of this measure is to reduce GHG emissions in order to protect the global climate.

Source Category:
Stationary and area GHG sources

Further Study Measure Description:

In response to the immediate threat from climate change to our region, the Air District has adopted the goals of reducing Bay Area greenhouse gas (GHG) emissions 40 percent below 1990 levels by 2030, and 80 percent below 1990 levels by 2050.[1] Meeting these aggressive mid- and long-term targets will likely require implementing new approaches and streamlining existing processes to accelerate the pace of GHG reductions. Traditionally, the Air District's rulemaking process focuses on developing a unique rule to address a specific pollutant from a particular source-type. While this approach has achieved significant criteria and air toxic emission reductions in the Bay Area over the past decades, there might be alternative approaches that are more effective in reducing GHG emissions at the rate needed. Thus, the Air District is planning to evaluate a more encompassing rulemaking process –omnibus rules that could address GHG emissions from multiple source-types or entire source sectors, simultaneously– as a future approach. These "omnibus" rules could address GHG emissions more broadly and systematically, therefore yielding faster and larger GHG emission reductions. For example, approximately half of Bay Area GHG emissions (~40 MMT CO_2e) result from stationary combustion across industrial, commercial and residential sectors. The Air District is currently developing a basin-wide combustion strategy to systematically address these emissions (see **SS18: Basin-Wide Combustion Strategy**). Phase 1 of the combustion strategy will explore establishing a regulatory cap on the carbon intensity, or CO_2 emitted per unit of product, of all major industrial combustion sources at current levels. Phase 2 calls for source-by-source rulemaking to increase combustion efficiency. An omnibus rule could offer an alternative or parallel approach to accelerate the efforts of Phase 2.

There are important challenges that the Air District would need to overcome in order to

[1] These goals are consistent with the State of California's GHG 2030 reduction target, per SB 32 (Pavley, 2016), and the State's 2050 GHG reduction target per Executive Order S-3-05.

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develop, evaluate, adopt and enforce omnibus rules. In order for rules to be legally defensible and free from unintended negative consequences, the rulemaking process must comply with federal Clean Air Act requirements, the requirements of the California Health and Safety Code, include a robust and comprehensive public engagement process, and the development of technical, socioeconomic and environmental impacts analyses. The complexity that would be necessarily associated with an omnibus rule would present challenges to the Air District in completing these legal and administrative requirements in a timely and thorough manner, therefore increasing the possibility of legal challenges and the chance of unanticipated negative environmental and/or economic consequences.

Particularly, there are significant concerns in four areas of the rulemaking process:

- *transparency and public outreach*
  An omnibus rule, encompassing multiple sectors and source-types, would likely involve a much higher number of stakeholders from affected communities, industries, environmental groups, as well as other regulatory agencies, than the traditional rulemaking process. Reaching and engaging all relevant parties in the rule development, while maintaining process transparency, will probably become more difficult as the number and geographic variety of stakeholders increase.
- *technical development and evaluation of the rule*
  The complex nature of an omnibus rule would present substantial challenges during the technical analysis of the rule. For instance, the greater variety of sources, in terms of type of equipment and potential emission controls, means longer and more complex technical research and analyses. Among these analyses, the H&SC requires the Air District to detail all existing rules and control requirements for each source-type or equipment included in the proposed rule as well as any conflict, difference or duplication that may occur between these regulations.
- *socioeconomic and California Environmental Quality Act (CEQA) analyses*
  The significant increase in the number of stakeholders and technical complexity might also make it difficult to conduct accurate and comprehensive socioeconomic and environmental impacts (CEQA) analyses; there simply might be too many factors to consider in each analysis.
- *implementation and enforcement*
  Air District staff might need to develop individual implementation plans and enforcement strategies for each source-type affected by an omnibus rule, in order for these to be useful to our Compliance and Enforcement staff and to relevant industries.

The challenges described above would need to be further investigated to assure that developing an effective, legally-defensible, and enforceable omnibus rule would achieve greater emissions reductions and/or efficiencies than developing individual rules to accomplish the same objectives. Air District staff will consider all these issues as they evaluate whether omnibus rulemaking might be a feasible and effective strategy to accelerate the pace of GHG emission reductions. The Air District will also explore the omnibus rulemaking concept for criteria and toxic air contaminant emissions.

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Source:

1. OEHHA (2013) Indicators of Climate Change in California. Available at: http://oehha.ca.gov/climate-change/document/indicators-climate-change-california

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FSM_AG1: Wineries

Brief Summary:
Study potential to reduce VOC's from fermentation at wineries.

Purpose:
Reduce VOC emissions from fermentation at wineries and breweries.

Source Category:
Stationary Source

Further Study Measure Description:
In 2005, San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) adopted rule 4694 to control emissions from wineries that emit over 10 tons/year of organic emissions (primarily ethanol) based on formulae in the rule. The rule requires a reduction of fermentation emissions of 35 percent, and also requires that storage tanks of 5,000 gallon size or greater be equipped with a pressure/vacuum valve and be kept at a temperature of no greater than 75^{o} F. San Joaquin staff estimated that 18 wineries would be subject to the rule, 14 of which were major stationary sources subject to federal Title V permits. The rule achieves emission reductions of between 0.6 to 0.7 tons per day from a total inventory of 4.6 tons per day ROG from wineries.

In 2009, SJVUAPCD adopted rule 4695 to control emissions from wine and brandy aging operations. This rule increased the control requirements for storage tanks to raise emission reductions from 35 to 50 percent. In their 2007 ozone plan, SJVUAPCD investigated further control to remove alternative compliance provisions in Rule 4694 to require operators to achieve an 86 percent VOC capture and control efficiency on fermentation tanks. Due to significant technical uncertainty and high costs associated with installing additional controls (greater than $100,000 per ton of VOC reduced per year), these additional requirements were not part of the rule, and SJVUAPCD staff recommended future study on equipment advancements that may produce additional reductions.

The Air District is not aware of any existing rules addressing emissions from breweries beyond permit requirements resulting from Reg. 2, New Source Review. Further research is needed to determine the number and size of breweries in the Bay Area.

The Air District inventory for winery emissions is 0.79 tons per day of ROG, as compared with SJVUAPCD at 4.6 tons per day. SJVUAPCD counted 109 wineries in their district in 2007. Whereas, there are over 300 wineries in Napa County alone that collectively account for about 60 percent of the Bay Area winery emissions. Further research will have to be done to determine whether any of the Bay Area wineries meet the San Joaquin threshold of 10 tons ROG emissions per year, or whether cost-effective controls could be applied to Bay Area facilities.

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District staff will investigate the number and size of winery facilities in operation in the Bay Area and their estimated emissions. In addition, staff will investigate the number and size of breweries to determine if capture and control methods may be applied to this industry.

Sources:

1. SJVAPCD, Rule 4694: Wine Fermentation and Storage Tanks, Dec 15, 2005
2. SJVAPCD 2007 Ozone Plan, measure S-IND-12, dated April 30, 2007
3. SJVAPCD, Rule 4695: Brandy Aging and Wine Aging Operations, dated September 17, 2009

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