REGULATION III - CONTROL OF AIR CONTAMINANTS

RULE 323

FUEL BURNING EQUIPMENT FROM INDUSTRIAL /COMMERCIAL/ INSTITUTIONAL (ICI) SOURCES

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SECTION 100 – GENERAL

101 **PURPOSE:** To limit the discharge of nitrogen oxides, sulfur oxides, carbon monoxide, and particulate matter emissions into the atmosphere from fuel burning combustion equipment at industrial and/or commercial and/or institutional (ICI) sources.

102 **APPLICABILITY:** This rule applies to any of the following types of ICI combustion equipment that burns either fossil fuels or alternative fuels:

102.1 Each steam generating unit that has a maximum design rated heat input capacity from fuels combusted in the generating unit of greater than 10 million (MM) Btu/hr (2.9 Megawatts (MW)).

102.2 Each stationary gas turbine with a heat input at peak load equal to or greater than 2.9 megawatts (MW).

102.3 Each cogeneration steam generating unit with a heat input of greater than 10 MMBtu/hr.

102.4 Each indirect-fired process heater with a heat input greater than 10 MMBtu/hr.

102.5 **NSPS & NESHAP:** In addition to this rule, facilities may be subject to New Source Performance Standards (NSPS) in Rule 360 and/or National Emission Standards for Hazardous Air Pollutants (NESHAP) in Rule 370 of these Rules.

103 **EXEMPTIONS:** This rule shall not apply to the following types of equipment:

103.1 Incinerators, crematories, or burn-off ovens; or

103.2 Dryers, cement and lime kilns; or

103.3 Direct-fired process heaters; or

103.4 Medical waste incinerators; or

103.5 Reciprocating internal combustion equipment; or

103.6 Combustion equipment used in power plant operations for the purpose of supplying greater than one third of the electricity to any utility power distribution system for sale; or

103.7 Combustion equipment associated with nuclear power plant operations; or

103.8 Water heaters used for the sole purpose of heating hot water for comfort or for radiant heat.

104 PARTIAL EXEMPTIONS:

104.1 Stationary gas turbines listed in subsection 102.2 of this rule that are used for any of the following reasons shall be exempt from Sections 304, 305 and subsections 301.1, 301.2, 501.1 and 501.3 of this rule:

a. Used for firefighting; or

b. Used for flood control; or

c. Used at military training facilities other than a garrison facility; or

d. Engaged by manufacturers in research and the development of equipment for either gas turbine emission control techniques or gas turbine efficiency improvements; or

e. Fired with emergency fuel that is normally fired with natural gas, or

f. Testing, reliability, maintenance, training, and readiness purposes for a total of 36 hours per year per unit when firing any emergency fuel.

104.2 All steam generating units including cogeneration units and process heaters that are used for any of the following reasons shall be exempt from Sections 301, 304, 305 and subsections 501.1 and 501.3 of this rule:

a. Fired with an emergency fuel that is normally fired with natural gas; or

b. Firing any emergency fuel for testing, reliability, and maintenance purposes up to a maximum total of 36 hrs. per unit per year.

SECTION 200 - DEFINITIONS: For the purpose of this rule, the following definitions shall apply. See Rule 100 (General Provisions and Definitions) of these rules for definitions of terms that are used but not specifically defined in this rule.

201 **ALTERNATIVE FUELS –** Substitutes for traditional oil-derived and fossil-fuel derived motor vehicle fuels including but not limited to biodiesel, propane, ethanol or methanol.

202 **COGENERATION STEAM GENERATING UNIT –** A steam or hot water generating unit that simultaneously produces both electrical (or mechanical) and thermal energy (such as heat or steam) from the same primary energy source.

203 **CORRECTIVE ACTION PLAN (CAP) –** A methodical procedure that is used to evaluate and correct a turbine operational problem and that includes, at a minimum, improved preventative maintenance procedures, improved ECS operating practices, possible operational amendments, and progress reports.

204 **DISTILLATE OIL**-A petroleum fraction of fuel oil produced by distillation that complies with the specifications for fuel oil numbers 1 or 2, as defined by the American Society for Testing and Materials in ASTM D396-01, “Standard Specification for Fuel Oils.”

205 **EMERGENCY FUEL –** Fuel fired by a gas combustion unit, normally fueled by natural gas, only during circumstances of unforeseen disruption or interruption in the supply of natural gas to a unit that normally runs on natural gas. The inability to burn natural gas may be one of the following, but is not limited to, natural gas emergency, natural gas curtailment, or a breakdown of the delivery system.

206 **EMISSION CONTROL SYSTEM (ECS) -** A system approved in writing by the Control Officer, designed and operated in accordance with good engineering practice to reduce emissions.

207 **FOSSIL FUEL** – Naturally occurring carbonaceous substances from the ground such as natural gas, petroleum, coal, and any form of solid, liquid or gaseous fuel derived from such material for the purpose of creating energy.

208 **HEAT INPUT** – Heat derived from the combustion of fuel not including the heat input from preheated combustion air, recirculated flue gases, or exhaust gases from other sources, such as gas turbines, internal combustion engines, and kilns.

209 **LOW SULFUR OIL** – Fuel oil containing less than or equal to 0.05 % by weight of sulfur.

210 **NATURAL GAS CURTAILMENT** – A shortage in the supply of natural gas, due solely to limitations or restrictions in distribution pipelines by the utility supplying the gas and not due to the cost of natural gas.

211 **OPACITY –** A condition of the ambient air, or any part thereof, in which an air contaminant partially or wholly obscures the view of an observer.

212 PARTICULATE MATTER EMISSIONS - Any and all particulate matter emitted to the ambient air as measured by applicable state and federal test methods.

213 PEAK LOAD - 100% of the manufacturer's design capacity of a gas turbine at 288 Kelvin, 60% relative humidity, and 101.3 kilopascals pressure (ISO standard day conditions).

214 PROCESS HEATER – An enclosed combustion device that uses controlled flame to transfer heat to a process fluid or a process material that is not a fluid or to heat transfer material for use in a process unit (not including the generation of steam). A process heater may be either indirect or direct-fired, dependent upon whether the gases of combustion mix with and exhaust to the same stack or vent (direct-fired) with gases emanating from the process material or not (indirect-fired). Emissions from indirect-fired units consist entirely of products of combustion while emissions from direct-fired units are unique to the given process and may vary widely in any industrial process. A process heater is not an oven or kiln used for drying, curing, baking, cooking, calcining, or vitrifying.

215 RATED HEAT INPUT CAPACITY - The heat input capacity in million Btu/hr. as specified on the nameplate of the combustion unit. If the combustion unit has been altered or modified so that its maximum heat input is different than the heat input capacity on the nameplate (design heat capacity), the maximum heat input shall be considered as the rated heat input capacity.

216 REGENERATIVE CYCLE GAS TURBINE – Any stationary gas turbine that recovers thermal energy from the exhaust gases and utilizes the thermal energy to preheat air prior to entering the combustor.

217 **RESIDUAL OIL –** The heavier oils that remain after the distillate oils and lighter hydrocarbons are distilled off in refinery operations. This includes crude oil or fuel oil numbers 1 and 2 that have a nitrogen content greater than 0.05% by weight, and all fuel oil numbers 4, 5 and 6, as defined by the American Society of Testing and Materials in ASTM D396-01, "Standard Specifications for Fuel Oils".

218 **SIMPLE CYCLE GAS TURBINE –** Any stationary gas turbine that does not recover heat from the gas turbine exhaust gases to preheat the inlet combustion air to the gas turbine, or that does not recover heat from the gas turbine exhaust gases to heat water or generate steam.

219 **STATIONARY GAS TURBINE –** Any simple cycle gas turbine or regenerative gas turbine that is not self-propelled or that is attached to a foundation.

220 **STEAM GENERATING UNIT -** An external combustion unit or boiler fired by fossil fuel that is used to generate hot water or steam. The hot water or steam is then used as energy for driving another process or piece of equipment.

221 **SULFUR OXIDES (SOx)-** The sum of the oxides of sulfur emitted from the flue gas from a combustion unit that are directly dependent upon the amount of sulfur in the fuel used.

222 **UNCOMBINED WATER –** Condensed water containing no more than analytical trace amounts of other chemical elements or compounds.

223 **WASTE DERIVED FUEL GAS –** Any gaseous fuel that is generated from the biodegradation of solid or liquid waste including but not limited to, sewage sludge, digester gas, and landfill gas.

224 WATER HEATER – A closed vessel in which water is heated by combustion of fuel and water is either withdrawn for use external to the vessel (at pressures not exceeding 160 psi with all controls and devices preventing water temperatures from exceeding 210°F) or used for radiant heat. Water heaters are usually no larger than 1 MM Btu/hr as opposed to boilers, do not reach temperatures of 220°F and higher that boilers can reach, and are not manufactured to meet boiler codes.

SECTION 300 - STANDARDS

301 LIMITATIONS - PARTICULATE MATTER:

301.1 Limitation- Liquid Fuels: An owner or operator shall not discharge, cause or allow the discharge of particulate matter emissions, caused by combustion of non-gaseous liquid fuels or a blend of liquid fuels with other fuels in excess of 0.10 lbs. per MMBtu from any combustion units listed in subsections 102.1, 102.3 and 102.4 with either a rated heat input capacity or heat input of greater than 100 MM Btu/hr.

301.2 Particulate Matter Testing: A backhalf analysis shall be performed, using Reference Method 202 referenced in subsection 504.6 of this rule, each time a compliance test for particulate matter emissions to meet the standards in subsection 301.1 of this rule is performed using Method 5. (The results of the Method 202 testing shall be used for emissions inventory purposes).

301.3 Good Combustion Practices for Turbines: An owner or operator of a stationary gas turbine listed in subsection 102.2 of this rule, regardless of fuel type or size, shall use operational practices recommended by the manufacturer and parametric monitoring that ensure good combustion control. One of the following procedures may be used:

a. Monitor the maximum temperature differential across the combustion burners or at locations around the back end of the turbine, dependent upon the particular unit, to ensure no more than a 100° F difference using a thermocouple. If a valid maximum temperature differential of greater than 100° F is observed across the burners, investigation and corrective action shall be taken within three hours to either reduce the temperature difference to 100° F or less, or

b. If the manufacturer recommends that the maximum numerical temperature differential to ensure good combustion is a temperature that is greater than 100°F, then proof of this maximum alternate temperature shall be submitted to the Control Officer. The procedure to measure the maximum temperature differential listed above in subsection 301.3a shall then be followed using the alternate recommended maximum temperature differential after approval by the Control Officer.

c. If a repetitive pattern of failure to meet the proper temperature differential of 100°F or to meet the alternate temperature differential recommended by the manufacturer indicates that the turbine is not being operated in a manner consistent with good combustion practices, then the Control Officer may require the owner or operator to submit a Corrective Action Plan (CAP).

302 LIMITATIONS – OPACITY: No owner or operator shall discharge into the ambient air from any single source of emissions any air contaminant, other than uncombined water, in excess of 20% opacity.

303 LIMITATIONS - SULFUR IN FUEL: An owner or operator of any applicable equipment listed in Section 102 that burns liquid fuel oil or a mixture or blend of fuel oil with any other fuels shall use only low sulfur oil. An owner or operator using waste derived fuel gas shall use only waste derived fuel gas with a sulfur content less than or equal to 800 ppm (0.08%).

304 LIMITATIONS – NITROGEN OXIDES:

304.1 An owner or operator of any combustion equipment listed in Section 102 with a heat input of greater than 10 MMBtu/hr to 100 MMBtu/hr, except gas turbines, shall comply either with (a) or (b below:

a. Establish initial optimal baseline concentrations for NOx and CO within 90 days of the first usage of the combustion equipment utilizing the initial design burner specifications or manufacturer's recommendations to ensure good combustion practices. Tune the unit annually in accordance with good combustion practices or a manufacturer's procedure, if applicable, that will include the following at a minimum:

(1) Inspect the burner system and clean and replace any components of the burner as necessary to minimize emissions of NOx and CO; and

(2) Inspect the burner chamber for areas of impingement and remove if necessary; and

(3) Inspect the flame pattern and make adjustments as necessary to optimize the flame pattern; and

(4) Inspect the system controlling the air-to-fuel ratio and ensure that it is correctly calibrated and functioning properly; and

(5) Measure the NOx and the CO concentration of the effluent stream after each adjustment was made with a handheld portable monitor to ensure optimal baseline concentrations are maintained or

b. Limit nitrogen oxide emissions to no more than the following amounts:

(1) 155 ppm calculated as nitrogen dioxide, when burning gaseous fuel. During steady state operations, this test result using EPA Reference Method(s) 7 shall be based upon the arithmetic mean of the results of three test runs. Each test run shall have a minimum sample run time of one hour.

(2) 230 ppm calculated as nitrogen dioxide, when burning liquid fuel. During steady state operations, this test result using EPA Reference Method(s) 7 shall be based upon the arithmetic mean of the results of three test runs. Each test run shall have a minimum sample run time of one hour.

c. For simple gas turbines, the nitrogen oxides shall be measured dry and corrected to 15% oxygen. For all other combustion equipment, the nitrogen oxides shall be measured dry and corrected to 3% oxygen.

304.2 An owner or operator of any combustion equipment, listed in Section 102, with a heat input greater than 100 MMBtu/hr, shall:

a. Tune the equipment every 6 months with good combustion practices or a manufacturer's procedure that at a minimum includes the procedures listed in subsection 304.1a of this rule and

b. Meet the NOx emission limits as stated in subsection 304.1b of this rule.

305 LIMITATIONS – CARBON MONOXIDE: No owner or operator of any equipment listed in Section 102 of this rule with a heat input greater than 100 MM Btu/hr shall cause to be discharged into the atmosphere, carbon monoxide (CO), measured in excess of 400 ppmv at any time. This test result, using EPA Reference Method 10, shall be based upon the arithmetic mean of the results of three test runs and shall be measured during steady state compliance source testing. Each test run shall have a minimum sample time of one hour. For simple gas turbines, the CO shall be measured dry and corrected to 15% oxygen. For all other combustion equipment, the CO shall be measured dry and corrected to 3% oxygen.

306 REQUIREMENTS FOR AIR POLLUTION CONTROL EQUIPMENT AND ECS MONITORING EQUIPMENT:

306.1 Emission Control System Required: For affected operations which may exceed any of the applicable standards set forth in Sections 300 of this rule, an owner or operator may comply by installing and operating an emission control system (ECS).

306.2 Providing and Maintaining ECS Monitoring Devices: No owner or operator required to use an approved ECS pursuant to this rule shall do so without first providing, properly installing, operating, and maintaining in calibration and in good working order, devices for indicating temperatures, pressures, transfer rates, rates of flow, or other operating conditions necessary to determine if air pollution control equipment is functioning properly and is properly maintained as described in an approved O&M Plan.

306.3 Operation and Maintenance (O&M) Plan Required For ECS:

a. **General Requirements**: An owner or operator shall provide and maintain an O&M Plan for any ECS, any other emission processing equipment, and any ECS monitoring devices that are used pursuant to this rule or an air pollution permit.

b. **Approval by Control Officer:** An owner or operator shall submit to the Control Officer for approval the O&M Plans of each ECS and each ECS monitoring device that is used pursuant to this rule.

c. **Initial Plans:** An owner or operator that is required to have an O&M Plan pursuant to this rule shall comply with all O&M Plans that the owner or operator has submitted for approval, but which have not yet been approved, unless notified by the Control Officer in writing. Once the initial plan has been approved in writing by the Control Officer, an owner or operator shall comply with this approved plan.

d. **Revisions to Plan:** If revisions to the initial plan have been approved by the Control Officer in writing, an owner or operator shall comply with the revisions to the initial plan. If revisions to the plan have not yet been approved by the Control Officer in writing, then an owner or operator shall comply with the most recent O&M plan on file at Maricopa County Air Quality Department.

e. **Control Officer Modifications to Plan:** After discussion with the owner or operator, the Control Officer may modify the plan in writing prior to approval of the initial O&M plan. An owner or operator shall then comply with the plan that has been modified by the Control Officer.

SECTION 400 - ADMINISTRATIVE REQUIREMENTS (NOT APPLICABLE)

SECTION 500 - MONITORING AND RECORDS

501 RECORDKEEPING AND REPORTING: An owner or operator subject to this rule shall comply with the requirements set forth in this section. Any records and data required by this section shall be kept on site at all times in a consistent and complete manner and be made available without delay to the Control Officer or his designee upon request. Records shall consist of the following information:

501.1 Equipment Listed In Section 102: Type of fuel used, amount of fuel used, amount of sulfur in the fuel if using liquid fuel, and the days and hours of operation.

501.2 Emergency Fuel Usage: Monthly records of: type of emergency fuel used, dates and hours of operation using emergency fuel, and nature of the emergency or purpose for the use of the emergency fuel as stated in subsections 104.1 and 104.2. Yearly records of the twelve month log of hours of operation in the emergency mode.

501.3 Good Combustion Practice: Measurements of the temperature differential across the burners of turbines per subsection 301.3, results of evaluation and corrective action taken to reduce the temperature differential or a finding that the temperature differential returned to the range listed in subsection 301.3 (a) or (b) of this rule without any action by the owner or operator.

501.4 Tuning Procedure: Date that the procedure was performed on the particular unit and at a minimum: stack gas temperature, flame conditions, nature of the adjustment and results of the nitrogen oxide and carbon monoxide concentrations obtained by using a handheld monitor after each adjustment.

502 RECORDS RETENTION: Copies of reports, logs and supporting documentation required by the Control Officer shall be retained for at least 5 years. Records and information required by this rule shall also be retained for at least 5 years.

503 COMPLIANCE DETERMINATION:

503.1 Low Sulfur Oil Verification:

a. An owner or operator shall submit fuel oil receipts from the fuel supplier indicating the sulfur content of the fuel oil or verification that the fuel oil used meets the 0.05% sulfur limit or the 0.08% limit for landfill or digester gas if requested by the Control Officer, or

b. If fuel receipts are not available, an owner or operator shall submit a statement of certification or proof of the sulfur content of the fuel oil from the supplier to the Control Officer, or

c. An owner or operator may elect to test the fuel oil for sulfur content in lieu of certification from the fuel supplier or fuel receipts using one of the test methods incorporated by reference in subsections 504.11, 504.12, 504.14 or 504.15.

504 TEST METHODS ADOPTED BY REFERENCE: The EPA test methods as they exist in the Code of Federal Regulations (CFR) (July 1, 2004), as listed below, are incorporated by reference in Appendix G of the Maricopa County Air Pollution Control Regulations. Copies of test methods referenced in this section are available at the Maricopa County Air Quality Department, 1001 N. Central Avenue, Phoenix, AZ 85004-1942. When more than one test method as listed in subsections 504.11, 504.12, 504.14, or 504.15 of this rule is permitted for the same determination, an exceedance of the limits established in this rule determined by any one of the applicable test methods constitutes a violation.

504.1 EPA Reference Methods 1 ("Sample and Velocity Traverses for Stationary Sources"), and 1 A ("Sample and Velocity Traverses for Stationary Sources with Small Stacks and Ducts") (40 CFR 60, Appendix A).

504.2 EPA Reference Methods 2 ("Determination of Stack Gas Velocity and Volumetric Flow Rate"), 2A ("Direct Measurement of Gas Volume Through Pipes and Small Ducts"), 2C ("Determination of Stack Gas Velocity and Volumetric Flow Rate in Small Stacks or Ducts"), and 2D ("Measurement of Gas Volumetric Flow Rates in Small Pipes and Ducts") (40 CFR 60, Appendix A).

504.3 EPA Reference Methods 3 ("Gas Analysis for the Determination of Dry Molecular Weight"), 3A ("Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary

Sources (Instrumental Analyzer Procedure)”), 3B (“Gas Analysis for the Determination of Emission Rate Correction Factor of Excess Air”), and 3C (“Determination of Carbon Dioxide, Methane, Nitrogen and Oxygen from Stationary Sources”) (40 CFR 60, Appendix A).

504.4 EPA Reference Method 4 (“Determination of Moisture Content in Stack Gases”) (40 CFR 60, Appendix A).

504.5 EPA Reference Method 5 (“Determination of Particulate Emissions from Stationary Sources”) (40 CFR 60, Appendix A)

504.6 EPA Reference Method 202 (“Determination of Condensable Particulate Emissions from Stationary Sources”) (40 CFR 51, Appendix M).

504.7 EPA Reference Methods 7 (“Determination of Nitrogen Oxide Emissions from Stationary Sources”), 7A (“Determination of Nitrogen Oxide Emissions form Stationary Sources”), 7B (“Determination of Nitrogen Oxide Emissions from Stationary Sources – Ultraviolet Spectrometry”), 7C (“Determination of Nitrogen Oxide Emissions from Stationary Sources – Alkaline-Permanganate Colorimetric Method”), 7D (“Determination of Nitrogen Oxide Emissions from Stationary Sources – Alkaline – Permanganate Chromatographic Method”), and 7E (“Determination of Nitrogen Oxide Emissions from Stationary Sources – Instrumental Analyzer Method“), (40 CFR 60, Appendix A).

504.8 EPA Reference Method 9, (“Visual Determination of the Opacity of Emissions from Stationary Sources”) (40 CFR 60, Appendix A).

504.9 EPA Reference Method 10, ("Determination of Carbon Monoxide from Stationary Sources") (40 CFR 60, Appendix A).

504.10 EPA Reference Method 20, ("Determination of Nitrogen Oxides, Sulfur Dioxide, and Diluent Emissions From Stationary Gas Turbines") (40 CFR 60, Appendix A).

504.11 American Society of Testing Materials, ASTM Method D2622-92 or 98, ("Standard Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-Ray Fluorescence Spectrometry"), 1992 or 1998.

504.12 American Society of Testing Materials, ASTM Method D1266-98, ("Standard Test Method for Sulfur in Petroleum Products (Lamp Method)"), 1998.

504.13 American Society of Testing Materials, ASTM Method D2880-00, ("Standard Specification for Gas Turbine Fuel Oils"), 2000.

504.14 American Society of Testing Materials, ASTM Method D4294-90 or 98, ("Standard Test Method for Sulfur in Petroleum and Petroleum Products by Energy- Dispersive X-ray Fluorescence Spectrometry"), 1990 or 1998.

504.15 American Society of Testing Materials, ASTM Method D5504-01,("Standard Test Method for Determination of Sulfur compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Chemiluminescence"), 2006.