UNIVERSITY PHYSICIANS HEALTHCARE HOSPITAL AT KINO CAMPUS
AIR QUALITY OPERATING PERMIT #641

TECHNICAL SUPPORT DOCUMENT

I. SOURCE DESCRIPTION

University Physicians Healthcare Hospital at Kino Campus is a hospital complex which operates several generators and commercial/institutional boilers. The primary pollutants emitted from this source are NO_X, CO, SO_X, PM_{10}, and VOC. The source will emit levels of these criteria pollutants less than major source thresholds by accepting a *Synthetic Emission Limitation* of operating hours for the emergency generators.

No add-on air pollution control devices are required by this permit.

II. EMISSION ESTIMATES

Based on standard EPA AP-42 emission factors, the controlled emissions of the source operating under this permit shall be less than or equal to the following rates:

Pollutant	Emissions (tons/yr)
NO_X	7.79
CO	4.54
SO_X	37.82
VOC	0.35
PM_{10}	0.67
HAPs (total)	0.12

Based on these estimates, University Physicians Healthcare Hospital at Kino Campus is a **Class III, True Minor, Stationary Source**.

III. APPLICABLE REQUIREMENTS

Section A New Source Performance Standards (NSPS) Compression Ignition Internal Combustion Engines (40 CFR Part 60 Subpart IIII).

Section B New and Existing Stationary Source Performance Standards for Fossil-Fuel Fired Industrial and Commercial Equipment

Section C Facility Wide Specific Conditions.

IV. PERMIT CONTENTS

A. Applicability

University Physicians Healthcare Hospital at Kino Campus is required to obtain a permit for the Stationary Rotating Machinery (two generators) and Fossil Fuel Fired Equipment (four boilers) maintained at the facility, pursuant to PCC 17.12.140.B.3.b & c. The generators and boilers operated at the facility are subject to the regulations of PCC 17.16.340 and PCC 17.16.165, respectively.

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B. Operational Limitation

In order to avoid classification as a major source (potentially emitting ≥100 tons of any criteria pollutant) and the associated increase in regulatory stringency, the Permittee must voluntarily agree to restrict the total hours which the generator will be run in any given 12 month period. Any restriction in operating hours is documented in Attachment 2 of the permit. The restriction ensures that the source will not exceed the threshold for classification as a major source. The Permittee demonstrates compliance with this restriction by keeping complete records of the time periods in which the generator is operated.

The conditions of the permit allow for continuous operation of the boilers (24 hours a day, 7 days a week, 365 days a year; or otherwise stated as 8760 hours a year) when natural gas is fired. If only natural gas is fired, and the operating hour restrictions for generators are observed, the source falls well below all major source thresholds. If diesel fuel is fired in the dual fired boilers, however, the potential exists for the source to exceed major source threshold for SO_X. A limitation on the volume of diesel fuel allowed to be fired has been incorporated to ensure the source does not exceed major source SO_X levels. An explanation for the volume chosen, along with calculations, can be found below in the Miscellaneous Comments section of this TSD.

C. Opacity Standard

By law, the Permittee cannot allow any equipment under his control to emit effluents (such as exhaust from a generator or boiler) that exceed specific values of opacity (the degree to which light cannot pass through the plume of effluent/exhaust.) The specific value of opacity that effluent from each piece of equipment cannot exceed is stated in the permit. The Permittee demonstrates compliance with this regulation by checking the exhaust from the generators and boiler quarterly, and keeping complete records of these checks.

D. Fuel Limitation

Each type of fuel burned in equipment powered by combustion has a unique blend of constituents. When burned, each fuel results in the release of regulated pollutants to the atmosphere at characteristic levels. This permit is written to account for only the fuels specified in Attachment 2 of the permit. Use of fuels other than those specified would result in different rates of pollutant emission. Therefore, the Permittee must only burn the designated fuels found in Attachment 2 of the permit to remain in compliance with the conditions of this permit.

E. Facility Changes

The Permittee retains the ability to modify operations at the facility. However, the permit covering the facility must reflect the current state of operations *at all times*. Therefore, provisions have been made in the Pima County Code to allow changes in operating permits to reflect new facility conditions. The proper procedure must be followed when making certain modifications to the facility that will affect air quality.

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V. Alternate Operating Scenarios

There are no alternate operating scenarios proposed by University Physicians Healthcare Hospital at Kino Campus.

VI. Miscellaneous Comments

A. Sulfur Dioxide:

The requirement in PCC 17.16.340.J to report daily periods when the fuel sulfur content of the fuel being fired exceeds 0.8% by weight has not been included in the permit as all fuel delivered to Pima County has an enforceable limit of 0.9% by weight. Any fuel over 0.8% but below 0.9% would not be an exceedance of any standard or limitation and so it would be burdensome for sources to report every time the fuel had a sulfur content above 0.8%. An excess emissions report would be submitted should the fuel exceed the 0.9% sulfur content standard. This permit will not allow the use of high sulfur diesel. Moreover, even though the sulfur content limit is 0.9% by weight, jet fuel, natural gas, gasoline and low sulfur diesel #2 delivered to Pima County consistently shows sulfur levels below this limit as shown in past records of fuel supplier specifications which verify sulfur content of the fuel fired. The limitations in IV.A.1 and IV.B.1, of the Specific Conditions, will ensure high sulfur fuel is not fired allowing the omission of rules PCC 17.16.340.H and PCC 17.16.165.G, as well. These rules are incorporated by reference in Attachment 1 of the permit.

Compliance with the fuel limitation requirements of IV.A.1 and IV.B.1, of the Specific Conditions, shall ensure compliance with the Sulfur Dioxide Standards of PCC 17.16.340.F and PCC 17.16.165.E; which limit the emission of SO_2 to 1.0 pound per million BTU heat input, when burning low sulfur fuel. The definition of low sulfur fuel (PCC 17.04.340.A. "Low Sulfur Fuel") is fuel oil containing less than 0.9 percent sulfur by weight. EPA AP-42 Appendix A, page A-5 states the heating value of diesel fuel is 137,000 BTU per gallon. Thus, 1 million BTU of heat input is equivalent to 7.3 gallons of diesel. At 7.05 lbs per gallon, 51.47 lbs of diesel will produce 1 million BTU. At 0.9% 51.47 lbs of diesel contains 0.46 lbs of sulfur. Combined with Oxygen to form SO_2, and assuming 100% of the sulfur in the fuel forms SO_2, this would yield 0.92 lb SO_2 per 1MMBtu. Thus, low sulfur fuel oil will produce 0.92 lbs of SO_2 per million BTU of heat input. This is roughly 8% less than the prescribed 1.0 pound SO_2 per million BTU (PCC 17.16.340.F and PCC 17.16.165.E). Likewise, distillate, residual, and other such fuel oils range from 0.84 to 0.94 lbs of SO_2 per million BTU. Thus, it is not necessary to include the standards in the permit explicitly but, by reference in Attachment 1 of the permit.

B. Particulate Matter:

PCC 17.16.340.C.1 limits the emissions of particulate matter from stationary rotating machinery. This rule has not been included in the permit as allowable emissions are well above EPA AP-42 estimated potential emissions. The chart in Figure 1, page 4, illustrates the point.

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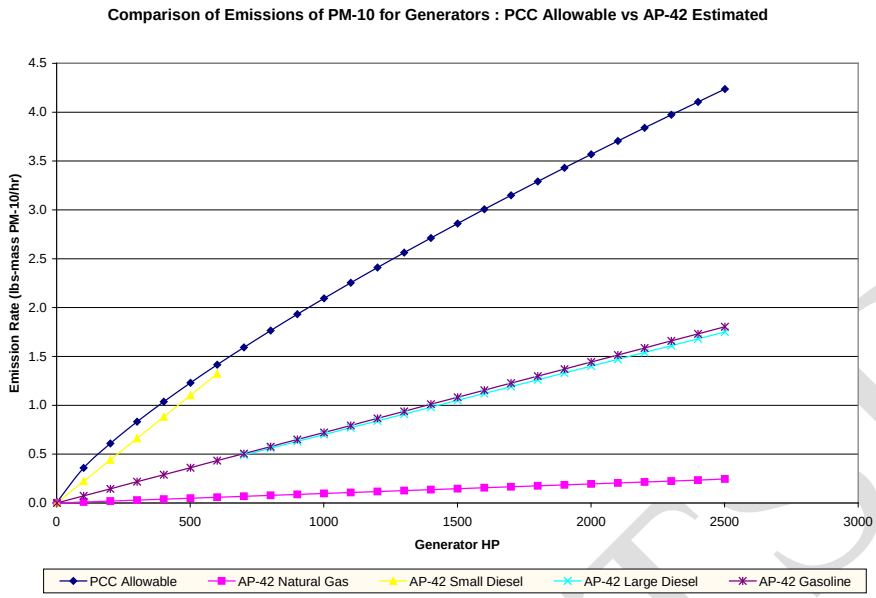
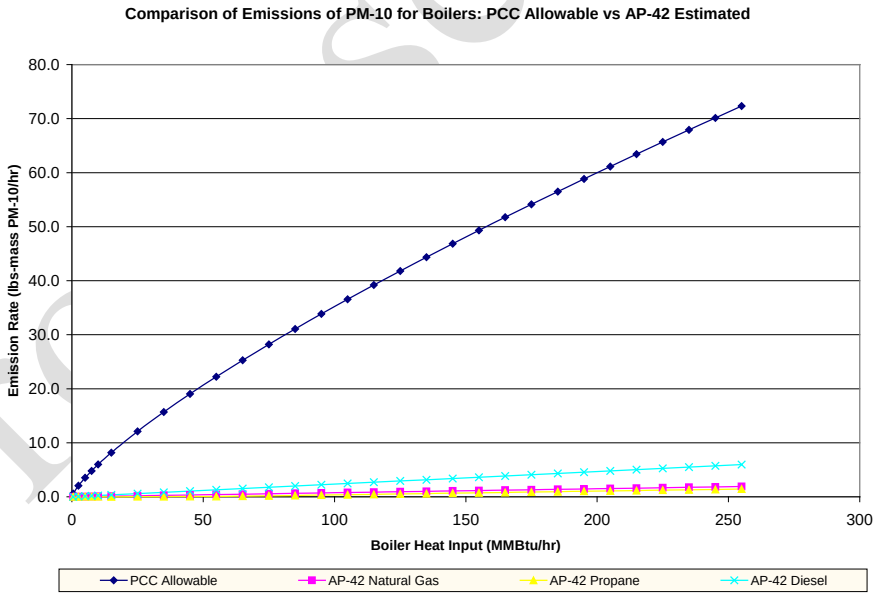


[1]The atomic weight of SO_2 = 64; the atomic weight of S = 32. SO_2 = (S) x (SO_2/S); (0.46 lb/MMBtu) x (64/32) = 0.92 lb SO_z

Figure 1) Comparative Chart of Allowable Particulate Emissions Under Pima County Code, Title 17 and Estimated Potential Emissions based on EPA AP-42 Estimates for Stationary Rotating Machinery. EPA AP-42 estimated emissions are demonstrably less than allowable emissions; and with the exception of small diesel engines, AP-42 estimated emissions are significantly less than the allowable emissions.[2] Therefore, it is not necessary to include the standard in the permit explicitly, but by reference in Attachment 1.



[2]At 599 hp the allowable emissions rate is 1.41 lb/hr while AP-42 estimates 1.32 lb/hr.

Figure 2) Comparative Chart of Allowable Particulate Emissions Under Pima County Code, Title 17, and Estimated Potential Emissions based on EPA AP-42 Estimates for External Combustion Sources. Allowable emissions are consistently over ten times estimated potential emissions. Therefore, it is not necessary to include the standard in the permit explicitly, but by reference in Attachment 1.

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Likewise, PCC 17.16.165.C limits the emissions of particulate matter from commercial and industrial fossil-fuel fired equipment (including but not limited to boilers.) This rule has not been included in the permit as allowable emissions are consistently over an entire order of magnitude higher than EPA AP-42 estimated potential emissions. The chart in Figure 2 illustrates the point.

C. Boiler Diesel Fuel Volume Limitation:

The information provided by the source in the renewal application indicated that a trivial volume of diesel fuel is fired in the dual fired boilers in any given year. Specifically, the volume given was 1,300 gallons fired in 2005. Upon review of AP-42 emission factors and the size of the dual fired boilers, it was found that substantially more fuel would have to be fired for University Physicians Healthcare Hospital at Kino Campus to reach major source thresholds for SO_X. The number generated was around 1.3 million gallons of diesel fuel in one year (see the calculations below for clarification.)

Phone conversations with the source confirmed the impractical nature of ever firing such a large volume of diesel fuel; and a willingness to accept a limitation well above the actual consumption rate at the facility. Based on the large disparity between actual consumption values at the source and what would be necessary to exceed major source levels, an even 1 million gallons per year of diesel fuel limitation was incorporated into the permit (500,000 gals/yr in each dual fired boiler.) The number was chosen arbitrarily, and intended to provide the source the maximum flexibility possible; while assuring PDEQ that major source thresholds will never be exceeded (at worst case the boilers will produce 64.8 tons SO_X/yr.) See the calculations below for potential emissions.

From AP-42 table 1.3-1, the SO_X emission factor for diesel fired boilers is .946 lb/MMBtu (taking into account fuel in Pima County will not exceed .9% sulfur by weight.) So:

0.946 lb SO_X/MMBtu x 0.137 MMBtu/gal.diesel = 0.1296 lb SO_X/gal.diesel

1,000,000 gal.diesel/yr x 0.1296 lb SO_X/gal.diesel * 1 ton/2000 lb = 64.8 tons/yr

VII. IMPACTS TO AMBIENT AIR QUALITY

Only major sources are required to conduct impacts to ambient air quality, and University Physicians Healthcare Hospital at Kino Campus is not a major source.

VIII. CONTROL TECHNOLOGY DETERMINATION

No control technologies needed to be determined; source is not subject to BACT or LAER.

IX. PREVIOUS PERMIT CONDITIONS

None removed.

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