

# GENERAL AIR QUALITY OPERATING PERMIT FOR GENERATORS

## TECHNICAL SUPPORT DOCUMENT

January 05 2007

### I. GENERAL COMMENTS

The Pima County Department of Environmental Quality (PDEQ) has created this general permit application for generators to streamline the permitting process for the large number of sources which would otherwise require substantially similar individual source permits. This action shall reduce PDEQ's workload and afford decreased permitting timeframes. To obtain coverage under this general permit, the Applicant shall complete the general permit application form in order to obtain an *Authorization to Operate (ATO)*.

### II. SOURCE DESCRIPTION

Sources covered by this general permit include any piece(s) of stationary rotating machinery (internal combustion engines and generator sets) located at sources which do not otherwise require an air quality permit for other equipment or processes located or conducted on-site. Sources with other equipment or processes cannot obtain this general permit and shall be required to submit a complete permit application and obtain an individual permit from PDEQ.

The primary pollutants emitted from such sources are NO<sub>x</sub>, CO, SO<sub>x</sub>, PM<sub>10</sub>, and VOC. Sources covered by this general permit shall emit less than major source thresholds on an individual basis for all criteria pollutants by operational design or via *Synthetic Emissions Limitation (SEL)*; i.e. voluntarily accepted limitation on hours of operation by the applicant).

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

### III. EMISSION ESTIMATES

Based on standard AP-42 emission factors (or test results submitted by the source) the sum of all emissions from any source operating under this general permit shall be less than the following rates:

Pollutant	Emissions (tons/yr)
NO <sub>x</sub>	< 100 <sup>1</sup>
CO	< 100 <sup>1</sup>
SO <sub>x</sub>	< 100 <sup>1</sup>
VOC	< 100 <sup>1</sup>
PM <sub>10</sub>	< 100 <sup>1</sup>
HAP's (combined)	Negligible
HAP (individual)	Negligible

Based on these estimates, facilities covered by this general permit shall be **Class III, Minor, Stationary Sources**.<sup>2</sup>

<sup>1</sup> <90 tpy for sources with synthetic emission limitations.

<sup>2</sup> Minor status is by operational design or via SEL.

**V. APPLICABLE REQUIREMENTS**

- A. **NSPS** – No NSPS rules apply to applicable sources. If NSPS applies the source is excluded from coverage under this general permit.
- B. **NESHAP** – No NESHAP rules apply to applicable sources. If NESHAP applies the source is excluded from coverage under this General Permit.
- C. **Pima County Code (PCC)** – The following PCC rules apply:
  - 17.16.010 Local Rules and Standards; Applicability of more than one Standard
  - 17.16.040 Standards and Applicability (Includes NESHAP)
  - 17.16.050 Visibility Limiting Standard
  - 17.16.340 Standards of Performance for Stationary Rotating Machinery

**VI. PERMIT CONTENTS**

- A. **Applicability** – Stationary rotating machinery located at a source which is only required to obtain a permit pursuant to Title 17 of the Pima County Code (PCC) 17.12.140.B.3.b.
- B. **Operational Limitation**

Standard	Discussion	Authority
II.A	Prohibition from operating affected stationary rotating machinery in excess of the allowable hours of operation in any 12-consecutive month period as specified in the (ATO). This is a SEL pursuant to PCC 17.12.190.B. For true minor sources there shall effectively be no limitation as the ATO shall not specify one.	PCC 17.12.190.B.
II.B	Requirement to monitor and keep records of each engine’s hours of operation in each 12-consecutive month period to ensure compliance with II.A of the Specific Conditions.	PCC 17.12.190.B.

- C. **Opacity Standard**

Standard	Discussion	Authority
III.A	Prohibition from emitting smoke from generators in excess of 40% opacity; the first 10 minutes immediately after startup are exempt from this opacity limit.	PCC 17.16.340.E.
III.B	Prohibition from emitting smoke from generators in excess of 60% opacity when engines are cold or are being accelerated under load.	PCC 17.16.040.
III.C	Requirement to conduct quarterly visible emissions checks and keep records of such inspections.	PCC 17.12.185.A.3.d
III.D	Should it be necessary, provision for the Control Officer to require a Method 9 test to be conducted by the Permittee.	PCC 17.12.185.A.3.d

- D. **Fuel Limitation**

Standard	Discussion	Authority
IV.A	Prohibition from firing fuels other than those allowed by the ATO. This is a SEL as firing alternate fuels may result in an increase in emissions above major source thresholds. There is also a prohibition from firing high sulfur fuel. This requirement is the basis for not requiring measures to show compliance with 17.16.340.F (see VI.A below).	PCC 17.12.190.B.

Standard	Discussion	Authority
IV.B	Requirement to maintain records of fuel specifications to demonstrate compliance with IV.A of the Specific Conditions.	PCC 17.12.185.A.3.d.

V. **Alternate Operating Scenarios** – There are no alternate operating scenarios for pieces of equipment covered by this General Permit.

VI. **Miscellaneous Comments**

A. **Sulfur Dioxide:**

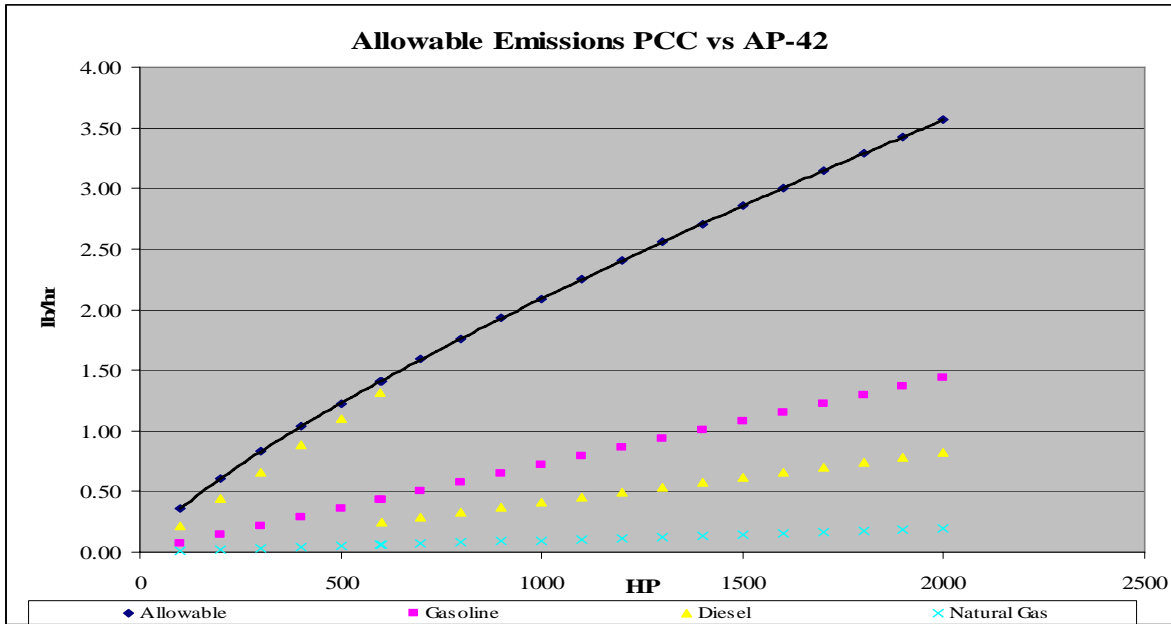
Compliance with the fuel limitation requirement of PCC 17.16.340.H (IV.B of the Specific Conditions) shall ensure compliance with the Sulfur Dioxide Standard of 17.16.340.F which limits the emission of SO<sub>2</sub> to 1.0 pound per million BTU heat input, when burning low sulfur fuel. The definition of low sulfur fuel (17.04.340.A. “Low Sulfur Fuel”) is fuel oil containing less than 0.9 percent sulfur by weight. 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<sub>2</sub> and assuming 100% of the sulfur in the fuel forms SO<sub>2</sub> this would yield 0.92 lb SO<sub>2</sub> per 1MMBtu.<sup>3</sup> Thus, low sulfur fuel oil will produce 0.92 lbs of SO<sub>2</sub> per million BTU of heat input. This is roughly 8% less than the prescribed 1.0 pound SO<sub>2</sub> per million BTU (PCC 17.16.340.F). Likewise, distillate, residual, and other such fuel oils range from 0.84 to 0.94 lbs of SO<sub>2</sub> per million BTU. Thus, it is not necessary to include the standard in the permit explicitly but, by reference in Attachment 1.

B. 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 that is 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 general 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.

C. **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 potential emissions. The following Chart illustrates the fact:

<sup>3</sup> The atomic weight of SO<sub>2</sub> = 64; the atomic weight of S = 32. SO<sub>2</sub> = (S) x (SO<sub>2</sub>/S);  
(0.46 lb/MMBtu) x (64/32) = 0.92 lb SO<sub>2</sub>



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.<sup>4</sup> Therefore, it is not necessary to include the standard in the permit explicitly but, by reference in Attachment 1.

## VII. IMPACTS TO AMBIENT AIR QUALITY

Only major sources are required to conduct impacts to ambient air quality and major sources are excluded from this General Permit.

## VIII. CONTROL TECHNOLOGY DETERMINATION

Control Technologies are not required for applicable sources.

## IX. APPLICATION PACKAGE

An application package has been drafted in conjunction with this general permit to further expedite the process. This user-friendly package should help lower the rate of incomplete applications as well as provide the permit engineer with a less intensive, standardized approach to processing this type of source.

### A. Instructions

**Step 1 – Applicability Determination.** The basis of this determination is 17.12.140.B.3. The 325 horsepower threshold is derived from 3.b of that rule, while 3.a of the rule is meant to address gasoline fired units which, according to AP-42, are projected to have a PTE in excess of 100 tpy of CO with units greater than 52 hp. This, however, was not stated explicitly in the application because a number of combinations of lower power gasoline generators co-located with units of other fuel types might trip the CO threshold before tripping a 325/52 hp threshold. For this reason the alternate threshold to the 325 hp level was expressed in terms of emissions.

<sup>4</sup> At 599 hp the allowable emissions rate is 1.41 lb/hr while AP-42 estimates 1.32 lb/hr.

The applicant is responsible for determining if other activities or equipment conducted or located on-site exclude the source from coverage under this permit. Broadly stated, exclusions from applicability include other equipment or activities co-located onsite that are subject to a permitting standard under 17.12.140 via applicability to a particular standard or by potential emissions.

Finally, as this general permit does not cover Class I sources, the applicant must be willing to accept an SEL if necessary.

**Step 2 – STANDARD PERMIT APPLICATION FORM.** This form been altered or tailored for the general permit and has slight differences from the form that is used for regular Class II and III sources.

**Step 3 – Equipment List.** The equipment list form has been altered from previous PDEQ forms included with the standard permit application package. This form has an additional column for fuel(s) which will assist in providing the necessary information for determining applicability, appropriate SELs, and any other information needed for generating a valid ATO and monitoring compliance after issuance.

Capacity should be listed as the maximum rated horsepower. Standard AP-42 conversion factors were used in arriving at the values listed.<sup>5</sup>

**Step 4 – Emissions calculations.** The applicant may elect to perform calculations by hand on Form 3 or use the spreadsheet created specifically for this application package. Rather than requiring an individual PTE to be calculated for each unit, this form requires the source to calculate the total maximum rated horsepower in each of four categories and then use those values to determine facility-wide emissions.

NO<sub>x</sub> and CO alone are considered in the calculation as SO<sub>x</sub>, VOC, PM<sub>10</sub>, and HAPs emissions do not meet permitting thresholds for generators that are minor sources of NO<sub>x</sub> & CO as well as those which have accepted SELs to avoid designation as major sources of NO<sub>x</sub> and/or CO.

Emission factors are from AP-42 Tables 3.3-1 for gasoline and small diesel fired engines (< 600 hp, Table 3.4-1 for large diesel fired engines (≥ 600 hp), and the most conservative values from Tables 3.2-1, 3.2-2, and 3.2-3 for natural gas fired engines.

The conversion factor in Tables 2, 3, & 5 is derived from the following equation:

$$(8760 \text{ hr/yr}) / (2000 \text{ lb/ton}) = 4.38 \text{ hr-ton/yr-lb}$$

The conversion factor in Table 4 is derived from the following equation:

$$[(8760 \text{ hr/yr}) / (2000 \text{ lb/yr})] \times [(2542.5 \text{ Btu/hp}) / (1,000,000 \text{ Btu/MMBtu})] = 0.011 \text{ hr-MMBtu/lb-hp}$$

**Step 5 – Synthetic Emissions Limitation Calculation.** This form should only be completed by those sources that exceed 100 TPY of NO<sub>x</sub> and/or CO emissions. As Pima County is in attainment for all pollutants in most areas, should sources not desire to use the supplied SEL calculation Form 4,

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<sup>5</sup> The following equations were used in formulating the conversion factors used in the application package:  
kW: hp = (kW) x (1.341 hp/kW). Factor = 1.341 hp/kW.  
Gal/hr Diesel: hp = (gal/hr) x (137,000 Btu/gal) / (2543.5 Btu/hp-hr). Factor = 53.86 hp-hr/gal.  
Gal/hr Gasoline: hp = (gal/hr) x (130,000 Btu/gal) / (2543.5 Btu/hp-hr). Factor = 51.11 hp-hr/gal.  
SCF/hr Natural Gas: hp = (SCF) x (1050 Btu/SCF) / (2543.5 Btu/hp-hr). Factor = 0.413 hp-hr/SCF.  
Btu/hr Natural Gas: hp = (Btu/hr) / 2543.5 hp-hr/Btu. Factor = 0.000393 hp-hr/Btu.

PDEQ will give sources the discretion to determine hours of operation. Note that in the past, the standard EPA emergency designation (500 hours per 12-consecutive month period) was ideally intended for major sources of emissions and not minor sources. PDEQ will always review applications to determine if the location where the generator(s) is/are located has been re-designated non-attainment and inform the source if additional restrictions on any suggested hours will be required.

**Step 6 – Other Activities Declaration.** This form serves as a measure to help prevent applicants who might otherwise require an individual source permit from applying for and/or obtaining coverage under this general permit. In theory such a source would declare as other equipment or activities those that would trigger an applicability requirement. Other activities and equipment declared in this form that do not otherwise require a permit shall not be specifically listed in the ATO.

**Step 7 – Statement of Compliance.** This form contains a statement of compliance, standard truth, accuracy, and completeness language as well as a requirement for the applicant to supplement this application when necessary/appropriate.

