

CATERPILLAR INC. – TUCSON PROVING GROUNDS COMPLEX

AIR QUALITY PERMIT #716

TECHNICAL SUPPORT DOCUMENT (TSD)

I. GENERAL COMMENTS:

A. Company Information

1. Source Name: Caterpillar Inc. – Tucson Proving Grounds Complex.
2. Source Address: 6000 W. Caterpillar Trail, Green Valley AZ 85614

B. Background

This is the first renewal of the 5 year permit for the Caterpillar Inc. – Tucson Proving Grounds Complex (TPGC) facility. This permit action includes a minor revision to replace the generators operated at the facility. In July 2005, the facility submitted a significant revision application revising the permit to remove the hourly restriction and allowing the facility to operate all the generators as non-emergency generators and voluntarily limit the generator run hours to keep the NO_x emissions below 90 tons to avoid classification as a major Title V source that requires a Class I permit. The facility currently operates under an older Class II air quality permit. The facility is a synthetic minor source for NO_x and CO and a true minor for all other pollutants.

This TSD was developed for the renewal of the permit. The renewal application was received on July 3, 2006 and a minor permit revision was received on December 5, 2014.

C. Attainment Classification

Caterpillar Inc. – TPGC is located in an area that is in attainment for all pollutants.

II. SOURCE DESCRIPTION

A. Process Description

TPGC is a facility that operates heavy equipment for testing and demonstrations for potential buyers. The source also carries out research & development. The permit also includes provisions for land clearing, earthmoving, trenching and other fugitive emissions sources at the facility.

B. Operating Capacity and Schedule

The operating schedule at the facility is not limited by the permit and the facility and equipment is permitted for operation 7/days/week, 24 hours a day, 365 days a year

C. Air Pollution Control Equipment

None. The generator engines are engineered to meet the NSPS, Subpart IIII standards when operated according to the manufacturer recommendations.

III. REGULATORY HISTORY

The last inspection was conducted on February 8, 2012. TPGC received a Notice of Violation (PC 1202-088) on March 14, 2012 as a result of the inspection for failing submit a minor permit revision prior to the installation of replacement generators subject to the NSPS, Subpart IIII standards. The facility has since taken corrective actions and the action has been closed.

IV. EMISSIONS ESTIMATES

TPGC requested the flexibility to operate all of the generators installed at the facility as non-emergency generators. The generators meet the NSPS emission requirements for non-emergency generators which was used to estimate the controlled emissions. Uncontrolled and Controlled emission estimates for Caterpillar Inc. – TPG and THDAC were derived using emission factors from AP-42 tables (uncontrolled) and Tier 3 and 4 emission limits (controlled). The uncontrolled potential to emit was estimated with the 6 generators and boiler operating 8760 hours per year and using the highest emission factors. The limiting pollutant for the facility is Nitrogen Dioxide. The controlled PTE estimates were derived using 8760 hours for the operation of the boiler and restricted run hours for the generators using the Tier 3 and 4 NSPS emission limits applicable to each of the generators. For purposes of calculating the synthetic run hour or duty cycle limitation, the weighted NO_x emission rate used for the installed non-emergency generators is 2.78 g/hphr or 6.13×10^{-3} lbs/hphr.¹

The following tables outline the TPGC facility potential to emit uncontrolled (8760 hr/yr generators and boilers) and controlled (6830 hr/yr limitation for each generator or a combined duty cycle limited to 78% for all the generators).²

Potential to Emit (Tons per Year)							
Diesel Fired Generators and Distillate Fuel Oil Fired Boilers							
	NO_x	CO	VOC	SO_x	PM₁₀	PM_{2.5}	HAPs
Uncontrolled*	114.76	106.87	13.47	5.70	4.52	3.79	0.24
Controlled**	89.67	83.37	10.51	5.65	3.54	2.97	0.19
<p>* Generator and Boiler PTE calculated at 8760 hrs/yr operation using NSPS and AP-42 emission factors.</p> <p>** Generator PTE calculated on limited operation (6830 hrs/yr or a combined duty cycle of 78%) while firing Ultra Low Sulfur Diesel (ULSD). Boiler PTE is calculated on unlimited operation (8760 hrs/yr) while firing fuel oil limited to less than 0.9% wt. S%.</p>							

¹ The weighted NO_x emission rate = (3 x 626 hp x 3.0 g/hphr + 3 x 790 hp x 2.6 g NO_x/hphr)/4248 hp_{Total} = 2.78 g/hphr

² The duty cycle (%) = the annual run hours of all 6 generators (on a 12 month rolling total basis) divided by 52,560 (Number of generators x 8760) multiplied by 100.

V. APPLICABLE REQUIREMENTS

40 CFR, Part 60 Standards of Performance for New Stationary Sources

- Subpart A General Provisions
- Subpart III NSPS for Stationary Compression Ignition Internal Combustion Engines
- Appendix A Test Methods

40 CFR Part 63 National Emission Standards for Hazardous Air Pollutants for Source Categories

- Subpart A General Provisions
- Subpart JJJJJ NESHAP for Industrial, Commercial, and Institutional Boilers Area Sources

Pima County Code Title 17, Chapter 17.12 – Permits and Permit Revisions

Article I – General Provisions

- 17.12.010 Statutory Authority
- 17.12.020 Planning, Constructing, or Operating Without a Permit
- 17.12.040 Reporting requirements
- 17.12.045 Test methods and procedures
- 17.12.050 Performance tests
- 17.12.080 Permit Display or Posting

Article II – Individual Source Permits

- 17.12.165 Permit application processing procedures for Class II and Class III permits
- 17.12.185 Permit contents for Class II and Class III permits
- 17.12.190 Permits containing synthetic emission limitations and standards
- 17.12.235 Facility Changes that require a permit revision
- 17.12.240 Procedures for certain changes that do not require a permit revision Class II or Class III
- 17.12.255 Minor Permit Revision
- 17.12.260 Significant Permit Revision
- 17.12.270 Permit Reopenings – Revocation and reissuance – Termination
- 17.12.350 Material permit condition

Article VI – Individual Source Permits

- 17.12.520 Fees related to Class II and Class III permits

Pima County Code Title 17, Chapter 17.16 – Emission Limiting Standards

Article I – General Provisions

- 17.16.010 Local rules and standards; Applicability of more than one standard
- 17.16.020 Noncompliance with applicable standards
- 17.16.030 Odor limiting standards

Article II – Visible Emission Standards

- 17.16.040 Standards and applicability (includes NESHAP)
- 17.16.050 Visibility limiting standard

Article III – Emissions from Existing and New Nonpoint Sources

- 17.16.060 Fugitive dust producing activities
- 17.16.070 Fugitive dust emissions standards for motor vehicle operation
- 17.16.080 Vacant lots and open spaces
- 17.16.090 Roads and streets
- 17.16.100 Particulate materials
- 17.16.110 Storage piles
- 17.16.120 Mineral tailings

Article IV – New and Existing Stationary Source Performance Standards

- 17.16.130 Applicability
- 17.16.165 Standards of performance for fossil-fuel fired industrial commercial equipment
- 17.16.340 Standards of performance for stationary rotating machinery
- 17.16.430 Standards of performance for unclassified sources

Pima County Code Title 17, Chapter 17.20 – Emissions Source Testing and Monitoring

- 17.20.010 Source sampling, monitoring and testing
- 17.20.040 Concealment of emissions

Pima County Code Title 17, Chapter 17.24:

- 17.24.020 Recordkeeping for compliance determination

V. REQUIREMENTS SPECIFICALLY IDENTIFIED AS NON-APPLICABLE

40 CFR Part 60 NSPS Subpart Dc has been identified as non-applicable to the boiler since the boiler has a maximum design heat input capacity that is less than 10 MMBtu/hr. The boiler is also not subject to particulate emission standards in 40 CFR Part 63, Subpart JJJJJ since it did not commence construction after June 4, 2010.

VI. PERMIT CHANGES and APPLICABILITY DETERMINATIONS

A. Permit and Permit Summary:

The Specific Conditions have been organized into permit sections specific to the equipment and emission source categories. Many of the conditions in the previous permit no longer apply and NSPS and NESHAP requirements apply to the boilers and generators.

B. General Applicability (Section 1):

This Section of the permit provides a reference for the affected sources, PCC, and federal rules that apply to the facility and operations, and to help organize the permit sections. Specific Conditions relating to the applicability for the permitted facility sources are included in Section 7.

C. Facility-Wide Operations (Section 2):

This Section incorporates the facility wide provisions applicable to all sources at the facility and is used to streamline provisions applicable to the specific sources and operations in other sections to include the following: voluntary limitations, general control standards, materials handling standards, odor limiting standards, opacity limit, visibility limiting standard, non-point fugitive dust control, specific authorization to conduct fugitive dust producing activities, and asbestos requirements for demolition and renovation activities. This Section also incorporates the facility-wide provisions for recordkeeping, reporting requirements, facility changes, and testing.

D. NSPS for Stationary Internal Combustion Engines ‘ICE’ (Section 3):

This Section incorporates the voluntary generator run hour limitations to remain a non-major source and specific federal emission limits and requirements for installation and operation of compression ignition engines subject to 40 CFR Part 60, NSPS Subpart IIII.

E. Fossil Fuel Fired Industrial and Commercial Equipment (Boilers and Heaters) (Section 4):

This Section incorporates applicable PCC requirements and voluntary limitations for boilers, heaters, and fuel fired equipment to avoid certain requirements in PCC 17.16.165, 40 CFR Part 60, NSPS Subpart Dc, and 40 CFR Part 63, NESHAP Subpart JJJJJ. The specific applicability provisions for the boilers and heaters are included in Section 7 and indicated in the equipment list.

The listed equipment is limited to firing natural gas; or fuel oil. The specific definition for natural gas is taken from the NESHAP standard and is a broad definition that also includes LPG or Propane for use in temporary boilers or as an alternate fuel if required.

NSPS affected boilers constructed or reconstructed after February 28, 2005 with a maximum design heat input greater than 30 MMBtu/hr or new NESHAP affected boilers greater than 10 MMBtu/hr are limited to firing No.1 and No.2 distillate fuels oil or No. 1-D or 2-D diesel fuel which are limited by federal fuel standards to contain no more than 0.5% weight Sulfur (5000 ppm_{mass}). [ref. 40 CFR 63.11237, distillate fuel oil definition & ASTM D396]

The limitations in this section avoid triggering additional federal requirements that require sulfur dioxide and particulate matter emission limits and additional monitoring. The permit also restricts operation of dual fired boilers to use fuel oil only during periods of gas curtailment, gas supply interruption, startups, or periodic testing on liquid fuel to avoid triggering boiler tune up requirements for boilers that are considered gas fired boilers in accordance with 40 CFR Part 63, Subpart JJJJJ.

F. NESHAP For Industrial, Commercial, And Institutional Steam Generating Units (Boilers) – Oil Subcategory (Section 5):

New and existing oil fired boilers are subject to the work practice, emission reduction measures, and management practices that include periodic tune-up requirements as provided in Section 5 of the permit. Affected boilers including dual fired boilers that switch fuels or make a physical change to the boiler that results in the applicability of a different subcategory within NESHAP subpart JJJJJ or the boiler becoming subject to subpart JJJJJ, must demonstrate compliance within 180 days of the effective date of the fuel switch or the physical change to the boiler.

NESHAP, subpart JJJJJ also applies to hot water heaters/boilers (i.e. not generating steam) that have a capacity of more than 120 gallons or that have a heat capacity of more than 1.6 MMBtu/hr that are fired with fuel oil.

G. Specific Applicability Provisions (Section 5):

This Section of the permit includes specific conditions on the applicability of permitted facility sources to include provisions related to the source categories, affected facilities, equipment, emission sources, installations, activities and operations at the facility.

Applicable steam generating units (boilers) that comply with Section 3 of the permit shall be considered to be compliant with 40 CFR 60, Subpart Dc and PCC 17.16.165. The facility is required to submit a significant revision if the facility desires to fire fuels other than those allowed in Section 3 of the permit.

H. Emissions from new and existing nonpoint sources (Fugitive Dust) (Section 6):

This section of the permit contains applicable fugitive dust control standards and describes reasonably necessary and feasible precautions for the control of fugitive dust to comply with I.E through H of Section 2 of the permit. In II.A of Section 2 of the permit, the Permittee is required to conduct monthly observations of facility wide fugitive dust sources in accordance with the standards.

VII. Periodic Monitoring

This is a Class II/III permit and as such does not include the mandatory submittal of a semiannual summary report of required monitoring or an annual compliance certification to the Control Officer. The permit requires the facility to maintain the required periodic monitoring records on site and to be submitted upon request of the Control Officer to demonstrate compliance.

IX. Control Technology Determination

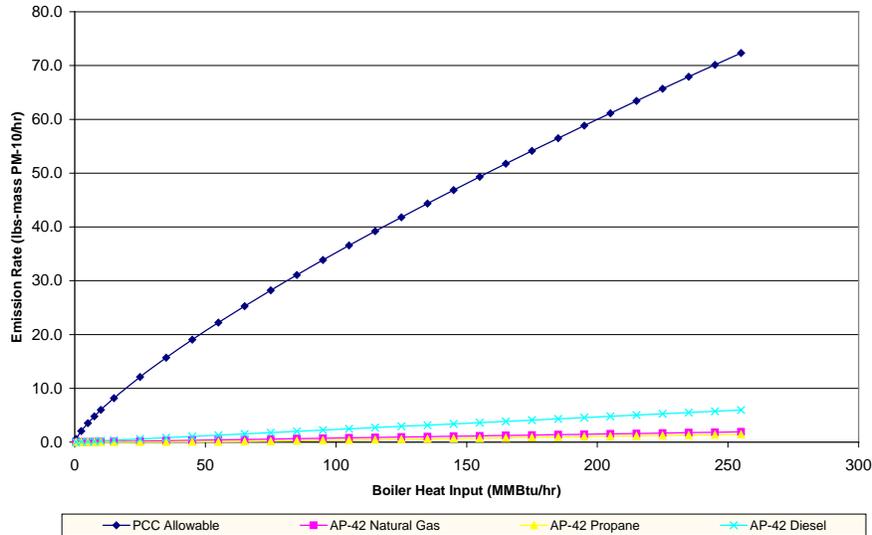
No control technologies needed to be determined; the source is not subject to RACT, BACT or LAER.

X. Exclusion of PCC Particulate Matter Discharge Rate Standards

The applicable PCC rules for the maximum particulate discharge rates are not normally included for Class II and III area source permits as explained below.

- For particulate matter sources, the calculated maximum particulate matter discharge rate, as provided in Title 17, yields maximum rates that far exceed the emissions expected from most typical area sources. For example a 200 ton/hour process source, which is typical for an average construction aggregate operation, would be limited to a maximum particulate matter discharge rate of 40.4 lbs/hour or 177 tons/year. This limit far exceeds estimated emissions from typical sources using EPA AP-42 emission factors and the source is far more likely to exceed opacity and visibility limiting standards well before reaching this limit.
- With regard to fuel burning equipment, 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 limit is not normally included in permits because allowable emissions are consistently over an entire order of magnitude higher than EPA AP-42 estimated potential emissions. The chart over page, illustrates the point.

Comparison of Emissions of PM-10 for Boilers: PCC Allowable vs AP-42 Estimated



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.

XI. Exclusion of PCC Sulfur Dioxide Emission Standards

Compliance with the fuel sulfur limitation requirements in the permit shall ensure compliance with the Sulfur Dioxide Standards of PCC 17.16.165.E and 17.16.340.F; which limit the emission of SO₂ to 1.0 pound per million BTU of 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. “High Sulfur Fuel” is defined as fuel oil containing 0.9% wt. or more Sulfur. In accordance with EPA AP-42 Appendix A, page A-5, the heating value of diesel fuel is estimated at 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 SO₂, and assuming 100% of the sulfur in the fuel forms SO₂, this would yield 0.92 lb SO₂ per 1MMBtu. Thus, low sulfur fuel oil will produce 0.92 lbs of SO₂ per million BTU of heat input. This is roughly 8% less than the prescribed 1.0 pound SO₂ per million BTU limit.

An excess emissions report is required to be submitted to the control officer should the fuel oils fired in fuel burning equipment including rotating machinery contain 0.9% wt. Sulfur or greater since the permit explicitly prohibits the use of high sulfur oil by the Permittee in any stationary or portable source. Jet fuel, natural gas, gasoline and No. 1 and 2 distillate fuel oils and diesel delivered to Pima County consistently show sulfur levels below this limit as shown in fuel supplier certifications which verify the sulfur content of the fuel fired. The sulfur content limitations in the permit and the prohibition to use high sulfur oil without the submittal of a revision and demonstration that there are not sufficient quantities of low sulfur fuels available allow for the omission of PCC 17.16.165.E and PCC 17.16.340. These rules are incorporated by reference in Attachment 1 of the permit.