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## SCS ENGINEERS

May 24, 2013  
File No. 06212008.00

Mrs. Cindy Zhang-Torres  
Florida Department of Environmental Protection  
Southwest District  
13051 N. Telecom Parkway  
Temple Terrace, FL 33637

Dept. Of Environmental Protection

**MAY 24 2013**

Southwest District

Subject: Commencement of Construction Notification  
Permit Number 0810055-009-AC  
Manatee Lena Road Landfill, Manatee County, Florida

Dear Mrs. Zhang-Torres:

On behalf of Manatee County Utilities Department, SCS Engineers (SCS) is providing this Commencement of Construction Notification per permit condition A.16. The construction of the project commenced on April 26, 2013. The additional required information per the permit is as follows:

Name and Address of Owner:

Manatee County Utilities Department  
4410 66<sup>th</sup> Street West  
Bradenton, FL 34210

Address of affected Source: Facility to be constructed at

3415 Lena Road  
Bradenton, FL 34211

Engine and Emission Control Information: CAT G3520C Generator Set- See Attachment. Serial Number will be determined upon delivery of Engine.

Fuel: The proposed Generator Set will combust collected gas from the Lena Road Landfill.

Cindy Zhang-Torres  
May 24, 2013  
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Please do not hesitate to call us at (813) 621-0080, should you have any questions or require additional information.

Sincerely,



Orion J. Holtey, P.E.  
Senior Project Engineer  
**SCS ENGINEERS**



Daniel R. Cooper, P.E.  
Project Manager  
**SCS ENGINEERS**

Enclosures

cc: Jeff Streitmatter, Manatee County (Electronic)  
Sherri Robinson, Manatee County (Electronic)  
Edgar Argueta, SCS (Electronic)

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**GAS GENERATOR SET**


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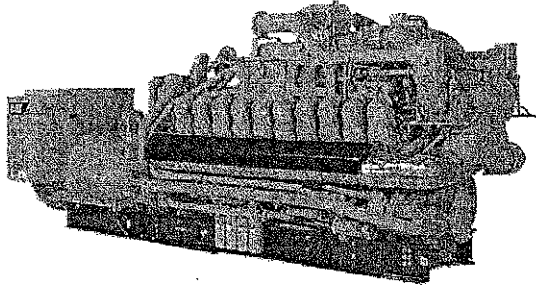


Image shown may not reflect actual package

**LOW ENERGY FUEL  
CONTINUOUS  
1600 ekW / 2000 kVA  
60 HZ 1200 RPM 480 VOLTS**  
4160

Caterpillar is leading the power generation marketplace with Power Solutions engineered to deliver unmatched flexibility, expandability, reliability and cost-effectiveness.

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**BENEFITS**


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**EMISSIONS**

- Meets most worldwide emissions requirements down to .5 g/bhp-hr NO<sub>x</sub> level without aftertreatment

**FULL RANGE OF ATTACHMENTS**

- Wide range of bolt-on system expansion attachments, factory designed and tested
- Flexible packaging options for easy and cost effective installation

**PROVEN SYSTEM**

- Fully prototype tested
- Field proven in a wide range of applications worldwide
- Certified torsional vibration analysis available

**WORLDWIDE PRODUCT SUPPORT**

- Cat<sup>®</sup> dealers provide extensive post sales support including maintenance and repair agreement
- Cat dealers have over 1,600 dealer branch stores operating in 200 countries
- Cat<sup>®</sup> S-O-S<sup>SM</sup> program cost effectively detects internal engine component condition, even the presence of unwanted fluids and combustion by-products

**CAT G3520C GAS ENGINE**

- Robust high speed diesel block design provides prolonged life and lower owning operating costs
- Designed for maximum performance on low pressure gaseous fuel supply
- Simple open chamber combustion system for reliability and fuel flexibility
- Leading edge technology in ignition system and air/fuel ratio control for lower emission and engine efficiency
- One electronic control module handles all engine functions: ignition, governing, air/fuel ratio control and engine protection

**CAT SR4B GENERATOR**

- Designed to match performance and output characteristics of Cat gas engines
- Industry leading mechanical and electrical design
- High efficiency

**CAT EMCP II+ CONTROL PANEL**

- Simple user friendly interface and navigation
  - Digital monitoring, metering and protection setting
  - Fully-featured power metering and protective relaying
  - UL 508A Listed
  - Remote control and monitor capability options
-

# CONTINUOUS 1600 kW 2000 kVA

60 Hz 1200 RPM 480V



## FACTORY INSTALLED STANDARD & OPTIONAL EQUIPMENT

System	Standard	Optional
<b>Gas Engine Control Module (GECM)</b>	Fuel/air ratio control; Start/stop logic; gas purge cycle; staged shutdown; Engine Protection System; detonation sensitive timing; high exhaust temperature shutdown; Governor; Transient richening and turbo bypass control; Ignition.	
<b>Air Inlet</b>	Two element, single-stage air cleaner with enclosure and service indicator	Air cleaner with precleaner; Mounting stand
<b>Control Panel</b>	EMCR II	Local alarm module; Remote annunciator; Communications Module (PL1000T, PL1000E); Synchronizing module; Engine failure relay
<b>Cooling</b>	Engine driven water pumps for jacket water and aftercooler; Jacket water and SCAC thermostats; ANSI/DN customer flange connections for JW inlet and outlet Cat flanges on SCAC circuit	Coolant level drain line with valves, fan with guard; Inlet/Outlet connections.
<b>Exhaust</b>	Dry exhaust manifolds, insulated and shielded; Center section cooled turbocharger with Cat flanged outlet; Individual exhaust port and turbocharger outlet wired to Integrated Temperature Sensing Module (ITSM) with GECM providing alarms and shutdowns.	Flange; Exhaust expander; Elbow; Flexible fitting; Muffler and spark-arresting muffler with companion flanges.
<b>Fuel</b>	Electronic fuel metering valve; Throttle plate, 24V DC actuator, controlled by GECM; Fuel system is sized for 10.8 to 25.6 MJ/Nm <sup>3</sup> (275 to 650 Btu/cu ft) dry pipeline natural gas with pressure of 10.0 to 34.5 kPa (1.5 to 5 psi) to the engine fuel control valve.	Fuel filter; Gas pressure regulator; Gas shutoff valve, 24V, ETR (Energized-To-Run)
<b>Generator</b>	SR4B generator, includes: Cat Digital Voltage Regulator (Cat DVR) with 3-phase sensing and KVAR/PPF control; Reactive droop; BUS bar connections; Winding temperature detectors; Anti-condensation space heater.	Medium and high voltage generators and attachments; Low voltage extension box; Cable access box; Air filter for generator; Bearing temperature detectors; Manual voltage control; European bus bar.
<b>Governing</b>	Electronic speed governor as part of GECM; Electronically-controlled 24V DC actuator connected to throttle shaft.	Woodward load sharing module
<b>Ignition</b>	Electronic Ignition System controlled by GECM; Individual cylinder Detonation Sensitive Timing (DST)	
<b>Lubrication</b>	Lubricating oil; Gear type lube oil pump; Oil filter, filler and dipstick; Integral lube oil cooler; Oil drain valve; Crankcase breather.	Oil level regulator; Prelube pump; Positive crankcase ventilation system
<b>Mounting</b>	330 mm structural steel base (for low and medium voltage units); Spring-type anti-vibration mounts (shipped loose)	
<b>Starting / Charging</b>	24V starting motors; Battery with cables and rack (shipped loose); Battery disconnect switch; 60A, 24V charging alternator (standard on 60Hz 1800rpm only)	Charging alternator; Battery charger; Oversized battery; Jacket water heater;
<b>General</b>	Paint - Caterpillar Yellow except rails & radiators; Dampener guard; Operation and Maintenance Manuals; Parts Book	Crankcase explosion relief valve; Engine barring group; IEC D.O.I. and other certifications

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60 Hz 1200 RPM 480V



## SPECIFICATIONS

### CAT GAS ENGINE

G3520C SCAC 4-stroke-cycle watercooled gas engine	
Number of Cylinders -----	V20
Bore --- mm (in) -----	170 (6.7)
Stroke --- mm (in) -----	190 (7.5)
Displacement --- L (cu in) -----	86.3 (5266)
Compression Ratio -----	11.3:1
Aspiration -----	Turbocharged Separate Circuit Aftercooled
Cooling Type -----	Two stage aftercooler, JW + O/C + A/C 1 combined
Fuel System -----	Low Pressure
Governor Type -----	Electronic (ADEM™ III)

### CAT SR4B GENERATOR

Frame size -----	868
Excitation -----	Permanent Magnet
Pitch -----	0.75
Number of poles -----	6
Number of bearings -----	2
Number of leads -----	6
Insulation -----	Class H
IP rating -----	Drip proof IP22
Alignment -----	Pilot shaft
Overspeed capability -- % of rated -----	125%
Waveform deviation line to line, no load -----	less than 3.0%
Paralleling kit droop transformer -----	Standard
Voltage regulator -----	Cat DVR
Voltage level adjustment -----	+/- 5.0%
Voltage regulation, steady state -----	+/- 0.5%
Voltage regulation with 3% speed change -----	+/- 0.5%
Telephone Influence Factor (TIF) -----	less than 50

Consult your Cat dealer for available voltage

### CAT EMCPII+ CONTROL PANEL

- Power by 24 volts DC
- NEMA 12, IP44 dust-proof enclosure
- Lockable hinged door
- Single-location customer connection
- Auto start/stop control switch
- Voltage adjustment potentiometer
- True RMS AC metering, 3 phase
- Purge cycle and staged shutdown logic
- Digital indication for:
  - RPM
  - Operating hours
  - Oil pressure
  - Coolant temperature
  - DC voltage
  - L-L volts, L-N volts, phase amps, Hz, ekW, kVA, kVAR, kWhr, %kW, pf
  - System diagnostic codes
- Shutdown with indicating lights;
  - Low oil pressure
  - High coolant temperature
  - High oil temperature
  - Overspeed
  - Overcrank
  - Emergency stop
  - High inlet air temperature (for TA engine only)
  - Detonation sensitive timing (for LE engine only)
- Programmable protective relaying functions:
  - Under / Over voltage
  - Under / Over frequency
  - Overcurrent
  - Reverse power
- Spare indicator LEDs
- Spare alarm/shutdown inputs

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## TECHNICAL DATA

G3520C Gas Generator Set (1)			DM 5859		DM 5860	
Emission level (NO <sub>x</sub> )	mg/Nm <sup>3</sup>	g/bhp-hr	440	1.0	220	0.5
Aftercooler SCAC (Stage 2)	Deg C	Deg F	54	130	54	130
<b>Package Performance</b>						
Power Rating @ 0.8 pf (w/ 2 water pumps and w/o fan)	ekW	Continuous	1600		1600	
Power Rating @ 0.8 pf (w/ 2 water pumps and w/o fan)	kVA	Continuous	2000		2000	
Power Rating @ 1.0 pf (w/ 2 water pumps and w/o fan)	ekW	Continuous	1613		1613	
Electric Efficiency @ 1.0 pf (ISO 3046/1) (2)			39.7%		38.9%	
Mechanical Power (w/ 2 water pumps and w/o fan)	bkW	bhp	1665	2233	1665	2233
<b>Fuel Consumption (3)</b>						
100% load w/o fan	Nm <sup>3</sup> /hr	scf/hr	812	30 390	832	31 115
75% load w/o fan	Nm <sup>3</sup> /hr	scf/hr	699	23 898	647	24 214
50% load w/o fan	Nm <sup>3</sup> /hr	scf/hr	436	16 236	461	17 247
<b>Altitude Capability (4)</b>						
At 25 Deg C (77 Deg F) ambient, above sea level	M	ft	880	2888	420	1378
<b>Cooling System</b>						
Ambient air temperature	Deg C	Deg F	25	77	25	77
Jacket water temperature (Maximum outlet)	Deg C	Deg F	110	230	110	230
<b>Exhaust System</b>						
Combustion air inlet flow rate	Nm <sup>3</sup> /min	SCFM	112	4317	117	4512
Exhaust stack gas temperature	Deg C	Deg F	488	910	481	898
Exhaust gas flow rate	Nm <sup>3</sup> /min	CFM	121	12 063	127	12 476
Exhaust flange size ( internal diameter )	mm	in	360	14	360	14
<b>Heat Rejection (5)</b>						
Heat rejection to jacket water & oil cooler & AC Stage 1	kW	Btu/min	907	51 594	926	52 669
Heat rejection to AC Stage 2	kW	Btu/min	158	8675	156	8895
Heat rejection to exhaust (LHV to 350 Deg F)	kW	Btu/min	994	56 564	1011	57 574
Heat rejection to exhaust (LHV to 120 Deg C)	kW	Btu/min	1176	66 938	1201	68 360
Heat rejection to atmosphere from engine	kW	Btu/min	127	7210	127	7210
Heat rejection to atmosphere from generator	kW	Btu/min	667	3797	667	3797
<b>Generator</b>						
Frame			868		868	
Temperature rise	Deg C	Deg F	105	221	105	221
Motor starting capability @ 30% voltage dip (6)	skVA		4079		4079	
<b>Lubrication System</b>						
Standard sump refill with filter change	L	gal	541	143	541	143
<b>Emissions (7)</b>						
NO <sub>x</sub> @ 5% O <sub>2</sub> (dry)	mg/Nm <sup>3</sup>	g/bhp-hr	440	1.0	220	0.5
CO @ 5% O <sub>2</sub> (dry)	mg/Nm <sup>3</sup>	g/bhp-hr	1100	2.5	1100	2.5
THC @ 5% O <sub>2</sub> (dry)	mg/Nm <sup>3</sup>	g/bhp-hr	2522	5.56	2601	5.84
NMHC @ 5% O <sub>2</sub> (dry)	mg/Nm <sup>3</sup>	g/bhp-hr	379	0.84	391	0.88
Exhaust O <sub>2</sub> (dry)	%		8.7		9	

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## DEFINITIONS AND CONDITIONS

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(1) **Continuous** --- Maximum output available for an unlimited time

**Data** is based on low energy gas having a Low Heat Value (LHV) of 18 MJ/Nm<sup>3</sup> (456 Btu/ft<sup>3</sup>) and 135 Cat Methane Number. For values in excess of altitude, ambient temperature, inlet/exhaust restriction, or different from the conditions listed, contact your Cat dealer.

(2) **Efficiency** of standard generator is used. For higher efficiency generators, contact your local Cat dealer.

(3) **Ratings and fuel consumption** are based on ISO3046/1 standard reference conditions of 25° C (77° F) of ambient temperature and 100 kPa (29.61 in Hg) of total barometric pressure, 30% relative humidity with 0, +5% fuel tolerance.

(4) **Altitude** capability is based on 2.5 kPa air filter and 5.0 kPa exhaust stack restrictions.

(5) **Heat Rejection** --- Values based on nominal data with fuel tolerance of +/-2.5% and 2.5 kPa inlet and 5.0 kPa exhaust restrictions.

(6) Assume synchronous driver

(7) **Emissions data** measurements are consistent with those described in EPA CFR 40 Part 89 Subpart D & E and ISO8178-1 for measuring HC, CO, PM, NO<sub>x</sub>.

Data shown is based on steady state engine operating conditions of 25° C (77° F), 96.28 kPa (28.43 in Hg) and having a LHV of 456 Btu/cu and 135 Cat Methane number at 101.6 kPa (30.00 in Hg) absolute and 0°C (32°F).

Emission data shown is subject to instrumentation, measurement, facility, and engine fuel system adjustment.

CO value is nominal and representative of a new engine with < or equal to 100 hours.

For not-to-exceed or site specific emissions, contact your Cat Dealer.

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## DIMENSIONS

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Package Dimensions		
Length	6367.1 mm	250.67 in
Width	1996.5 mm	78.60 in
Height	2466.1 mm	97.05 in
Est. Shipping Weight	18 350 kg	40 455 lb

Note: Do not use for installation design.  
See general dimension drawings  
for detail. (Drawing # 267-7367)

Performance Number: DM5859, DM5860  
Feature Code: 520GE38  
Generator Argmt: 158-6422  
Source: U.S. Sourced

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