

MELLOTT  
COMPANY  
September 30, 2015



UPS OVERNIGHT 1Z9YV4080168580114

Ms. Beverly McKeone  
West Virginia DEP-Division of Air Quality  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304

003-16152

COMPANY	FILE
FACILITY	Mellott
REGION	REG. 640-C074

Class II General Permit Application  
Proctor & Gamble Warehouse Project  
Berkeley County, Inwood, WV  
Mellott Company Project: 2015.008

Dear Ms. McKeone:

Enclosed please find (in triplicate) the General Permit application package for a non-metallic mineral processing plant to be located at the Proctor & Gamble warehouse site which is located at Tabler Station Road, Berkeley County, Inwood, West Virginia 25428. We would like to start construction of the plant in mid-November and start crushing operations in mid-December 2015. Also enclosed is check number 126276, in the amount of \$1,500.00 for the application fee.

Please note that most of the equipment used for this plant will be new; therefore, I currently do not have the date of construction, reconstruction, modification or serial numbers.

This application also includes four (4) mobile track units. These units can be used separately or in conjunction with each other at various locations on the project site. At this time, we are undecided as to whether or not the track units will be used at the site, but added them to the application to cover any emissions in the event that they are in use. If the units are used, some or all of them will not be in constant operation. They will be moved around within the site boundaries to perform on the spot crushing as necessary.

All material that is crushed will remain on site and will be used as base material for the warehouse. None of the material will be used for resale. The product stockpiles will be minimal.

If you have any questions, or require any additional information, please contact me by phone at (301) 678-2133 or by email at [sstanley@mellotts.com](mailto:sstanley@mellotts.com).

Sincerely,

MELLOTT COMPANY

*Sharon Elbin*

Sharon Elbin  
Environmental Manager

Enclosures

cc: File: 2015.008-20-025

*Entire Document*  
**NON-CONFIDENTIAL**

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WEST VIRGINIA  
 DEPARTMENT OF ENVIRONMENTAL PROTECTION  
 DIVISION OF AIR QUALITY  
 601 57<sup>th</sup> Street, SE  
 Charleston, WV 25304  
 Phone: (304) 926-0475 • www.dep.wv.gov/daq

**APPLICATION FOR GENERAL PERMIT REGISTRATION**  
 CONSTRUCT, MODIFY, RELOCATE OR ADMINISTRATIVELY UPDATE  
 A STATIONARY SOURCE OF AIR POLLUTANTS

- CONSTRUCTION     MODIFICATION     RELOCATION     CLASS I ADMINISTRATIVE UPDATE  
 CLASS II ADMINISTRATIVE UPDATE

**CHECK WHICH TYPE OF GENERAL PERMIT REGISTRATION YOU ARE APPLYING FOR:**

- |   |  |
|---|--|
| <input type="checkbox"/> <b>G10-D</b> – Coal Preparation and Handling                                   | <input checked="" type="checkbox"/> <b>G40-C</b> – Nonmetallic Minerals Processing       |
| <input type="checkbox"/> <b>G20-B</b> – Hot Mix Asphalt   | <input type="checkbox"/> <b>G50-B</b> – Concrete Batch                                   |
| <input type="checkbox"/> <b>G30-D</b> – Natural Gas Compressor Stations                                 | <input type="checkbox"/> <b>G60-C</b> – Class II Emergency Generator                     |
| <input type="checkbox"/> <b>G33-A</b> – Spark Ignition Internal Combustion Engines                      | <input type="checkbox"/> <b>G65-C</b> – Class I Emergency Generator                      |
| <input type="checkbox"/> <b>G35-A</b> – Natural Gas Compressor Stations (Flare/Glycol Dehydration Unit) | <input type="checkbox"/> <b>G70-A</b> – Class II Oil and Natural Gas Production Facility |

**SECTION I. GENERAL INFORMATION**

1. Name of applicant (as registered with the WV Secretary of State's Office): <b>Mellott Company</b>		2. Federal Employer ID No. (FEIN): <b>23-1415787</b>	
3. Applicant's mailing address: <b>100 Mellott Drive</b> <b>Warfordsburg, PA 17267</b>		4. Applicant's physical address: <b>100 Mellott Drive</b> <b>Warfordsburg, PA 17267</b>	
5. If applicant is a subsidiary corporation, please provide the name of parent corporation:			
6. <b>WV BUSINESS REGISTRATION.</b> Is the applicant a resident of the State of West Virginia? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO ⇨ IF YES, provide a copy of the Certificate of Incorporation/ Organization / Limited Partnership (one page) including any name change amendments or other Business Registration Certificate as Attachment A. ⇨ IF NO, provide a copy of the Certificate of Authority / Authority of LLC / Registration (one page) including any name change amendments or other Business Certificate as Attachment A.			

**SECTION II. FACILITY INFORMATION**

7. Type of plant or facility (stationary source) to be constructed, modified, relocated or administratively updated (e.g., coal preparation plant, primary crusher, etc.): <b>Nonmetallic mineral processing plant</b>		8a. Standard Industrial Classification Classification (SIC) code: <b>1422</b>	AND	8b. North American Industry System (NAICS) code: <b>212312</b>
9. DAQ Plant ID No. (for existing facilities only): <b>NA</b>		10. List all current 45CSR13 and other General Permit numbers associated with this process (for existing facilities only): <b>NA</b>		

**A: PRIMARY OPERATING SITE INFORMATION**

11A. Facility name of primary operating site: <b>Proctor &amp; Gamble</b> <hr/> <b>Warehouse</b>	12A. Address of primary operating site: Mailing: <u>100 Mellott Drive</u> Physical: <u>Tabler Station Rd.</u> <hr/> <u>Warfordsburg PA 17267</u> <u>Inwood, WV 25428</u>	
13A. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO ⇨ IF YES, please explain: <u>will have control of site while</u> <u>performing rock crushing/screening operations</u> ⇨ IF NO, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.		
14A. ⇨ For <b>Modifications or Administrative Updates</b> at an existing facility, please provide directions to the present location of the facility from the nearest state road; ⇨ For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a <b>MAP</b> as <b>Attachment F</b> . <u>I-81 near Inwood, head north. Take Exit 8 for Co Route 32/Tabler Station Rd. Turn right onto Tabler Station Rd. Continue onto Business Park Dr. Turn Left onto US-11N. Turn L onto Martha Dr.</u>		
15A. Nearest city or town:  <u>Inwood</u>	16A. County:  <u>Berkeley</u>	17A. UTM Coordinates: Northing (KM): <u>4365930.9</u> Easting (KM): <u>755727.4</u> Zone: <u>17</u>
18A. Briefly describe the proposed new operation or change (s) to the facility:  <u>Rock crushing &amp; screening plant.</u>		19A. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: <u>39.405</u> Longitude: <u>78.03</u>

**B: 1<sup>ST</sup> ALTERNATE OPERATING SITE INFORMATION (only available for G20, G40, & G50 General Permits)**

11B. Name of 1 <sup>st</sup> alternate operating site: <u>NA</u> <hr/>	12B. Address of 1 <sup>st</sup> alternate operating site: Mailing: _____ Physical: _____ <hr/>	
13B. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? <input type="checkbox"/> YES <input type="checkbox"/> NO ⇨ IF YES, please explain: _____ _____ ⇨ IF NO, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.		

14B. ⇨ For <b>Modifications or Administrative Updates</b> at an existing facility, please provide directions to the present location of the facility from the nearest state road; ⇨ For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a <b>MAP as Attachment F.</b>  _____ _____		
15B. Nearest city or town:	16B. County:	17B. UTM Coordinates: Northing (KM): _____ Easting (KM): _____ Zone: _____
18B. Briefly describe the proposed new operation or change (s) to the facility:		19B. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: _____ Longitude: _____

**C: 2<sup>ND</sup> ALTERNATE OPERATING SITE INFORMATION (only available for G20, G40, & G50 General Permits):**

11C. Name of 2 <sup>nd</sup> alternate operating site: _____	12C. Address of 2 <sup>nd</sup> alternate operating site: Mailing: _____ Physical: _____	
13C. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? <input type="checkbox"/> YES <input type="checkbox"/> NO ⇨ IF YES, please explain: _____ _____ ⇨ IF NO, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.		
14C. ⇨ For <b>Modifications or Administrative Updates</b> at an existing facility, please provide directions to the present location of the facility from the nearest state road; ⇨ For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a <b>MAP as Attachment F.</b>  _____ _____		
15C. Nearest city or town:	16C. County:	17C. UTM Coordinates: Northing (KM): _____ Easting (KM): _____ Zone: _____
18C. Briefly describe the proposed new operation or change (s) to the facility:		19C. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: _____ Longitude: _____

<p>20. Provide the date of anticipated installation or change:</p> <p><u>11 / 16 / 15</u></p> <p><input type="checkbox"/> If this is an <b>After-The-Fact</b> permit application, provide the date upon which the proposed change did happen: :</p> <p><u>    /    /    </u></p>	<p>21. Date of anticipated Start-up if registration is granted:</p> <p><u>12 / 14 / 15</u></p>
<p>22. Provide maximum projected <b>Operating Schedule</b> of activity/activities outlined in this application if other than 8760 hours/year. (Note: anything other than 24/7/52 may result in a restriction to the facility's operation).</p> <p>Hours per day <u>12</u> Days per week <u>5.5</u> Weeks per year <u>40</u> Percentage of operation <u>100</u></p>	

**SECTION III. ATTACHMENTS AND SUPPORTING DOCUMENTS**

<p>23. Include a check payable to WVDEP – Division of Air Quality with the appropriate <b>application fee</b> (per 45CSR22 and 45CSR13).</p>
<p>24. Include a <b>Table of Contents</b> as the first page of your application package.</p>
<p>All of the required forms and additional information can be found under the Permitting Section (General Permits) of DAQ's website, or requested by phone.</p>
<p>25. Please check all attachments included with this permit application. Please refer to the appropriate reference document for an explanation of the attachments listed below.</p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> ATTACHMENT A : CURRENT BUSINESS CERTIFICATE</li> <li><input checked="" type="checkbox"/> ATTACHMENT B: PROCESS DESCRIPTION</li> <li><input checked="" type="checkbox"/> ATTACHMENT C: DESCRIPTION OF FUGITIVE EMISSIONS</li> <li><input checked="" type="checkbox"/> ATTACHMENT D: PROCESS FLOW DIAGRAM</li> <li><input checked="" type="checkbox"/> ATTACHMENT E: PLOT PLAN</li> <li><input checked="" type="checkbox"/> ATTACHMENT F: AREA MAP</li> <li><input checked="" type="checkbox"/> ATTACHMENT G: EQUIPMENT DATA SHEETS AND REGISTRATION SECTION APPLICABILITY FORM</li> <li><input type="checkbox"/> ATTACHMENT H: AIR POLLUTION CONTROL DEVICE SHEETS</li> <li><input checked="" type="checkbox"/> ATTACHMENT I: EMISSIONS CALCULATIONS</li> <li><input checked="" type="checkbox"/> ATTACHMENT J: CLASS I LEGAL ADVERTISEMENT</li> <li><input checked="" type="checkbox"/> ATTACHMENT K: ELECTRONIC SUBMITTAL</li> <li><input checked="" type="checkbox"/> ATTACHMENT L: GENERAL PERMIT REGISTRATION APPLICATION FEE</li> <li><input type="checkbox"/> ATTACHMENT M: SITING CRITERIA WAIVER</li> <li><input checked="" type="checkbox"/> ATTACHMENT N: MATERIAL SAFETY DATA SHEETS (MSDS)</li> <li><input checked="" type="checkbox"/> ATTACHMENT O: EMISSIONS SUMMARY SHEETS</li> <li><input checked="" type="checkbox"/> OTHER SUPPORTING DOCUMENTATION NOT DESCRIBED ABOVE (Equipment Drawings, Aggregation Discussion, etc.)</li> </ul> <p>Please mail an original and two copies of the complete General Permit Registration Application with the signature(s) to the DAQ Permitting Section, at the address shown on the front page of this application. Please <b>DO NOT</b> fax permit applications. For questions regarding applications or West Virginia Air Pollution Rules and Regulations, please refer to the website shown on the front page of the application or call the phone number also provided on the front page of the application.</p>

SECTION IV. CERTIFICATION OF INFORMATION

This General Permit Registration Application shall be signed below by a Responsible Official. A Responsible Official is a President, Vice President, Secretary, Treasurer, General Partner, General Manager, a member of a Board of Directors, or Owner, depending on business structure. A business may certify an Authorized Representative who shall have authority to bind the Corporation, Partnership, Limited Liability Company, Association, Joint Venture or Sole Proprietorship. Required records of daily throughput, hours of operation and maintenance, general correspondence, Emission Inventory, Certified Emission Statement, compliance certifications and all required notifications must be signed by a Responsible Official or an Authorized Representative. If a business wishes to certify an Authorized Representative, the official agreement below shall be checked off and the appropriate names and signatures entered. Any administratively incomplete or improperly signed or unsigned Registration Application will be returned to the applicant.

FOR A CORPORATION (domestic or foreign)

I certify that I am a President, Vice President, Secretary, Treasurer or in charge of a principal business function of the corporation

FOR A PARTNERSHIP

I certify that I am a General Partner

FOR A LIMITED LIABILITY COMPANY

I certify that I am a General Partner or General Manager

FOR AN ASSOCIATION

I certify that I am the President or a member of the Board of Directors

FOR A JOINT VENTURE

I certify that I am the President, General Partner or General Manager

FOR A SOLE PROPRIETORSHIP

I certify that I am the Owner and Proprietor

I hereby certify that (please print or type) \_\_\_\_\_ is an Authorized Representative and in that capacity shall represent the interest of the business (e.g., Corporation, Partnership, Limited Liability Company, Association Joint Venture or Sole Proprietorship) and may obligate and legally bind the business. If the business changes its Authorized Representative, a Responsible Official shall notify the Director of the Office of Air Quality immediately, and/or,

I hereby certify that all information contained in this General Permit Registration Application and any supporting documents appended hereto is, to the best of my knowledge, true, accurate and complete, and that all reasonable efforts have been made to provide the most comprehensive information possible

Signature Brian L Mellott 9-24-15  
(please use blue ink) Responsible Official Date

Name & Title Brian L. Mellott, Vice President  
(please print or type)

Signature \_\_\_\_\_  
(please use blue ink) Authorized Representative (if applicable) Date

Applicant's Name Mellott Company

Phone & Fax 301-678-2000 301-678-2207  
Phone Fax

Email sstanley@mellotts.com

**ATTACHMENT A**

**CURRENT BUSINESS CERTIFICATE**

**WEST VIRGINIA  
STATE TAX DEPARTMENT  
BUSINESS REGISTRATION  
CERTIFICATE**

**ISSUED TO:  
MELLOTT COMPANY  
100 MELLOTT DR  
WARFORDSBURG, PA 17267-8555**

**BUSINESS REGISTRATION ACCOUNT NUMBER: 1013-3840**

This certificate is issued on: **06/28/2010**

*This certificate is issued by  
the West Virginia State Tax Commissioner  
in accordance with W.Va. Code § 11-12.*

*The person or organization identified on this certificate is registered  
to conduct business in the State of West Virginia at the location above.*

*This certificate is not transferable and must be displayed at the location for which issued.*

This certificate shall be permanent until cessation of the business for which the certificate of registration was granted or until it is suspended, revoked or cancelled by the Tax Commissioner.

Change in name or change of location shall be considered a cessation of the business and a new certificate shall be required.

**TRAVELING/STREET VENDORS:** Must carry a copy of this certificate in every vehicle operated by them.  
**CONTRACTORS, DRILLING OPERATORS, TIMBER/LOGGING OPERATIONS:** Must have a copy of this certificate displayed at every job site within West Virginia.

3/21/91  
SC



# CERTIFICATE

*J. Ken Hechler, Secretary of State of the State of West Virginia, hereby certify that*  
H. B. MELLOTT ESTATE, INC.

a corporation formed under the laws of Pennsylvania has applied for a Certificate of Authority to transact business in West Virginia as required by the provisions of Chapter 3, Article 1, Sections 53 and 54 of the West Virginia Code. I further certify that the application conforms to law and is filed in my office.

THEREFORE, I issue this

### CERTIFICATE OF AUTHORITY

to the corporation authorizing it to transact business in West Virginia under the name of H. B. MELLOTT ESTATE, INC.

and I attach to this certificate a duplicate original of the application.

*Given under my hand and the Great Seal of the State of West Virginia, on this*



Twenty-first day of March 1991

*Ken Hechler*

*Secretary of State*

**ATTACHMENT B**

**PROCESS DESCRIPTION**

SOURCE AGGREGATION

The emissions associated with the temporary operation of this facility are secondary emissions as defined in 45CSR13 Section 2.23.

*"Secondary emissions" means emissions which would occur as a result of the construction or operation of a stationary source or modification, but do not come from the stationary source or modification itself. For the purpose of this rule, secondary emissions must be specific, well defined, quantifiable, and impact the same general area as the stationary source or modification which causes the secondary emissions. Secondary emissions include, but are not limited to, emissions from any off-site support facility which would not otherwise be constructed or increase its emissions except as a result of the construction or operation of the stationary source or modification.*

45CSR13 Section 2.19 defined "Potential to Emit" which states that "secondary emissions" shall not be included in any determination of a stationary sources potential to emit. Therefore, these emissions are temporary and not additive in making a source determination.

MONITORING OF OPERATIONS

KSC will be required to perform the following monitoring and recordkeeping associated with this permit application:

- Monitor and record quantity of raw material throughput.
- Monitor and minimize fugitive emissions.
- Monitor all applicable requirements of 40CFR60 Subparts III and OOO.
- Monitor and record the operating hours of the engines.
- The records shall be maintained on site or in a readily available off-site location maintained by KSC for a period of five (5) years.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates KSC's Sandstrom Treatment Facility meets all the requirements of applicable regulations. Therefore, impact on the surrounding area should be minimized and it is recommended that the Doddridge County location should be granted registration under General Permit G40-C.

---

Jerry Williams, P.E.  
Engineer

---

Date

## PLANT PROCESS DESCRIPTION

Mellott Company is proposing to install a rock crushing and screening operation to process stone to make a usable aggregate material for the warehouse project. All material will remain onsite. Stockpiles will be at a minimum.

The main plant will consist of primary, secondary and tertiary crushing/screening operations. The primary section will include a Metso C120 jaw crusher with a vibrating grizzly feeder. The secondary circuit will include a Metso HP300 cone crusher and a 6 x 20, triple deck screen. The tertiary circuit will include a Metso, HP400 cone crusher and another 6 x 20 triple deck screen. The plant will have a total of fifteen (15) belt conveyors. This equipment will be powered by using three (3) generators. One of the generators is rated at 1,214 HP and the other two are rated at 1,081 HP.

Materials are loaded and transported to location of the processing plant muck pile by the building contractor. Material is then transported from the muck pile to the primary feeder via Mellott Company Caterpillar loaders. The primary feeder (BS-1) empties into the primary jaw (JC-1). The primary jaw crusher reduces the size of the material to 6" minus. The material is then conveyed via conveyors BC-1, BC-8 and BC-5 to the secondary screen (TD-1). The secondary screen sizes material to 2A's which is then conveyed via BC-3 to conveyor BC-11 which stockpiles the material. The secondary screen also sizes material to 3's. This material is can either be pulled out and stockpiled via conveyor BC-26 to BC-12, or it can be sent to the HP300 crusher (OT-1).

The oversize material from the secondary screen is fed directly into the HP300 crusher (OT-1) which crushes the material to a 2" minus. The crushed material is then fed via BC-2 to BC-9 and then goes to the tertiary screen (TD-2). The tertiary screen sizes the material to 3/8" minus which is conveyed by BC-6 to BC-15 which stockpiles the material. BC-15 is a radial stacker which can be moved to blend this material into the 2A's stockpile.

The 3/4" x 3/8" material goes to the stockpile via BC-14. The 1-1/2" x 3/4" is stockpiled via BC-13. The oversize material from the screen goes directly into the HP400 cone crusher (OT-2) which reduces the material to 3/4" minus. The crushed material is then returned to the tertiary screen via BC-7 and the return belt (BC-10).

Mellott Company is also proposing the use of four (4) track units that can be used separately or in conjunction with each other at various locations on the project site. Each track unit is powered by its' own diesel-fired engine. The track units include one (1) Metso 1213 impact crusher, one (1) Metso 106 jaw crusher, one (1) Metso 116 jaw crusher, one (1) Metso HP300 cone crusher and ten (10) conveyors. Four (4) of these conveyors will not be in use during the operation, but they are attached to the track units. Each track unit also has a vibrating grizzly feeder.

LT1213 includes:

RB-1	Metso 1213 Impact Jaw Crusher
BC-20	48" BW Undercrusher Conveyor
BC-21	20" BW Side Conveyor
BS-4	Vibrating Grizzly Feeder
CE-6	CAT, C13 Diesel Engine

LT106 includes:

JC-3	Metso 106 Jaw Crusher
BC-18	40" BW Primary Conveyor
BC-19	20" Bypass Conveyor*
BS-3	Vibrating Grizzly Feeder
CE-5	CAT, C9 Diesel Engine

LT116 includes:

JC-2	Metso 16 Jaw Crusher
BC-16	48" BW Primary Conveyor
BC-17	20" BW Bypass Conveyor*
BS-2	Vibrating Grizzly Feeder
CE-4	CAT, C13 Diesel Engine

LT300HP includes:

OT-3	Metso HP300 Cone Crusher
BC-22	48" Feed Conveyor
BC-23	32" Bypass Conveyor*
BC-24	48" Undercrusher Conveyor
BC-25	32" Bypass Conveyor*
BS-5	Vibrating Grizzly Feeder
CE-7	CAT, C15 Diesel Engine

At this time, we are undecided as to whether or not the track units will be used at the site, but added them to the application to cover any emissions in the event that they are in use. If the units are used, some or all of them will not be in constant operation. They will be moved around within the site boundaries to perform on the spot crushing as necessary.

All fugitive emissions will be controlled with water spray.

\*These conveyors will not be in use, but are attached to the track units.

**ATTACHMENT C**

**DESCRIPTION OF FUGITIVE EMISSIONS**

## DESCRIPTION OF FUGITIVE EMISSIONS

The sources of fugitive emissions are product stockpiles, haul roads and stone dust from the processing plant.

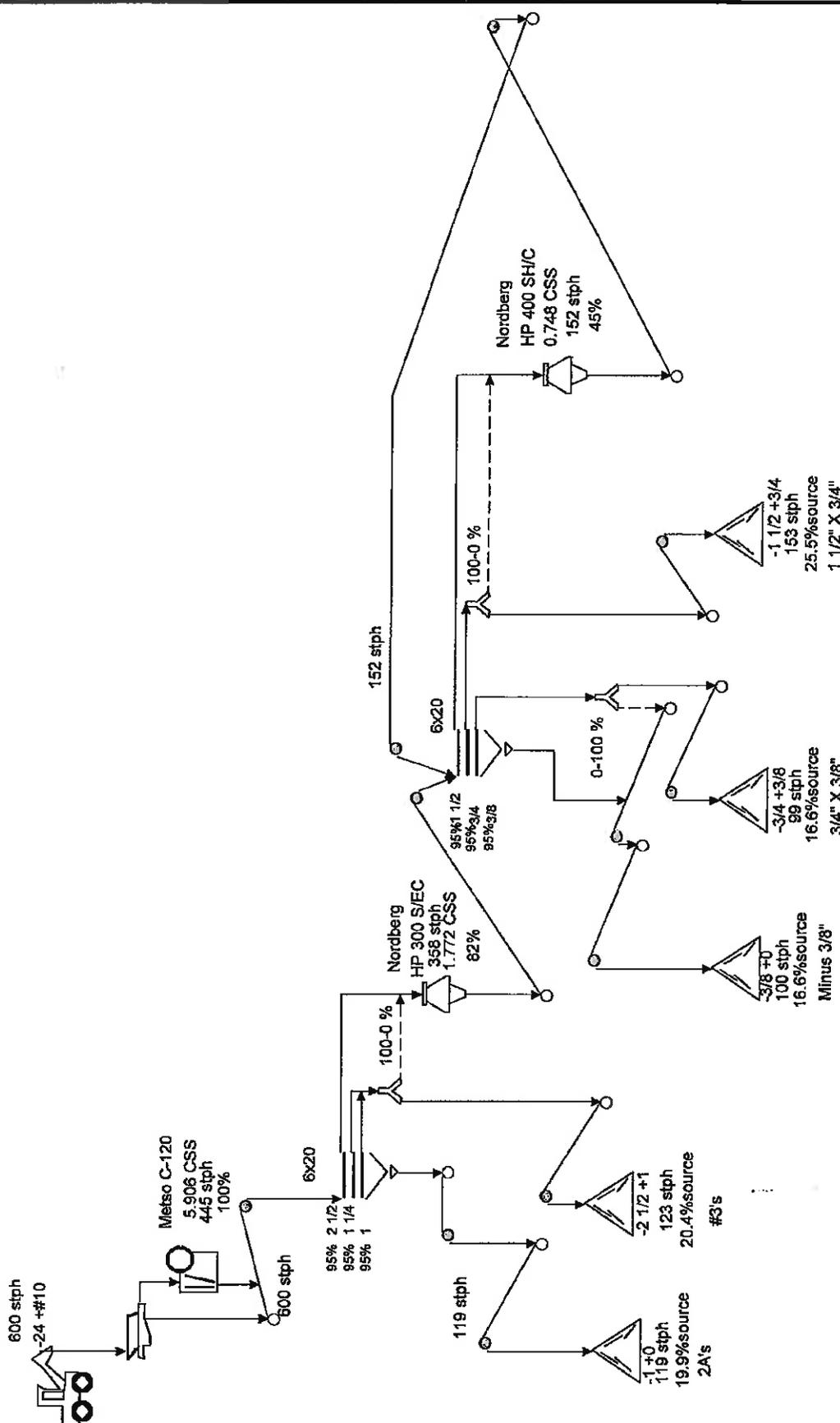
The fugitive emissions from the road surfaces and from the stockpiles will be controlled by a water truck. The water truck is fitted with a pump and spray nozzles that deliver water evenly over the unpaved roads. Stockpiles can be sprayed with the nozzles on the water truck. Water spray will be utilized as often as necessary to control fugitive particulate emissions that may be generated from the haul roads, stockpiles and other work areas.

Stone dust emissions from the processing plant is another source of fugitive emissions. These emissions are generated by the processing of the stone. Processing includes crushing, screening, sizing, material handling and stockpiling.

Stone dust emissions from plant operations will be controlled by use of water spray. Spray heads are mounted on spray bars at all transfer points, feed hoppers, crusher exits and screening operations. Actual water application rate shall vary, being adjusted as needed to control the dust emissions

**ATTACHMENT D**

**PROCESS FLOW DIAGRAM**

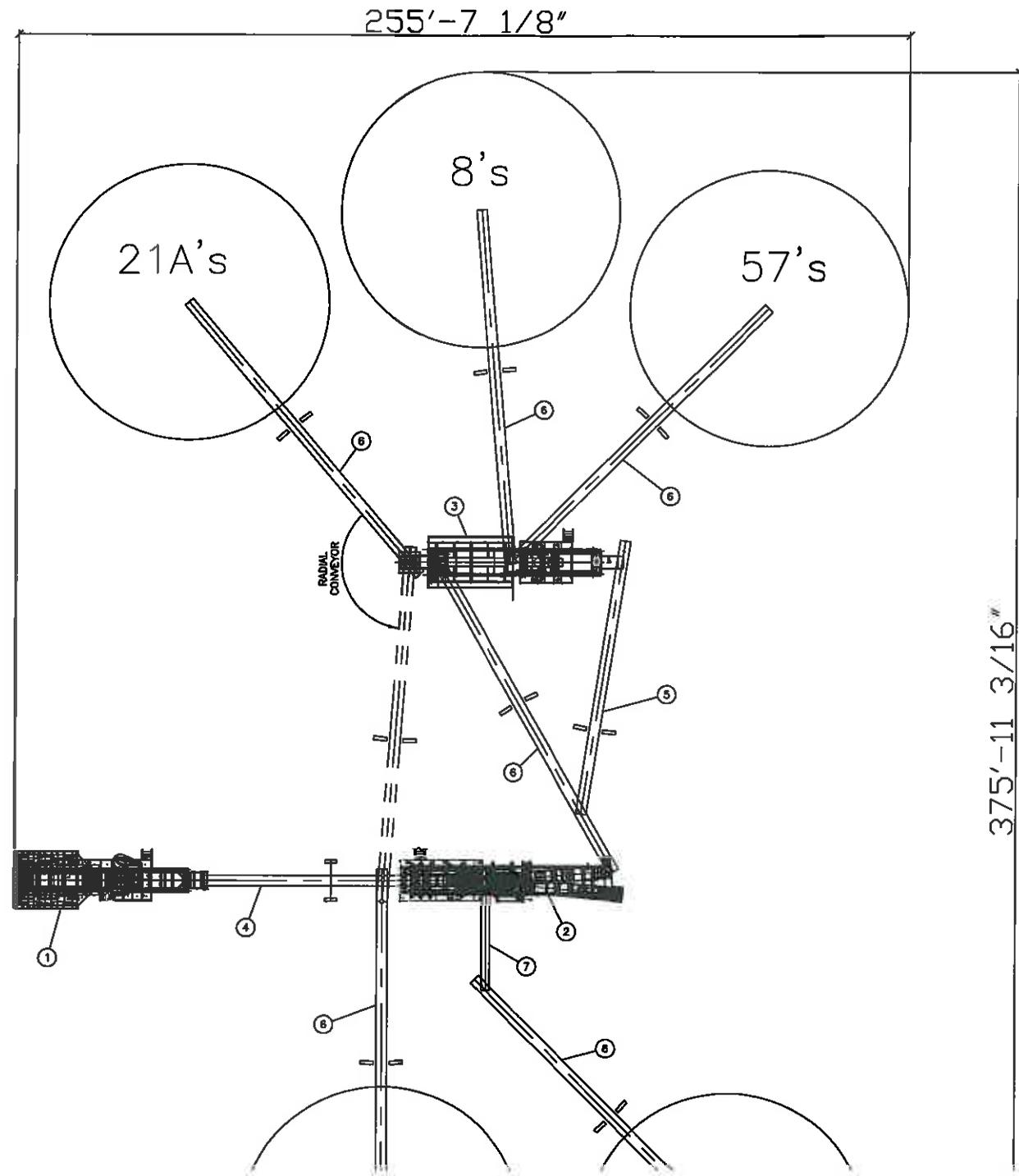


Calculation results may differ due to variations in operating conditions and application of crushing and screening equipment. This information does not constitute an express or implied warranty, but shows results of calculations based on information provided by customers or equipment manufacturers. Use this information for estimating purposes only.

All calculations performed by AggFlow. <http://www.AggFlow.com>

Mellott Company  
 Fluor Martinsburg, WV Project  
 Brian Mellott  
 Page #1

Date: September/17/2015



EQUIPMENT LIST

1. MC120 PRIMARY CRUSHING STATION
  - METSO C120 JAW CRUSHER
  - METSO 46x20 VGF
  - INDECO HP2000 HAMMER
2. MC300-CC CRUSHING PLANT
  - METSO HP300 CONE CRUSHER
  - METSO FS303 6x20 3-DECK SCREEN
3. HP400 CRUSHING PLANT
  - METSO HP400 CONE CRUSHER
  - 6X20 3-DECK SCREEN

ATTACHMENT E

PLOT PLAN

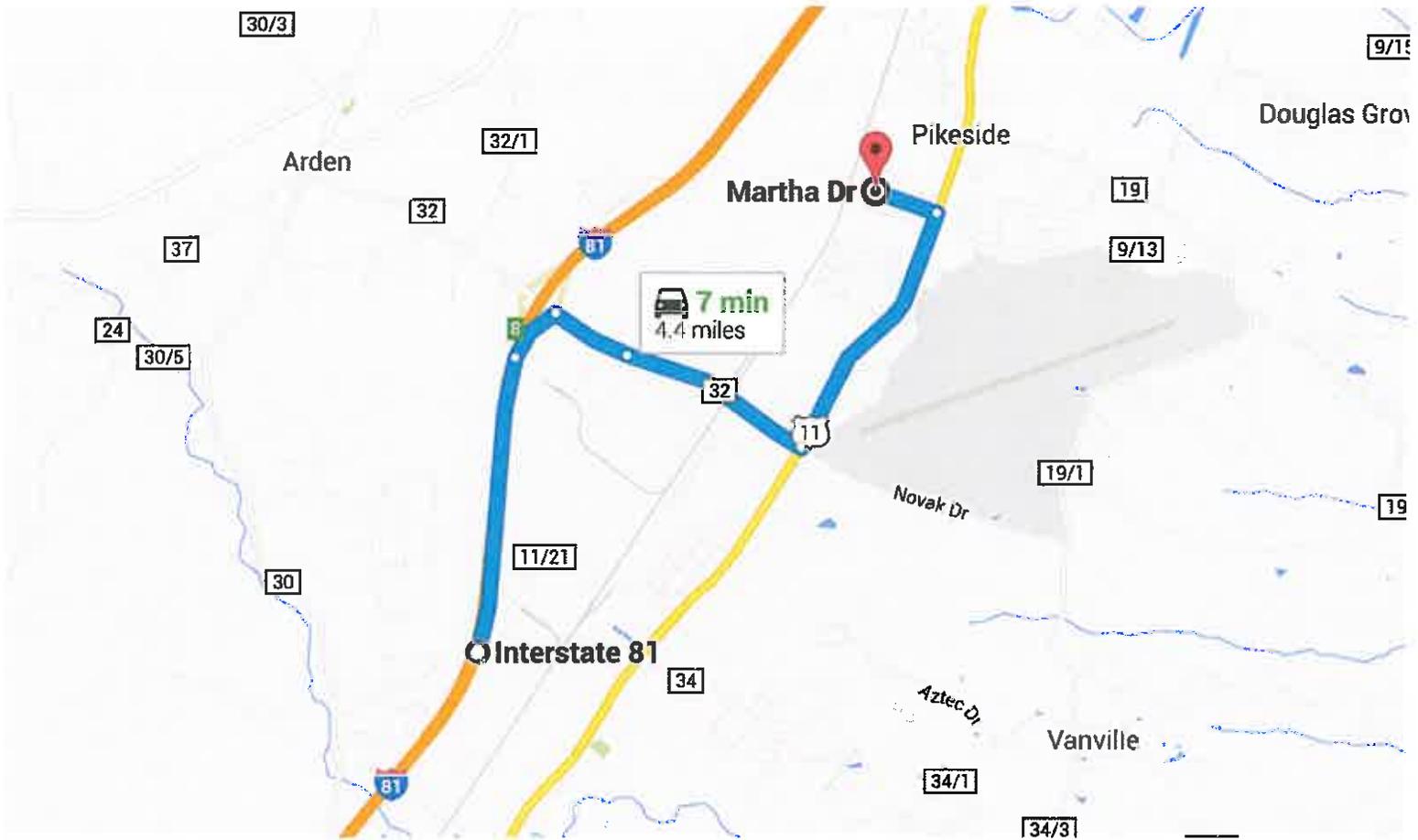


**ATTACHMENT F**

**AREA MAP**



# Directions from I-81 to Martha Dr



**Interstate 81**  
 Inwood, WV 25428

- ↑ Head north on I-81 N  
1.3 mi
- ↘ Take exit 8 for Co Route 32/Tabler Station Rd  
0.3 mi
- ↗ Turn right onto Tabler Station Rd  
0.4 mi
- ↑ Continue onto Business Park Dr  
0.9 mi
- ↙ Turn left onto US-11 N  
1.2 mi
- ↙ Turn left onto Martha Dr

**ATTACHMENT G**

**EQUIPMENT DATA SHEETS AND REGISTRATION SECTION  
APPLICABILITY FORM**

## Metso's Mining and Construction crushing and screening equipment

### Product families:

- Crushers**
  - C series jaw crushers
  - SUPERIOR gyratory crushers
  - GP series cone crushers
  - HP series cone crushers
  - MP series cone crushers
  - NP series horizontal impact crushers
  - Pumatic series vertical impact crushers
- Screens**
  - DF series screens
  - CV8 series screens
  - E5 series screens
  - TS series screens
  - MF series screens
  - RF series screens
- Feeders**
  - TK series feeders
  - VF series feeders
  - LHG series feeders
  - VG series feeders
  - PF series feeders
  - H88M series feeders
- Mobile crushing and screening plants**
  - Lokotrack U series track-mounted crushing plants
  - Lokotrack CT and CV series track- and wheel-mounted conveyors
  - Nordberg NW series wheel-mounted crushing and screening plants
  - Stationary crushing plants
  - Complete plants for aggregates production
  - Complete plants for recycling applications



All Metso Minerals Oy Tampere Works equipment is produced in accordance with a quality assurance system that complies with the ISO 9001 standard, as certified by Lloyd's Register Quality Assurance Limited.



www.metso.com  
minerals.info@metso.com

### AUSTRALIA AND NEW ZEALAND

Metso Minerals (Australia) Ltd  
1110 Hay Street  
West Perth, WA 6005  
Australia  
Phone: +61 8 9420 5555  
Fax: +61 8 5320 2300

### CHINA

Metso Minerals (Beijing) Ltd  
19/F, The Exchange Beijing, Tower 4  
No. 118 Jiefang Gate Lu Yi Chaoyang District  
100022 Beijing  
China  
Phone: +86 10 6566 6700  
Fax: +86 10 6566 2983

### EUROPE, MIDDLE EAST AND AFRICA

Metso Minerals España, S.A.  
C/ Bidas Nº 4  
28023 Madrid  
Spain  
Phone: +34 91 825 5700  
Fax: +34 91 825 5740

### INDIA AND ASIA-PACIFIC

Metso Minerals (India) Pvt Ltd  
1st Floor, DLF Building No. 10,  
Tower A, DLF Cybercity  
DLF Phase II  
Gurgaon 12002  
India  
Phone: +91 124 235 1541  
Fax: +91 124 235 1001

### NORTH AND CENTRAL AMERICA

Metso Minerals Industries Inc.  
20905 Crossroads Circle  
Waukesha, WI 53188  
U.S.A.  
Phone: +1 262 717 2500  
Fax: +1 262 717 2504

### RUSSIA AND OTHER CIS COUNTRIES

ZAO Metso Minerals (CIS)  
Pulkovskoe shosse, 40/4 1/2  
office building "Tehnopolis"  
1196158, St. Petersburg  
Russia  
Phone: +7 812 333 40 00  
Fax: +7 812 333 40 01

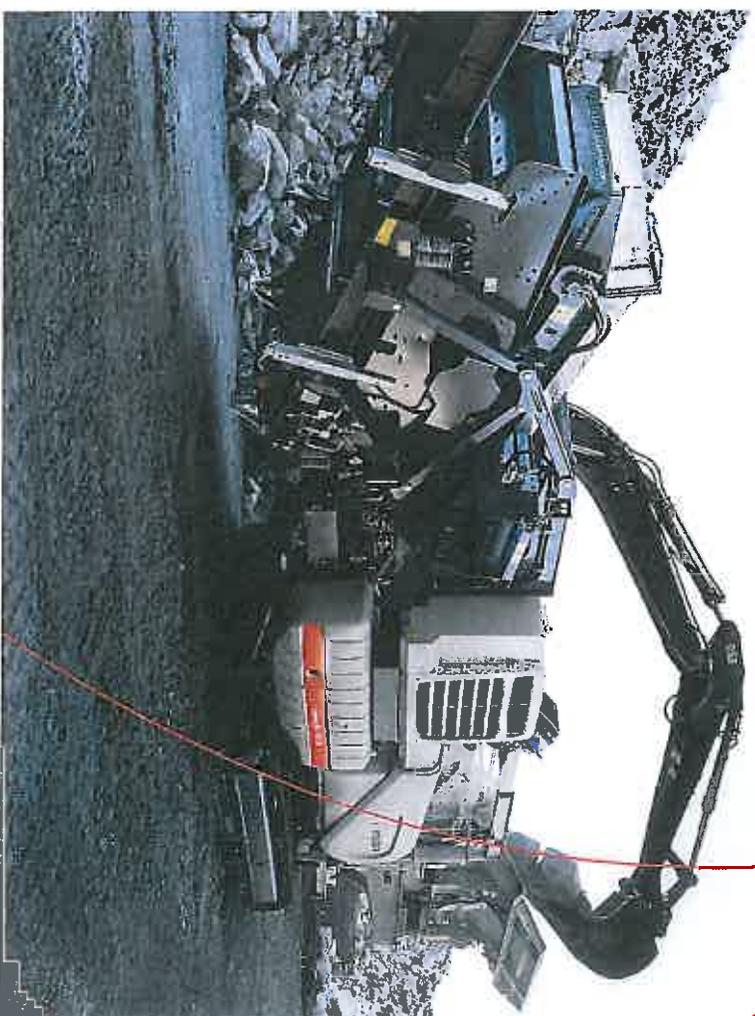
### SOUTH AMERICA

Metso Minerals Indústria e Comércio Ltda  
Avenida Independência, 2500 - Eden  
18087-050 Sorocaba  
Brazil  
Phone: +55 15 3102 1300  
Fax: +55 15 3102 1696

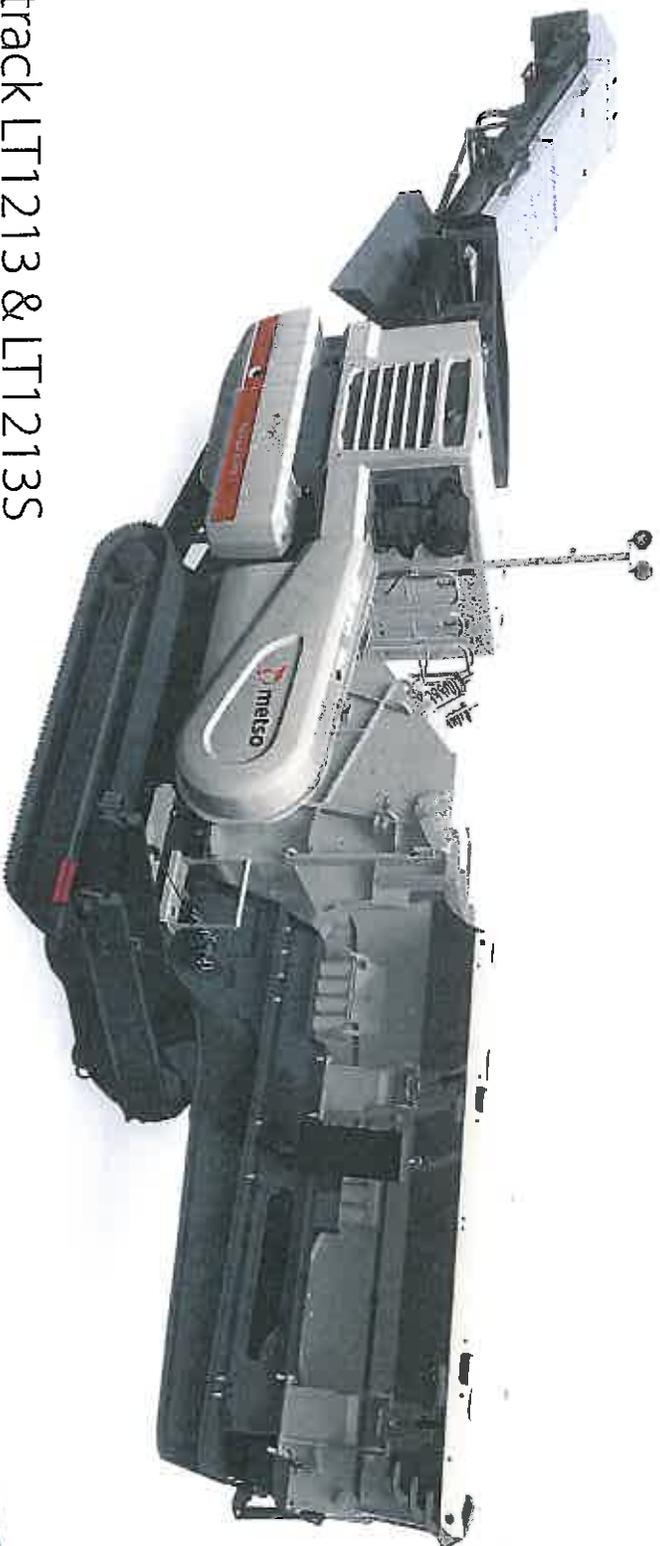
### METSO'S MINING AND CONSTRUCTION

Lokonpolku 3, PO Box 306  
FI-33101 Tampere  
Finland  
Phone: +358 20 484 142  
Fax: +358 20 484 143

## Mobile crushing plants Lokotrack LT1213 & LT1213S



Subject to the above without prejudice to the above No 2688-06-13-EE/L/Tampere-English,  
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# Lokotrack LT1213 & LT1213S

## The desired impact

Metso Lokotrack LT1213S is fully equipped mobile impactor plant with high capacity screen and return conveyor. LT1213 has the same features and options available but no screen nor return conveyor. The crushing plants have been built around powerful Caterpillar C13 diesel engine and capacity is provided by the refreshed NP1213M impact crusher. Lokotrack LT1213 and LT1213S can be transported as a single unit on a low bed trailer.

### Flexibility in applications

New radial return conveyor makes Lokotrack LT1213S easy to operate in closed and open circuits. The conveyor or turns hydraulically. Lokotrack LT1213S has the brand new dual slope screen to provide high on board screening capacity. The screening unit can be docked in a few minutes. Both Lokotracks are designed to operate together with other Lokotrack mobile crushing and screening plants. LT1213 and LT1213S can be fine-tuned for aggregate, quarry or recycling applications with features like vibrating grizzly or pan feeder, under the crusher.

### Energy saving built-in

Lokotrack LT1213 and LT1213S have advanced gearbox as a standard. The Metso gearbox provides the most efficient crusher drive system on the market with assisted start and brake. Optimized hydraulic circuit with independent fan and standby function gives up to 20% lower fuel consumption and more power for the crusher.

### Safe to operate and maintain

The crusher service rotation is done by 24V hydraulic power pack. New tools are provided to help changing the blow bars and breaker plates. Special attention is being paid on access to the service locations and trouble free material flow. Stand-by function helps to save fuel and reduce noise when idling.

### Profitable crushing for different customers

Fast set up is important when crushing plants are moving regularly. Lokotrack LT1213 and LT1213S are ready for crushing only few moments after arriving onsite. Any tools or cranes are not required. LC700 control system with single button start and stop makes the Lokotrack easy to use. Parameters for different sites can be stored and even setting can be optionally adjusted from control display. Lokotrack LT1213 and LT1213S come always with high quality blow bars for efficient crushing. Operator and service DVD with scheduled maintenance equipment protection plan and extended warranty maximize the availability and profitability.



High quality blow bars are a standard

**Lokotrack LT1213 & LT1213S:**

- High capacity in a combination of high performance and flexibility
- Efficient power transmission provides up to 20% lower fuel consumption
- Compact dimensions, massive steel and easy handling
- New features like assisted start, pan feeder, grizzly and screen

ЛОКОТРАКЪК LT1213 & LT1213S

ЛОКОТРАКЪК LT1213 & LT1213S





- 1 No tools are required for set-up.
- 2 Dual slope screen enables efficient & accurate separation.
- 3 Meter gearbox and direct drive enable efficient crushing.
- 4 Return conveyor dumps on back of LT1213S.



Model LT1213S		Model LT1213	
Rear dimensions		Rear dimensions	
Standard	6 m <sup>2</sup>	Arco	5.2 m <sup>2</sup>
With extensions	9 m <sup>2</sup>	Standard	6 m <sup>2</sup>
Feeder	41 m	With extensions	6 m <sup>2</sup>
Length	1100 mm	Loading height	4.1 m
Main conveyor	4200 mm	Width	1100 mm
Discharge height	47"	Length	4200 mm
Capacity (C13)	310 t/h	Width	1200 mm
Engine	16,600 mm	Discharge height	47"
Height	3,600 mm	Capacity (C13)	310 t/h
Weight	45 tons	Engine	16,600 mm
		Height	3,600 mm
		Weight	45 tons

Model LT1213S		Model LT1213	
Rear dimensions		Rear dimensions	
Standard	6 m <sup>2</sup>	Arco	5.2 m <sup>2</sup>
With extensions	9 m <sup>2</sup>	Standard	6 m <sup>2</sup>
Feeder	41 m	With extensions	6 m <sup>2</sup>
Length	1100 mm	Loading height	4.1 m
Main conveyor	4200 mm	Width	1100 mm
Discharge height	47"	Length	4200 mm
Capacity (C13)	310 t/h	Width	1200 mm
Engine	16,600 mm	Discharge height	47"
Height	3,600 mm	Capacity (C13)	310 t/h
Weight	45 tons	Engine	16,600 mm
		Height	3,600 mm
		Weight	45 tons

The Lokotrack LT1213S is easily transportable on a trailer.

\*\* - Dimensions with a long main conveyor, impact, separate side conveyor and feed hopper extensions

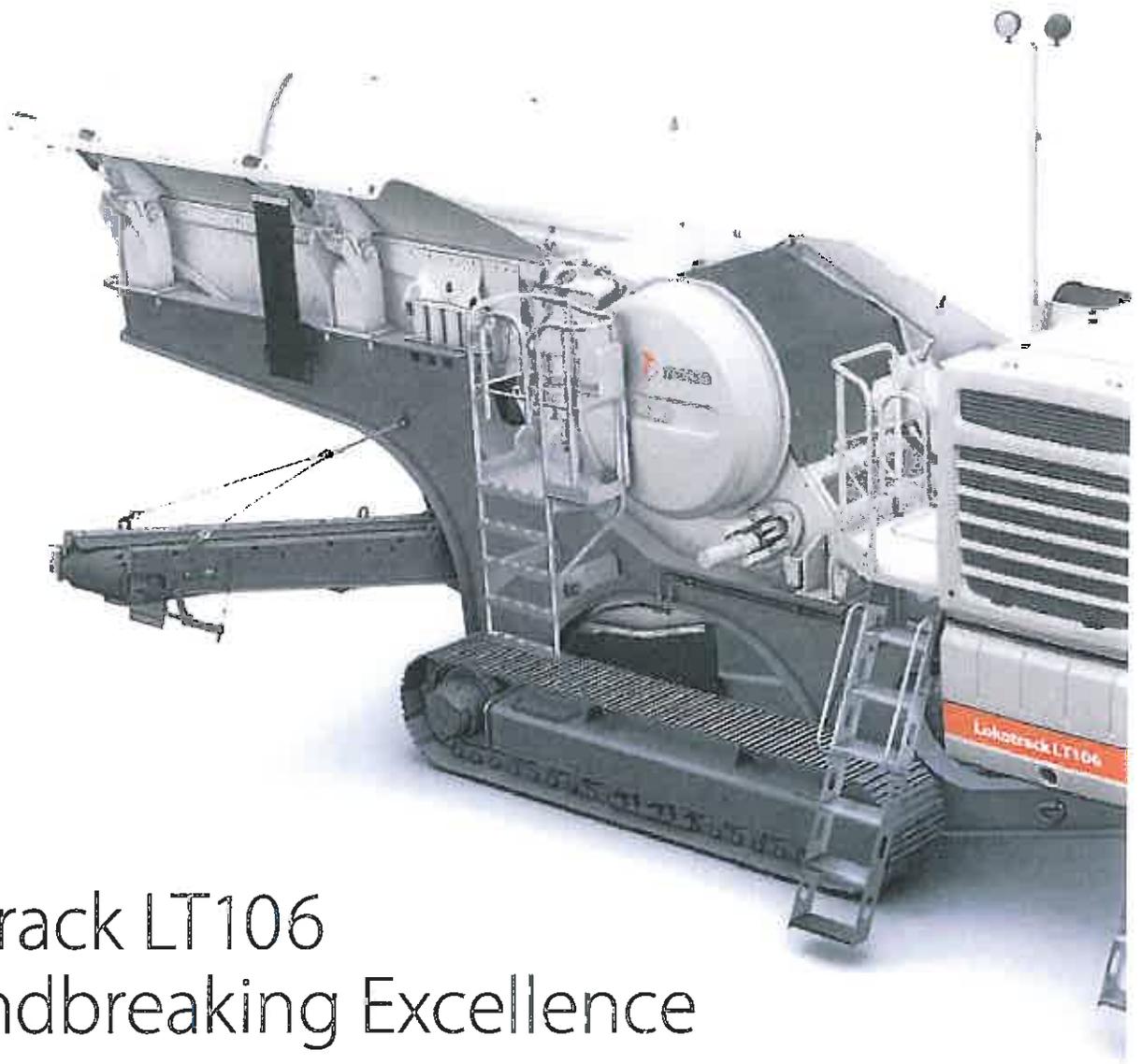
\*\* - Dimensions with all options



# Mobile crushing plant Lokotrack LT106

 **metso**  
Expect results





# Lokotrack LT106 Groundbreaking Excellence

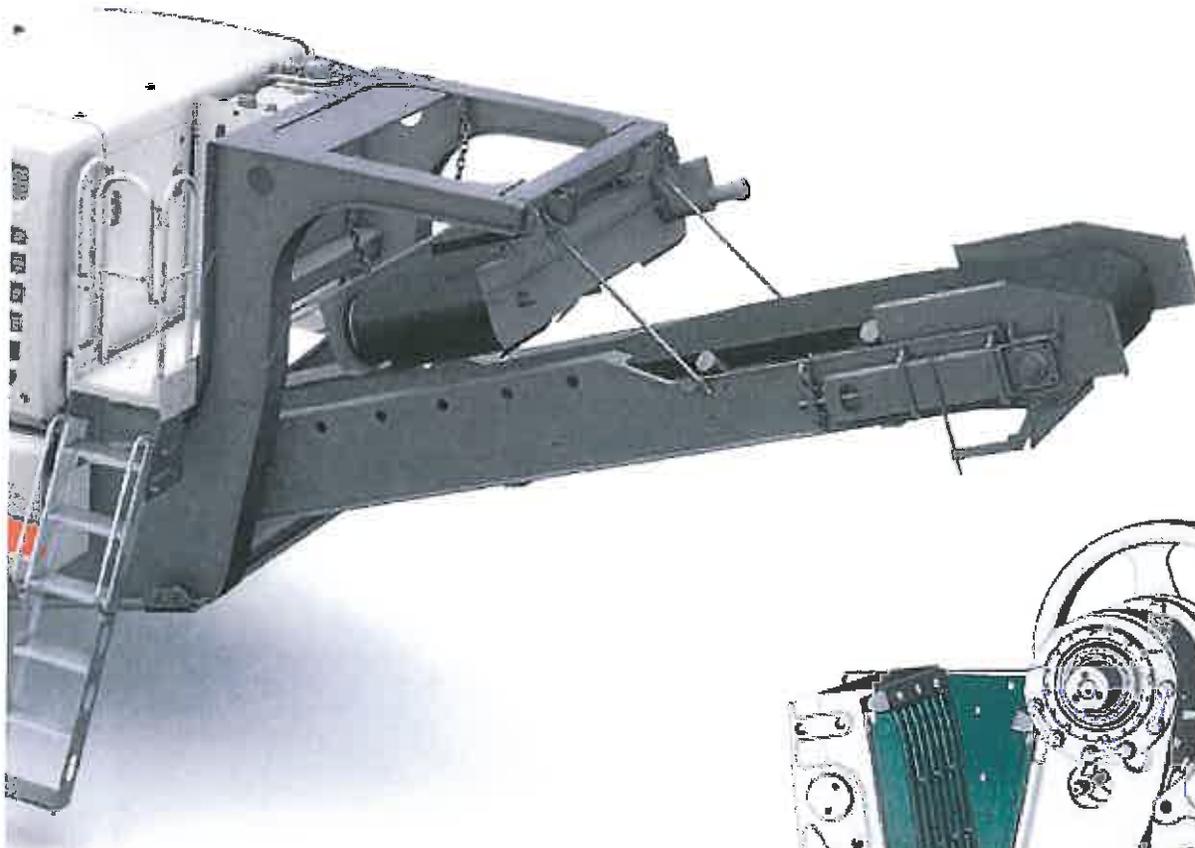
The improved successor to the industry benchmark in mobile crushing takes production capacity to a whole new level, while simultaneously cutting operating costs and generating the highest customer value possible. By combining over 25 years of experience in mobile equipment with 21st century materials and design, the LT106 takes a giant leap forward in the mobile crushing industry.

## New generation of proven performance

The Lokotrack LT106 is built around the world-renowned C106 jaw crusher, with a proven track record in the toughest of applications. New features, such as a radial side conveyor, high inertia flywheels and an IC700 automation system that utilizes an ultrasonic material level sensor, offer the best capacity and cost efficiency in the 40-ton size class. The totally new fuel-efficient CAT9.3 Tier 4 engine with hydraulic drive ensures trouble-free operation and enables the direction of the crusher to be changed in the event of a blockage.

## Setting standards in mobility

The Lokotrack LT106's compact dimensions and agility on tracks mean lower transport costs between and within crushing sites. The chassis design, with good clearance on both ends, enables safe and easy loading onto a trailer. Thanks to the feed hopper sides, with a patented and safe hydraulic securing system and radial side conveyor, the unit is ready for crushing or transport within minutes.

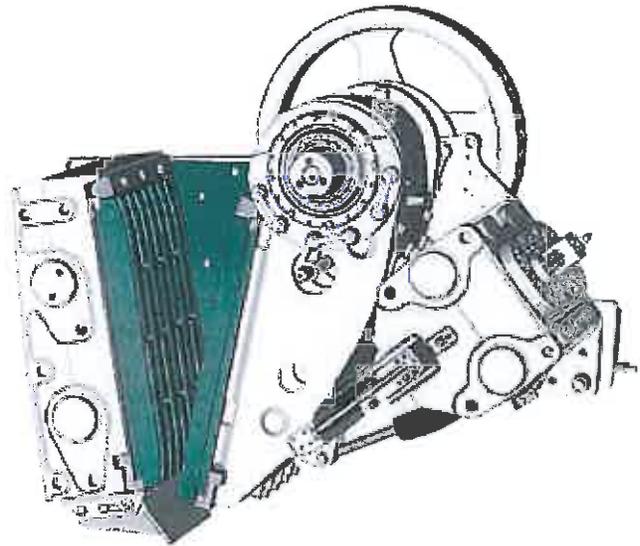


### Safe and easy to operate

New design features, such as engine and flywheel composite covers, together with spacious service platforms and general excellent accessibility make daily operations safe and easy.

### Flexible and fuel-efficient solution for the value-driven customer

Active setting control, screen module, Metso hammer and a wide range of other options give the Lokotrack LT106 unmatched process flexibility and the capability to work in the most demanding aggregate and recycling processes. A new hydraulic system, coupled with an environmentally friendly, low-emission Caterpillar C9.3 Tier 4 or C9 Tier 3 engine and high inertia flywheels, offers excellent fuel efficiency of 17–22 liters per hour on average without compromising process flexibility, safety and the durability of the hydraulic drive.



*Active Setting Control is available for Lokotrack LT106.*

### Lokotrack LT106:

- Proven C106 crusher with new features offers high capacity and lower operational costs
- Compact and agile to transport
- Availability and productivity maximized through high quality components and process automation
- 21st century design for safe and easy operation and maintenance

**LOKOTRACK LT106**





- ① Composite material increases accessibility and enables easy and safe service.
- ② Radial side conveyor can be turned to either side, thereby increasing process flexibility.
- ③ Feed hopper sides and locking mechanism are hydraulically operated.
- ④ Compact dimensions make LT106 easily transportable on trailer. The unit pictured is equipped with an optional screen module.

Basic dimensions LK106			
C106 jaw crusher			
	Feed opening	1060 x 700 mm	42 x 28"
Feed hopper	Standard	6 m <sup>3</sup>	8 yd <sup>3</sup>
	With extensions	9 m <sup>3</sup>	12 yd <sup>3</sup>
	Loading height	3.9 m	12' 10"
Feeder	Width	1100 mm	3' 7"
	Length	4150 mm	13' 8"
Main conveyor	Width	1000 mm	39"
	Discharge height (standard)	2800 mm	9' 7"
	Discharge height (optional)	3900 mm	12' 9"
Engine	Caterpillar C9.3	224 kW (1800 rpm)	300 hp
Transport dimensions	Length	15200 mm	49' 9"
	Width	2800 mm	9' 2"
	Height	3400 mm	11' 2"
	Weight	41 tons	90400 lbs
Noise emissions	L <sub>WA</sub> (EN ISO 9614)*	124 dB	
	L <sub>PA</sub> (EN ISO 11202)**	99 dB	
<b>Options</b>			

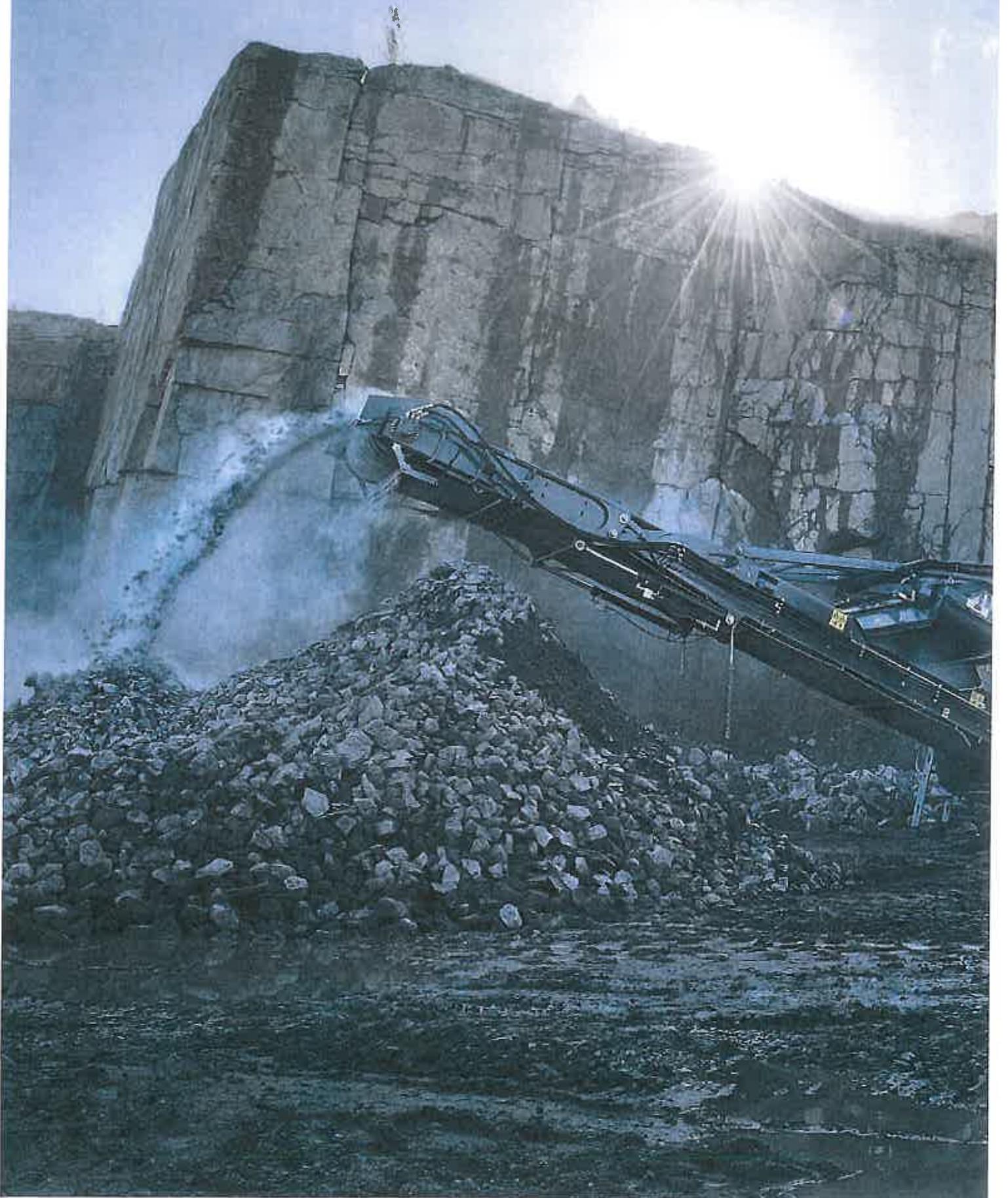
Screen module, long main conveyor, side conveyor, active setting control for crusher (ASC), crusher wear plates for recycling and quarry, hammer and boom, magnetic separator, automatic lubrication unit, radio remote control, conveyor dust covers and discharge hoods, high pressure water spraying system, belt protection plate, additional side plates for hopper, rubber bottom for feeder, hydraulic generator, hydraulic power takeoff, additional service platform, pre-heater for engine, interlocking cable, hot and cold climate kits.

\*L<sub>WA</sub> =A-weighted sound power level

\*\*L<sub>PA</sub> =A-weighted sound pressure level at the workstation



**LOKOTRACK LT106**





## Metso's Mining and Construction crushing and screening equipment

### Product families:

#### Crushers

- C series jaw crushers
- SUPERIOR® gyratory crushers
- GP series cone crushers
- HP series cone crushers
- MP series cone crushers
- NP series horizontal impact crushers
- Barmac series vertical impact crushers

#### Screens

- DF series screens
- CVB series screens
- FS series screens
- TS series screens
- MF series screens
- RF series screens

#### Feeders

- TK series feeders
- VF series feeders
- LH.G series feeders
- VG series feeders
- PF series feeders
- HRBM series feeders

#### Mobile crushing and screening plants

- Lokotrack LT series track-mounted crushing plants
- Lokotrack ST series track-mounted screening plants
- Lokotrack CT and CW series track- and wheel-mounted conveyors
- Nordberg NW series wheel-mounted crushing and screening plants

#### Stationary crushing plants

- Complete plants for aggregates production
- Complete plants for recycling applications



All Metso Minerals Oy Tampere Works equipment is produced in accordance with a quality assurance system that complies with the ISO 9001 standard, as certified by Lloyd's Register Quality Assurance Limited.



www.metso.com  
minerals.info.csr@metso.com

#### AUSTRALIA AND NEW ZEALAND

Metso Minerals (Australia) Ltd  
1110 Hay Street  
West Perth, WA 6005  
Australia  
Phone: +61 8 9420 5555  
Fax: +61 8 9320 2500

#### CHINA

Metso Minerals (Beijing) Ltd  
19/F, The Exchange Beijing, Tower 4  
No. 118 Jian Guo Lu Yi Chaoyang District  
100022 Beijing  
China  
Phone: +86 10 6566 6600  
Fax: +86 10 6566 2583

#### EUROPE, MIDDLE EAST AND AFRICA

Metso Minerals España, S.A.  
C/ Rivas N° 4  
28032 Madrid  
Spain  
Phone: +34 91 825 5700  
Fax: +34 91 825 5740

#### INDIA AND ASIA-PACIFIC

Metso Minerals (India) Pvt Ltd  
1st Floor, DLF Building No. 10,  
Tower A, DLF Cybercity  
DLF Phase II  
Gurgaon 122002  
India  
Phone: +91 124 235 1541  
Fax: +91 124 235 1601

#### NORTH AND CENTRAL AMERICA

Metso Minerals Industries Inc.  
20965 Crossroads Circle  
Waukesha, WI 53186  
U.S.A.  
Phone: +1 262 717 2500  
Fax: +1 262 717 2504

#### RUSSIA AND OTHER CIS COUNTRIES

ZAO Metso Minerals (CIS)  
Pulkovskoe shosse, 40/4 "A"  
office building "Technopolis"  
196158, St. Petersburg  
Russia  
Phone: +7 812 333 40 00  
Fax: +7 812 333 40 01

#### SOUTH AMERICA

Metso Minerals Indústria e Comércio Ltda  
Avenida Independência, 2500 - Éden  
18087-050 Sorocaba  
Brazil  
Phone: +55 15 2102 1300  
Fax: +55 15 2102 1696

#### METSO'S MINING AND CONSTRUCTION

Lokomonkatu 3, P.O.Box 306  
FI-33101 Tampere  
Finland  
Phone: +358 20 484 142  
Fax: +358 20 484 143



## Lokotrack LT116

The Nordberg® C116™ jaw crusher on an advanced chassis makes the Lokotrack® LT116™ relatively light but provides high capacity in contracting crushing. A total weight of around 50 tonnes means easy transportability on roads. The IC700™ process control system is a standard feature in the LT116.

**Lokotrack LT116 is built around the Nordberg C116 jaw crusher**, benefiting from proven, tested solutions through the latest product development and know-how. The C116 jaw crusher is designed to crush all rock types from the hardest granites to abrasive ones and to recycle materials.

**The by-pass chute with an optional side conveyor** offers versatile working options according to the required crushing process. An independent scalper and a screen module are available for the most demanding feed materials. The Lokotrack LT116 is a versatile solution, perfectly suited to Lokotrack multistage processes.

### Features

Crusher	Nordberg® C116™
Feed opening	1 150 x 800 mm (45" x 32")
Engine	CAT® C13, 310 kW (415 hp)
Weight	50 000 kg (110 000 lbs)

# Lokotrack jaw plants

	LF96™	LT106™	LT116™	LT120™	LT120E™	LT125™
<b>Transport dimensions</b>						
Length	12 450 mm (40'10")	15 200 mm (49'9")	15 390 mm (51'2")	16 650 / 17 400 mm (54'8" / 57'1")	16 650 / 17 400 mm (54'8" / 57'1")	15 700 / 16 000 / 20 700 mm (51'6" / 59'1" / 67'10")
Width	2 500 mm (8'2")	2 800 mm (9'2")	3 000 mm (9'10")	3 099 mm (9'10")	3 000 mm (9'10")	3 500 mm (11'5")
Height	3 100 mm (10'2")	3 460 mm (11'2")	3 500 mm (11'6")	3 900 mm (12'10")	3 900 mm (12'10")	3 850 mm (12'7")
Weight	28 000 kg (62 000 lbs)	40 700 kg (89 700 lbs)	50 000 kg (110 000 lbs)	62 000 kg (137 000 lbs)	65 000 kg (143 000 lbs)	66 000 kg (145 000 lbs)
<b>Crusher</b>						
Model	Nordberg® C96™	Nordberg® C106™	Nordberg® C116™	Nordberg® C120™	Nordberg® C120™	Nordberg® C125™
Nominal feed opening	930 x 580 mm (37" x 23")	1 060 x 700 mm (42" x 28")	1 150 x 800 mm (45" x 32")	1 250 x 870 mm (49" x 34")	1 250 x 870 mm (49" x 34")	1 250 x 950 mm (49" x 37")
<b>Feeder</b>						
Hopper volume	4 / 5 m <sup>3</sup> (5.2 / 6.7 yd <sup>3</sup> )	6 / 9 m <sup>3</sup> (8.1 / 12 yd <sup>3</sup> )	6 / 8 m <sup>3</sup> (8 / 12 yd <sup>3</sup> )	7 / 12 m <sup>3</sup> (9 / 16 yd <sup>3</sup> )	7 / 12 m <sup>3</sup> (9 / 16 yd <sup>3</sup> )	7 / 12 / 12 <sup>1</sup> / 23 <sup>1</sup> m <sup>3</sup> (9.2 / 14.4 <sup>1</sup> / 22.3 <sup>1</sup> / 30.1 <sup>1</sup> yd <sup>3</sup> )
Loading height	2 500 mm (11'6")	3 900 mm (12'10")	4 500 mm (12'11")	4 430 mm (14'6")	4 430 mm (14'6")	5 360 mm (17'7")
Loading width	2 693 / 3 500 mm (8'10" / 11'6")	2 630 / 3 800 mm (8'8" / 11'10")	2 819 / 3 610 mm (9'3" / 11'10")	2 360 / 4 100 mm (8'1" / 13'6")	2 600 / 3 100 mm (8'7" / 10'2")	3 100 / 5 100 mm (10'3" / 16'9")
<b>Conveyors' discharge height</b>						
Main conveyor	2 900 / 3 500 mm (9'7" / 11'10")	2 800 / 3 800 mm (9'2" / 12'6")	2 900 / 3 500 mm (9'7" / 11'6")	3 400 / 4 790 mm (11'2" / 15'9")	3 400 / 4 700 mm (11'2" / 15'5")	3 000 / 5 900 / 6 870 mm (9'10" / 19'10" / 22'10")
Side conveyor	1 547 mm (5'1")	1 630 mm (5'4")	1 930 mm (6'4")	2 850 mm (9'5")	2 850 mm (9'5")	3 000 mm (9'10")
Screen product conveyor	2 300 mm (7'7")	2 800 mm (9'2")	2 710 mm (8'11")	—	—	—
Screen side conveyor	1 800 mm (6')	2 650 mm (8'8")	2 775 mm (9'1")	—	—	—
<b>Engine</b>						
Model	CAT® C6.6 / C7.1	CAT® C9 / C9.3	CAT® C13	CAT® C13	CAT® C13	CAT® C13
Power	170 kW (228 hp)	224 kW (300 hp)	310 kW (415 hp)	310 kW (415 hp)	310 kW / 420 kW (415 hp)	310 kW (415 hp)
Fuel tank capacity	500 l (132 gal)	630 l (166 gal)	600 l (159 gal)	630 l (166 gal)	630 l (166 gal)	640 l (248 gal)
Process control	IC700™	IC700™	IC700™	IC700™	IC900™	—
<b>Screen</b>						
Model	TK11-30-S <sup>1</sup>	TK11-30-S <sup>1</sup>	TK13-30-S <sup>1</sup>	—	—	—
Size	3 000 / 1 100 mm (9'10" / 3'7")	3 000 / 1 100 mm (9'10" / 3'7")	3 000 / 1 300 mm (9'10" / 4'3")	—	—	—
<b>Options</b>						
Hopper extensions	•	•	•	•	•	•
Feeder rubber bottom	•	•	•	•	•	•
Rubber lining for hopper	•	•	•	•	•	•
Side conveyor	•	•	•	•	•	•
Active Sealing Control™	•	•	•	•	•	•
Material level controller	•	•	•	•	•	•
Jet protection plate	•	•	•	•	•	•
Automatic lubrication unit	•	•	•	•	•	•
Long main conveyor	•	•	•	•	•	•
Magnetic separator	•	•	•	•	•	•
Remote radio control	•	•	•	•	•	•
Dust extrapsulation	•	•	•	•	•	•
High pressure water spraying	•	•	•	•	•	•
Pre-heater for engine	•	•	•	•	•	•
Hot / cold climate kit	•	•	•	•	•	•
Extreme cold climate kit	•	•	•	•	•	•
Hydraulic boom and hammer	•	•	•	•	•	•
Additional platform	•	•	•	•	•	•
Hydraulic generator	•	•	•	•	•	•
Fuel filling pump	•	•	•	•	•	•
Hydraulic power take off	•	•	•	•	•	•
Interlocking cable	•	•	•	•	•	•

\*option



## Lokotrack LT300HP

The track-mounted Lokotrack® LT300HP™ cone plant, equipped with the proven Nordberg® HP300™ cone crusher, is the most efficient and flexible secondary and tertiary crushing plant on the market that can be transported from site to site as a single unit.

**Lokotrack LT300HP has robust construction** for the toughest of hard rock crushing sites. The proven HP300 crusher cavity can be selected according to the specific application requirements to achieve high capacity, top end product quality as well as low wear part costs. The optimized power transmission system makes the LT300HP extremely cost effective.

**The LT300HP can be optimized** for different needs and applications with a variety of optional feeding and screening equipment. An integrated screen module option offers the possibility to produce calibrated end products. The LT300HP is equipped with advanced IC600™ process control system and can also be used as part of a multistage plant together with different mobile screens. Easy transportability on a trailer allows the Lokotrack LT300HP to be used in high-capacity contracting.

### Features

Crusher	Nordberg® HP300™
Feed opening	230 mm (9 1/4")
Engine	CAT® C15, 403 kW (540 hp)
Weight	43 000 kg (95 000 lbs)



Lokotrack LT300HP is available with either a belt feeder or alternatively with a vibrating grizzly feeder.



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**Regulatory Information**

<b>EPA TIER 2</b>		<b>2006 - 2010</b>		
GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSIONS VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.				
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 2	CO: 3.5 NOx + HC: 6.4 PM: 0.20

<b>EPA EMERGENCY STATIONARY</b>		<b>2011 - —</b>		
GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART III AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSIONS LIMIT VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.				
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	STATIONARY	EMERGENCY STATIONARY	CO: 3.5 NOx + HC: 6.4 PM: 0.20

Altitude Derate Data

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

AMBIENT OPERATING TEMP (F)	60	60	70	80	90	100	110	120	130	NORMAL
ALTITUDE (FT)										
0	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214
1,000	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214
2,000	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214
3,000	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214
4,000	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214
5,000	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214
6,000	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,197	1,214
7,000	1,214	1,214	1,214	1,214	1,214	1,212	1,191	1,170	1,150	1,214
8,000	1,214	1,214	1,214	1,207	1,185	1,164	1,144	1,124	1,105	1,214
9,000	1,214	1,204	1,181	1,159	1,138	1,118	1,098	1,079	1,061	1,214
10,000	1,178	1,155	1,134	1,113	1,092	1,073	1,054	1,036	1,018	1,195
11,000	1,130	1,109	1,088	1,067	1,048	1,029	1,011	994	977	1,154
12,000	1,084	1,063	1,043	1,024	1,005	987	970	953	937	1,115
13,000	1,039	1,019	1,000	981	964	946	930	914	898	1,077
14,000	996	977	958	940	923	907	891	876	861	1,039
15,000	954	935	918	901	884	868	853	839	824	1,003

**Cross Reference**

Engine Arrangement			
Arrangement Number	Effective Serial Number	Engineering Model	Engineering Model Version
2671232	MJE0001	GS327	-
3495619	MJE0001	GS603	LS
3541450	PEN0001	GS582	-

Test Specification Data						
Test Spec	Setting	Effective Serial Number	Engine Arrangement	Governor Type	Default Low Idle Speed	Default High Idle Speed
0K7925	PP5660	MJE0001	2671232	ADEM4		
3704841	GG0523	MJE0001	3495619	ADEM4		
0K4031	GG0383	PEN0001	3541450	ADEM4		

## Performance Parameter Reference

### Parameters Reference:DM9600-05 PERFORMANCE DEFINITIONS

#### PERFORMANCE DEFINITIONS DM9600

##### APPLICATION:

Engine performance tolerance values below are representative of a typical production engine tested in a calibrated dynamometer test cell at SAE J1995 standard reference conditions. Caterpillar maintains ISO9001:2000 certified quality management systems for engine test Facilities to assure accurate calibration of test equipment. Engine test data is corrected in accordance with SAE J1995. Additional reference material SAE J1228, J1349, ISO 8665, 3046-1:2002E, 3046-3:1989, 1585, 2534, 2288, and 9249 may apply in part or are similar to SAE J1995. Special engine rating request(SERR)test data shall be noted.

##### PERFORMANCE PARAMETER TOLERANCE FACTORS:

Power	+/- 3%
Torque	+/- 3%
Exhaust stack temperature	+/- 8%
Inlet airflow	+/- 5%
Intake manifold pressure-gage	+/- 10%
Exhaust flow	+/- 6%
Specific fuel consumption	+/- 3%
Fuel rate	+/- 5%
Heat rejection	+/- 5%
Heat rejection exhaust only	+/- 10%

Torque is included for truck and industrial applications, do not use for Gen Set or steady state applications.

On C7 - C18 engines, at speeds of 1100 RPM and under these values are provided for reference only, and may not meet the tolerance listed.

These values do not apply to C280/3600. For these models, see the tolerances listed below.

##### C280/3600 HEAT REJECTION TOLERANCE FACTORS:

Heat rejection	+/- 10%
Heat rejection to Atmosphere	+/- 50%
Heat rejection to Lube Oil	+/- 20%
Heat rejection to Aftercooler	+/- 5%

##### TEST CELL TRANSDUCER TOLERANCE FACTORS:

Torque	+/- 0.5%
Speed	+/- 0.2%
Fuel flow	+/- 1.0%
Temperature	+/- 2.0 C degrees
Intake manifold pressure	+/- 0.1 kPa

OBSERVED ENGINE PERFORMANCE IS CORRECTED TO SAE J1995 REFERENCE AIR AND FUEL CONDITIONS.

##### REFERENCE ATMOSPHERIC INLET AIR

##### FOR 3500 ENGINES AND SMALLER

SAE J1228 reference atmospheric pressure is 100 KPA (29.61 in hg) and standard temperature is 25 (77) at 60% relative humidity.

##### FOR 3600 ENGINES

Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JAN90 standard reference conditions of 25, 100 KPA 30% relative humidity and 150M altitude at the stated aftercooler water temperature.

##### MEASUREMENT LOCATION FOR INLET AIR TEMPERATURE

Location for air temperature measurement air cleaner inlet at stabilized operating conditions.

## PERFORMANCE DATA[DM7696]

December 16, 2011

### REFERENCE EXHAUST STACK DIAMETER

The Reference Exhaust Stack Diameter published with this dataset is only used for the calculation of Smoke Opacity values displayed in this dataset. This value does not necessarily represent the actual stack diameter of the engine due to the variety of exhaust stack adapter options available. Consult the price list, engine order or general dimension drawings for the actual stack diameter size ordered or options available.

### REFERENCE FUEL

#### DIESEL

Reference fuel is #2 distillate diesel with a 35API gravity; A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 29 (84.2), where the density is 838.9 G/Liter (7.001 Lbs/Gal).

#### GAS

Reference natural gas fuel has a lower heating value of 33.74 KJ/L (805 BTU/CU FT). Low BTU ratings are based on 18.64 KJ/L (500 BTU/CU FT) lower heating value gas. Propane ratings are based on 87.56 KJ/L (2350 BTU/CU FT) lower heating value gas.

### ENGINE POWER (NET) IS THE CORRECTED FLYWHEEL POWER (GROSS) LESS EXTERNAL AUXILIARY LOAD

Engine corrected gross output includes the power required to drive standard equipment; lube oil, scavenge lube oil, fuel transfer, common rail fuel, separate circuit aftercooler and jacket water pumps. Engine net power available for the external (flywheel) load is calculated by subtracting the sum of auxiliary load from the corrected gross flywheel output power. Typical auxiliary loads are radiator cooling fans, hydraulic pumps, air compressors and battery charging alternators.

### ALTITUDE CAPABILITY

Altitude capability is the maximum altitude above sea level at standard temperature and standard pressure at which the engine could develop full rated output power on the current performance data set. Standard temperature values versus altitude could be seen on TM2001.

Engines with ADEM MEUI and HEUI fuel systems operating at conditions above the defined altitude capability derate for atmospheric pressure and temperature conditions outside the values defined, see TM2001. Mechanical governor controlled unit injector engines require a setting change for operation at conditions above the altitude defined on the engine performance sheet. See your Caterpillar technical representative for non standard ratings.

### REGULATIONS AND PRODUCT COMPLIANCE

TMI Emissions information is presented at 'nominal' and 'not to exceed' values for standard ratings. No tolerances are applied to the emissions data. These values are subject to change at any time. The controlling federal and local emission requirements need to be verified by your Caterpillar technical representative. Log on to the Technology and Solutions Divisions (T&SD) web page ([http://tsd.cat.com/etsd/index.cfm?tech\\_id=2635ICAL](http://tsd.cat.com/etsd/index.cfm?tech_id=2635ICAL)) for information including federal regulation applicability and time lines for implementation. Information for labeling and tagging requirements is also provided.

### NOTES:

Regulation watch covers regulations in effect and future regulation changes for world, federal, state and local. This page includes items on the watch list where a regulation change or product change might be pending and may need attention of the engine product group. For additional emissions information log on to the TMI web page.

Additional product information for specific market application is available.

Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.

### HEAT REJECTION DEFINITIONS:

Diesel Circuit Type and HHV Balance : DM8500

### EMISSIONS DEFINITIONS:

Emissions : DM1176

### SOUND DEFINITIONS:

## PERFORMANCE DATA[DM7696]

December 16, 2011

Sound Power : DM8702

Sound Pressure : TM7080

### RATING DEFINITIONS:

Agriculture : TM6008

Fire Pump : TM6009

Generator Set : TM6035

Generator (Gas) : TM6041

Industrial Diesel : TM6010

Industrial (Gas) : TM6040

Irrigation : TM5749

Locomotive : TM5037

Marine Auxiliary : TM6036

Marine Prop (Except 3600) : TM5747

Marine Prop (3600 only) : TM5748

MSHA : TM6042

Oil Field (Petroleum) : TM6011

Off-Highway Truck : TM6039

On-Highway Truck : TM6038

Date Released : 11/23/11

**MANUFACTURER EMISSIONS DATA**

**FOR CE-4 & CE-6**

**CATERPILLAR MODEL C13 ENGINES**

**PERFORMANCE DATA**

**FEBRUARY 23, 2015**

For Help Desk Phone Numbers [Click here](#)

Perf No: DM7686

Change Level: 08 ▼

General      Heat Rejection      Emissions      Regulatory      Altitude Derate      Cross Reference

[View PDF](#)

<b>SALES MODEL:</b>	C13	<b>COMBUSTION:</b>	DI
<b>ENGINE POWER (BHP):</b>	415	<b>ENGINE SPEED (RPM):</b>	2,100
<b>PEAK TORQUE (FT-LB):</b>	1,398.4	<b>PEAK TORQUE SPEED (RPM):</b>	1,400
<b>COMPRESSION RATIO:</b>	17.3	<b>TORQUE RISE (%):</b>	35
<b>RATING LEVEL:</b>	INDUSTRIAL B	<b>ASPIRATION:</b>	TA
<b>PUMP QUANTITY:</b>	1	<b>AFTERCOOLER TYPE:</b>	ATAAC
<b>FUEL TYPE:</b>	DIESEL	<b>AFTERCOOLER CIRCUIT TYPE:</b>	JW+OC, ATAAC
<b>MANIFOLD TYPE:</b>	DRY	<b>INLET MANIFOLD AIR TEMP (F):</b>	120
<b>GOVERNOR TYPE:</b>	ELEC	<b>JACKET WATER TEMP (F):</b>	192.2
<b>INJECTOR TYPE:</b>	EUI	<b>TURBO CONFIGURATION:</b>	SINGLE
<b>REF EXH STACK DIAMETER (IN):</b>	5	<b>TURBO QUANTITY:</b>	1
<b>MAX OPERATING ALTITUDE (FT):</b>	4,400	<b>TURBOCHARGER MODEL:</b>	GTA4502BS 1.33 A/R
		<b>CERTIFICATION YEAR:</b>	2006
		<b>PISTON SPD @ RATED ENG SPD (FT/MIN):</b>	2,163.4

INDUSTRY	SUB INDUSTRY	APPLICATION
INDUSTRIAL	FORESTRY	INDUSTRIAL
INDUSTRIAL	GENERAL INDUSTRIAL	INDUSTRIAL
OIL AND GAS	LAND PRODUCTION	INDUSTRIAL
INDUSTRIAL	AGRICULTURE	INDUSTRIAL
INDUSTRIAL	CONSTRUCTION	INDUSTRIAL
INDUSTRIAL	MATERIAL HANDLING	INDUSTRIAL
INDUSTRIAL	MINING	INDUSTRIAL
OIL AND GAS	WELL SERVICING	INDUSTRIAL

**General Performance Data [Top](#)**

ENGINE SPEED	ENGINE POWER	ENGINE TORQUE	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP
RPM	BHP	LB-FT	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
2,100	415	1,038	205	0.347	20.7	45.8	125.2	1,117.2	38.8	894.7
2,000	415	1,090	215	0.342	20.5	46.5	123.4	1,121.0	37.4	904.1
1,900	415	1,147	227	0.343	20.4	47.3	123.1	1,135.1	36.0	921.8
1,800	415	1,211	239	0.339	20.2	48.0	121.2	1,149.8	34.3	942.4
1,700	410	1,268	251	0.336	19.8	48.1	118.7	1,161.0	32.3	956.0
1,600	402	1,318	261	0.333	19.2	48.2	116.9	1,161.1	30.4	956.8
1,500	389	1,364	269	0.336	18.8	48.4	115.2	1,180.3	28.7	980.4
1,400	373	1,399	276	0.331	17.8	47.3	111.2	1,186.0	26.4	986.3

1,300	342	1,380	273	0.340	16.7	47.0	110.0	1,188.8	24.4	991.4
1,200	308	1,349	267	0.331	14.7	38.3	100.9	1,202.6	18.6	1,040.6
1,100	261	1,245	246	0.337	12.6	31.1	95.2	1,211.3	13.8	1,064.3

ENGINE SPEED	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
RPM	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
2,100	415	47	312.1	964.1	2,520.1	4,201.4	4,346.6	914.9	841.8
2,000	415	47	311.0	941.4	2,473.4	4,093.2	4,236.4	891.7	819.5
1,900	415	48	310.6	913.3	2,427.4	3,961.5	4,104.3	863.9	792.5
1,800	415	48	311.4	884.5	2,385.2	3,832.3	3,973.8	836.4	765.8
1,700	410	49	310.3	844.0	2,296.2	3,649.7	3,788.7	797.5	728.4
1,600	402	48	308.2	807.2	2,189.8	3,476.7	3,611.1	760.1	694.5
1,500	389	48	310.3	765.7	2,113.7	3,297.0	3,428.3	721.6	657.1
1,400	373	47	309.4	710.6	1,968.2	3,054.6	3,179.5	669.2	608.1
1,300	342	47	310.5	664.7	1,840.9	2,846.3	2,963.4	623.8	566.5
1,200	308	38	279.3	552.0	1,577.2	2,352.7	2,455.8	516.9	467.0
1,100	261	30	250.7	456.5	1,322.9	1,939.3	2,027.8	426.8	384.2

### Heat Rejection Data Top

ENGINE SPEED	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHUAUST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
RPM	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
2,100	415	6,445	1,974	17,923	10,014	2,354	3,144	17,601	44,203	47,087
2,000	415	6,340	1,696	17,681	9,941	2,320	3,076	17,601	43,551	46,393
1,900	415	6,312	1,993	17,564	9,961	2,322	2,975	17,601	43,600	46,445
1,800	415	6,226	1,757	17,440	10,015	2,297	2,920	17,601	43,129	45,943
1,700	410	6,104	1,795	16,948	9,788	2,253	2,800	17,408	42,295	45,055
1,600	402	6,103	1,654	16,229	9,347	2,184	2,663	17,032	41,006	43,682
1,500	389	5,980	1,802	15,849	9,246	2,136	2,576	16,515	40,104	42,721
1,400	373	5,583	1,698	14,842	8,667	2,018	2,424	15,810	37,884	40,356
1,300	342	5,309	1,904	13,922	8,148	1,896	2,286	14,490	35,589	37,911
1,200	308	4,925	1,450	12,229	7,314	1,668	1,681	13,074	31,316	33,360
1,100	261	4,650	1,407	10,401	6,268	1,436	1,208	11,061	26,967	28,727

### Emissions Data Top

Units Filter  ▼

#### RATED SPEED POTENTIAL SITE VARIATION: 2100 RPM

ENGINE POWER	BHP	415	311	208	104	41.5
PERCENT LOAD	%	100	75	50	25	10
TOTAL NOX (AS NO2)	G/HR	1,437	794	417	220	140
TOTAL CO	G/HR	1,000	1,253	313	540	474
TOTAL HC	G/HR	55	75	114	137	169
PART MATTER	G/HR	83.0	82.1	48.0	75.6	72.4
TOTAL NOX (AS NO2)	(CORR 5% O2) MG/NM3	1,613.1	1,076.6	780.1	723.6	785.1
TOTAL CO	(CORR 5% O2) MG/NM3	1,120.7	1,705.6	597.9	1,773.9	2,665.4
TOTAL HC	(CORR 5% O2) MG/NM3	53.0	88.8	184.8	389.8	819.8
PART MATTER	(CORR 5% O2) MG/NM3	78.4	96.3	79.1	223.1	372.8
TOTAL NOX (AS NO2)	(CORR 5% O2) PPM	786	524	380	352	382
TOTAL CO	(CORR 5% O2) PPM	897	1,364	478	1,419	2,132

TOTAL HC	(CORR 5% O2)	PPM	99	166	345	728	1,530
TOTAL NOX (AS NO2)		G/HP-HR	3.49	2.57	2.02	2.13	3.38
TOTAL CO		G/HP-HR	2.43	4.06	1.52	5.23	11.48
TOTAL HC		G/HP-HR	0.13	0.24	0.55	1.32	4.08
PART MATTER		G/HP-HR	0.20	0.27	0.23	0.73	1.75
TOTAL NOX (AS NO2)		LB/HR	3.17	1.75	0.92	0.49	0.31
TOTAL CO		LB/HR	2.20	2.76	0.69	1.19	1.05
TOTAL HC		LB/HR	0.12	0.17	0.25	0.30	0.37
PART MATTER		LB/HR	0.18	0.18	0.11	0.17	0.16

**RATED SPEED NOMINAL DATA: 2100 RPM**

<b>ENGINE POWER</b>		<b>BHP</b>	<b>415</b>	<b>311</b>	<b>208</b>	<b>104</b>	<b>41.5</b>
<b>PERCENT LOAD</b>		<b>%</b>	<b>100</b>	<b>75</b>	<b>50</b>	<b>25</b>	<b>10</b>
TOTAL NOX (AS NO2)		G/HR	1,331	735	386	204	129
TOTAL CO		G/HR	535	670	167	289	254
TOTAL HC		G/HR	29	40	60	72	89
TOTAL CO2		KG/HR	213	172	126	71	42
PART MATTER		G/HR	42.6	42.1	24.6	38.7	37.1
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	1,493.6	996.8	722.3	670.0	727.0
TOTAL CO	(CORR 5% O2)	MG/NM3	599.3	912.1	319.7	948.6	1,425.3
TOTAL HC	(CORR 5% O2)	MG/NM3	28.0	47.0	97.8	206.2	433.8
PART MATTER	(CORR 5% O2)	MG/NM3	40.2	49.4	40.6	114.4	191.2
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	728	486	352	326	354
TOTAL CO	(CORR 5% O2)	PPM	479	730	256	759	1,140
TOTAL HC	(CORR 5% O2)	PPM	52	88	182	385	810
TOTAL NOX (AS NO2)		G/HP-HR	3.23	2.38	1.87	1.97	3.13
TOTAL CO		G/HP-HR	1.30	2.17	0.81	2.80	6.14
TOTAL HC		G/HP-HR	0.07	0.13	0.29	0.70	2.16
PART MATTER		G/HP-HR	0.10	0.14	0.12	0.38	0.90
TOTAL NOX (AS NO2)		LB/HR	2.93	1.62	0.85	0.45	0.29
TOTAL CO		LB/HR	1.18	1.48	0.37	0.64	0.56
TOTAL HC		LB/HR	0.06	0.09	0.13	0.16	0.20
TOTAL CO2		LB/HR	469	378	278	157	92
PART MATTER		LB/HR	0.09	0.09	0.05	0.09	0.08
OXYGEN IN EXH		%	10.7	12.5	14.1	15.5	17.1
DRY SMOKE OPACITY		%	1.4	1.5	0.9	2.0	2.0
BOSCH SMOKE NUMBER			0.97	1.04	0.54	1.27	1.29

**Regulatory Information [Top](#)**

<b>EPA TIER 3</b>		<b>2005 - 2010</b>				
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.						
<b>Locality</b>	<b>Agency</b>	<b>Regulation</b>	<b>Tier/Stage</b>	<b>Max Limits - G/BKW - HR</b>		
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 3	CO: 3.5 NOx + HC: 4.0 PM: 0.20		

<b>EU STAGE IIIA</b>		<b>2006 - 2010</b>				
GASEOUS EMISSION DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EU 97/68/EC, ECE REGULATION NO. 96 AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSION VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.						
<b>Locality</b>	<b>Agency</b>	<b>Regulation</b>	<b>Tier/Stage</b>	<b>Max Limits - G/BKW - HR</b>		
EUROPE	EU	NON-ROAD	STAGE IIIA	CO: 3.5 NOx + HC: 4.0 PM: 0.20		

IMO II

2011 - ----

GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN REGULATION 13 OF REVISED ANNEX VI OF MARPOL 73/78 AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THIS ENGINE CONFORMS TO INTERNATIONAL MARINE ORGANIZATION'S (IMO) MARINE COMPRESSION-IGNITION EMISSION REGULATIONS.

### Altitude Derate Data Top

#### ALTITUDE CORRECTED POWER CAPABILITY (BHP)

AMBIENT OPERATING TEMP (F)	50	60	70	80	90	100	110	120	130	NORMAL
ALTITUDE (FT)										
0	415	415	415	415	415	415	415	415	415	415
1,000	415	415	415	415	415	415	415	415	415	415
2,000	415	415	415	415	415	415	415	415	414	415
3,000	415	415	415	415	415	415	413	406	399	415
4,000	415	415	415	415	412	404	397	390	384	415
5,000	415	415	411	403	396	389	382	375	369	415
6,000	410	402	395	388	381	374	367	361	355	405
7,000	394	387	380	372	366	359	353	347	341	392
8,000	379	372	365	358	351	345	339	333	328	379
9,000	364	357	350	344	337	331	326	320	315	366
10,000	349	343	336	330	324	318	313	307	302	354
11,000	335	329	323	317	311	305	300	295	290	342
12,000	322	315	309	304	298	293	288	283	278	331
13,000	308	302	297	291	286	281	276	271	267	319
14,000	296	290	284	279	274	269	264	260	255	308
15,000	283	278	272	267	263	258	253	249	245	298

### Cross Reference Top

Engine Arrangement			
Arrangement Number	Effective Serial Number	Engineering Model	Engineering Model Version
2413804	LGK21070	E707	-

Test Specification Data						
Test Spec	Setting	Effective Serial Number	Engine Arrangement	Governor Type	Default Low Idle Speed	Default High Idle Speed
OK6067	PP5377	LGK21070	2413804	ELEC		

**MANUFACTURER EMISSIONS DATA**

**FOR CE-5**

**CATERPILLAR MODEL C9 ENGINE**

# INDUSTRIAL ENGINE PERFORMANCE DATA

Performance Number: DM8117

Change Level: 02

Sales Model: C9 DITA	Combustion: DI	Aspr: TA
Engine Power: 300 HP	Speed: 2,200 RPM	After Cooler: ATAAC
Manifold Type: DRY	Governor Type: ELEC	After Cooler Temp(F): 120
Turbo Quantity: 1	Engine App: IN	Turbo Arrangement:
Application Type: IND-DIESEL	Engine Rating: IN	Strategy:
Rating Type: IND-B	Certification: EPA TIER-3 2005 - ----	
	EU STAGE -IIIA 2006 - 2010	
	IMO II - 2011 - ----	

## General Performance Data 1

ENGINE SPEED RPM	ENGINE POWER BHP	ENGINE TORQUE LB.FT	ENGINE BMEP PSI	FUEL BSFC LB/BHP-HR	FUEL RATE GPH	INTAKE MFLD TEMP DEG F	INTAKE MFLD P IN-HG	INTAKE AIR FLOW CFM	EXH MFLD TEMP DEG F	EXH STACK TEMP DEG F	EXH GAS FLOW CFM
2,200	300	716.91	201.17	0.37	15.77	118.94	46.2	731.01	1,089.5	864.5	1,896.4
2,100	300	751.57	210.74	0.36	15.59	117.14	46.46	706.29	1,097.24	875.48	1,843.43
2,000	300	789.19	221.33	0.36	15.4	115.7	46.88	681.57	1,108.94	890.06	1,797.52
1,900	300	830.49	232.93	0.35	15.22	116.06	47.44	653.32	1,130.18	914.54	1,755.14
1,800	300	876.22	245.84	0.35	15.06	114.44	48.06	625.07	1,150.34	936.86	1,716.29
1,700	293	906.46	254.26	0.35	14.71	112.1	47.83	593.29	1,169.06	957.92	1,652.73
1,600	284	933.01	261.8	0.35	14.29	109.94	47.14	561.5	1,192.64	984.2	1,585.63
1,500	274	958.83	269.05	0.35	13.82	107.6	46.2	522.66	1,223.6	1,017.86	1,515
1,400	264	988.33	277.32	0.36	13.37	105.98	45.22	483.81	1,264.46	1,061.06	1,447.9
1,300	244	987.59	277.03	0.36	12.55	102.38	41.52	430.84	1,306.94	1,115.24	1,331.36
1,200	226	988.33	277.17	0.36	11.76	99.14	37.28	377.87	1,359.86	1,182.02	1,214.83
1,100	207	988.33	277.32	0.37	10.99	95.72	32.31	317.83	1,422.14	1,260.86	1,091.22

## General Performance Data 2

ENGINE SPEED RPM	ENGINE POWER BHP	COMPRESS OUT PRESS IN-HG	COMPRESS OUT TEMP DEG F	CHARGE AIRFLOW LB/HR
2,200	300	48.27	330.8	3,207.94
2,100	300	48.51	328.28	3,095.07
2,000	300	48.71	327.02	2,977.34
1,900	300	49.07	327.74	2,855.64
1,800	300	49.54	328.46	2,741
1,700	293	49.25	326.84	2,603.22
1,600	284	48.48	324.86	2,451.32
1,500	274	47.35	323.24	2,285.53
1,400	264	46.14	322.88	2,111.14
1,300	244	42.26	311	1,883.85
1,200	226	37.85	297.5	1,647.29
1,100	207	32.69	281.66	1,395.74

**Engine Heat Rejection Data**

ENGINE SPEED RPM	ENGINE POWER BHP	REJ TO JW BTU/MN	REJ TO ATMOS BTU/MN	REJ TO EXHAUST BTU/MN	EXH RCOV TO 350F BTU/MN	FROM OIL CLR BTU/MN	FROM AFT CLR BTU/MN	WORK ENERGY BTU/MN	LHV ENERGY BTU/MN	HHV ENERGY BTU/MN
2,200	300	5,317.3	2,957.2	13,250.7	8,758.0	1,819.8	2,616.0	12,738.8	34,178.8	36,396.7
2,100	300	5,271.8	2,900.4	13,023.2	8,644.2	1,797.1	2,502.3	12,738.8	33,780.7	35,941.8
2,000	300	5,203.6	2,786.6	12,795.7	8,587.3	1,774.3	2,445.4	12,738.8	33,325.8	35,486.8
1,900	300	5,141.0	2,684.3	12,682.0	8,644.2	1,757.3	2,331.7	12,738.8	32,927.7	35,088.7
1,800	300	5,084.2	2,559.1	12,568.2	8,644.2	1,734.5	2,274.8	12,738.8	32,586.4	34,747.5
1,700	293	5,197.9	2,388.5	12,283.9	8,530.5	1,700.4	2,161.1	12,454.5	31,904.0	34,008.2
1,600	284	5,163.8	2,331.7	11,942.7	8,416.7	1,654.9	2,047.3	12,056.4	31,051.0	33,041.4
1,500	274	4,970.4	2,331.7	11,601.5	8,303.0	1,598.0	1,876.7	11,601.5	30,027.3	32,017.7
1,400	264	4,708.8	2,502.3	11,317.1	8,246.1	1,552.6	1,763.0	11,146.5	29,117.4	31,051.0
1,300	244	4,532.5	2,445.4	10,691.5	7,961.8	1,461.6	1,535.5	10,350.3	27,411.3	29,174.2
1,200	226	4,424.5	2,445.4	10,066.0	7,677.4	1,370.6	1,251.1	9,554.1	25,762.1	27,411.3
1,100	207	4,407.4	2,502.3	9,326.7	7,222.5	1,279.6	1,023.7	8,758.0	24,056.0	25,648.3

**EMISSIONS DATA**

EPA TIER-3 2005 - ----- \*\*\*\*\* G5  
 Gaseous emissions data measurement are consistent with those described in 40 CFR, EU 97/68/EC, ECE Regulation No. 96 and ISO 8178 for measuring HC, CO, PM and NOx.

Gaseous emissions values are WEIGHTED CYCLE AVERAGES and are in compliance with the following non-road regulations:

LOCALITY	AGENCY/LEVEL	MAX LIMITS - g/kw-hr		
U. S. (incl Calif)	EPA/Tier 3	CO:3.5	NOx + HC:4.0	PM:0.2
Europe	EU/Stage-III A	CO:3.5	NOx + HC:4.0	PM:0.2

EU STAGE -IIIA 2006 - 2010 ----- \*\*\*\*\* G5  
 Gaseous emissions data measurement are consistent with those described in 40 CFR, EU 97/68/EC, ECE Regulation No. 96 and ISO 8178 for measuring HC, CO, PM and NOx.

Gaseous emissions values are WEIGHTED CYCLE AVERAGES and are in compliance with the following non-road regulations:

LOCALITY	AGENCY/LEVEL	MAX LIMITS - g/kw-hr		
U. S. (incl Calif)	EPA/Tier 3	CO:3.5	NOx + HC:4.0	PM:0.2
Europe	EU/Stage-III A	CO:3.5	NOx + HC:4.0	PM:0.2

IMO II - 2011 - ----- \*\*\*\*\* M5  
 Gaseous emissions data measurements are consistent with those described in REGULATION 13 of ANNEX VI of MARPOL 73/78 and ISO 8178 for measuring HC, CO, PM, and NOx.

This engine conforms to INTERNATIONAL MARINE ORGANIZATION'S (IMO) MARINE compression-ignition emission regulations.

REFERENCE EXHAUST STACK DIAMETER	--
WET EXHAUST MASS	3,353.2 LB/HR
WET EXHAUST FLOW (863.60 F STACK TEMP)	1,898.17 CFM

WET EXHAUST FLOW RATE ( 32 DEG F AND 29.98 IN HG )  
 DRY EXHAUST FLOW RATE ( 32 DEG F AND 29.98 IN HG )  
 FUEL FLOW RATE

698.00 STD CFM  
 639.20 STD CFM  
 16 GAL/HR

**RATED SPEED "Not to exceed data"**

ENGINE SPEED RPM	PERCENT LOAD	ENGINE POWER BHP	TOTAL NOX (AS NO2) LB/HR	TOTAL CO LB/HR	TOTAL HC LB/HR	PART MATTER LB/HR	OXYGEN IN EXHAUST PERCENT
2,200	100	300	2.2900	1.8100	.2000	.0700	10.9000
2,200	75	225	1.2800	2.0200	.2800	.0800	12.2000
2,200	50	150	.7600	.5800	.3100	.1000	13.5000
2,200	25	75	.4800	.8700	.4200	.1100	15.2000
2,200	10	30	.3300	.8400	.4200	.0900	17.0000

**RATED SPEED "Nominal Data"**

ENGINE SPEED RPM	PERCENT LOAD	ENGINE POWER BHP	TOTAL NOX (AS NO2) LB/HR	TOTAL CO LB/HR	TOTAL HC LB/HR	TOTAL CO2 LB/HR	PART MATTER LB/HR	OXYGEN IN EXHAUST PERCENT
2,200	100	300	1.8900	.9700	.1100	338.3	.0300	10.9000
2,200	75	225	1.0600	1.0800	.1500	273.5	.0400	12.2000
2,200	50	150	.6300	.3100	.1600	204	.0500	13.5000
2,200	25	75	.3900	.4600	.2200	119	.0600	15.2000
2,200	10	30	.2800	.4500	.2200	69.5	.0500	17.0000

**Altitude Capability Data(Corrected Power Altitude Capability)**

Ambient Operating Temp.	50 F	68 F	86 F	104 F	122 F	NORMAL
Altitude						
0 F	300.39 hp					
984.25 F	300.39 hp					
1,640.42 F	300.39 hp					
3,280.84 F	300.39 hp					
4,921.26 F	300.39 hp					
6,561.68 F	300.39 hp	300.39 hp	300.39 hp	296.37 hp	286.98 hp	300.39 hp
8,202.1 F	300.39 hp	297.71 hp	286.98 hp	277.59 hp	269.55 hp	300.39 hp
9,842.52 F	288.32 hp	278.93 hp	269.55 hp	261.5 hp	253.45 hp	288.32 hp
11,482.94 F	270.89 hp	261.5 hp	253.45 hp	245.41 hp	237.36 hp	273.57 hp
13,123.36 F	253.45 hp	245.41 hp	237.36 hp	229.31 hp	222.61 hp	258.82 hp
14,763.78 F	237.36 hp	229.31 hp	222.61 hp	214.56 hp	207.86 hp	245.41 hp

The powers listed above and all the Powers displayed are Corrected Powers

**Identification Reference and Notes**

Engine Arrangement:	2524430	Lube Oil Press @ Rated Spd(Psi):	55.1
Effective Serial No:	JSC00261	Piston Speed @ Rated Eng SPD(FT/Min):	2,145.7
Primary Engine Test Spec:	0K4893	Max Operating Altitude(FT):	8,500.7
Performance Parm Ref:	TM5737	PEEC Elect Control Module Ref	
Performance Data Ref:	DM8117	PEEC Personality Cont Mod Ref	
Aux Coolant Pump Perf Ref:			
Cooling System Perf Ref:		Turbocharger Model	S310G-1.10 VTF

Performance Data

<b>Certification Ref:</b>		<b>Fuel Injector</b>	
<b>Certification Year:</b>	2006	<b>Timing-Static (DEG):</b>	--
<b>Compression Ratio:</b>	17.0	<b>Timing-Static Advance (DEG):</b>	--
<b>Combustion System:</b>	DI	<b>Timing-Static (MM):</b>	--
<b>Aftercooler Temperature (F):</b>	120	<b>Unit Injector Timing (MM):</b>	--
<b>Crankcase Blowby Rate(CFH):</b>	--	<b>Torque Rise (percent)</b>	37.5
<b>Fuel Rate (Rated RPM) No Load(Gal/HR):</b>	--	<b>Peak Torque Speed RPM</b>	1400
<b>Lube Oil Press @ Low Idle Spd(PSI):</b>	22.5	<b>Peak Torque (LB/FT):</b>	987.6

**MANUFACTURER EMISSIONS DATA**

**FOR CE-7**

**CATERPILLAR MODEL C15 ENGINE**

**INDUSTRIAL ENGINE PERFORMANCE DATA**

**MARCH 05, 2013**

For Help Desk Phone Numbers [Click here](#)

Performance Number: DM7520

Change Level:

<b>Sales Model:</b> C15 DITA	<b>Combustion:</b> DI	<b>Aspr:</b> TA
<b>Engine Power:</b> 540 HP	<b>Speed:</b> 2,100 RPM	<b>After Cooler:</b> ATAAC
<b>Manifold Type:</b> DRY	<b>Governor Type:</b> ELEC	<b>After Cooler Temp(F):</b> 120
<b>Turbo Quantity:</b> 1	<b>Engine App:</b> IN	<b>Turbo Arrangement:</b>
<b>Application Type:</b> IND-DIESEL	<b>Engine Rating:</b> IN	<b>Strategy:</b>
<b>Rating Type:</b> IND-C (INT)	<b>Certification:</b> EPA TIER-3 2005 - ----	
	EU STAGE-II 2002 - 2005	
	IMO II - 2011 - ----	

**General Performance Data 1**

ENGINE SPEED RPM	ENGINE POWER BHP	ENGINE TORQUE LB.FT	ENGINE BMEP PSI	FUEL BSFC LB/BHP-HR	FUEL RATE GPH	INTAKE MFLD TEMP DEG F	INTAKE MFLD P IN-HG	INTAKE AIR FLOW CFM	EXH MFLD TEMP DEG F	EXH STACK TEMP DEG F	EXH GAS FLOW CFM
2,100	540	1,351.21	219.74	0.37	28.9	121.46	49.45	1,267.8	1,183.46	937.94	3,471.44
2,000	540	1,419.07	230.76	0.37	28.74	121.64	50.73	1,243.08	1,197.14	956.48	3,443.18
1,900	540	1,493.56	242.8	0.37	28.56	121.46	52	1,211.29	1,213.88	976.46	3,404.34
1,800	540	1,576.9	256.29	0.37	28.37	120.92	53.19	1,175.98	1,231.16	996.44	3,347.83
1,700	534	1,649.18	268.18	0.36	27.82	119.48	53.96	1,126.54	1,247.54	1,015.16	3,259.55
1,600	522	1,714.83	278.77	0.36	27.08	117.5	54.22	1,070.04	1,261.4	1,030.28	3,135.95
1,500	506	1,773.09	288.34	0.36	26.13	114.98	53.84	1,002.94	1,270.94	1,039.28	2,962.9
1,400	485	1,818.82	295.74	0.36	24.89	111.74	52.15	925.25	1,274.18	1,044.5	2,729.83
1,300	444	1,795.22	291.82	0.36	22.75	107.24	48.12	822.83	1,277.06	1,050.98	2,436.71
1,200	360	1,573.95	255.85	0.36	18.36	101.48	41.07	699.23	1,288.4	1,074.2	2,101.22
1,100	325	1,550.35	252.08	0.35	16.46	94.46	30.92	554.44	1,317.74	1,126.04	1,737.48

**General Performance Data 2**

ENGINE SPEED RPM	ENGINE POWER BHP	COMPRESS OUT PRESS IN-HG	COMPRESS OUT TEMP DEG F	CHARGE AIRFLOW LB/HR
2,100	540	52.21	338	5,556.97
2,000	540	53.33	338.72	5,443.87
1,900	540	54.46	340.16	5,306.96
1,800	540	55.47	341.24	5,140.51
1,700	534	56.06	341.24	4,933.28
1,600	522	56.12	340.7	4,687.46
1,500	506	55.5	339.44	4,398
1,400	485	53.57	336.56	4,043.49
1,300	444	49.37	326.84	3,596.62
1,200	360	42.11	304.16	3,054.5
1,100	325	31.69	266.36	2,421.11

## Engine Heat Rejection Data

ENGINE SPEED RPM	ENGINE POWER BHP	REJ TO JW BTU/MN	REJ TO ATMOS BTU/MN	REJ TO EXHAUST BTU/MN	EXH RCOV TO 350F BTU/MN	FROM OIL CLR BTU/MN	FROM AFT CLR BTU/MN	WORK ENERGY BTU/MN	LHV ENERGY BTU/MN	HHV ENERGY BTU/MN
2,100	540	8,303.0	4,686.1	23,999.1	13,819.4	3,230.2	4,640.6	22,918.6	60,623.3	64,547.3
2,000	540	8,132.4	4,669.0	24,056.0	13,990.0	3,218.8	4,555.3	22,918.6	60,395.8	64,319.8
1,900	540	7,961.8	4,583.7	24,056.0	14,160.6	3,201.8	4,470.0	22,918.6	60,054.6	63,978.6
1,800	540	7,904.9	4,464.3	23,885.3	14,160.6	3,179.0	4,367.6	22,918.6	59,656.5	63,523.7
1,700	534	7,791.2	4,521.2	23,487.3	14,046.9	3,133.5	4,219.8	22,634.2	58,860.3	62,670.6
1,600	522	7,677.4	4,634.9	22,804.8	13,705.6	3,065.3	4,032.1	22,122.4	57,552.3	61,305.7
1,500	506	7,450.0	4,669.0	21,724.3	13,080.1	2,957.2	3,804.6	21,496.8	55,505.0	59,144.7
1,400	485	7,108.7	4,253.9	20,188.8	12,113.3	2,780.9	3,503.2	20,530.0	52,206.6	55,618.7
1,300	444	6,596.9	4,060.5	18,141.5	10,919.0	2,536.4	3,042.5	18,823.9	47,600.1	50,671.1
1,200	360	5,800.7	5,601.7	15,923.6	9,611.0	2,246.4	2,388.5	15,241.1	42,197.4	44,984.1
1,100	325	5,175.2	4,691.8	13,478.2	8,303.0	1,939.3	1,603.7	13,762.5	36,396.7	38,728.4

**EMISSIONS DATA**

EPA TIER-3 2005 - ---- \*\*\*\*\* D4  
 Gaseous emissions data measurements are consistent with those described in 40 CFR, EU 97/68/EC, ECE Regulation No. 96 and ISO 8178 for measuring HC, CO, PM, and NOx.

Gaseous emissions values are WEIGHTED CYCLE AVERAGES and are in compliance with the following non-road regulations:

LOCALITY	AGENCY/LEVEL	MAX LIMITS - g/kW-hr			
U. S. (incl Calif)	EPA/TIER-3	CO:3.5	NOx + HC:4.0	PM:0.2	
Europe	EU/Stage-II	CO:3.5	HC:1.0	NOx:6.0	PM:0.2

EU STAGE-II 2002 - 2005 \*\*\*\*\* D4  
 Gaseous emissions data measurements are consistent with those described in 40 CFR, EU 97/68/EC, ECE Regulation No. 96 and ISO 8178 for measuring HC, CO, PM, and NOx.

Gaseous emissions values are WEIGHTED CYCLE AVERAGES and are in compliance with the following non-road regulations:

LOCALITY	AGENCY/LEVEL	MAX LIMITS - g/kW-hr			
U. S. (incl Calif)	EPA/TIER-3	CO:3.5	NOx + HC:4.0	PM:0.2	
Europe	EU/Stage-II	CO:3.5	HC:1.0	NOx:6.0	PM:0.2

IMO II - 2011 - ---- \*\*\*\*\* M5  
 Gaseous emissions data measurements are consistent with those described in REGULATION 13 of ANNEX VI of MARPOL 73/78 and ISO 8178 for measuring HC, CO, PM, and NOx.

This engine conforms to INTERNATIONAL MARINE ORGANIZATION'S (IMO) MARINE compression-ignition emission regulations.

REFERENCE EXHAUST STACK DIAMETER	--
WET EXHAUST MASS	5,676.9 LB/HR
WET EXHAUST FLOW (971.60 F STACK TEMP )	3,476.38 CFM
WET EXHAUST FLOW RATE ( 32 DEG F AND 29.98 IN HG )	1,176.00 STD CFM
DRY EXHAUST FLOW RATE ( 32 DEG F AND 29.98 IN HG )	1,077.10 STD CFM
FUEL FLOW RATE	29 GAL/HR

**RATED SPEED "Potential site variation"**

ENGINE SPEED RPM	PERCENT LOAD	ENGINE POWER BHP	TOTAL NOX (AS NO2) LB/HR	TOTAL CO LB/HR	TOTAL HC LB/HR	PART MATTER LB/HR	OXYGEN IN EXHAUST PERCENT
2,100	100	540	4.5800	4.0300	.1000	.4100	3.1000
2,100	75	405	2.4900	1.4900	.1900	.1600	11.9000
2,100	50	270	1.3900	.7900	.2500	.1400	13.6000
2,100	25	135	1.5800	1.3500	.1500	.4200	14.9000
2,100	10	54	1.1400	1.0000	.1700	.2000	16.7000

**RATED SPEED "Nominal Data"**

ENGINE SPEED RPM	PERCENT LOAD	ENGINE POWER BHP	TOTAL NOX (AS NO2) LB/HR	TOTAL CO LB/HR	TOTAL HC LB/HR	TOTAL CO2 LB/HR	PART MATTER LB/HR	OXYGEN IN EXHAUST PERCENT
2,100	100	540	3.7900	2.1600	.0600	631.1	.2100	3.1000
2,100	75	405	2.0600	.8000	.1000	537	.0800	11.9000
2,100	50	270	1.1500	.4200	.1300	406.7	.0700	13.6000
2,100	25	135	1.3000	.7200	.0800	188.3	.2200	14.9000
2,100	10	54	.9400	.5300	.0900	113.8	.1000	16.7000

**Altitude Capability Data(Corrected Power Altitude Capability)**

<b>Ambient Operating Temp.</b>	<b>50 F</b>	<b>68 F</b>	<b>86 F</b>	<b>104 F</b>	<b>122 F</b>	<b>NORMAL</b>
<b>A l t i t u d e</b>						
0 F	540.43 hp	540.43 hp	540.43 hp	540.43 hp	540.43 hp	540.43 hp
984.25 F	540.43 hp	540.43 hp	540.43 hp	540.43 hp	540.43 hp	540.43 hp
1,640.42 F	540.43 hp	540.43 hp	540.43 hp	540.43 hp	540.43 hp	540.43 hp
3,280.84 F	540.43 hp	540.43 hp	540.43 hp	540.43 hp	531.04 hp	540.43 hp
4,921.26 F	540.43 hp	540.43 hp	533.73 hp	516.29 hp	500.2 hp	540.43 hp
6,561.68 F	536.41 hp	518.97 hp	501.54 hp	485.45 hp	470.7 hp	523 hp
8,202.1 F	504.22 hp	486.79 hp	470.7 hp	455.95 hp	441.2 hp	497.52 hp
9,842.52 F	473.38 hp	457.29 hp	442.54 hp	427.79 hp	414.38 hp	472.04 hp
11,482.94 F	443.88 hp	429.13 hp	414.38 hp	400.96 hp	388.9 hp	447.9 hp
13,123.36 F	415.72 hp	402.31 hp	388.9 hp	376.83 hp	364.76 hp	425.1 hp
14,763.78 F	390.24 hp	376.83 hp	363.42 hp	352.69 hp	341.96 hp	402.31 hp

**The powers listed above and all the Powers displayed are Corrected Powers**

**Identification Reference and Notes**

<b>Engine Arrangement:</b>	2543835	<b>Lube Oil Press @ Rated Spd(PSI):</b>	--
<b>Effective Serial No:</b>	JRE0001	<b>Piston Speed @ Rated Eng SPD (FT/Min):</b>	2,362.2
<b>Primary Engine Test Spec:</b>	OK5581	<b>Max Operating Altitude(FT):</b>	5,498.7
<b>Performance Parm Ref:</b>	TM5737	<b>PEEC Elect Control Module Ref</b>	
<b>Performance Data Ref:</b>	DM7520	<b>PEEC Personality Cont Mod Ref</b>	
<b>Aux Coolant Pump Perf Ref:</b>			
<b>Cooling System Perf Ref:</b>		<b>Turbocharger Model</b>	GTA5008BS-1.41 VTF
<b>Certification Ref:</b>		<b>Fuel Injector</b>	
<b>Certification Year:</b>	2006	<b>Timing-Static (DEG):</b>	--
<b>Compression Ratio:</b>	18.0	<b>Timing-Static Advance (DEG):</b>	--
<b>Combustion System:</b>	DI	<b>Timing-Static (MM):</b>	--
<b>Aftercooler Temperature (F):</b>	120	<b>Unit Injector Timing (MM):</b>	--
<b>Crankcase Blowby Rate(CFH):</b>	--	<b>Torque Rise (percent)</b>	34.5
<b>Fuel Rate (Rated RPM) No Load (Gal/HR):</b>	--	<b>Peak Torque Speed RPM</b>	1400
<b>Lube Oil Press @ Low Idle Spd(PSI):</b>	--	<b>Peak Torque (LB/FT):</b>	1,817.3

**Reference Number: DM7520** EPA TIER-3 2005---D4EU STAGE-II 20022005D4  
IMO II - 2011---M5

**Parameters Reference: TM5737**

## **DIESEL INDUSTRIAL PERFORMANCE**

### **DEFINITIONS:**

IND A - CONTINUOUS HEAVY DUTY SERVICE WHERE THE ENGINE IS OPERATED AT MAXIMUM POWER AND SPEED UP TO 100% OF THE TIME WITHOUT INTERRUPTION OR LOAD CYCLING. TIME AT FULL LOAD CAN BE UP TO 100% OF THE DUTY CYCLE. TYPICAL SERVICE EXAMPLES ARE: PUMPING, VENTILATION, CUSTOMER SPECS.

IND B - FOR SERVICE WHERE POWER AND/OR SPEED ARE CYCLIC. TIME AT FULL LOAD IS NOT TO EXCEED 80% OF THE DUTY CYCLE. TYPICAL SERVICE EXAMPLES ARE: IRRIGATION WHERE NORMAL PUMP DEMAND IS 85% OF ENGINE POWER, OIL FIELD MECHANICAL PUMPING/DRILLING, STATIONARY PLANT AIR COMPRESSORS.

IND C - INTERMITTENT SERVICE WHERE MAXIMUM POWER AND/OR SPEED ARE CYCLIC. THE POWER AND SPEED CAPABILITY OF THE ENGINE CAN BE UTILIZED FOR ONE UNINTERRUPTED HOUR FOLLOWED BY ONE HOUR OF OPERATION AT OR BELOW IND A. TIME AT FULL LOAD IS NOT TO EXCEED 50% OF THE DUTY CYCLE. TYPICAL SERVICE EXAMPLES ARE: AGRICULTURAL TRACTORS, HARVESTERS AND COMBINES, OFF HIGHWAY TRUCKS, FIRE PUMP APPLICATION POWER, BLAST HOLE DRILLS, ROCK CRUSHERS AND WOOD CHIPPERS WITH HIGH TORQUE RISE, AND OIL FIELD HOISTING.

IND D - FOR SERVICE WHERE MAXIMUM POWER IS REQUIRED FOR PERIODIC OVERLOADS. THE MAXIMUM POWER AND SPEED CAPABILITY OF THE ENGINE CAN BE UTILIZED FOR A MAXIMUM OF 30 UNINTERRUPTED MINUTES FOLLOWED BY ONE HOUR AT IND C. TIME AT FULL LOAD IS NOT TO EXCEED 10% OF THE DUTY CYCLE. TYPICAL SERVICE EXAMPLES ARE: OFFSHORE CRANES, RUNWAY SNOW BLOWERS, WATER WELL DRILLS, PORTABLE AIR COMPRESSORS, AND FIRE PUMP CERTIFICATION POWER.

IND E - FOR SERVICE WHERE MAXIMUM POWER IS REQUIRED FOR A SHORT TIME FOR INITIAL STARTING OR SUDDEN OVERLOAD. FOR EMERGENCY SERVICE WHERE STANDARD POWER IS UNAVAILABLE. THE MAXIMUM POWER AND SPEED CAPABILITY OF THE ENGINE CAN BE UTILIZED FOR A MAXIMUM OF 15 UNINTERRUPTED MINUTES FOLLOWED BY ONE HOUR AT IND C POWER OR DURATION OF THE EMERGENCY. TIME AT FULL LOAD IS NOT TO EXCEED 5% OF THE DUTY CYCLE. TYPICAL SERVICE EXAMPLES ARE: STANDBY CENTRIFUGAL WATER PUMPS, OIL FIELD WELL SERVICING, CRASH TRUCKS AND GAS TURBINE STARTERS.

## **DIESEL INDUSTRIAL PERFORMANCE**

### **TOLERANCES:**

CURVES REPRESENT TYPICAL VALUES OBTAINED UNDER NORMAL OPERATING CONDITIONS. AMBIENT AIR CONDITIONS AND FUEL USED WILL AFFECT THESE VALUES. EACH OF THE VALUES MAY VARY IN ACCORDANCE WITH THE FOLLOWING TOLERANCES:

Power	+/- 3%
Exhaust stack temperature	+/- 8%

Inlet airflow	+/- 5%
Intake manifold pressure-gage	+/- 10%
Exhaust flow	+/- 6%
Specific fuel consumption	+/- 3%
Fuel rate	+/- 5%
Heat rejection	+/- 5%

**CONDITIONS:**

ENGINE PERFORMANCE IS CORRECTED TO INLET AIR STANDARD CONDITIONS OF 99 KPA (29.31 IN HG) DRY BAROMETER AND 25 DEG C (77 DEG F) TEMPERATURE. THESE VALUES CORRESPOND TO THE STANDARD ATMOSPHERIC PRESSURE AND TEMPERATURE AS SHOWN IN SAE J1995.

PERFORMANCE MEASURED USING A STANDARD FUEL WITH FUEL GRAVITY OF 35 DEGREES API HAVING A LOWER HEATING VALUE OF 42,780 KJ/KG (18,390 BTU/LB) WHEN USED AT 29 DEG C (84.2 DEG F) WHERE THE DENSITY IS 838.9 G/L (7.001 LB/US GAL).

THE CORRECTED PERFORMANCE VALUES SHOWN FOR CATERPILLAR ENGINES WILL APPROXIMATE THE VALUES OBTAINED WHEN THE OBSERVED PERFORMANCE DATA IS CORRECTED TO SAE J1995, ISO 3046-2 & 8665 & 2288 & 9249 & 1585, EEC 80/1269 AND DIN 70020 STANDARD REFERENCE CONDITIONS.

ENGINES ARE EQUIPPED WITH STANDARD ACCESSORIES; LUBE OIL, FUEL PUMP AND JACKET WATER PUMP. THE POWER REQUIRED TO DRIVE AUXILIARIES MUST BE DEDUCTED FROM THE GROSS OUTPUT TO ARRIVE AT THE NET POWER AVAILABLE FOR THE EXTERNAL (FLYWHEEL) LOAD. TYPICAL AUXILIARIES INCLUDE COOLING FANS, AIR COMPRESSORS AND CHARGING ALTERNATORS.

RATINGS MUST BE REDUCED TO COMPENSATE FOR ALTITUDE AND OR AMBIENT TEMPERATURE CONDITIONS ACCORDING TO THE APPLICABLE DATA SHOWN ON THE PERFORMANCE DATA SET.

**DIESEL INDUSTRIAL PERFORMANCE**

**ALTITUDE:**

ALTITUDE CAPABILITY DATA - THE RECOMMENDED REDUCED POWER VALUES FOR SUSTAINED ENGINE OPERATION AT SPECIFIC ALTITUDE LEVELS AND AMBIENT TEMPERATURE.

AMBIENT DATA - THE FLYWHEEL POWER AVAILABLE AT NORMAL AMBIENT TEMPERATURE.

AMBIENT TEMPERATURE - TO BE MEASURED AT THE AIR CLEANER AIR INLET DURING NORMAL ENGINE OPERATION.

STD TEMPERATURE - THE STD TEMPERATURE AT VARIOUS SPECIFIC ALTITUDE LEVELS FOUND ON TM2001.

**DIESEL INDUSTRIAL PERFORMANCE**

\*\*\*\*\*INDUSTRIAL ENGINE 5 TIER DATA SHEET\*\*\*\*\*

THE FOLLOWING INFORMATION NEEDS TO BE DETERMINED AND ENTERED ON THE DATA SHEET FOR FUTURE USE IN THE TIER AND ENGINE SELECTION PROCESS USING THE SELECTION GUIDE.

**\* APPLICATION BACKGROUND INFORMATION**

- FUNCTION OF ENGINE \_\_\_\_\_
- DRIVEN EQUIPMENT DESCRIPTION \_\_\_\_\_
- ESTIMATE OF HOURS PER YEAR OF OPERATION \_\_\_\_\_
- ESTIMATED LOAD FACTOR \_\_\_\_\_
- MAX UNINTERRUPTED TIME AT FULL LOAD \_\_\_\_\_
- TYPICAL OWNERSHIP/PRODUCT LIFE CYCLE \_\_\_\_\_

ADDITIONAL RESTRICTIONS PER "APPLICATION GUIDELINES" \_\_\_\_\_

\* DETERMINE LOAD & SPEED CYCLE INFORMATION IN AS FINE AN INCREMENT AS POSSIBLE.

POWER (% RATED)	SPEED (% RATED)	TIME (% CYCLE)
--------------------	--------------------	-------------------

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

\* DETERMINATION OF THE ENGINE INFORMATION  
POWER & SPEED REQUIRED AT FULL LOAD

ASPIRATION DESIRED: NA \_\_\_\_\_; T \_\_\_\_\_; TA \_\_\_\_\_

EXHAUST MANIFOLD TYPE: WC \_\_\_\_\_; DRY \_\_\_\_\_

TYPE COOLING: RADIATOR \_\_\_\_\_ FAN POWER \_\_\_\_\_

HEAT EXCHANGER \_\_\_\_\_

COOLING TOWER \_\_\_\_\_

OTHER \_\_\_\_\_

AMBIENT CONDITION MODIFIERS: TEMP \_\_\_\_\_

ALTITUDE \_\_\_\_\_

PACKAGE SIZE CONSTRAINTS: L \_\_\_\_\_; W \_\_\_\_\_; H \_\_\_\_\_

WEIGHT \_\_\_\_\_

\* IDENTIFY CUSTOMER PREFERENCE ENGINE IF ANY: \_\_\_\_\_

\* FOR ADDITIONAL DATA SHEETS DUPLICATE THIS FORM

DIESEL INDUSTRIAL PERFORMANCE

\*\*\*\*\*INDUSTRIAL ENGINE SELECTION GUIDE\*\*\*\*\*

INTRODUCTION

THE FOLLOWING SECTIONS PROVIDE DETAILED INFORMATION ON ANALYZING INDUSTRIAL APPLICATIONS. THE INTENT OF THIS SECTION IS TO PROVIDE SUFFICIENT INFORMATION TO ALLOW DETERMINATION OF THE APPROPRIATE RATING TIER LEVEL AND SELECTION OF AN ACCEPTABLE ENGINE MODEL.

THIS PROCESS INVOLVES A DETAILED ANALYSIS OF THE APPLICATION DUTY CYCLE IN TERMS OF TIME SPENT AT VARIOUS IDENTIFIABLE LOAD CONDITIONS AND TIME SPENT UNDER VARIOUS IDENTIFIABLE SPEED CONDITIONS. A STEP-BY-STEP EXAMPLE DEPICTS HOW THE PROCESS UTILIZES THIS INFORMATION IN TERMS OF LOAD FACTOR AND SPEED FACTOR TO CALCULATE A RATING FACTOR. THE RATING FACTOR CHART ALLOWS THE APPROPRIATE TIER LEVEL TO BE IDENTIFIED AS ONE MAJOR SELECTION CRITERIA.

THE INDUSTRIAL ENGINE SELECTION GUIDE WORKSHEET LEADS THE ANALYST STEP-BY-STEP THROUGH THE DISCOVERY PROCESS USING THE DUTY CYCLE AND OTHER REQUESTED INFORMATION TO SELECT A FINAL TIER LEVEL AND ENGINE CHOICE FOR THE APPLICATION IN QUESTION.

ANY FURTHER INQUIRIES CONCERNING THE UTILIZATION OF THIS PROCESS OR TO PURSUE SITUATIONS THAT DO NOT FIT THIS SELECTION PROCESS SHOULD BE DIRECTED TO THE FACTORY VIA YOUR NORMAL CONTACTS AND PROCEDURES.

LOAD FACTOR

LOAD FACTOR (THE AVERAGE DEMAND ON AN ENGINE) CAN BE DETERMINED THROUGH ACTUAL FUEL CONSUMPTION. IT CAN BE DETERMINED BY DIVIDING THE ACTUAL FUEL USED IN A WORK CYCLE BY THE AMOUNT OF FUEL THAT COULD BE CONSUMED AT THE STATED ENGINE RATING DURING THE SAME TIME PERIOD.

ACTUAL FUEL CONSUMED  
(GAL OR L)

-----  
 RATED FUEL RATE X LENGTH OF WORK CYCLE  
 (GPH OR L/H) (H)

A MORE PRECISE DETERMINATION OF LOAD FACTOR IS THROUGH DETAILED ANALYSIS OF THE DUTY CYCLE.

DIESEL INDUSTRIAL PERFORMANCE  
DUTY CYCLE

A DUTY CYCLE ANALYSIS IS CRITICAL IN THE DETERMINATION OF THE APPROPRIATE RATING TIER. THE DUTY CYCLE IS DEFINED AS THE TIME SPENT AT VARIOUS POWERS AND SPEEDS. IT IS BEST TO DIVIDE THE DUTY CYCLE INTO AS MANY ELEMENTS OF POWER AS POSSIBLE (RATED, %'S OF RATED AND IDLE) AND AS MANY ELEMENTS OF SPEED AS POSSIBLE (RATED, %'S OF RATED, HIGH IDLE, AND LOW IDLE). THESE VALUES ARE USED IN THE CALCULATIONS OF LOAD FACTOR AND SPEED FACTOR. MULTIPLYING THE LOAD FACTOR AND THE SPEED FACTOR TOGETHER RESULTS IN A RATING FACTOR. THIS RATING FACTOR HELPS DETERMINE THE PROPER RATING TIER FOR THIS DUTY CYCLE.

POWER AND SPEED PROFILE FOR DUTY CYCLE

-----  
 POWER (% RATED) \* SPEED (% RATED) \* TIME (% CYCLE)

100 \* 100 \*  
 \* \*  
 \* \*  
 -----  
 LOW IDLE = 10 \* \* LOW IDLE = (25-40)\*\* \*  
 HIGH IDLE = 10 \* \* HIGH IDLE (110)\*\* \*  
 -----

- \* ALL IDLE (LOW & HIGH) POWER IS ASSUMED AS 10% OF RATED POWER
- \*\* LOW IDLE SPEED IS USUALLY 25 - 40% OF RATED SPEED
- \*\*\* HIGH IDLE SPEED IS USUALLY 110% OF RATED SPEED

(EXAMPLE OF A SIMPLE DUTY CYCLE)

-----  
 POWER (% RATED) \* SPEED (% RATED) \* TIME (% CYCLE)

100 \* 100 \* 50  
 80 \* 85 \* 10  
 50 \* 75 \* 20  
 LOW IDLE (10) \* LOW IDLE (40) \* 10  
 HIGH IDLE (10) \* HIGH IDLE (110) \* 10  
 -----

DIESEL INDUSTRIAL PERFORMANCE

\* LOAD FACTOR CALCULATION  
 LOAD FACTOR = TOTAL OF % POWER X % TIME  
 1.00 X .50 = .50  
 .80 X .10 = .08  
 .50 X .20 = .10  
 .10 X .10 = .01  
 .10 X .10 = .01  
 TOTAL = .70 OR 70% LOAD FACTOR

\* SPEED FACTOR CALCULATION  
 SPEED FACTOR = (TOTAL OF % SPEED X % TIME) SQUARED  
 1.00 X .50 = .500  
 .85 X .10 = .085  
 .75 X .20 = .150  
 .40 X .10 = .040

1.10 X .10 = .110  
 TOTAL = (.885) SQUARED = .78 OR 78% SPEED FACTOR

\* RATING FACTOR CALCULATION  
 LOAD FACTOR X SPEED FACTOR = RATING FACTOR

CALCULATION: .70 X .78 = .546 OR .55

RESULT: A .55 RATING FACTOR EQUATES TO A (C) TIER RATING (SEE TIER RATING FACTOR CHART)

SEE PRODUCT NEWS LEXH3256 FOR A DUTY CYCLE DIAGRAM

EXAMPLE OF A COMPLEX DUTY CYCLE

POWER (% RATED)	* SPEED (% RATED)	* TIME (% CYCLE)
100	* 100	* 1
70	* 94	* 14
25	* 96	* 8
80	* 75	* 1
55	* 75	* 9
30	* 75	* 10
20	* 53	* 57

DIESEL INDUSTRIAL PERFORMANCE

\* LOAD FACTOR CALCULATION  
 LOAD FACTOR = TOTAL OF % POWER X % TIME

1.00 X .01 = .010  
 .70 X .14 = .098  
 .25 X .08 = .020  
 .80 X .01 = .008  
 .55 X .09 = .050  
 .30 X .10 = .030  
 .20 X .57 = .114  
 TOTAL = .330 OR 33% LOAD FACTOR

\* SPEED FACTOR CALCULATION  
 SPEED FACTOR = (TOTAL OF % SPEED X % TIME) SQUARED

1.00 X .01 = .010  
 .94 X .14 = .132  
 .96 X .08 = .077  
 .75 X .01 = .008  
 .75 X .09 = .068  
 .75 X .10 = .075  
 .53 X .57 = .302  
 TOTAL = (.672) SQUARED = .452 OR 45%

\* RATING FACTOR CALCULATION  
 LOAD FACTOR X SPEED FACTOR = RATING FACTOR

CALCULATION: .33 X .45 = .15

RESULT: A .15 RATING FACTOR EQUATES TO A E TIER RATING (SEE TIER RATING FACTOR CHART)

(TIER IDENTIFICATION CHART)  
 TIER RATING FACTOR CHART

(FACTOR)	(RATING TIER)
1.00 -----	
A	
.85 -----	
B	

.65 \_\_\_\_\_  
 C \_\_\_\_\_  
 .45 \_\_\_\_\_  
 D \_\_\_\_\_  
 .25 \_\_\_\_\_  
 E \_\_\_\_\_  
 .10 \_\_\_\_\_

DIESEL INDUSTRIAL PERFORMANCE  
 \*\*\*\*\*INDUSTRIAL ENGINE SELECTION GUIDE\*\*\*\*\*

THE FOLLOWING INFORMATION NEEDS TO BE DETERMINED AND ENTERED IN THE SELECTION GUIDE. TO ARRIVE AT THE CORRECT RESULT THE GUIDE SHOULD BE FILLED OUT AND DECISIONS MADE IN THE ORDER PROVIDED. THE FIRST SECTION LEADS TO A DETERMINATION OF AN APPROPRIATE TIER LEVEL FOR THE APPLICATION DEFINED. THE SECOND SECTION LEADS TO A DETERMINATION OF THE CORRECT ENGINE CONFIGURATION FOR THE APPLICATION WITHIN THE TIER LEVEL DETERMINED.

\* DETERMINATION OF TIER LEVEL

STEP 1 - APPLICATION BACKGROUND INFORMATION FOR TIER SELECTION

REFERENCE:

FUNCTION OF ENGINE \_\_\_\_\_  
 DRIVEN EQUIPMENT DESCRIPTION \_\_\_\_\_  
 ESTIMATE OF HOURS PER YEAR OF OPERATION \_\_\_\_\_  
 ESTIMATED LOAD FACTOR \_\_\_\_\_  
 MAX UNINTERRUPTED TIME AT FULL LOAD \_\_\_\_\_  
 REFER TO "APPLICATION GUIDELINES" IN TMI FOR REFERENCE TIER

STEP 2 - DETERMINE LOAD & SPEED CYCLE INFORMATION IN AS FINE AN INCREMENT AS POSSIBLE. CONSTRUCT DUTY CYCLE & CALCULATE "RATING FACTOR" PER TMI.

WORKSHEET:

POWER SPEED TIME LOAD FACTOR SPEED FACTOR  
 (% RATED) (% RATED) (% CYCLE) (% POWER X % TIME) (% SPEED X % TIME)

POWER (% RATED)	SPEED (% RATED)	TIME (% CYCLE)	LOAD FACTOR (% POWER X % TIME)	SPEED FACTOR (% SPEED X % TIME)
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

TOTAL: \_\_\_\_\_  
 TOTAL SQUARED= \_\_\_\_\_

POWER FACTOR CALCULATION:

\* TOTAL LOAD FACTOR \_\_\_\_\_ X SPEED FACTOR \_\_\_\_\_ = RATING FACTOR \_\_\_\_\_

COMPARE RATING FACTOR TO TIER RATING FACTOR CHART PER TMI/  
 PRODUCT NEWS SELECT TIER \_\_\_\_\_

CONSTRUCT LOAD PROFILE CHART PER TMI/PRODUCT NEWS & COMPARE TO  
 PROFILES IN TMI/PRODUCT NEWS SELECT TIER \_\_\_\_\_

DIESEL INDUSTRIAL PERFORMANCE

STEP 3 - MAX TIME AT FULL LOAD PER CYCLE \_\_\_\_\_, ETC.

REFER TO "APPLICATION GUIDELINES" FOR COMPLETE RESTRICTIONS.

SELECT TIER \_\_\_\_\_

RESULT \_\_\_\_\_

RESULT - COMPARE TIER DETERMINED & SELECT THE MOST RESTRICTIVE TIER FROM STEPS 2 & 3. THIS TIER WILL BE USED TO SELECT THE ACCEPTABLE ENGINE IN THE ENGINE SELECTION SECTION.

\* DETERMINATION OF THE ACCEPTABLE ENGINE

STEP 4 - POWER & SPEED REQUIRED AT FULL LOAD \_\_\_\_\_

ASPIRATION DESIRED: NA \_\_\_\_\_; T \_\_\_\_\_; TA \_\_\_\_\_

EXHAUST MANIFOLD TYPE: WC \_\_\_\_\_; DRY \_\_\_\_\_

TYPE COOLING: RADIATOR \_\_\_\_\_ FAN POWER \_\_\_\_\_

HEAT EXCHANGER \_\_\_\_\_  
COOLING TOWER \_\_\_\_\_  
OTHER \_\_\_\_\_  
AMBIENT CONDITION MODIFIERS: TEMP \_\_\_\_\_  
PACKAGE SIZE CONSTRAINTS: L \_\_\_\_\_; W \_\_\_\_\_; H \_\_\_\_\_  
WEIGHT \_\_\_\_\_

RESULT - REFER TO PRICE LIST & TMI AT THE PRESELECTED  
TIER TO PICK AN ACCEPTABLE ENGINE  
(DELIVERABLE POWER AT TIER LEVEL)  
SELECT ENGINE \_\_\_\_\_

STEP 5 - IDENTIFY CUSTOMER PREFERENCE ENGINE IF ANY: \_\_\_\_\_

\* IF POWER NEEDED IS OVER POWER AVAILABLE WITH PREFERENCE ENGINE  
VERSUS THAT DETERMINED THROUGH THE SELECTION PROCESS THEN ACCEPT  
THE SELECTED ENGINE OR REQUEST A SPECIAL RATING BY USING THE  
SPECIAL ENGINE RATING REQUEST (SERR) PROCESS.

FOR ADDITIONAL SELECTION GUIDE WORKSHEETS DUPLICATE THIS FORM.

**SOUND DEFINITIONS:**

Sound Power : DM8702  
Sound Pressure : TM7080

Date Released : 10/04/11

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Caterpillar Confidential: **Green**  
Content Owner: Shane Gilles  
Web Master(s): PSG Web Based Systems Support  
Current Date: Tuesday, March 05, 2013 10:16:04 AM  
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**CATERPILLAR 988F SERIES II WHEEL LOADER**

[VIEW ARTICLES ON THIS ITEM](#)

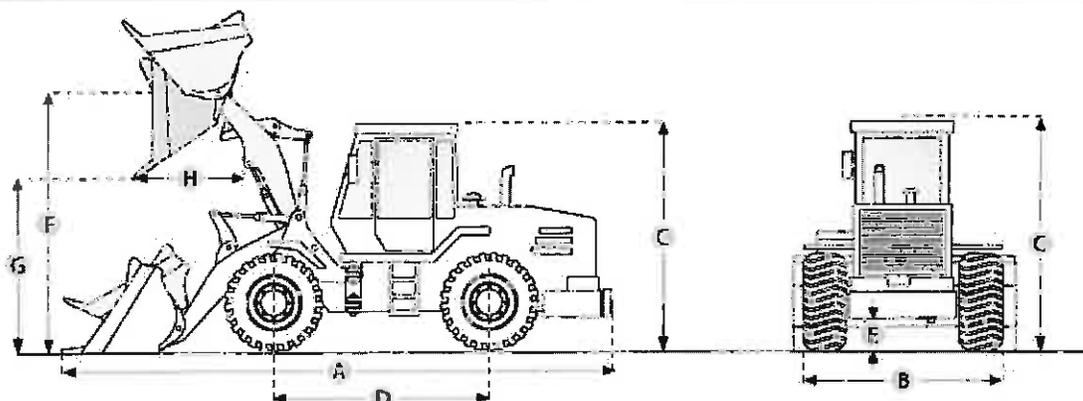
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**Selected Dimensions**

**Bucket**

G. DUMP CLEARANCE AT MAX RAISE	10.6 ft in	3218 mm
--------------------------------	------------	---------

**Dimensions**

A. LENGTH WITH BUCKET ON GROUND	35.9 ft in	10928 mm
B. WIDTH OVER TIRES	11.5 ft in	3520 mm
C. HEIGHT TO TOP OF CAB	13.5 ft in	4115 mm
E. GROUND CLEARANCE	1.6 ft in	496 mm
H. REACH AT MAX LIFT AND DUMP	5.3 ft in	1611 mm

**Specification**

**Engine**

MAKE	Caterpillar	
MODEL	3408E TA	
GROSS POWER	430 hp	320.7 kw
DISPLACEMENT	1098.4 cu in	18 L

**Operational**

OPERATING WEIGHT	100702.8 lb	45678 kg
FUEL CAPACITY	174.1 gal	659 L
HYDRAULIC SYSTEM FLUID CAPACITY	77.9 gal	295 L
STATIC TIPPING WEIGHT	67889.2 lb	30794 kg

**Transmission**

NUMBER OF FORWARD GEARS	4	
NUMBER OF REVERSE GEARS	3	
MAX SPEED - FORWARD	21.8 mph	35.1 km/h
MAX SPEED - REVERSE	14.6 mph	23.5 km/h

**Hydraulic System**

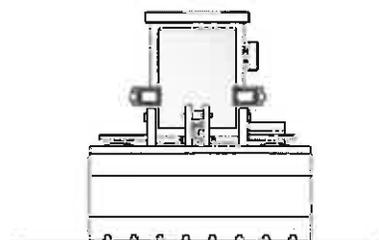
RAISE TIME	7.9 sec	
DUMP TIME	3.3 sec	
LOWER TIME	4 sec	

**Bucket**

BREAKOUT FORCE	82282 lb	366 kN
DUMP CLEARANCE AT MAX RAISE	10.6 ft in	3218 mm
BUCKET WIDTH	12.4 ft in	3772 mm
BUCKET CAPACITY - HEAPED	6.6 yd3	5 m3
BUCKET CAPACITY - STRUCK	4.1 yd3	3.1 m3

**Dimensions**

LENGTH WITH BUCKET ON GROUND	35.9 ft in	10928 mm
WIDTH OVER TIRES	11.5 ft in	3520 mm
HEIGHT TO TOP OF CAB	13.5 ft in	4115 mm



Viewing Photo 1 of 5

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**CATERPILLAR 988H WHEEL LOADER**

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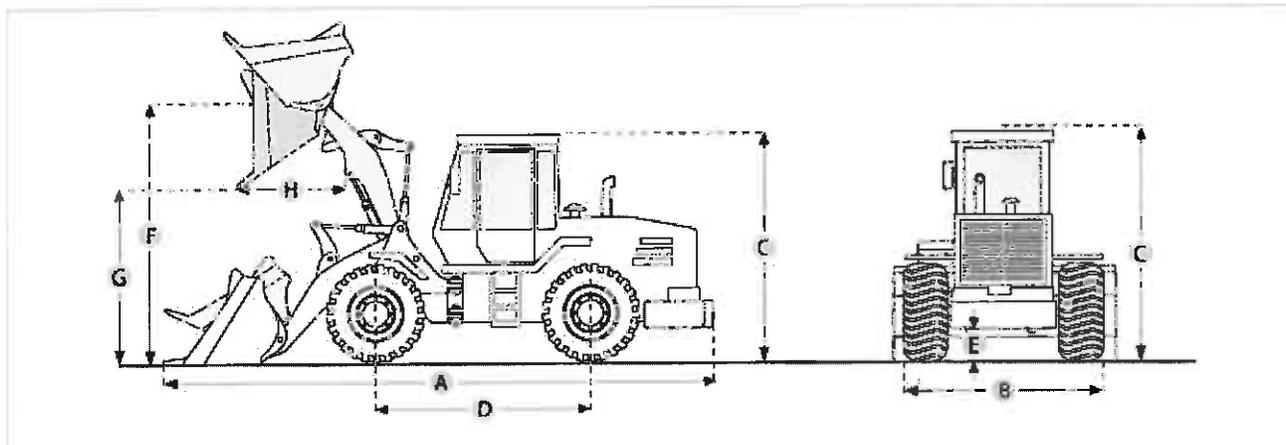
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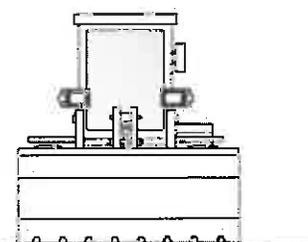
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**Selected Dimensions**

Bucket		
G. DUMP CLEARANCE AT MAX RAISE	11.3 ft in	3466 mm
Dimensions		
A. LENGTH WITH BUCKET ON GROUND	40.1 ft in	12215 mm
B. WIDTH OVER TIRES	11.8 ft in	3579 mm
C. HEIGHT TO TOP OF CAB	13.4 ft in	4128 mm
D. WHEELBASE	14.8 ft in	4550 mm
E. GROUND CLEARANCE	1.7 ft in	549 mm
F. HINGE PIN - MAX HEIGHT	19.2 ft in	5853 mm
H. REACH AT MAX LIFT AND DUMP	6.7 ft in	2028 mm



**Specification**

Engine		
MAKE	Caterpillar	
MODEL	C18 ACERT	
NET POWER	501 hp	373 kw
GROSS POWER	555 hp	414 kw
POWER MEASURED @	1800 rpm	
DISPLACEMENT	1104.5 cu in	18.1 L
NUMBER OF CYLINDERS	6	

Operational		
OPERATING WEIGHT	109249 lb	49546 kg
FUEL CAPACITY	188 gal	712 L
HYDRAULIC SYSTEM FLUID CAPACITY	70.5 gal	267 L
ENGINE OIL FLUID CAPACITY	15.9 gal	60 L
COOLING SYSTEM FLUID CAPACITY	27.2 gal	103 L
TRANSMISSION FLUID CAPACITY	18.5 gal	70 L
FRONT AXLE/DIFF FLUID CAPACITY	49 gal	186 L
REAR AXLE/DIFF FLUID CAPACITY	49 gal	186 L
STATIC TIPPING WEIGHT	76776 lb	34825 kg
TURNING RADIUS	28 ft in	8543 mm
OPERATING VOLTAGE	24 V	
ALTERNATOR SUPPLIED AMPERAGE	100 amps	
REAR AXLE OSCILLATION	26 degrees	
TIRE SIZE	35/65	

Transmission		
NUMBER OF FORWARD GEARS	4	
NUMBER OF REVERSE GEARS	3	
MAX SPEED - FORWARD	24 mph	38.6 km/h
MAX SPEED - REVERSE	15.6 mph	25.1 km/h

**Hydraulic System**

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Equipment Comparison



Caterpillar 988F Series II

Caterpillar 988H

Engine

	Caterpillar		Caterpillar	
MAKE		3408E TA		C18 ACERT
MODEL		320.7 kw		414 kw
GROSS POWER	430 hp		555 hp	
DISPLACEMENT	1098.4 cu in	18 L	1104.5 cu in	18.1 L
NET POWER			501 hp	373 kw
POWER MEASURED @				1800 rpm
NUMBER OF CYLINDERS				6

Operational

OPERATING WEIGHT	100702.8 lb	45678 kg	109249 lb	49546 kg
FUEL CAPACITY	174.1 gal	659 L	188 gal	712 L
HYDRAULIC SYSTEM FLUID CAPACITY	77.9 gal	295 L	70.5 gal	267 L
STATIC TIPPING WEIGHT	67889.2 lb	30794 kg	76776 lb	34825 kg
ENGINE OIL FLUID CAPACITY			15.9 gal	60 L
COOLING SYSTEM FLUID CAPACITY			27.2 gal	103 L
TRANSMISSION FLUID CAPACITY			18.5 gal	70 L
FRONT AXLE/DIFF FLUID CAPACITY			49 gal	186 L
REAR AXLE/DIFF FLUID CAPACITY			49 gal	186 L
TURNING RADIUS			28 ft in	8543 mm
OPERATING VOLTAGE				24 V
ALTERNATOR SUPPLIED AMPERAGE				100 amps
REAR AXLE OSCILLATION				26 degrees
TIRE SIZE				35/65

Transmission

NUMBER OF FORWARD GEARS		4		4
NUMBER OF REVERSE GEARS		3		3
MAX SPEED - FORWARD	21.8 mph	35.1 km/h	24 mph	38.6 km/h
MAX SPEED - REVERSE	14.6 mph	23.5 km/h	15.6 mph	25.1 km/h

Hydraulic System

RAISE TIME		7.9 sec		9.4 sec
DUMP TIME		3.3 sec		2.4 sec
LOWER TIME		4 sec		3.8 sec
RELIEF VALVE PRESSURE			4500 psi	31000 kPa
PUMP FLOW CAPACITY			130 gal/min	492 L/min

Bucket

BREAKOUT FORCE	82282 lb	366 kN	85068 lb	378.4 kN
DUMP CLEARANCE AT MAX RAISE	10.6 ft in	3218 mm	11.3 ft in	3466 mm
BUCKET WIDTH	12.4 ft in	3772 mm	12.5 ft in	3810 mm
BUCKET CAPACITY - HEAPED	6.6 yd3	5 m3	8.3 yd3	6.4 m3
BUCKET CAPACITY - STRUCK	4.1 yd3	3.1 m3	6.9 yd3	5.3 m3

Dimensions

LENGTH WITH BUCKET ON GROUND	35.9 ft in	10928 mm	40.1 ft in	12215 mm
WIDTH OVER TIRES	11.5 ft in	3520 mm	11.8 ft in	3579 mm
HEIGHT TO TOP OF CAB	13.5 ft in	4115 mm	13.4 ft in	4128 mm
GROUND CLEARANCE	1.6 ft in	496 mm	1.7 ft in	549 mm
REACH AT MAX LIFT AND DUMP	5.3 ft in	1611 mm	6.7 ft in	2028 mm
WHEELBASE			14.8 ft in	4550 mm
HINGE P-IN - MAX HEIGHT			19.2 ft in	5853 mm

Looking to purchase this item?

[Find a Caterpillar Wheel Loader](#) being sold at Ritchie Bros. auctions.

Need to sell equipment?

[Complete this form](#) and a Ritchie Bros. representative will contact you.

**General Permit G40-C Registration  
Section Applicability Form**

General Permit G40-C allows qualified registrants to seek registration for a variety of sources. These sources include nonmetallic mineral processing plants which include crushers, screens, transfer points (loading, unloading, etc.), open stockpiles, bins, haulroads, reciprocating internal combustion engine driven compressors, emergency standby generators, and tanks. All registered facilities will be subject to Sections 1.0, 1.1, 2.0, 3.0 and 4.0.

General Permit G40-C allows the registrant to choose which sections of the permit that they wish to seek registration under. Therefore, please mark which sections that you are applying for registration under. Please keep in mind, that if this registration is approved, the issued registration will state which sections will apply to your affected facility.

- |                        |  |                                     |
|------------------------|--|-------------------------------------|
| Section 5 <sup>1</sup> | Nonmetallic Mineral Processing Operations  | <input checked="" type="checkbox"/> |
| Section 6              | Standards of Performance for Nonmetallic Mineral Processing Plants that Commenced Construction, Reconstruction or Modification after August 31, 1983 but before April 22, 2008 (40CFR60 Subpart OOO) | <input type="checkbox"/>            |
| Section 7              | Standards of Performance for Nonmetallic Mineral Processing Plants that Commenced Construction, Reconstruction or Modification on or after April 22, 2008. (40CFR60 Subpart OOO)                     | <input checked="" type="checkbox"/> |
| Section 8 <sup>2</sup> | Reciprocating Internal Combustion Engines (R.I.C.E.)   | <input checked="" type="checkbox"/> |
| Section 9              | Tanks  | <input type="checkbox"/>            |
| Section 10             | Standards of Performance for Stationary Compression Ignition Internal Combustion Engines (40CFR60 Subpart IIII)  | <input checked="" type="checkbox"/> |
| Section 11             | Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (40CFR60 Subpart JJJJ)  | <input type="checkbox"/>            |

1 Affected facilities that are subject to Section 5 may also be subject to Sections 6 and 7. Therefore, if the applicant is seeking registration under multiple sections, they will need to select all applicable sections.

2 Affected facilities that are subject to Section 8 may also be subject to Sections 10 or 11. Therefore, if the applicant is seeking registration under multiple sections, they will need to select all applicable sections.

ATTACHMENT I

EMISSIONS CALCULATIONS





**3. WIND EROSION OF STOCKPILES (including all stockpiles of raw coal, clean coal, coal refuse, etc.)**

p =	number of days per year with precipitation >0.01 inch	148
f =	percentage of time that the unobstructed wind speed exceeds 12 mph at the mean pile height	11

Source ID No.	Stockpile Description	Silt Content of Material %	Stockpile base area Max. sqft	Control Device ID Number	Control Efficiency %
OS-1	2A's	5	5,027	SW-WS	70
OS-2	3's	0	5,027	SW-WS	70
OS-3	Sand	5	5,027	SW-WS	70
OS-4	8's	0	5,027	SW-WS	70
OS-5	57's	0	5,027	SW-WS	70

**4. UNPAVED HAULROADS (including all equipment traffic involved in process, haul trucks, endloaders, etc.)**

s =	silt content of road surface material (%)	10
p =	number of days per year with precipitation >0.01 inch	148
M <sub>dry</sub> =	surface material moisture content (%) - dry conditions	10

Item Number	Description	Number of wheels	Mean Vehicle Weight(tons)	Mean Vehicle Speed (mph)	Miles per Trip	Maximum Trips Per Hour	Maximum Trips Per Year	Control Device ID Number	Control Efficiency %
1	988H CAT Loader	4	55	10	0.25	25	57,600	HR-WS	70
2	988F CAT Loader	4	50	10	0.25	25	57,600	HR-WS	70
3									
4									
5									
6									
7									
8									

**5. INDUSTRIAL PAVED HAULROADS (including all equipment traffic involved in process, haul trucks, endloaders, etc.)**

sL =	road surface silt loading, (g/ft <sup>2</sup> )	70
P =	number of days per year with precipitation >0.01 inch	148

Item Number	Description	Mean Vehicle Weight (tons)	Miles per Trip	Maximum Trips Per Hour	Maximum Trips Per Year	Control Device ID Number	Control Efficiency %
1							
2							
3							
4							
5							
6							
7							
8							

**1. Emissions From CRUSHING AND SCREENING**

**1a. Primary Crushing**

Primary Crusher ID Number	PM				PM-10			
	Uncontrolled		Controlled		Uncontrolled		Controlled	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
JC-1	0.890	1.068	0.178	0.214	0.445	0.534	0.089	0.107
JC-2	0.800	0.960	0.160	0.192	0.400	0.480	0.080	0.096
JC-3	0.800	0.960	0.160	0.192	0.400	0.480	0.080	0.096
RB-1	0.800	0.960	0.160	0.192	0.400	0.480	0.080	0.096
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>TOTAL</b>	<b>3.290</b>	<b>3.948</b>	<b>0.658</b>	<b>0.790</b>	<b>1.645</b>	<b>1.974</b>	<b>0.329</b>	<b>0.395</b>

**1b. Secondary and Tertiary Crushing**

Secondary & Tertiary Crusher ID	PM				PM-10			
	Uncontrolled		Controlled		Uncontrolled		Controlled	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
OT-1	1.933	2.320	0.387	0.464	0.859	1.031	0.172	0.208
OT-2	0.821	0.985	0.164	0.197	0.365	0.438	0.073	0.088
OT-3	2.160	2.592	0.432	0.518	0.960	1.152	0.192	0.230
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>TOTAL</b>	<b>4.914</b>	<b>5.897</b>	<b>0.983</b>	<b>1.179</b>	<b>2.184</b>	<b>2.621</b>	<b>0.437</b>	<b>0.524</b>

**1c. Screening**

Screen ID Number	PM				PM-10			
	Uncontrolled		Controlled		Uncontrolled		Controlled	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
TD-1	15.000	18.000	3.000	3.600	5.220	6.264	1.044	1.253
TD-2	12.750	15.300	2.550	3.060	4.437	5.324	0.887	1.065
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>TOTAL</b>	<b>27.750</b>	<b>33.300</b>	<b>5.550</b>	<b>6.660</b>	<b>9.657</b>	<b>11.588</b>	<b>1.931</b>	<b>2.318</b>

Crushing and Screening	PM				PM-10			
	Uncontrolled		Controlled		Uncontrolled		Controlled	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
<b>TOTAL</b>	<b>35.954</b>	<b>43.145</b>	<b>7.191</b>	<b>8.629</b>	<b>13.486</b>	<b>16.183</b>	<b>2.697</b>	<b>3.237</b>

**1. Emissions From CRUSHING AND SCREENING (Continued)**

**EMISSION FACTORS**

source: AP42, Fifth Edition, Revised 08/2004

(lb/ton of material throughput)

<b>PM</b>	
Primary Crushing	0.002
Tertiary Crushing	0.0054
Screening	0.025

<b>PM-10</b>	
Primary Crushing	0.001
Tertiary Crushing	0.0024
Screening	0.0087



## 2. Emissions From TRANSFER POINTS (continued)

Transfer Point ID No.	PM				PM-10			
	Uncontrolled		Controlled		Uncontrolled		Controlled	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTALS	11.750	14.099	3.525	4.230	5.557	6.669	1.667	2.001

**Source:**

AP42, Fifth Edition, Revised 11/2006  
13.2.4 Aggregate Handling and Storage Piles

Emissions From Batch Drop

$$E = k \cdot (0.0032) \cdot [(U/5)^{1.3}] / [(M/2)^{1.4}] = \text{pounds/ton}$$

Where:

		PM	PM-10
k =	Particle Size Multiplier (dimensionless)	0.74	0.35
U =	Mean Wind Speed (mph)		
M =	Material Moisture Content (%)		

Assumptions:

**k - Particle size multiplier**

For PM (< or equal to 30um) k = 0.74

For PM-10 (< or equal to 10um) k = 0.35

**Emission Factor**

For PM  $E = \frac{0.0032 \cdot k \cdot (U/5)^{1.3}}{(M/2)^{1.4}}$  =lb/ton

For PM-10  $E = \frac{0.0032 \cdot k \cdot (U/5)^{1.3}}{(M/2)^{1.4}}$  =lb/ton

For lb/hr  $[\text{lb/ton}] \cdot [\text{ton/hr}] = [\text{lb/hr}]$

For Tons/year  $[\text{lb/ton}] \cdot [\text{ton/yr}] \cdot [\text{ton}/2000\text{lb}] = [\text{ton/yr}]$

### 3. Emissions From WIND EROSION OF STOCKPILES

Stockpile ID No.	PM				PM-10			
	Uncontrolled		Controlled		Uncontrolled		Controlled	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
OS-1	0.018	0.081	0.006	0.024	0.009	0.038	0.003	0.011
OS-2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
OS-3	0.018	0.081	0.006	0.024	0.009	0.038	0.003	0.011
OS-4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
OS-5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTALS	0.037	0.162	0.011	0.048	0.017	0.076	0.005	0.023

**Source:**

*Air Pollution Engineering Manual*

Storage Pile Wind Erosion (Active Storage)

$$E = 1.7 * [s/1.5] * [(365-p)/235] * [f/15] = (\text{lb/day/acre})$$

Where:

s =	silt content of material
p =	number of days with >0.01 inch of precipitation per year
f =	percentage of time that the unobstructed wind speed exceeds 12 mph at the mean pile height

**Emission Factors**

For PM  $E = (1.7) * ((\text{Inputs!F147})/1.5) * ((365 - \text{Inputs!I139})/235) * ((\text{Inputs!I140})/15)$

For PM-10  $E = 0.47 * (1.7) * ((\text{Inputs!F147})/1.5) * ((365 - \text{Inputs!I139})/235) * ((\text{Inputs!I140})/15)$

For lb/hr  $[\text{lb/day/acre}] * [\text{day}/24\text{hr}] * [\text{base area of pile (acres)}] = \text{lb/hr}$

For Ton/yr  $[\text{lb/day/acre}] * [365\text{day/yr}] * [\text{Ton}/2000\text{lb}] * [\text{base area of pile (acres)}] = \text{Ton/yr}$

#### 4. Emissions From UNPAVED HAULROADS

Item No.	PM				PM-10			
	Uncontrolled		Controlled		Uncontrolled		Controlled	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
1	99.79	114.96	29.94	34.49	29.46	33.93	8.84	10.18
2	95.61	110.14	28.68	33.04	28.22	32.51	8.47	9.75
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTALS	195.40	225.10	58.62	67.53	57.67	66.44	17.30	19.93

**Source:**

AP42, Fifth Edition, Revised 11/2006  
13.2.2 Unpaved Roads

Emission Estimate For Unpaved Haulroads at Industrial Sites (equation 1)

$$E = k \cdot ((s/12)^a) \cdot ((W/3)^b) = \text{lb/vmt}$$

Where:

		PM	PM-10
k =	particle size multiplier	4.90	1.50
a =	empirical constant	0.7	0.9
b =	empirical constant	0.45	0.45

**Emission Factors**

For PM  $E = ((\$35) \cdot (((\text{Inputs!}\$163)/12)^{(\$36)}) \cdot (((\text{Inputs!}H171)/3)^{\$37}))$

For PM-10  $E = ((\$J35) \cdot (((\text{Inputs!}\$163)/12)^{(\$J36)}) \cdot (((\text{Inputs!}H171)/3)^{\$J37}))$

For lb/hr  $(\text{lb/vmt}) \cdot (\text{miles per trip}) \cdot (\text{Max trips per hour})$

For Ton/yr  $(\text{lb/vmt}) \cdot (\text{miles per trip}) \cdot (\text{Max trips per year}) \cdot (1/2000)$

### 5. Emissions From INDUSTRIAL PAVED HAULROADS

Item No.	PM				PM-10			
	Uncontrolled		Controlled		Uncontrolled		Controlled	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>TOTALS</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>

**Source:**

AP42, Fifth Edition, Revised 11/2006  
13.2.1 PAVED ROADS

Emission Estimate For Paved Haulroads

$$E = [k * (sL/2)^{0.65} * (W/3)^{1.5} - C] * (1 - (P/4 * N)) = \text{lb / Vehicle Mile Traveled (VMT)}$$

Where:

		PM	PM-10
k =	particle size multiplier	0.082	0.016
sL =	road surface silt loading, (g/ft <sup>2</sup> )	70	
P =	number of days per year with precipitation >0.01 inch	148	
N =	number of days in averaging period	365	
C =	factor for exhaust, brake wear and tire wear	0.00047	0.00047

**Emission Factors**

For PM  $E = (k * (sL/2)^{0.65} * ((Inputs!G190)/3)^{1.5} - C) * (1 - ((Inputs!G190)/4 * N))$

For PM-10  $E = (k * (sL/2)^{0.65} * ((Inputs!G190)/3)^{1.5} - C) * (1 - ((Inputs!G190)/4 * N))$

For lb/hr  $(\text{lb/vmt}) * (\text{miles per trip}) * (\text{Max trips per hour})$

For Ton/yr  $(\text{lb/vmt}) * (\text{miles per trip}) * (\text{Max trips per year}) * (1/2000)$

**TABLE 5 CE-1**  
**MELLOTT COMPANY- Proctor & Gamble Warehouse, Inwood, WV**  
**EMISSIONS ESTIMATE - MOBILE PLANT ENGINE - CE-1**  
**October 1, 2015**

Plan/Permit I.D.	Diesel Powered Power Units Permit Approved Equipment	POTENTIAL FUEL USE		ACTUAL FUEL USE		ACTUAL NOx EMISSIONS			
		Potential Fuel Use Per Hour of Operation (gal/hr)	Potential Fuel Use per year of Operation (gal/yr)	Actual Fuel Use Per Hour of Operation (gal/hr)	Actual Fuel Use per year of Operation (gal/yr)	Units Lb Nox/Gal Fuel	Emission Factor References (See Note 7)	Actual NOx Per Hour of Operation (lb/hr)	Actual NOx per year of Operation (Tons/yr)
CE-1	Cat, 3412CDITA, 1,081 HP, Diesel Engine	53.00	464,280	17.00	40,800	0.3228	B	5.49	6.59
<b>TOTALS</b>		<b>53.00</b>	<b>464,280</b>	<b>17.00</b>	<b>40,800</b>			<b>5.49</b>	<b>6.59</b>

Plan/Permit I.D.	Diesel Powered Power Units Permit Approved Equipment	POTENTIAL MmBTU'S		ACTUAL MmBTU'S	
		Potential MmBTU'S Per Hour of Operation (MmBtu/hr)	Potential MmBTU's per year of Operation (MmBtu/yr)	Actual MmBTU'S Per Hour of Operation (MmBtu/hr)	Actual MmBTU's per year of Operation (MmBtu/yr)
CE-1	Cat, 3412CDITA, 1,081 HP, Diesel Engine	7.26	63,620.29	2.33	5,590.82
<b>TOTALS</b>		<b>7.26</b>	<b>63,620.29</b>	<b>2.33</b>	<b>5,591</b>

**ESTIMATED EMISSIONS - ALL DIESEL FUELED GENERATORS**

ITEM	POLLUTANT	Emission Factor	Units	POTENTIAL EMISSIONS		ACTUAL EMISSIONS		Emission Factor References (See Note 9)
				Per Hour of Operation (lbs/hr)	Per year of Operation (tons/year)	Per Hour of Operation (lbs/hr)	Per year of Operation (tons/year)	
1	PM-10	0.31000000	lb/MmBtu	2.25	9.86	0.72	0.87	A
2	NOx	see table above		5.49	24.04	5.49	6.59	B,C,D,E,F
3	CO	see CO table		0.97	4.24	0.97	1.16	G,H,I,J,K
4	SOx	0.29000000	lb/MmBtu	2.11	9.22	0.68	0.81	A
5	Total Organic Compounds (TOC)	0.35000000	lb/MmBtu	2.54	11.13	0.82	0.98	A2
6	Benzene*	0.00093300	lb/MmBtu	0.01	0.03	0.00	0.00	A2
7	Toluene*	0.00040900	lb/MmBtu	0.00	0.01	0.00	0.00	A2
8	Xylenes*	0.00028500	lb/MmBtu	0.00	0.01	0.00	0.00	A2
9	Propylene*	0.00025800	lb/MmBtu	0.00	0.01	0.00	0.00	A2
10	1,3-Butadiene*	0.00003910	lb/MmBtu	0.00	0.00	0.00	0.00	A2
11	Formaldehyde*	0.00118000	lb/MmBtu	0.01	0.04	0.00	0.00	A2
12	Acetaldehyde*	0.00076700	lb/MmBtu	0.01	0.02	0.00	0.00	A2
13	Acrolein*	0.00009250	lb/MmBtu	0.00	0.00	0.00	0.00	A2
14	Naphthalene*	0.00008480	lb/MmBtu	0.00	0.00	0.00	0.00	A2
HAP Total				0.03	0.13	0.01	0.01	

\* Hazardous air pollutant (HAP) listed in the Clear Air Act.  
 TOC includes VOC's

**Notes**

1. Estimated hourly fuel use based on estimated maximum data, actual fuel use from field measured identical engines which has been shown to be much lower.
2. Potential Use indicates Continuous operation 24 hrs/day, 365 days a year, or 8,760 hours total.
3. Per TABLE 3.4-1, US EPA AP-42 (10/96) - Heating value of diesel assumed to be 19,300 Btu/lb., with a density of 7.1 lb/gal.  
 Therefore 19,300 Btu/lb x 7.1 lb./gal. = 137,030 Btu/gal.
4. Percent Sulfur in Fuel Oil = 0.0015 %
5. Actual Hours of Operation 2,400

**TABLE 5 CE-2**  
**MELLOTT COMPANY- Proctor & Gamble Warehouse, Inwood, WV**  
**EMISSIONS ESTIMATE - MOBILE PLANT ENGINE - CE-2**  
**October 1, 2015**

Plan/Permit I.D.	Diesel Powered Power Units Permit Approved Equipment	POTENTIAL FUEL USE		ACTUAL FUEL USE		ACTUAL NOx EMISSIONS			
		Potential Fuel Use Per Hour of Operation (gal/hr)	Potential Fuel Use per year of Operation (gal/yr)	Actual Fuel Use Per Hour of Operation (gal/hr)	Actual Fuel Use per year of Operation (gal/yr)	Units Lb Nox/Gal Fuel	Emission Factor References (See Note 7)	Actual NOx Per Hour of Operation (lb/hr)	Actual NOx per year of Operation (Tons/yr)
CE-2	Cat, 3412CDITA, 1,081 HP, Diesel Engine	53.00	464,280	17.06	40,944	0.3228	B	5.51	6.61
<b>TOTALS</b>		<b>53.00</b>	<b>464,280</b>	<b>17.06</b>	<b>40,944</b>			<b>5.51</b>	<b>6.61</b>

Plan/Permit I.D.	Diesel Powered Power Units Permit Approved Equipment	POTENTIAL MMBTU'S		ACTUAL MMBTU'S	
		Potential MmBTU'S Per Hour of Operation (MmBtu/hr)	Potential MmBTU's per year of Operation (MmBtu/yr)	Actual MmBTU'S Per Hour of Operation (MmBtu/hr)	Actual MmBTU's per year of Operation (MmBtu/yr)
CE-2	Cat, 3412CDITA, 1,081 HP, Diesel Engine	7.26	63,620.29	2.34	5,610.56
<b>TOTALS</b>		<b>7.26</b>	<b>63,620.29</b>	<b>2.34</b>	<b>5,611</b>

**ESTIMATED EMISSIONS - ALL DIESEL FUELED GENERATORS**

ITEM	POLLUTANT	Emission Factor	Units	POTENTIAL EMISSIONS		ACTUAL EMISSIONS		Emission Factor References (See Note 9)
				Per Hour of Operation (lbs/hr)	Per year of Operation (tons/year)	Per Hour of Operation (lbs/hr)	Per year of Operation (tons/year)	
1	PM-10	0.31000000	lb/MmBtu	2.25	9.86	0.72	0.87	A
2	NOx	see table above		5.51	24.12	5.51	6.61	B,C,D,E,F
3	CO	see CO table		0.97	4.26	0.97	1.17	G,H,I,J,K
4	SOx	0.29000000	lb/MmBtu	2.11	9.22	0.68	0.81	A
5	Total Organic Compounds (TOC)	0.35000000	lb/MmBtu	2.54	11.13	0.82	0.98	A2
6	Benzene*	0.00093300	lb/MmBtu	0.01	0.03	0.00	0.00	A2
7	Toluene*	0.00040900	lb/MmBtu	0.00	0.01	0.00	0.00	A2
8	Xylenes*	0.00028500	lb/MmBtu	0.00	0.01	0.00	0.00	A2
9	Propylene*	0.00025800	lb/MmBtu	0.00	0.01	0.00	0.00	A2
10	1,3-Butadiene*	0.00003910	lb/MmBtu	0.00	0.00	0.00	0.00	A2
11	Formaldehyde*	0.00118000	lb/MmBtu	0.01	0.04	0.00	0.00	A2
12	Acetaldehyde*	0.00076700	lb/MmBtu	0.01	0.02	0.00	0.00	A2
13	Acrolein*	0.00009250	lb/MmBtu	0.00	0.00	0.00	0.00	A2
14	Naphthalene*	0.00008480	lb/MmBtu	0.00	0.00	0.00	0.00	A2
HAP Total				0.03	0.13	0.01	0.01	

\* Hazardous air pollutant (HAP) listed in the Clear Air Act.  
 TOC includes VOC's

**Notes**

- Estimated hourly fuel use based on estimated maximum data, actual fuel use from field measured identical engines which has been shown to be much lower.
- Potential Use indicates Continuous operation 24 hrs/day, 365 days a year, or 8,760 hours total.
- Per TABLE 3.4-1, US EPA AP-42 (10/96) - Heating value of diesel assumed to be 19,300 Btu/lb. , with a density of 7.1 lb/gal.  
 Therefore 19,300 Btu/lb x 7.1 lb./gal. = 137,030 Btu/gal.
- Percent Sulfur in Fuel Oil = 0.0015 %
- Actual Hours of Operation 2,400

**TABLE 5 CE-3**  
**MELLOTT COMPANY- Proctor & Gamble Warehouse, Inwood, WV**  
**EMISSIONS ESTIMATE - MOBILE PLANT ENGINE-CE-3**  
**October 1, 2015**

Plan/Permit I.D.	Diesel Powered Power Units Permit Approved Equipment	POTENTIAL FUEL USE		ACTUAL FUEL USE		ACTUAL NOx EMISSIONS			
		Potential Fuel Use Per Hour of Operation (gal/hr)	Potential Fuel Use per year of Operation (gal/yr)	Actual Fuel Use Per Hour of Operation (gal/hr)	Actual Fuel Use per year of Operation (gal/yr)	Units Lb Nox/Gal Fuel	Emission Factor References (See Note 7)	Actual NOx Per Hour of Operation (lb/hr)	Actual NOx per year of Operation (Tons/yr)
CE-3	Cat, C27, 1214 HP, Diesel Engine	57.00	499,320	14.36	34,464	0.2410	C	3.46	4.15
<b>TOTALS</b>		<b>57.00</b>	<b>499,320</b>	<b>14.36</b>	<b>34,464</b>			<b>3.46</b>	<b>4.15</b>

Plan/Permit I.D.	Diesel Powered Power Units Permit Approved Equipment	POTENTIAL MmbTU'S		ACTUAL MmbTU'S	
		Potential MmbTU'S Per Hour of Operation (Mmbtu/hr)	Potential MmbTU's per year of Operation (Mmbtu/yr)	Actual MmbTU'S Per Hour of Operation (Mmbtu/hr)	Actual MmbTU's per year of Operation (Mmbtu/yr)
CE-3	Cat, C27, 1214 HP, Diesel Engine	7.81	68,421.82	1.97	4,722.60
<b>TOTALS</b>		<b>7.81</b>	<b>68,421.82</b>	<b>1.97</b>	<b>4,723</b>

**ESTIMATED EMISSIONS - ALL DIESEL FUELED GENERATORS**

ITEM	POLLUTANT	Emission Factor	Units	POTENTIAL EMISSIONS		ACTUAL EMISSIONS		Emission Factor References (See Note 9)
				Per Hour of Operation (lbs/hr)	Per year of Operation (tons/year)	Per Hour of Operation (lbs/hr)	Per year of Operation (tons/year)	
1	PM-10	0.31000000	lb/MmBtu	2.42	10.61	0.61	0.73	A
2	NOx	see table above		3.46	15.16	3.46	4.15	B,C,D,E,F
3	CO	see CO table		0.15	0.67	0.15	0.18	G,H,I,J,K
4	SOx	0.29000000	lb/MmBtu	2.27	9.92	0.57	0.68	A
5	Total Organic Compounds (TOC)	0.35000000	lb/MmBtu	2.73	11.97	0.69	0.83	A2
6	Benzene*	0.00093300	lb/MmBtu	0.01	0.03	0.00	0.00	A2
7	Toluene*	0.00040900	lb/MmBtu	0.00	0.01	0.00	0.00	A2
8	Xylenes*	0.00028500	lb/MmBtu	0.00	0.01	0.00	0.00	A2
9	Propylene*	0.00025800	lb/MmBtu	0.00	0.01	0.00	0.00	A2
10	1,3-Butadiene*	0.00003910	lb/MmBtu	0.00	0.00	0.00	0.00	A2
11	Formaldehyde*	0.00118000	lb/MmBtu	0.01	0.04	0.00	0.00	A2
12	Acetaldehyde*	0.00076700	lb/MmBtu	0.01	0.03	0.00	0.00	A2
13	Acrolein*	0.00009250	lb/MmBtu	0.00	0.00	0.00	0.00	A2
14	Naphthalene*	0.00008480	lb/MmBtu	0.00	0.00	0.00	0.00	A2
	HAP Total			0.03	0.14	0.01	0.01	

\* Hazardous air pollutant (HAP) listed in the Clear Air Act.  
 TOC includes VOC's

**Notes**

- Estimated hourly fuel use based on estimated maximum data, actual fuel use from field measured identical engines which has been shown to be much lower.
- Potential Use indicates Continuous operation 24 hrs/day, 365 days a year, or 8,760 hours total.
- Per TABLE 3.4-1, US EPA AP-42 (10/96) - Heating value of diesel assumed to be 19,300 Btu/lb., with a density of 7.1 lb/gal.  
 Therefore 19,300 Btu/lb x 7.1 lb./gal. = 137,030 Btu/gal.
- Percent Sulfur in Fuel Oil = 0.0015 %
- Actual Hours of Operation = 2,400

**TABLE 5 CE-4**  
**MELLOTT COMPANY- Proctor & Gamble Warehouse, Inwood, WV**  
**EMISSIONS ESTIMATE - MOBILE PLANT ENGINE - CE-4**  
**October 1, 2015**

Plan/Permit I.D.	Diesel Powered Power Units Permit Approved Equipment	POTENTIAL FUEL USE		ACTUAL FUEL USE		ACTUAL NOx EMISSIONS			
		Potential Fuel Use Per Hour of Operation (gal/hr)	Potential Fuel Use per year of Operation (gal/yr)	Actual Fuel Use Per Hour of Operation (gal/hr)	Actual Fuel Use per year of Operation (gal/yr)	Units	Emission Factor References (See Note 7)	Actual NOx Per Hour of Operation (lb/hr)	Actual NOx per year of Operation (Tons/yr)
CE-4	CAT, C13, 415 HP Diesel Engine	20.70	181,332	8.74	20,976	Lb Nox/Gal Fuel	D	1.24	1.48
<b>TOTALS</b>		<b>20.70</b>	<b>181,332</b>	<b>8.74</b>	<b>20,976</b>			<b>1.24</b>	<b>1.48</b>

Plan/Permit I.D.	Diesel Powered Power Units Permit Approved Equipment	POTENTIAL MmbTU'S		ACTUAL MmbTU'S	
		Potential MmbTU'S Per Hour of Operation (Mmbtu/hr)	Potential MmbTU's per year of Operation (Mmbtu/yr)	Actual MmbTU'S Per Hour of Operation (Mmbtu/hr)	Actual MmbTU's per year of Operation (Mmbtu/yr)
CE-4	CAT, C13, 415 HP Diesel Engine	2.84	24,847.92	1.20	2,874.34
<b>TOTALS</b>		<b>2.84</b>	<b>24,847.92</b>	<b>1.20</b>	<b>2,874</b>

**ESTIMATED EMISSIONS - ALL DIESEL FUELED GENERATORS**

ITEM	POLLUTANT	Emission Factor	Units	POTENTIAL EMISSIONS		ACTUAL EMISSIONS		Emission Factor References (See Note 9)
				Per Hour of Operation (lbs/hr)	Per year of Operation (tons/year)	Per Hour of Operation (lbs/hr)	Per year of Operation (tons/year)	
1	PM-10	0.31000000	lb/MmBtu	0.88	3.85	0.37	0.45	A
2	NOx	see table above		1.24	5.42	1.24	1.48	B,C,D,E,F
3	CO	see CO table		0.50	2.18	0.50	0.60	G,H,I,J,K
4	SOx	0.29000000	lb/MmBtu	0.82	3.60	0.35	0.42	A
5	Total Organic Compounds (TOC)	0.35000000	lb/MmBtu	0.99	4.35	0.42	0.50	A2
6	Benzene*	0.00093300	lb/MmBtu	0.00	0.01	0.00	0.00	A2
7	Toluene*	0.00040900	lb/MmBtu	0.00	0.01	0.00	0.00	A2
8	Xylenes*	0.00028500	lb/MmBtu	0.00	0.00	0.00	0.00	A2
9	Propylene*	0.00025800	lb/MmBtu	0.00	0.00	0.00	0.00	A2
10	1,3-Butadiene*	0.00003910	lb/MmBtu	0.00	0.00	0.00	0.00	A2
11	Formaldehyde*	0.00118000	lb/MmBtu	0.00	0.01	0.00	0.00	A2
12	Acetaldehyde*	0.00076700	lb/MmBtu	0.00	0.01	0.00	0.00	A2
13	Acrolein*	0.00009250	lb/MmBtu	0.00	0.00	0.00	0.00	A2
14	Naphthalene*	0.00008480	lb/MmBtu	0.00	0.00	0.00	0.00	A2
<b>HAP Total</b>				<b>0.01</b>	<b>0.05</b>	<b>0.00</b>	<b>0.01</b>	

\* Hazardous air pollutant (HAP) listed in the Clear Air Act.  
 TOC includes VOC's

**Notes**

- Estimated hourly fuel use based on estimated maximum data, actual fuel use from field measured identical engines which has been shown to be much lower.
- Potential Use indicates Continuous operation 24 hrs/day, 365 days a year, or 8,760 hours total.
- Per TABLE 3.4-1, US EPA AP-42 (10/96) - Heating value of diesel assumed to be 19,300 Btu/lb., with a density of 7.1 lb/gal.  
 Therefore 19,300 Btu/lb x 7.1 lb./gal. = 137,030 Btu/gal.
- Percent Sulfur in Fuel Oil = 0.0015 %
- Actual Hours of Operation = 2,400

**TABLE 5 CE-5**  
**MELLOTT COMPANY- Proctor & Gamble Warehouse, Inwood, WV**  
**EMISSIONS ESTIMATE - PLANT ENGINE CE-5**  
**October 1, 2015**

Plan/Permit I.D.	Diesel Powered Power Units Permit Approved Equipment	POTENTIAL FUEL USE		ACTUAL FUEL USE		ACTUAL NOx EMISSIONS			
		Potential Fuel Use Per Hour of Operation (gal/hr)	Potential Fuel Use per year of Operation (gal/yr)	Actual Fuel Use Per Hour of Operation (gal/hr)	Actual Fuel Use per year of Operation (gal/yr)	Units	Emission Factor References (See Note 7)	Actual NOx Per Hour of Operation (lb/hr)	Actual NOx per year of Operation (Tons/yr)
CE-5	CAT, C9, 300 HP Diesel Engine	16.00	140,160	9.79	23,496	Lb Nox/Gal Fuel	E	1.40	1.68
<b>TOTALS</b>		<b>16.00</b>	<b>140,160</b>	<b>9.79</b>	<b>23,496</b>			<b>1.40</b>	<b>1.68</b>

Plan/Permit I.D.	Diesel Powered Power Units Permit Approved Equipment	POTENTIAL MmBTU'S		ACTUAL MmBTU'S	
		Potential MmBTU'S Per Hour of Operation (MmBtu/hr)	Potential MmBTU's per year of Operation (MmBtu/yr)	Actual MmBTU'S Per Hour of Operation (MmBtu/hr)	Actual MmBTU's per year of Operation (MmBtu/yr)
CE-5	CAT, C9, 300 HP Diesel Engine	2.19	19,206.12	1.34	3,219.66
<b>TOTALS</b>		<b>2.19</b>	<b>19,206.12</b>	<b>1.34</b>	<b>3,220</b>

**ESTIMATED EMISSIONS - ALL DIESEL FUELED GENERATORS**

ITEM	POLLUTANT	Emission Factor	Units	POTENTIAL EMISSIONS		ACTUAL EMISSIONS		Emission Factor References (See Note 9)
				Per Hour of Operation (lbs/hr)	Per year of Operation (tons/year)	Per Hour of Operation (lbs/hr)	Per year of Operation (tons/year)	
1	PM-10	0.31000000	lb/MmBtu	0.68	2.98	0.42	0.50	A
2	NOx	see table above		1.40	6.14	1.40	1.68	B,C,D,E,F
3	CO	see CO table		1.11	4.85	1.11	1.33	G,H,I,J,K
4	SOx	0.29000000	lb/MmBtu	0.64	2.78	0.39	0.47	A
5	Total Organic Compounds (TOC)	0.35000000	lb/MmBtu	0.77	3.36	0.47	0.56	A2
6	Benzene*	0.00093300	lb/MmBtu	0.00	0.01	0.00	0.00	A2
7	Toluene*	0.00040900	lb/MmBtu	0.00	0.00	0.00	0.00	A2
8	Xylenes*	0.00028500	lb/MmBtu	0.00	0.00	0.00	0.00	A2
9	Propylene*	0.00025800	lb/MmBtu	0.00	0.00	0.00	0.00	A2
10	1,3-Butadiene*	0.00003910	lb/MmBtu	0.00	0.00	0.00	0.00	A2
11	Formaldehyde*	0.00118000	lb/MmBtu	0.00	0.01	0.00	0.00	A2
12	Acetaldehyde*	0.00076700	lb/MmBtu	0.00	0.01	0.00	0.00	A2
13	Acrolein*	0.00009250	lb/MmBtu	0.00	0.00	0.00	0.00	A2
14	Naphthalene*	0.00008480	lb/MmBtu	0.00	0.00	0.00	0.00	A2
	HAP Total			0.01	0.04	0.01	0.01	

\* Hazardous air pollutant (HAP) listed in the Clear Air Act.  
 TOC includes VOC's

**Notes**

- Estimated hourly fuel use based on estimated maximum data, actual fuel use from field measured identical engines which has been shown to be much lower.
- Potential Use indicates Continuous operation 24 hrs/day, 365 days a year, or 8,760 hours total.
- Per TABLE 3.4-1, US EPA AP-42 (10/96) - Heating value of diesel assumed to be 19,300 Btu/lb., with a density of 7.1 lb/gal.  
 Therefore 19,300 Btu/lb x 7.1 lb./gal. = 137,030 Btu/gal.
- Percent Sulfur in Fuel Oil = 0.0015 %
- Actual Hours of Operation = 2,400
- Potential Hours of Operation = 8,760

**TABLE 5 CE-6**  
**MELLOTT COMPANY- Proctor & Gamble Warehouse, Inwood, WV**  
**EMISSIONS ESTIMATE - MOBILE PLANT ENGINE - CE-6**  
**October 1, 2015**

Plan/Permit I.D.	Diesel Powered Power Units Permit Approved Equipment	POTENTIAL FUEL USE		ACTUAL FUEL USE		ACTUAL NOx EMISSIONS			
		Potential Fuel Use Per Hour of Operation (gal/hr)	Potential Fuel Use per year of Operation (gal/yr)	Actual Fuel Use Per Hour of Operation (gal/hr)	Actual Fuel Use per year of Operation (gal/yr)	Units	Emission Factor References	Actual NOx Per Hour of Operation (lb/hr)	Actual NOx per year of Operation (Tons/yr)
CE-6	CAT, C13, 415 HP Diesel Engine	20.70	181,332	8.74	20,976	Lb Nox/Gal Fuel	D	1.24	1.48
<b>TOTALS</b>		<b>20.70</b>	<b>181,332</b>	<b>8.74</b>	<b>20,976</b>			<b>1.24</b>	<b>1.48</b>

Plan/Permit I.D.	Diesel Powered Power Units Permit Approved Equipment	POTENTIAL MmbTU'S		ACTUAL MmbTU'S	
		Potential MmbTU'S Per Hour of Operation (Mmbtu/hr)	Potential MmbTU's per year of Operation (Mmbtu/yr)	Actual MmbTU'S Per Hour of Operation (Mmbtu/hr)	Actual MmbTU's per year of Operation (Mmbtu/yr)
CE-6	CAT, C13, 415 HP Diesel Engine	2.84	24,847.92	1.20	2,874.34
<b>TOTALS</b>		<b>2.84</b>	<b>24,847.92</b>	<b>1.20</b>	<b>2,874</b>

**ESTIMATED EMISSIONS - ALL DIESEL FUELED GENERATORS**

ITEM	POLLUTANT	Emission Factor	Units	POTENTIAL EMISSIONS		ACTUAL EMISSIONS		Emission Factor References (See Note 9)
				Per Hour of Operation (lbs/hr)	Per year of Operation (tons/year)	Per Hour of Operation (lbs/hr)	Per year of Operation (tons/year)	
1	PM-10	0.31000000	lb/MmBtu	0.88	3.85	0.37	0.45	A
2	NOx	see table above		1.24	5.42	1.24	1.48	B,C,D,E,F
3	CO	see CO table		0.50	2.18	0.50	0.60	G,H,I,J,K
4	SOx	0.29000000	lb/MmBtu	0.82	3.60	0.35	0.42	A
5	Total Organic Compounds (TOC)	0.35000000	lb/MmBtu	0.99	4.35	0.42	0.50	A2
6	Benzene*	0.00093300	lb/MmBtu	0.00	0.01	0.00	0.00	A2
7	Toluene*	0.00040900	lb/MmBtu	0.00	0.01	0.00	0.00	A2
8	Xylenes*	0.00028500	lb/MmBtu	0.00	0.00	0.00	0.00	A2
9	Propylene*	0.00025800	lb/MmBtu	0.00	0.00	0.00	0.00	A2
10	1,3-Butadiene*	0.00003910	lb/MmBtu	0.00	0.00	0.00	0.00	A2
11	Formaldehyde*	0.00118000	lb/MmBtu	0.00	0.01	0.00	0.00	A2
12	Acetaldehyde*	0.00076700	lb/MmBtu	0.00	0.01	0.00	0.00	A2
13	Acrolein*	0.00009250	lb/MmBtu	0.00	0.00	0.00	0.00	A2
14	Naphthalene*	0.00008480	lb/MmBtu	0.00	0.00	0.00	0.00	A2
HAP Total				0.01	0.05	0.00	0.01	

\* Hazardous air pollutant (HAP) listed in the Clear Air Act.  
 TOC includes VOC's

**Notes**

- Estimated hourly fuel use based on estimated maximum data, actual fuel use from field measured identical engines which has been shown to be much lower.
- Potential Use indicates Continuous operation 24 hrs/day, 365 days a year, or 8,760 hours total.
- Per TABLE 3.4-1, US EPA AP-42 (10/96) - Heating value of diesel assumed to be 19,300 Btu/lb. , with a density of 7.1 lb/gal.  
 Therefore 19,300 Btu/lb x 7.1 lb./gal. = 137,030 Btu/gal.
- Percent Sulfur in Fuel Oil = 0.0015 %
- Actual Hours of Operation 2,400

**TABLE 5 CE-7**  
**MELLOTT COMPANY- Proctor & Gamble Warehouse, Inwood, WV**  
**EMISSIONS ESTIMATE - MOBILE PLANT ENGINE - CE-7**  
**October 1, 2015**

Plan/Permit I.D.	Diesel Powered Power Units Permit Approved Equipment	POTENTIAL FUEL USE		ACTUAL FUEL USE		ACTUAL NOx EMISSIONS			
		Potential Fuel Use Per Hour of Operation (gal/hr)	Potential Fuel Use per year of Operation (gal/yr)	Actual Fuel Use Per Hour of Operation (gal/hr)	Actual Fuel Use per year of Operation (gal/yr)	Units Lb Nox/Gal Fuel	Emission Factor References (See Note 7)	Actual NOx Per Hour of Operation (lb/hr)	Actual NOx per year of Operation (Tons/yr)
CE-7	CAT, C15, 540 HP Diesel Engine	29.00	254,040	9.46	22,704	0.1579	F	1.49	1.79
<b>TOTALS</b>		<b>29.00</b>	<b>254,040</b>	<b>9.46</b>	<b>22,704</b>			<b>1.49</b>	<b>1.79</b>

Plan/Permit I.D.	Diesel Powered Power Units Permit Approved Equipment	POTENTIAL MMBTU'S		ACTUAL MMBTU'S	
		Potential MMBTU'S Per Hour of Operation (MmBtu/hr)	Potential MMBTU'S per year of Operation (MmBtu/yr)	Actual MMBTU'S Per Hour of Operation (MmBtu/hr)	Actual MMBTU'S per year of Operation (MmBtu/yr)
CE-7	CAT, C15, 540 HP Diesel Engine	3.97	34,811.10	1.30	3,111.13
<b>TOTALS</b>		<b>3.97</b>	<b>34,811.10</b>	<b>1.30</b>	<b>3,111</b>

**ESTIMATED EMISSIONS - ALL DIESEL FUELED GENERATORS**

ITEM	POLLUTANT	Emission Factor	Units	POTENTIAL EMISSIONS		ACTUAL EMISSIONS		Emission Factor References (See Note 9)
				Per Hour of Operation (lbs/hr)	Per year of Operation (tons/year)	Per Hour of Operation (lbs/hr)	Per year of Operation (tons/year)	
1	PM-10	0.31000000	lb/MmBtu	1.23	5.40	0.40	0.48	A
2	NOx	see table above		1.49	6.54	1.49	1.79	B,C,D,E,F
3	CO	see CO table		1.31	5.76	1.31	1.58	G,H,I,J,K
4	SOx	0.29000000	lb/MmBtu	1.15	5.05	0.38	0.45	A
5	Total Organic Compounds (TOC)	0.35000000	lb/MmBtu	1.39	6.09	0.45	0.54	A2
6	Benzene*	0.00093300	lb/MmBtu	0.00	0.02	0.00	0.00	A2
7	Toluene*	0.00040900	lb/MmBtu	0.00	0.01	0.00	0.00	A2
8	Xylenes*	0.00028500	lb/MmBtu	0.00	0.00	0.00	0.00	A2
9	Propylene*	0.00025800	lb/MmBtu	0.00	0.00	0.00	0.00	A2
10	1,3-Butadiene*	0.00003910	lb/MmBtu	0.00	0.00	0.00	0.00	A2
11	Formaldehyde*	0.00118000	lb/MmBtu	0.00	0.02	0.00	0.00	A2
12	Acetaldehyde*	0.00076700	lb/MmBtu	0.00	0.01	0.00	0.00	A2
13	Acrolein*	0.00009250	lb/MmBtu	0.00	0.00	0.00	0.00	A2
14	Naphthalene*	0.00008480	lb/MmBtu	0.00	0.00	0.00	0.00	A2
<b>HAP Total</b>				<b>0.02</b>	<b>0.07</b>	<b>0.01</b>	<b>0.01</b>	

\* Hazardous air pollutant (HAP) listed in the Clear Air Act.  
 TOC includes VOC's

**Notes**

- Estimated hourly fuel use based on estimated maximum data, actual fuel use from field measured identical engines which has been shown to be much lower.
- Potential Use indicates Continuous operation 24 hrs/day, 365 days a year, or 8,760 hours total.
- Per TABLE 3.4-1, US EPA AP-42 (10/96) - Heating value of diesel assumed to be 19,300 Btu/lb. , with a density of 7.1 lb/gal.  
 Therefore 19,300 Btu/lb x 7.1 lb./gal. = 137,030 Btu/gal.
- Percent Sulfur in Fuel Oil = 0.0015 %
- Actual Hours of Operation 2,400

**TABLE 5**  
**MELLOTT COMPANY- Proctor & Gamble Warehouse, Inwood, WV**  
**EMISSIONS ESTIMATE - MOBILE PLANT ENGINES**  
**October 1, 2015**

Plan/Permit I.D.	Diesel Powered Power Units Permit Approved Equipment	POTENTIAL FUEL USE		ACTUAL FUEL USE		ACTUAL NOx EMISSIONS			
		Potential Fuel Use Per Hour of Operation (gal/hr)	Potential Fuel Use per year of Operation (gal/yr)	Actual Fuel Use Per Hour of Operation (gal/hr)	Actual Fuel Use per year of Operation (gal/yr)	Units	Emission Factor References	Actual NOx Per Hour of Operation (lb/hr)	Actual NOx per year of Operation (Tons/yr)
CE-1	Cat, 3412CDITA, 1,081 HP, Diesel Engine	53.00	464,280	17.00	40,800	0.3228	B	5.49	6.59
CE-2	Cat, 3412CDITA, 1,081 HP, Diesel Engine	53.00	464,280	17.06	40,944	0.3228	B	5.51	6.61
CE-3	Cat, C27, 1214 HP, Diesel Engine	57.00	499,320	14.36	34,464	0.2410	C	3.46	4.15
CE-4	CAT, C13, 415 HP Diesel Engine	20.70	181,332	8.74	20,976	0.1415	D	1.24	1.48
CE-5	CAT, C9, 300 HP Diesel Engine	16.00	140,160	9.79	23,496	0.1431	E	1.40	1.68
CE-6	CAT, C13, 415 HP Diesel Engine	20.70	181,332	8.74	20,976	0.1415	D	1.24	1.48
CE-7	CAT, C15, 540 HP Diesel Engine	29.00	254,040	9.46	22,704	0.1579	F	1.49	1.79
<b>TOTALS</b>		<b>249.40</b>	<b>2,184,744</b>	<b>85.15</b>	<b>204,360</b>			<b>19.82</b>	<b>23.79</b>

Plan/Permit I.D.	Diesel Powered Power Units Permit Approved Equipment	POTENTIAL MmbTU'S		ACTUAL MmbTU'S	
		Potential MmbTU'S Per Hour of Operation (Mmbtu/hr)	Potential MmbTU's per year of Operation (Mmbtu/yr)	Actual MmbTU'S Per Hour of Operation (Mmbtu/hr)	Actual MmbTU's per year of Operation (Mmbtu/yr)
CE-1	Cat, 3412CDITA, 1,081 HP, Diesel Engine	7.26	63,620.29	2.33	5,590.82
CE-2	Cat, 3412CDITA, 1,081 HP, Diesel Engine	7.26	63,620.29	2.34	5,610.56
CE-3	Cat, C27, 1214 HP, Diesel Engine	7.81	68,421.82	1.97	4,722.60
CE-4	CAT, C13, 415 HP Diesel Engine	2.84	24,847.92	1.20	2,874.34
CE-5	CAT, C9, 300 HP Diesel Engine	2.19	19,206.12	1.34	3,219.66
CE-6	CAT, C13, 415 HP Diesel Engine	2.84	24,847.92	1.20	2,874.34
CE-7	CAT, C15, 540 HP Diesel Engine	3.97	34,811.10	1.30	3,111.13
<b>TOTALS</b>		<b>34.18</b>	<b>299,375.47</b>	<b>11.67</b>	<b>28,003</b>

**ESTIMATED EMISSIONS - ALL DIESEL FUELED GENERATORS**

ITEM	POLLUTANT	Emission Factor	Units	POTENTIAL EMISSIONS		ACTUAL EMISSIONS		Emission Factor References (See Note 9)
				Per Hour of Operation (lbs/hr)	Per year of Operation (tons/year)	Per Hour of Operation (lbs/hr)	Per year of Operation (tons/year)	
1	PM-10	0.31000000	lb/Mmbtu	10.59	46.40	3.62	4.34	A
2	NOx	see table above		19.82	86.83	19.82	23.79	B,C,D,E,F
3	CO	see CO table		5.51	24.15	5.51	6.62	G,H,I,J,K
4	SOx	0.29000000	lb/Mmbtu	9.91	43.41	3.38	4.06	A
5	Total Organic Compounds (TOC)	0.35000000	lb/Mmbtu	11.96	52.39	4.08	4.90	A2
6	Benzene*	0.00093300	lb/Mmbtu	0.03	0.14	0.01	0.01	A2
7	Toluene*	0.00040900	lb/Mmbtu	0.01	0.06	0.00	0.01	A2
8	Xylenes*	0.00028500	lb/Mmbtu	0.01	0.04	0.00	0.00	A2
9	Propylene*	0.00025800	lb/Mmbtu	0.01	0.04	0.00	0.00	A2
10	1,3-Butadiene*	0.00003910	lb/Mmbtu	0.00	0.01	0.00	0.00	A2
11	Formaldehyde*	0.00118000	lb/Mmbtu	0.04	0.18	0.01	0.02	A2
12	Acetaldehyde*	0.00076700	lb/Mmbtu	0.03	0.11	0.01	0.01	A2
13	Acrolein*	0.00009250	lb/Mmbtu	0.00	0.01	0.00	0.00	A2
14	Naphthalene*	0.00008480	lb/Mmbtu	0.00	0.01	0.00	0.00	A2
HAP Total				0.14	0.61	0.05	0.06	

\* Hazardous air pollutant (HAP) listed in the Clear Air Act.  
 TOC includes VOC's

**Notes**

1. Estimated hourly fuel use based on estimated maximum data, actual fuel use from field measured identical engines which has been shown to be much lower.
2. Potential Use indicates Continuous operation 24 hrs/day, 365 days a year, or 8,760 hours total.
3. Per TABLE 3.4-1, US EPA AP-42 (10/96) - Heating value of diesel assumed to be 19,300 Btu/lb. , with a density of 7.1 lb/gal.

Plan/Permit I.D.	Diesel Powered Power Units Permit Approved Equipment	POTENTIAL FUEL USE		ACTUAL FUEL USE		ACTUAL CO EMISSIONS			
		Potential Fuel Use Per Hour of Operation (gal/hr)	Potential Fuel Use per year of Operation (gal/yr)	Actual Fuel Use Per Hour of Operation (gal/hr)	Actual Fuel Use per year of Operation (gal/yr)	Units Lb CO/Gal Fuel	Emission Factor References (See Notes)	Actual CO Per Hour of Operation (lb/hr)	Actual CO per year of Operation (Tons/yr)
CE-1	Cat, 3412CDITA, 1,081 HP, Diesel Engine	53.00	464,280	17.00	40,800	0.0570	G	0.97	1.16
CE-2	Cat, 3412CDITA, 1,081 HP, Diesel Engine	53.00	464,280	17.06	40,944	0.0570	G	0.97	1.17
CE-3	Cat, C27, 1214 HP, Diesel Engine	57.00	499,320	14.36	34,464	0.0107	H	0.15	0.18
CE-4	CAT, C13, 415 HP Diesel Engine	20.70	181,332	8.74	20,976	0.0570	I	0.50	0.60
CE-5	CAT, C9, 300 HP Diesel Engine	16.00	140,160	9.79	23,496	0.1131	J	1.11	1.33
CE-6	CAT, C13, 415 HP Diesel Engine	20.70	181,332	8.74	20,976	0.0570	I	0.50	0.60
CE-7	CAT, C15, 540 HP Diesel Engine	29.00	254,040	9.46	22,704	0.1390	K	1.31	1.58
<b>TOTALS</b>		<b>249.40</b>	<b>2,184,744</b>	<b>85.15</b>	<b>204,360</b>			<b>5.51</b>	<b>6.62</b>

**Emission Factor References**

- G Estimated CO emissions from Manufacturer's data sheet for Cat 3412CDITA Diesel engine; A1800 rpm=3.02 lb/hr CO per 53 gal./fuel use.  
therefore, estimated CO = 0.05698 lb CO/gallon
- H Estimated CO emissions from Manufacturer's data sheet for Cat C-27 Diesel engine; A1800 rpm=0.61 lb/hr CO per 57 gal./fuel use;  
therefore, estimated Nox = 0.0107 lb Nox/gallon
- I Estimated CO emissions from Manufacturer's data sheet for Cat C-13 Diesel engine; A2100 rpm=1.18 lb/hr CO per 20.7 gal./fuel use.  
therefore, estimated Nox = 0.057 lb Nox/gallon
- J Estimated CO emissions from Manufacturer's data sheet for Cat C9 Diesel engine; A2200 rpm=1.81 lb/hr CO per 16 gal./fuel use;  
therefore, estimated Nox = 0.1131 lb Nox/gallon
- K Estimated CO emissions from Manufacturer's data sheet for Cat C-15 Diesel engine; A2100 rpm=4.03 lb/hr Nox per 29 gal./fuel use;  
therefore, estimated Nox = 0.1390 lb Nox/gallon

ATTACHMENT J

CLASS I LEGAL ADVERTISEMENT

## LEGAL ADVERTISEMENT

### AIR QUALITY PERMIT NOTICE Notice of Application

Notice is given that Mellott Company has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a General Permit Registration for a rock crushing and screening plant located on Tabler Station Road, Inwood, in Berkeley County, West Virginia. The latitude and longitude coordinates are: Latitude: 39.405, Longitude: 78.03

The applicant estimates the potential to discharge the following Regulated Air Pollutants will be:

**Potential Emissions from diesel engines:**

PM10=46 TPY, NOX=87 TPY, CO=24 TPY, SOX=43 TPY, TOC (VOC'S)=52 TPY

**Emissions from plant:**

Facility potential to emit PM = 13 TPY

Facility potential to emit PM10 = 5 TPY

Startup of operation is planned to begin on or about the 15th day of December, 2015. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57<sup>th</sup> Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1250, during normal business hours.

Dated this the 1st day of October, 2015.

By: Mellott Company  
Brian Mellott  
Sr. Vice President  
100 Mellott Drive  
Warfordsburg, PA 17267

ATTACHMENT K

ELECTRONIC SUBMITTAL

**ATTACHMENT L**

**GENERAL PERMIT APPLICATION FEE**

**ATTACHMENT N**

**MATERIAL SAFETY DATA SHEETS (MSDS)**



## ALLEGHENY MINERAL CORPORATION

P.O. Box 1022, Kittanning, PA 16201 • Phone Kittanning (724) 548-8101  
Plants in Harrisville, Slippery Rock, Murrinsville, Rose Point, Princeton,  
North Washington and Worthington

Miners and Shippers of  
Coal, Clay and Limestone



# SAFETY DATA SHEET

## SECTION 1: IDENTIFICATION

**PRODUCT NAME:** Limestone

**TRADE NAMES AND SYNONYMS:** Crushed Stone, Aggregate, Pulverized Limestone, Rip Rap, Ag Lime, Manufactured Sand, Barn Lime

**MANUFACTURER:** Allegheny Mineral Corp.

**ADDRESS:** PO Box 1022  
Kittanning, PA 16201

**Date Prepared:** 05/20/2015

**PHONE:** 724-548-8101

**EMERGENCY PHONE:** 724-548-8101

## SECTION 2: HAZARDS IDENTIFICATION

**OSHA HAZARD COMMUNICATION STANDARD:** This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

### GHS Classification

- Acute Oral Toxicity - Category 4
- Skin Corrosion/Irritation - Category 2
- Eye Damage/Irritation - Category 2B
- Carcinogenicity - Category 1A
- Target Organ Systemic Toxicity: Repeat Exposure - Category 1

### GHS LABEL ELEMENTS

#### Symbols



#### Signal Word

Danger

#### Hazard Statements

- Harmful if swallowed
- Causes skin and eye irritation
- May cause cancer
- Causes damage to lungs through prolonged or repeated exposure

**Precautionary Statements**

Do not eat, drink or smoke while using this product  
Wash hands thoroughly after handling  
Obtain special instructions before use  
Do not handle until all safety precautions have been read and understood  
Wear protective gloves/protective clothing/eye protection/face protection

---

**SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS**

---

**HAZARDOUS SUBSTANCE(S):**

NAME	CAS#	PERCENT (by weight)
Limestone <sup>‡</sup>	1317-65-3	100%
<sup>‡</sup> Composition varies naturally – typically contains quartz (crystalline silica).	14808-60-7	>1%

Trace Elements: These materials are mined from the earth. During chemical analysis, trace amounts of naturally occurring elements might be detected.

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**SECTION 4: FIRST AID MEASURES**

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**SKIN CONTACT:** Wash with soap and water. Contact a physician if irritation persists or later develops.

**EYE CONTACT:** Immediately flush the contaminated eye(s) with gently flowing water for 15-20 minutes, while holding the eyelid(s) open. Take care not to rinse contaminated water into the unaffected eye. Contact a physician if irritation persists or later develops.

**INHALATION:** Remove source of contamination or move victim to fresh air. If breathing is difficult, trained personnel should administer emergency oxygen. Seek medical help if coughing and other symptoms persist.

**INGESTION:** If excessive amount is ingested, seek medical attention.

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**SECTION 5: FIRE-FIGHTING MEASURES**

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**EXTINGUISHING MEDIA:** Use extinguishing media appropriate for surrounding fire.

**PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS:** Although Limestone poses no fire-related hazards, a self-contained breathing apparatus is recommended to limit exposure to combustion products when fighting any fire.

**SPECIFIC HAZARDS ARISING FROM THE MATERIAL:** Avoid breathing dust.

**HAZARDOUS COMBUSTION PRODUCTS:** none known

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**SECTION 6: ACCIDENTAL RELEASE MEASURES**

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**METHODS FOR CLEAN-UP:** Use appropriate clean-up methods such as shoveling, vacuuming or wetting to minimize dust exposure.

**ENVIRONMENTAL PRECAUTIONS:** Prevent spilled materials from inadvertently entering streams, drains or sewers.

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**SECTION 7: HANDLING AND STORAGE**

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**HANDLING:** Respirable crystalline silica containing dust may be generated during processing, handling and storage. The personal protection and controls identified in the SDS should be used as appropriate.

**STORAGE:** Do not store near food, beverages or smoking material.

---

**SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION**

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**EXPOSURE GUIDELINES**

Exposure limits:

Name	OSHA PEL	ACGIH TLV-TWA	MSHA
	mg/m <sup>3</sup>	mg/m <sup>3</sup>	mg/m <sup>3</sup>
Limestone	15 (total dust) 5 (respirable dust)	10	10 (if contains <1% quartz)
Crystalline silica Total dust Respirable	30 / (% SiO <sub>2</sub> +2) 10 / (% SiO <sub>2</sub> +2)	0.025 (R)	30 / (%quartz+3) 10 / (%quartz+2)

(E) = For particulate matter containing no asbestos and < 1% crystalline silica; (R) = Respirable fraction; (I) = Inhalable

**ENGINEERING CONTROLS**

Avoid creating dust and actions that cause dust to become airborne. Use general or local exhaust ventilation as required to maintain exposures below appropriate exposure limits. Use product in well ventilated areas. If ventilation is not adequate, see the respiratory protection recommended below.

**PERSONAL PROTECTION****Respiratory Protection:**

At a minimum, a fitted, NIOSH approved P100 particulate respirator shall be worn if exposures exceed established limits.

**Hand Protection:**

None needed.

**Eye Protection:**

To prevent eye contact wear safety glasses with side shields, safety goggles or face shields when handling dust. Dust goggles should be worn in extremely dusty conditions.

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**SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES**

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Typical physical and chemical properties are given below. Consult the Supplier in Section 1 for additional data.

**Physical state:** solid

**Appearance:** Angular gray/white particles ranging in size from boulders to powder.

**Odor:** odorless

**Specific Gravity (H<sub>2</sub>O = 1):** 2.6 – 2.75

**Flammability:** not flammable

**Flash point °C (°F) [method]:** not combustible

**Flammable limits (approx. Volume % in air) – LEL:** not applicable UEL: not applicable

**Autoignition temperature °C (°F):** not applicable

**Boiling point/range °C (°F):** not applicable

Vapor density @ 101 kPa (air =1): not applicable  
Vapor pressure @ 20°C, kPa (mm Hg): not applicable  
Evaporation rate (n-butyl acetate =1): 0  
Solubility in water: 0

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## SECTION 10: STABILITY AND REACTIVITY

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**STABILITY:** Stable.

**INCOMPATIBILITIES:** Contact with powerful oxidizing agents such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride and oxygen difluoride may cause fire and/or explosions. Silica dissolves readily on hydrofluoric acid producing a poisonous gas – silicon tetrafluoride.

**HAZARDOUS DECOMPOSITION PRODUCTS:** Limestone ignites on contact with fluorine and is incompatible with acids, aluminum, ammonium salts and magnesium. Silica reacts violently with powerful oxidizing agents such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride and oxygen difluoride yielding possible fire and/or explosions. Silica dissolves readily on hydrofluoric acid producing a poisonous gas – silicon tetrafluoride.

**HAZARDOUS POLYMERIZATION:** Not known to polymerize

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## SECTION 11: TOXICOLOGICAL INFORMATION

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### Potential Health Effects

- Skin Contact:** Exposure may cause skin abrasion  
**Eye Contact:** Dust can cause eye irritation and possible destruction of the eye tissue if dust is not washed from the eye  
**Inhalation:** Exposure to dust generated during handling or use may irritate eyes, skin, nose, throat and upper respiratory tract  
**Ingestion:** If large quantities are ingested, gastrointestinal irritation is possible

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## SECTION 12: ECOLOGICAL INFORMATION

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### DISPOSAL RECOMMENDATIONS:

Dispose of waste materials only in accordance with applicable federal, state, and local laws and regulations.

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## SECTION 13: DISPOSAL CONSIDERATIONS

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### DISPOSAL RECOMMENDATIONS:

Dispose of waste materials only in accordance with applicable federal, state, and local laws and regulations.

---

## SECTION 14: TRANSPORT INFORMATION

---

**DOT HAZARD CLASSIFICATION:** None

**PLACARD REQUIRED:** None

**LABEL REQUIRED:** Label as required by the OSHA Hazard Communication Standard (29CFR 1910.1200) and applicable state and local laws and regulations.

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**SECTION 15: REGULATORY INFORMATION**

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None of the components of this product are listed under SARA Section 302 (40CFR 355 Appendix A), SARA Section 313 (40CFR 372.65) or CERCLA (40CFR 302.4).

**State Regulations**

The following components appear on one or more of the following states hazardous substances lists:

<b>Component</b>	<b>CAS#</b>	<b>States</b>
Limestone	1317-65-3	PA, OH, WV
Quartz	14808-60-7	PA, OH, WV

---

**SECTION 16: OTHER INFORMATION**

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**ABBREVIATIONS:**

ACGIH = American Conference of Governmental Industrial Hygienists  
CAS = Chemical Abstract Service  
CFR = Code of Federal Regulations  
DOT = USA Department of Transportation  
IARC = International Agency for Research on Cancer  
MSHA = Mine Safety and Health Administration  
NIOSH = National Institute for Occupational Safety and Health  
NTP = National Toxicology Program  
OSHA = Occupational Health and Safety Administration  
PEL = Permissible Exposure Limit  
TLV = Threshold Limit Value  
TRI = Toxic Release Inventory  
TWA = Time Weighted Average

**DISCLAIMER:**

While the information provided in this material safety data sheet is believed to provide a useful summary of the hazards of Limestone as it is commonly used, the sheet cannot anticipate and provide all of the information that might be needed in every situation. Inexperienced product users should obtain proper training before using this product. In particular, the data furnished in this sheet do not address hazards that may be posed by other materials mixed with Limestone.

SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY Allegheny Mineral Corp., except that the product shall conform to contracted specifications. The information provided herein was believed by Allegheny Mineral Corp. to be accurate at the time of preparation or prepared from sources believed to be reliable, but it is the responsibility of the user to investigate and understand other pertinent sources of information to comply with all laws and procedures applicable to the safe handling and use of product and to determine the suitability of the product for its intended use. Buyer's exclusive remedy shall be for damages and no claim of any kind, whether as to product delivered or for nondelivery of product, and whether based on contract, breach of warranty, negligence, or otherwise shall be greater in amount than the purchase price of the quantity of product in respect of which damages are claimed. In no event shall Seller be liable for incidental or consequential damages, whether Buyer's claim is based on contract, breach of warranty, negligence or otherwise.

**ATTACHMENT O**

**EMISSIONS SUMMARY SHEETS**

# EMISSIONS SUMMARY

Name of applicant: Mellott Company  
 Name of plant: P&G Warehouse

## Particulate Matter or PM (for 45CSR14 Major Source Determination)

Uncontrolled PM		Controlled PM	
lb/hr	TPY	lb/hr	TPY

FUGITIVE EMISSIONS				
<i>Stockpile Emissions</i>	0.04	0.16	0.01	0.05
<i>Unpaved Haulroad Emissions</i>	195.40	225.10	58.62	67.53
<i>Paved Haulroad Emissions</i>	0.00	0.00	0.00	0.00
<b>Fugitive Emissions Total</b>	<b>195.44</b>	<b>225.26</b>	<b>58.63</b>	<b>67.58</b>

POINT SOURCE EMISSIONS				
<i>Equipment Emissions</i>	35.95	43.14	7.19	8.63
<i>Transfer Point Emissions</i>	12.41	14.89	3.72	4.47
<b>Point Source Emissions Total*</b>	<b>48.37</b>	<b>58.04</b>	<b>10.91</b>	<b>13.10</b>

\*Note: Point Source Total Controlled PM TPY emissions is used for 45CSR14 Major Source determination (see below)

<b>Facility Emissions Total</b>	<b>243.80</b>	<b>283.30</b>	<b>69.55</b>	<b>80.68</b>
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**\*Facility Potential to Emit (PTE) (Baseline Emissions) = 13.10**  
 (Based on Point Source Total controlled PM TPY emissions from above) **ENTER ON LINE 26 OF APPLICATION**

## Particulate Matter under 10 microns, or PM-10 (for 45CSR30 Major Source Determination)

Uncontrolled PM-10		Controlled PM-10	
lb/hr	TPY	lb/hr	TPY

FUGITIVE EMISSIONS				
<i>Stockpile Emissions</i>	0.02	0.08	0.01	0.02
<i>Unpaved Haulroad Emissions</i>	57.67	66.44	17.30	19.93
<i>Paved Haulroad Emissions</i>	0.00	0.00	0.00	0.00
<b>Fugitive Emissions Total</b>	<b>57.69</b>	<b>66.52</b>	<b>17.31</b>	<b>19.96</b>

POINT SOURCE EMISSIONS				
<i>Equipment Emissions</i>	13.49	16.18	2.70	3.24
<i>Transfer Point Emissions</i>	5.87	7.04	1.76	2.11
<b>Point Source Emissions Total*</b>	<b>19.36</b>	<b>23.23</b>	<b>4.46</b>	<b>5.35</b>

\*Note: Point Source Total Controlled PM-10 TPY emissions is used for 45CSR30 Major Source determination

<b>Facility Emissions Total</b>	<b>77.05</b>	<b>89.74</b>	<b>21.77</b>	<b>25.31</b>
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## HAULROAD EMISSIONS

**Include G40-C Emission Calculation Spreadsheet indicating haulroad emissions, or submit calculations indicating assumptions made to substantiate emission values.**

Emission Source	Uncontrolled Emissions		Controlled Emissions	
	Hourly (lb/hr)	Annual (tpy)	Hourly (lb/hr)	Annual (tpy)
Unpaved Haul Roads	57.67	.08	.01	.02

**TABLE 5**  
**MELLOTT COMPANY- Proctor & Gamble Warehouse, Inwood, WV**  
**EMISSIONS ESTIMATE - MOBILE PLANT ENGINES**  
**October 1, 2015**

Plan/Permit I.D.	Diesel Powered Power Units Permit Approved Equipment	POTENTIAL FUEL USE		ACTUAL FUEL USE		ACTUAL NOx EMISSIONS			
		Potential Fuel Use Per Hour of Operation (gal/hr)	Potential Fuel Use per year of Operation (gal/yr)	Actual Fuel Use Per Hour of Operation (gal/hr)	Actual Fuel Use per year of Operation (gal/yr)	Units Lb Nox/Gal Fuel	Emission Factor References (See Note 7)	Actual NOx Per Hour of Operation (lb/hr)	Actual NOx per year of Operation (Tons/yr)
CE-1	Cat, 3412CDITA, 1,081 HP, Diesel Engine	53.00	464,280	17.00	40,800	0.3228	B	5.49	6.59
CE-2	Cat, 3412CDITA, 1,081 HP, Diesel Engine	53.00	464,280	17.06	40,944	0.3228	B	5.51	6.61
CE-3	Cat, C27, 1214 HP, Diesel Engine	57.00	499,320	14.36	34,464	0.2410	C	3.46	4.15
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CE-5	CAT, C9, 300 HP Diesel Engine	16.00	140,160	9.79	23,496	0.1431	E	1.40	1.68
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<b>TOTALS</b>		<b>249.40</b>	<b>2,184,744</b>	<b>85.15</b>	<b>204,360</b>			<b>19.82</b>	<b>23.79</b>

Plan/Permit I.D.	Diesel Powered Power Units Permit Approved Equipment	POTENTIAL MmbTU'S		ACTUAL MmbTU'S	
		Potential MmbTU'S Per Hour of Operation (MmBtu/hr)	Potential MmbTU'S per year of Operation (MmBtu/yr)	Actual MmbTU'S Per Hour of Operation (MmBtu/hr)	Actual MmbTU'S per year of Operation (MmBtu/yr)
CE-1	Cat, 3412CDITA, 1,081 HP, Diesel Engine	7.26	63,620.29	2.33	5,590.82
CE-2	Cat, 3412CDITA, 1,081 HP, Diesel Engine	7.26	63,620.29	2.34	5,610.56
CE-3	Cat, C27, 1214 HP, Diesel Engine	7.81	68,421.82	1.97	4,722.60
CE-4	CAT, C13, 415 HP Diesel Engine	2.84	24,847.92	1.20	2,874.34
CE-5	CAT, C9, 300 HP Diesel Engine	2.19	19,206.12	1.34	3,219.66
CE-6	CAT, C13, 415 HP Diesel Engine	2.84	24,847.92	1.20	2,874.34
CE-7	CAT, C15, 540 HP Diesel Engine	3.97	34,811.10	1.30	3,111.13
<b>TOTALS</b>		<b>34.18</b>	<b>299,375.47</b>	<b>11.67</b>	<b>28,003</b>

**ESTIMATED EMISSIONS - ALL DIESEL FUELED GENERATORS**

ITEM	POLLUTANT	Emission Factor	Units	POTENTIAL EMISSIONS		ACTUAL EMISSIONS		Emission Factor References (See Note 9)
				Per Hour of Operation (lbs/hr)	Per year of Operation (tons/year)	Per Hour of Operation (lbs/hr)	Per year of Operation (tons/year)	
1	PM-10	0.31000000	lb/MmBtu	10.59	46.40	3.62	4.34	A
2	NOx	see table above		19.82	86.83	19.82	23.79	B,C,D,E,F
3	CO	see CO table		5.51	24.15	5.51	6.62	G,H,I,J,K
4	SOx	0.29000000	lb/MmBtu	9.91	43.41	3.38	4.06	A
5	Total Organic Compounds (TOC)	0.35000000	lb/MmBtu	11.96	52.39	4.08	4.90	A2
6	Benzene*	0.00093300	lb/MmBtu	0.03	0.14	0.01	0.01	A2
7	Toluene*	0.00040900	lb/MmBtu	0.01	0.06	0.00	0.01	A2
8	Xylenes*	0.00028500	lb/MmBtu	0.01	0.04	0.00	0.00	A2
9	Propylene*	0.00025800	lb/MmBtu	0.01	0.04	0.00	0.00	A2
10	1,3-Butadiene*	0.00003910	lb/MmBtu	0.00	0.01	0.00	0.00	A2
11	Formaldehyde*	0.00118000	lb/MmBtu	0.04	0.18	0.01	0.02	A2
12	Acetaldehyde*	0.00076700	lb/MmBtu	0.03	0.11	0.01	0.01	A2
13	Acrolein*	0.00009250	lb/MmBtu	0.00	0.01	0.00	0.00	A2
14	Naphthalene*	0.00008480	lb/MmBtu	0.00	0.01	0.00	0.00	A2
HAP Total				0.14	0.61	0.05	0.06	

\* Hazardous air pollutant (HAP) listed in the Clear Air Act.  
 TOC includes VOC's

**Notes**

- Estimated hourly fuel use based on estimated maximum data, actual fuel use from field measured identical engines which has been shown to be much lower.
- Potential Use Indicates Continuous operation 24 hrs/day, 365 days a year, or 8,760 hours total.
- Per TABLE 3.4-1, US EPA AP-42 (10/96) - Heating value of diesel assumed to be 19,300 Btu/lb., with a density of 7.1 lb/gal.



### EMISSION SUMMARY SHEET FOR HAZARDOUS/TOXIC POLLUTANTS

Registration Number (Agency Use) <u>G40-C</u>												
Source ID No.	Potential Emissions (lbs/hr)							Potential Emissions (tons/yr)				
	Benzene	Ethylbenzene	Toluene	Xylenes	n-Hexane	Formaldehyde	Benzene	Ethylbenzene	Toluene	Xylenes	n-Hexane	Formaldehyde
CE-1	.01	0	0	0	0	.01	.03	0	.01	.01	0	.04
CE-2	.01	0	0	0	0	.01	.03	0	.01	.01	0	.04
CE-3	.01	0	.01	0	0	.01	.03	0	.03	.01	0	.04
CE-4	0	0	0	0	0	0	.01	0	.01	0	0	.01
CE-5	0	0	0	0	0	0	.01	0	0	0	0	.01
CE-6	0	0	0	0	0	0	.01	0	.01	0	0	.01
CE-7	0	0	0	0	0	0	.02	0	.01	0	0	.02
<b>Total</b>	<b>.03</b>	<b>0</b>	<b>.01</b>	<b>0</b>	<b>0</b>	<b>.03</b>	<b>.14</b>	<b>0</b>	<b>.08</b>	<b>.03</b>	<b>0</b>	<b>.17</b>

**EMISSION SUMMARY SHEET FOR HAZARDOUS/TOXIC POLLUTANTS**

		Registration Number (Agency Use) <u>G40-C</u>							
		Potential Emissions (lbs/hr)				Potential Emissions (tons/yr)			
Source ID No.	Acetalde- hyde	Propylene			Acetalde- hyde	Propylene			
CE-1	.01	0			.02	.01			
CE-2	.01	0			.02	.01			
CE-3	.01	0			.03	.01			
CE-4	0	0			.01	0			
CE-5	0	0			.01	0			
CE-6	0	0			.01	0			
CE-7	0	0			.01	0			
<b>Total</b>	<b>.03</b>	<b>0</b>			<b>.11</b>	<b>.03</b>			

**ATTACHMENT P**

**AFFECTED SOURCE SHEETS  
AND  
ENGINE DATA SHEETS**

## CRUSHING AND SCREENING AFFECTED SOURCE SHEET

Source Identification Number <sup>1</sup>		JC-1	JC-2	JC-3	RB-1	OT-1	OT-2
Type of Crusher or Screen <sup>2</sup>		JC	JC	JC	RB	OT	OT
Make, Model No., Serial No. <sup>3</sup>		Metso-C120	Metso-16	Metso-106	Metso-1213	Metso-HP300	Metso-HP400
Date of Construction, Reconstruction, or Modification (Month/Year) <sup>4</sup>		NEW	NEW	NEW	NEW	NEW	NEW
Maximum Throughput <sup>5</sup>	tons/hour	445	400	400	400	358	152
	tons/year	1068000	960000	960000	960000	859200	364800
Material sized from/to: <sup>6</sup>		24"/6"	24"/6"	24"/6"	24"/4"	6"/2"	2"/3/4"
Average Moisture Content (%) <sup>7</sup>		4	4	4	4	4	4
Control Device ID Number <sup>8</sup>		PW	PW	PW	PW	PW	PW
Baghouse Stack Parameters <sup>9</sup>	height (ft)	NA	NA	NA	NA	NA	NA
	diameter (ft)	NA	NA	NA	NA	NA	NA
	volume (ACFM)	NA	NA	NA	NA	NA	NA
	exit temp (F)	NA	NA	NA	NA	NA	NA
	UTM Coordinates	NA	NA	NA	NA	NA	NA
Maximum Operating Schedule <sup>10</sup>	hours/day	10	10	10	10	10	10
	days/year	250	250	250	250	250	250
	hours/year	2400	2400	2400	2400	2400	2400

1. Enter the appropriate Source Identification Number for each crusher and screen. For example, in the case of an operation which incorporates multiple crushers, the crushers should be designated CR-1, CR-2, CR-3 etc. beginning with the breaker or primary crusher. Multiple screens should be designated S-1, S-2, S-3 etc.
2. Describe types of crushers and screens using the following codes:
 

HM	Hammermill	SS	Stationary Screen	DR	Double Roll Crusher
SD	Single Deck Screen	BM	Ball Mill	DD	Double-Deck Screen
RB	Rotary Breaker	TD	Triple Deck Screen	JC	Jaw Crusher
GC	Gyratory Crusher	OT	Other		
3. Enter the make, model number, and serial number of the crusher/screen.
4. Enter the date that each crusher and screen was constructed, reconstructed, or modified.
5. Enter the maximum throughput for each crusher and screen in tons per hour and tons per year.
6. Describe the nominal material size reduction (e.g. +2"/-3/4").
7. Enter the average percent moisture content of the material processed.
8. Enter the appropriate Control Device Identification Number for each crusher and screen. Refer to Table A - *Control Device Listing and Control Device Identification Number Instructions* in the *Reference Document* for Control Device ID prefixes and numbering.
9. Enter the appropriate stack parameters if a baghouse control device is used.
10. Enter the maximum operating schedule for each crusher and screen in hours per day, days per year and hours per year.

## CRUSHING AND SCREENING AFFECTED SOURCE SHEET

Source Identification Number <sup>1</sup>		OT-3				
Type of Crusher or Screen <sup>2</sup>		OT				
Make, Model No., Serial No. <sup>3</sup>		Metso-HP300				
Date of Construction, Reconstruction, or Modification (Month/Year) <sup>4</sup>		NEW				
Maximum Throughput <sup>5</sup>	tons/hour	400				
	tons/year	960000				
Material sized from/to: <sup>6</sup>		4" / 1-1/2"				
Average Moisture Content (%) <sup>7</sup>		4				
Control Device ID Number <sup>8</sup>		PW				
Baghouse Stack Parameters <sup>9</sup>	height (ft)	NA				
	diameter (ft)	NA				
	volume (ACFM)	NA				
	exit temp (F)	NA				
	UTM Coordinates	NA				
Maximum Operating Schedule <sup>10</sup>	hours/day	10				
	days/year	250				
	hours/year	2400				

1. Enter the appropriate Source Identification Number for each crusher and screen. For example, in the case of an operation which incorporates multiple crushers, the crushers should be designated CR-1, CR-2, CR-3 etc. beginning with the breaker or primary crusher. Multiple screens should be designated S-1, S-2, S-3 etc.
2. Describe types of crushers and screens using the following codes:
 

HM	Hammermill	SS	Stationary Screen	DR	Double Roll Crusher
SD	Single Deck Screen	BM	Ball Mill	DD	Double-Deck Screen
RB	Rotary Breaker	TD	Triple Deck Screen	JC	Jaw Crusher
GC	Gyratory Crusher	OT	Other		
3. Enter the make, model number, and serial number of the crusher/screen.
4. Enter the date that each crusher and screen was constructed, reconstructed, or modified.
5. Enter the maximum throughput for each crusher and screen in tons per hour and tons per year.
6. Describe the nominal material size reduction (e.g. +2" / -3/8").
7. Enter the average percent moisture content of the material processed.
8. Enter the appropriate Control Device Identification Number for each crusher and screen. Refer to Table A - *Control Device Listing and Control Device Identification Number Instructions* in the *Reference Document* for Control Device ID prefixes and numbering.
9. Enter the appropriate stack parameters if a baghouse control device is used.
10. Enter the maximum operating schedule for each crusher and screen in hours per day, days per year and hours per year.

### CONVEYING AFFECTED SOURCE SHEET

Source Identification Number <sup>1</sup>	Date of Construction, Reconstruction, or Modification (Month/Year) <sup>2</sup>	Type of Material Handled <sup>3</sup>	Size of Material Handled <sup>4</sup>	Maximum Material Transfer Rate <sup>5</sup>		Average Moisture Content (%) <sup>6</sup>	Control Device <sup>7</sup>
				tons/hour	tons/year		
BC-1	NEW	SM	6" minus	600	1,440,000	4	N
BC-2	NEW	SM	2" minus	358	859,000	4	N
BC-3	NEW	SM	1" minus	119	285,600	4	N
BC-4	NEW	SM	0	0	0	0	N
BC-5	NEW	SM	2" minus	600	1,440,000	4	N
BC-6	2003	SM	3/8" minus	100	240,000	4	N
BC-7	2003	SM	3/4" minus	152	364,800	4	N
BC-8	1982	SM	6" minus	600	1,440,000	4	N
BC-9	2014	SM	2" minus	358	859,200	4	N
BC-10	2015	SM	3/4" minus	152	364,800	4	N
BC-11	2015	SM	1-1/2" minus	119	285,600	4	N
BC-12	2015	SM	2-1/2" x 1"	123	295,200	4	N
BC-13	2015	SM	1-1/2" x 3/4"	153	367,200	4	N
BC-14	2015	SM	3/4" x 3/8"	99	237,600	4	N
BC-15	NEW	SM	3/8" minus	199	477,600	4	N
BC-16	NEW	SM	6" minus	400	960,000	4	N
BC-17	NEW	SM	0	0	0	0	N

1. Enter the appropriate Source Identification Number for each conveyor using the following codes. For example, multiple belt conveyors should be designated BC-1, BC-2, BC-3 etc. Transfer points are considered emission points, not sources, and should not be included in the *Conveying Affected Source Sheet*. Transfer Point Identification Numbers shall be assigned in the *Emission Calculation Sheet*.

BC	Belt Conveyor	BE	Bucket Elevator	DL	Drag-link Conveyor
PS	Pneumatic System	SC	Screw Conveyor	VC	Vibrating Conveyor
OT	Other				

2. Enter the date that each crusher and screen was constructed, reconstructed, or modified.
3. Enter the type of material being handled - Raw Material (RM) Sized Material (SM) Refuse (R) Other (O)
4. Enter the nominal size of the material being conveyed (e.g. sized material- 3/4" x 0). If more than one material is handled by the listed conveyor, list each material and enter the appropriate data for each material.
5. Enter the maximum material transfer rate for each conveyor in tons per hour and tons per year.
6. Enter the average percent moisture content of the conveyed material.
7. Enter the control device for the conveyor. PE - Partial Enclosure (example 3/4 hoop), FE - Full Enclosure, N - None

### CONVEYING AFFECTED SOURCE SHEET

Source Identification Number <sup>1</sup>	Date of Construction, Reconstruction, or Modification (Month/Year) <sup>2</sup>	Type of Material Handled <sup>3</sup>	Size of Material Handled <sup>4</sup>	Maximum Material Transfer Rate <sup>5</sup>		Average Moisture Content (%) <sup>6</sup>	Control Device <sup>7</sup>
				tons/hour	tons/year		
BC-18	NEW	SM	6" minus	400	960,000	4	N
BC-19	NEW	SM	0	0	0	0	N
BC-20	NEW	SM	4" minus	400	960,000	4	N
BC-21	NEW	SM	4" minus	400	960,000	4	N
BC-22	NEW	SM	4" minus	400	960,000	4	N
BC-23	NEW	SM	0	0	0	0	N
BC-24	NEW	SM	2" minus	400	960,000	4	N
BC-25	NEW	SM	0	0	0	0	N
BC-26	NEW	SM	2-1/2" x 1"	123	295,200	4	N

1. Enter the appropriate Source Identification Number for each conveyor using the following codes. For example, multiple belt conveyors should be designated BC-1, BC-2, BC-3 etc. Transfer points are considered emission points, not sources, and should not be included in the *Conveying Affected Source Sheet*. Transfer Point Identification Numbers shall be assigned in the *Emission Calculation Sheet*.
 

BC	Belt Conveyor	BE	Bucket Elevator	DL	Drag-link Conveyor
PS	Pneumatic System	SC	Screw Conveyor	VC	Vibrating Conveyor
OT	Other				
2. Enter the date that each crusher and screen was constructed, reconstructed, or modified.
3. Enter the type of material being handled - Raw Material (RM) Sized Material (SM) Refuse (R) Other (O)
4. Enter the nominal size of the material being conveyed (e.g. sized material- 3/4" x 0). If more than one material is handled by the listed conveyor, list each material and enter the appropriate data for each material.
5. Enter the maximum material transfer rate for each conveyor in tons per hour and tons per year.
6. Enter the average percent moisture content of the conveyed material.
7. Enter the control device for the conveyor. PE - Partial Enclosure (example 3/4 hoop), FE - Full Enclosure, N - None

## STORAGE ACTIVITY AFFECTED SOURCE SHEET

Source Identification Number <sup>1</sup>	OS-1	OS-2	OS-3	OS-4	OS-5	
Type of Material Stored <sup>2</sup>	2A's	3's	3/8" minus	3/4" x 3/8"	1-1/2" x 3/4"	
Average Moisture Content (%) <sup>3</sup>	4	4	4	4	4	
Maximum Yearly Storage Throughput (tons) <sup>4</sup>	576,000	144,000	216,000	216,000	288,000	
Maximum Storage Capacity (tons) <sup>5</sup>	2500	2500	2500	2500	2500	
Maximum Base Area (ft <sup>2</sup> ) <sup>6</sup>	5027	5027	5027	5027	5027	
Maximum Pile Height (ft) <sup>7</sup>	30'	30'	30'	30'	30'	
Method of Material Load-in <sup>8</sup>	SS	SS	SS	SS	SS	
Load-in Control Device Identification Number <sup>9</sup>	None	None	None	None	None	
Storage Control Device Identification Number <sup>9</sup>	None	None	None	None	None	
Method of Material Load-out <sup>8</sup>	FE	FE	FE	FE	FE	
Load-out Control Device Identification Number <sup>9</sup>	None	None	None	None	None	

1. Enter the appropriate Source Identification Number for each storage activity using the following codes. For example, if the facility utilizes three storage bins, four open stockpiles and one storage building (full enclosure), the Source Identification Numbers should be BS-1, BS-2, and BS-3; OS-1, OS-2, OS-3, and OS-4; and SB-1, respectively.
 

BS Bin or Storage Silo (full enclosure)	E3 Enclosure (three sided enclosure)
OS Open Stockpile	SB Storage Building (full enclosure)
SF Stockpiles with wind fences	OT Other
2. Describe the type of material stored or stockpiled. (e.g. sized material, raw material, refuse, etc).
3. Enter the average percent moisture content of the stored material.
4. Enter the maximum yearly storage throughput for each storage activity.
5. Enter the maximum storage capacity for each storage activity in tons (e.g. silo capacity, maximum stockpile size, etc.)
6. For stockpiles, enter the maximum stockpile base area.
7. For stockpiles, enter the maximum stockpile height.
8. Enter the method of load-in or load-out to/from stockpiles or bins using the following codes:
 

CS Clamshell	SS Stationary Conveyor/Stacker
FC Fixed Height Chute from Bins	ST Stacking Tube
FE Front Endloader	TC Telescoping Chute from Bins
MC Mobile Conveyor/Stacker	TD Truck Dump
UC Under-pile or Under-Bin Reclaim Conveyor	PC Pneumatic Conveyor/Stacker
RC Rake or Bucket Reclaim Conveyor	OT Other
9. Enter the appropriate Control Device Identification Number for each storage activity. Refer to Table A - Control Device Listing and Control Device Identification Number Instructions in the Reference Document for Control Device ID prefixes and numbering.

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### ENGINE DATA SHEET

Source Identification Number <sup>1</sup>		CE-1		CE-2		CE-3	
Engine Manufacturer and Model		CAT/3412		CAT/3412		CAT/C27	
Manufacturer's Rated bhp/rpm		1081/1800		1081/1800		1214/1800	
Source Status <sup>2</sup>		NS		NS		NS	
Date Installed/Modified/Removed (Month/Year) <sup>3</sup>		11/15		11/15		11/15	
Engine Manufactured/Reconstruction Date <sup>4</sup>		6-17-2002		05-07-2004		10-27-2006	
Is this a Certified Stationary Compression Ignition Engine according to 40CFR60 Subpart IIII? (Yes or No) <sup>5</sup>		YES		YES		YES	
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60 Subpart JJJJ? (Yes or No) <sup>6</sup>		NO		NO		NO	
Engine, Fuel and Combustion Data	Engine Type <sup>7</sup>	LB4S		LB4S		LB4S	
	APCD Type <sup>8</sup>	LEC		LEC		LEC	
	Fuel Type <sup>9</sup>	2FO		2FO		2FO	
	H <sub>2</sub> S (gr/100 scf)						
	Operating bhp/rpm	1081/1800		1081/1800		1214/1800	
	BSFC (Btu/bhp-hr)	.34		.34		.33	
	Fuel throughput (ft <sup>3</sup> /hr)	2.273		2.281		1.920	
	Fuel throughput (MMft <sup>3</sup> /yr)	5455		5474		4608	
	Operation (hrs/yr)	2400		2400		2400	
Reference <sup>10</sup>	Potential Emissions <sup>11</sup>	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
MD/OT	NO <sub>x</sub>	5.49	24.04	5.51	24.12	3.46	15.16
MD	CO	.97	4.24	.97	4.26	.15	.67
AP-42	VOC	2.54	11.13	2.54	11.13	2.73	11.97
AP-42	SO <sub>2</sub>	2.11	9.22	2.11	9.22	2.27	9.92
AP-42	PM <sub>10</sub>	2.25	9.86	2.25	9.86	2.42	10.61
AP-42	Formaldehyde	.01	.04	.01	.04	.01	.04
AP-42	Benzene	.01	.03	.01	.03	.01	.03
AP-42	Acetaldehyde	.01	.02	.01	.02	.01	.03
AP-42	Toluene	0	.01	0	.01	.01	.03
AP-42	Xylenes	0	.01	0	.01	0	.01
AP-42	Propylene	0	.01	0	.01	0	.01

1. Enter the appropriate Source Identification Number for each reciprocating internal combustion compressor/generator engine located at the facility. Multiple compressor engines should be designated CE-1, CE-2, CE-3 etc. Emergency Generator engines should be designated EG-1, EG-2, EG-3 etc. If more than three (3) engines exist, please use additional sheets.
2. Enter the Source Status using the following codes:

**ENGINE DATA SHEET**

Source Identification Number <sup>1</sup>		CE-4		CE-5		CE-6	
Engine Manufacturer and Model		Caterpillar C13		Caterpillar C9		Caterpillar C13	
Manufacturer's Rated bhp/rpm		415/2100		300/2200		415/2100	
Source Status <sup>2</sup>		NS		NS		NS	
Date Installed/Modified/Removed (Month/Year) <sup>3</sup>		11-15-15		11-15-15		11-15-15	
Engine Manufactured/Reconstruction Date <sup>4</sup>		NEW		NEW		NEW	
Is this a Certified Stationary Compression Ignition Engine according to 40CFR60 Subpart III? (Yes or No) <sup>5</sup>		YES		YES		YES	
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60 Subpart JJJ? (Yes or No) <sup>6</sup>		NO		NO		NO	
Engine, Fuel and Combustion Data	Engine Type <sup>7</sup>	LB4S		LB4S		LB4S	
	APCD Type <sup>8</sup>	LEC		LEC		LEC	
	Fuel Type <sup>9</sup>	2FO		2FO		2FO	
	H <sub>2</sub> S (gr/100 scf)						
	Operating bhp/rpm	415/2100		300/220		415/2100	
	BSFC (Btu/bhp-hr)	.347		0.37		.347	
	Fuel throughput (ft <sup>3</sup> /hr)	1.169		1.309		1.169	
	Fuel throughput (MMft <sup>3</sup> /yr)	2806		3142		2806	
	Operation (hrs/yr)	2400		2400		2400	
Reference <sup>10</sup>	Potential Emissions <sup>11</sup>	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
MD/OT	NO <sub>x</sub>	1.24	5.43	1.40	6.14	1.24	5.43
MD	CO	.50	2.18	1.11	4.86	.50	2.18
AP-42	VOC	.99	4.35	0.77	3.36	.99	4.35
AP-42	SO <sub>2</sub>	.82	3.60	0.64	2.78	.82	3.60
AP-42	PM <sub>10</sub>	.88	3.85	0.68	2.98	.88	3.85
AP-42	Formaldehyde	0	.01	0	.01	0	.01
AP-42	Benzene	0	.01	0	.01	0	.01
AP-42	Acetaldehyde	0	.01	0	.01	0	.01
AP-42	Toluene	0	.01	0	0	0	.01
AP-42	Xylenes	0	0	0	0	0	0
AP-42	Propylene	0	0	0	0	0	0

### ENGINE DATA SHEET

Source Identification Number <sup>1</sup>		CE-7					
Engine Manufacturer and Model		Caterpillar C15					
Manufacturer's Rated bhp/rpm		540/2100					
Source Status <sup>2</sup>		NS					
Date Installed/Modified/Removed (Month/Year) <sup>3</sup>		11-15-15					
Engine Manufactured/Reconstruction Date <sup>4</sup>		NEW					
Is this a Certified Stationary Compression Ignition Engine according to 40CFR60 Subpart IIII? (Yes or No) <sup>5</sup>		YES					
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60 Subpart JJJJ? (Yes or No) <sup>6</sup>		NO					
Engine, Fuel and Combustion Data	Engine Type <sup>7</sup>	LB4S					
	APCD Type <sup>8</sup>	LEC					
	Fuel Type <sup>9</sup>	2FO					
	H <sub>2</sub> S (gr/100 scf)						
	Operating bhp/rpm	540/2100					
	BSFC (Btu/bhp-hr)	.37					
	Fuel throughput (ft <sup>3</sup> /hr)	1.265					
	Fuel throughput (MMft <sup>3</sup> /yr)	3036					
	Operation (hrs/yr)	2400					
Reference <sup>10</sup>	Potential Emissions <sup>11</sup>	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
MD/OT	NO <sub>x</sub>	1.24	6.54				
MD	CO	1.31	5.76				
AP-42	VOC	1.39	6.09				
AP-42	SO <sub>2</sub>	1.15	5.05				
AP-42	PM <sub>10</sub>	1.23	5.40				
AP-42	Formaldehyde	0	.02				
AP-42	Benzene	0	.02				
AP-42	Acetaldehyde	0	.01				
AP-42	Toluene	0	.01				
AP-42	Xylenes	0	0				
AP-42	Propylene	0	0				

**MANUFACTURER EMISSIONS DATA**

**FOR CE-1 & CE-2**

**CATERPILLAR MODEL 3412 DITA ENGINES**



**GEN SET PACKAGE PERFORMANCE DATA**  
**[BLG00447]**

**JUNE 02, 2015**

**(BLG00447)-ENGINE (AFR00350)-GENERATOR (BCW00588)**  
**-GENSET**

For Help Desk Phone Numbers [Click here](#)

Performance Number: DM9135

Change Level:

Sales Model: 3412CDITA Combustion: DI

Aspr: TA

Engine Power:

725 W/F 758 W/O F  
 EKW EKW

Speed: 1,800 RPM

After Cooler: JWAC

1,081 HP

Manifold Type: DRY

Governor Type: PEEC

After Cooler Temp(F): --

Turbo Quantity: 4

Engine App: GP

Turbo Arrangement: Series

Hertz: 60

Application Type: PACKAGE-DIE

Engine Rating: PGS

Strategy:

Rating Type: PRIME

Certification: STAT-USE EPA-T1 2006 - 2006

**General Performance Data**

GEN W/F EKW	PERCENT LOAD	ENGINE POWER BHP	ENGINE BMEP PSI	FUEL BSFC LB/BHP-HR	FUEL RATE GPH	INTAKE MFLD TEMP DEG F	INTAKE MFLD P IN-HG	INTAKE AIR FLOW CFM	EXH MFLD TEMP DEG F	EXH STACK TEMP DEG F	EXH GAS FLOW CFM
725	100	1081	288.34	0.34	53.05	205.16	68.11	2,246.01	1,250.06	954.32	6,250.7
652.5	90	968	258.32	0.34	47.37	198.5	56.95	2,005.88	1,215.5	942.98	5,540.88
580	80	861	229.6	0.34	42.08	193.1	47.29	1,786.92	1,182.56	931.46	4,894.62
543.8	75	809	215.67	0.34	39.55	190.94	42.91	1,691.57	1,165.46	924.44	4,608.57
507.5	70	757	201.9	0.34	37.06	188.96	38.79	1,599.76	1,147.82	916.16	4,333.11
435	60	656	175.06	0.34	32.31	185.18	31.24	1,430.25	1,110.92	896.9	3,817.52
362.5	50	557	148.52	0.35	27.98	181.76	24.58	1,274.86	1,067.36	870.98	3,340.77
290	40	460	122.56	0.36	23.75	178.52	18.66	1,133.6	1,014.62	835.34	2,881.68
217.5	30	360	96.02	0.37	19.21	175.46	13.18	988.81	939.38	780.44	2,408.46
181.3	25	309	82.38	0.38	16.85	174.02	10.66	921.71	890.06	742.64	2,168.32
145	20	257	68.6	0.39	14.48	172.76	8.29	854.62	833.18	698	1,928.18
72.5	10	152	40.61	0.46	9.91	171.86	4.21	752.2	686.48	578.3	1,515

**Engine Heat Rejection Data**

GEN W/F EKW	PERCENT LOAD	REJ TO JW BTU/MN	REJ TO ATMOS BTU/MN	REJ TO EXHAUST BTU/MN	EXH RCOV TO 350F BTU/MN	FROM OIL CLR BTU/MN	FROM AFT CLR BTU/MN	WORK ENERGY BTU/MN	LHV ENERGY BTU/MN	HHV ENERGY BTU/MN
725	100	26,217.0	6,198.8	43,903.6	25,307.1	3,309.8	7,051.9	45,837.1	114,706.5	122,156.5
652.5	90	23,487.3	5,743.9	38,728.4	22,179.2	3,093.7	5,402.6	41,060.1	102,365.8	109,076.4
580	80	20,928.1	5,402.6	34,121.9	19,335.8	2,883.3	4,037.8	36,510.5	90,991.8	96,963.1
543.8	75	19,733.8	5,118.3	31,960.9	18,084.6	2,780.9	3,469.1	34,292.5	85,532.3	91,105.5
507.5	70	18,482.7	4,890.8	29,913.6	16,833.5	2,684.3	2,900.4	32,131.5	80,186.5	85,418.6
435	60	16,151.0	4,435.9	26,046.4	14,501.8	2,468.1	1,990.4	27,809.4	69,950.0	74,499.5
362.5	50	14,046.9	4,379.0	22,463.6	12,283.9	2,257.7	1,251.1	23,601.0	60,566.4	64,490.4
290	40	11,999.5	4,322.1	18,937.7	10,066.0	2,053.0	625.6	19,506.4	51,410.4	54,765.7
217.5	30	9,724.8	4,037.8	15,241.1	7,734.3	1,814.2	113.7	15,241.1	41,571.9	44,301.6
181.3	25	8,587.3	3,867.1	13,307.5	6,540.0	1,660.6	-56.9	13,080.1	36,510.5	38,842.1
145	20	7,393.1	3,639.7	11,430.8	5,345.8	1,501.4	-284.4	10,919.0	31,335.3	33,382.6
72.5	10	5,061.4	3,355.3	7,904.9	3,014.1	1,182.9	-511.8	6,483.2	21,439.9	22,804.8

**EXHAUST Sound Data: 4.92 FEET**

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
725	100	111	100	110	111	110	103	101	100	90
652.5	90	110	99	109	110	109	102	100	99	89
580	80	109	98	108	109	108	101	99	98	88
543.8	75	108	98	108	109	108	101	99	97	88
507.5	70	108	97	107	108	107	100	98	97	87
435	60	107	96	106	107	106	99	97	96	86
362.5	50	106	95	105	106	105	98	96	95	85
290	40	105	94	104	105	104	97	95	94	84
217.5	30	104	93	103	104	103	96	94	93	83
181.3	25	103	93	103	103	103	96	93	92	82
145	20	103	92	102	103	102	95	93	92	82
72.5	10	101	91	101	101	101	94	91	90	80

**EXHAUST Sound Data: 22.97 FEET**

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
725	100	97	91	101	96	95	90	89	89	81
652.5	90	96	90	100	95	94	89	88	88	80
580	80	96	89	99	94	93	88	87	87	79
543.8	75	95	89	98	93	93	88	87	87	79
507.5	70	95	88	98	93	92	87	86	86	78
435	60	94	87	97	92	91	86	85	85	77
362.5	50	93	86	96	91	91	85	84	84	76
290	40	92	85	95	90	89	84	83	83	75
217.5	30	91	84	94	89	88	83	82	82	74
181.3	25	90	84	93	88	88	83	82	82	74
145	20	89	83	92	87	87	82	81	81	73
72.5	10	88	82	91	86	86	81	80	80	72

**EXHAUST Sound Data: 49.21 FEET**

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
725	100	91	84	94	89	89	83	82	82	74
652.5	90	90	83	93	88	88	82	81	81	73
580	80	89	82	92	87	87	81	80	80	72
543.8	75	88	82	92	87	86	81	80	80	72
507.5	70	88	82	91	86	86	81	80	80	72
435	60	87	81	90	85	85	80	79	79	71
362.5	50	86	80	89	84	84	79	78	78	70
290	40	85	79	88	83	83	78	77	77	69
217.5	30	84	77	87	82	82	76	75	75	68
181.3	25	83	77	86	81	81	76	75	75	67
145	20	83	76	86	81	81	75	74	74	66
72.5	10	81	75	84	79	79	74	73	73	65

**MECHANICAL Sound Data: 3.28 FEET**

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
725	100	106	95	102	111	103	99	98	82	77
652.5	90	106	95	102	111	103	99	98	82	77
580	80	106	95	102	111	103	99	98	82	77
543.8	75	106	95	102	111	103	99	98	82	77
507.5	70	106	95	102	111	103	99	98	82	77
435	60	106	95	102	111	103	99	98	82	77
362.5	50	106	95	102	111	103	99	98	82	77
290	40	106	95	102	111	103	99	98	82	77
217.5	30	106	95	102	111	103	99	98	82	77
181.3	25	106	95	102	111	103	99	98	82	77
145	20	106	95	102	111	103	99	98	82	77
72.5	10	106	95	102	111	103	99	98	82	77

**MECHANICAL Sound Data: 22.97 FEET**

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCJ 8000HZ DB
725	100	94	85	90	98	90	87	86	79	70
652.5	90	94	85	90	98	90	87	86	79	70
580	80	94	85	90	98	90	87	86	79	70
543.8	75	94	85	90	98	90	87	86	79	70
507.5	70	94	85	90	98	90	87	86	79	70
435	60	94	85	90	98	90	87	86	79	70
362.5	50	94	85	90	98	90	87	86	79	70
290	40	94	85	90	98	90	87	86	79	70
217.5	30	94	85	90	98	90	87	86	79	70
181.3	25	94	85	90	98	90	87	86	79	70
145	20	94	85	90	98	90	87	86	79	70
72.5	10	94	85	90	98	90	87	86	79	70

**MECHANICAL Sound Data: 49.21 FEET**

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
725	100	88	81	84	92	85	80	79	74	62
652.5	90	88	81	84	92	85	80	79	74	62
580	80	88	81	84	92	85	80	79	74	62
543.8	75	88	81	84	92	85	80	79	74	62
507.5	70	88	81	84	92	85	80	79	74	62
435	60	88	81	84	92	85	80	79	74	62
362.5	50	88	81	84	92	85	80	79	74	62
290	40	88	81	84	92	85	80	79	74	62
217.5	30	88	81	84	92	85	80	79	74	62
181.3	25	88	81	84	92	85	80	79	74	62
145	20	88	81	84	92	85	80	79	74	62
72.5	10	88	81	84	92	85	80	79	74	62

**EMISSIONS DATA**

STAT-USE EPA-T1 2006 - 2006 \*\*\*\*\* P2

This engine meets EPA Tier 1 Equivalent Emission Levels for stationary use in 2006.

Gaseous emissions data measurements are consistent with those described in EPA 40 CFR PART 89 SUBPART D and ISO 8178 for measuring HC, CO, PM, and NOx.

Gaseous emissions values are WEIGHTED CYCLE AVERAGES and are capable of meeting the following non-road emission levels:

LOCALITY            AGENCY/LEVEL            MAX LIMITS - g/kW-hr

U. S. (incl Calif)    EPA/TIER-1            CO:11.4    HC:1.3    NOx:9.2    PM:0.5

REFERENCE EXHAUST STACK DIAMETER	8 IN
WET EXHAUST MASS	10,337.5 LB/HR
WET EXHAUST FLOW (953.60 F STACK TEMP )	6,254.23 CFM
WET EXHAUST FLOW RATE ( 32 DEG F AND 29.98 IN HG )	2,127.00 STD CFM
DRY EXHAUST FLOW RATE ( 32 DEG F AND 29.98 IN HG )	1,949.02 STD CFM
FUEL FLOW RATE	53 GAL/HR

**RATED SPEED "Potential site variation"**

GEN PWR EKW	PERCENT LOAD	ENGINE POWER BHP	TOTAL NOX (AS NO2) LB/HR	TOTAL CO LB/HR	TOTAL HC LB/HR	PART MATTER LB/HR	OXYGEN IN EXHAUST PERCENT	DRY SMOKE OPACITY PERCENT	BOSCH SMOKE NUMBER
725	100	1081	17.1100	3.0200	.5700	.4800	9.9000	1.4000	1.2800
543.8	75	809	12.8100	2.0800	.3300	.4000	10.0000	1.4000	1.2800
362.5	50	557	8.1800	1.6200	.2900	.3700	10.7000	2.0000	1.2800
181.3	25	309	4.1700	1.6800	.4100	.2800	12.4000	2.5000	1.2800
72.5	10	152	2.4000	1.8600	.9200	.2000	14.8000	2.0000	1.2800

**RATED SPEED "Nominal Data"**

GEN PWR EKW	PERCENT LOAD	ENGINE POWER BHP	TOTAL NOX (AS NO2) LB/HR	TOTAL CO LB/HR	TOTAL HC LB/HR	TOTAL CO2 LB/HR	PART MATTER LB/HR	OXYGEN IN EXHAUST PERCENT	DRY SMOKE OPACITY PERCENT	BOSCH SMOKE NUMBER
725	100	1081	14.1400	1.6100	.3000	1,184.1	.2400	9.9000	1.4000	1.2800
543.8	75	809	10.5800	1.1100	.1800	873.9	.2100	10.0000	1.4000	1.2800
362.5	50	557	6.7600	.8700	.1600	618.8	.1900	10.7000	2.0000	1.2800
181.3	25	309	3.4500	.9000	.2200	369.4	.1400	12.4000	2.5000	1.2800
72.5	10	152	1.9800	.9900	.4900	215.2	.1000	14.8000	2.0000	1.2800

**Altitude Capability Data(Corrected Power Altitude Capability)**

Ambient Operating Temp.	50 F	68 F	86 F	104 F	122 F	NORMA
<b>Altitude</b>						
0 FT	1,080.86 hp	1,080.86				
984.25 FT	1,080.86 hp	1,080.86				
1,640.42 FT	1,080.86 hp	1,080.86				
3,280.84 FT	1,080.86 hp	1,080.86 hp	1,080.86 hp	1,078.18 hp	1,044.65 hp	1,080.86
4,921.26 FT	1,080.86 hp	1,080.86 hp	1,047.34 hp	1,013.81 hp	982.97 hp	1,080.86
6,561.68 FT	1,055.38 hp	1,019.18 hp	985.65 hp	953.47 hp	923.96 hp	1,028.56
8,202.1 FT	991.01 hp	957.49 hp	925.3 hp	895.8 hp	868.98 hp	976.26 l
9,842.52 FT	930.67 hp	898.48 hp	868.98 hp	840.82 hp	815.34 hp	927.99 l
11,482.94 FT	873 hp	843.5 hp	815.34 hp	789.86 hp	764.38 hp	879.71 l
13,123.36 FT	818.02 hp	789.86 hp	764.38 hp	740.24 hp	717.45 hp	834.11 l
14,763.78 FT	765.72 hp	740.24 hp	716.1 hp	693.31 hp	671.85 hp	791.2 h

The powers listed above and all the Powers displayed are Corrected Powers

<b>Identification Reference and Notes</b>			
<b>Engine Arrangement:</b>	2819205	<b>Lube Oil Press @ Rated Spd(PSI):</b>	61.6
<b>Effective Serial No:</b>	BLG02982	<b>Piston Speed @ Rated Eng SPD (FT/Min):</b>	1,773.6
<b>Primary Engine Test Spec:</b>	0K2179	<b>Max Operating Altitude(FT):</b>	4,921.3
<b>Performance Parm Ref:</b>	TM5739	<b>PEEC Elect Control Module Ref</b>	
<b>Performance Data Ref:</b>	DM9135	<b>PEEC Personality Cont Mod Ref</b>	
<b>Aux Coolant Pump Perf Ref:</b>			
<b>Cooling System Perf Ref:</b>		<b>Turbocharger Model</b>	TV9215-2.00
<b>Certification Ref:</b>	STAT USE EPA T1	<b>Fuel Injector</b>	
<b>Certification Year:</b>	2006	<b>Timing-Static (DEG):</b>	18.50
<b>Compression Ratio:</b>	13.0	<b>Timing-Static Advance (DEG):</b>	3.50
<b>Combustion System:</b>	DI	<b>Timing-Static (MM):</b>	0.00
<b>Aftercooler Temperature (F):</b>	--	<b>Unit Injector Timing (MM):</b>	--
<b>Crankcase Blowby Rate(CFH):</b>	--	<b>Torque Rise (percent)</b>	--
<b>Fuel Rate (Rated RPM) No Load (Gal/HR):</b>	--	<b>Peak Torque Speed RPM</b>	--
<b>Lube Oil Press @ Low Idle Spd(PSI):</b>	61.2	<b>Peak Torque (LB.FT):</b>	--



Reference  
Number: DM9135 STAT-USE EPA-T1 20062006P2

Parameters  
Reference: TM5739 **GEN SET - PACKAGED - DIESEL**

**TOLERANCES:**

AMBIENT AIR CONDITIONS AND FUEL USED WILL AFFECT THESE VALUES. EACH OF THE VALUES MAY VARY IN ACCORDANCE WITH THE FOLLOWING TOLERANCES.

Power	+/- 3%
Exhaust Stack Temperature	+/- 8%
Generator Power	+/- 5%
Inlet Airflow	+/- 5%
Intake Manifold Pressure-gage	+/- 10%
Exhaust Flow	+/- 6%
Specific Fuel Consumption	+/- 3%
Fuel Rate	+/- 5%
Heat Rejection	+/- 5%
Heat Rejection - Exhaust Only	+/- 10%

**T4i Tolerance Exceptions**

**C15:** Power Tolerance +4% , -0%

**C27:** Power Tolerance +0% , -4%

**CONDITIONS:**

ENGINE PERFORMANCE IS CORRECTED TO INLET AIR STANDARD CONDITIONS OF 99 KPA (29.31 IN HG) AND 25 DEG C (77 DEG F).

THESE VALUES CORRESPOND TO THE STANDARD ATMOSPHERIC PRESSURE AND TEMPERATURE IN ACCORDANCE WITH SAE J1349. ALSO INCLUDED IS A CORRECTION TO STANDARD FUEL GRAVITY OF 35 DEGREES API HAVING A LOWER HEATING VALUE OF 42,780 KJ/KG (18,390 BTU/LB) WHEN USED AT 29 DEG C (84.2 DEG F) WHERE THE DENSITY IS 838.9 G/L (7.002 LB/GAL).

THE CORRECTED PERFORMANCE VALUES SHOWN FOR CATERPILLAR ENGINES WILL APPROXIMATE THE VALUES OBTAINED WHEN THE OBSERVED PERFORMANCE DATA IS CORRECTED TO SAE J1349, ISO 3046-2 & 8665 & 2288 & 9249 & 1585, EEC 80/1269 AND DIN70020 STANDARD REFERENCE CONDITIONS.

ENGINES ARE EQUIPPED WITH STANDARD ACCESSORIES; LUBE OIL, FUEL PUMP AND JACKET WATER PUMP. THE POWER REQUIRED TO DRIVE AUXILIARIES MUST BE DEDUCTED FROM THE GROSS OUTPUT TO ARRIVE AT THE NET POWER AVAILABLE FOR THE EXTERNAL (FLYWHEEL) LOAD. TYPICAL AUXILIARIES INCLUDE COOLING FANS, AIR COMPRESSORS, AND CHARGING ALTERNATORS.

RATINGS MUST BE REDUCED TO COMPENSATE FOR ALTITUDE AND/OR AMBIENT TEMPERATURE CONDITIONS ACCORDING TO THE APPLICABLE DATA SHOWN ON THE PERFORMANCE DATA SET.

**ALTITUDE:**

*ALTITUDE CAPABILITY* - THE RECOMMENDED REDUCED POWER VALUES FOR SUSTAINED ENGINE OPERATION AT SPECIFIC ALTITUDE LEVELS AND AMBIENT TEMPERATURES.

*COLUMN "N" DATA* - THE FLYWHEEL POWER OUTPUT AT NORMAL AMBIENT

**TEMPERATURE.**

*AMBIENT TEMPERATURE* - TO BE MEASURED AT THE AIR CLEANER AIR INLET DURING NORMAL ENGINE OPERATION.

*NORMAL TEMPERATURE* - THE NORMAL TEMPERATURE AT VARIOUS SPECIFIC ALTITUDE LEVELS IS FOUND ON TM2001.

THE GENERATOR POWER CURVE TABULAR DATA REPRESENTS THE NET ELECTRICAL POWER OUTPUT OF THE GENERATOR.

**GENERATOR SET RATINGS***EMERGENCY STANDBY POWER (ESP)*

OUTPUT AVAILABLE WITH VARYING LOAD FOR THE DURATION OF AN EMERGENCY OUTAGE. AVERAGE POWER OUTPUT IS 70% OF THE ESP RATING. TYPICAL OPERATION IS 50 HOURS PER YEAR, WITH MAXIMUM EXPECTED USAGE OF 200 HOURS PER YEAR.

*STANDBY POWER RATING*

OUTPUT AVAILABLE WITH VARYING LOAD FOR THE DURATION OF AN EMERGENCY OUTAGE. AVERAGE POWER OUTPUT IS 70% OF THE STANDBY POWER RATING. TYPICAL OPERATION IS 200 HOURS PER YEAR, WITH MAXIMUM EXPECTED USAGE OF 500 HOURS PER YEAR.

*PRIME POWER RATING*

OUTPUT AVAILABLE WITH VARYING LOAD FOR AN UNLIMITED TIME. AVERAGE POWER OUTPUT IS 70% OF THE PRIME POWER RATING. TYPICAL PEAK DEMAND IS 100% OF PRIME RATED EKW WITH 10% OVERLOAD CAPABILITY FOR EMERGENCY USE FOR A MAXIMUM OF 1 HOUR IN 12. OVERLOAD OPERATION CANNOT EXCEED 25 HOURS PER YEAR.

*CONTINUOUS POWER RATING*

OUTPUT AVAILABLE WITH NON-VARYING LOAD FOR AN UNLIMITED TIME. AVERAGE POWER OUTPUT IS 70-100% OF THE CONTINUOUS POWER RATING. TYPICAL PEAK DEMAND IS 100% OF CONTINUOUS RATED EKW FOR 100% OF OPERATING HOURS.

**SOUND DEFINITIONS:**

Sound Power : DM8702

Sound Pressure : TM7080

Date Released : 03/14/12

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Caterpillar Confidential: **Green**

Content Owner: Commercial Processes Division

Web Master(s): PSG Web Based Systems Support

Current Date: Tuesday, June 02, 2015 9:55:39 AM

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**MANUFACTURER EMISSIONS DATA**

**FOR CE-3**

**CATERPILLAR MODEL C27 ENGINE**

**PERFORMANCE DATA[DM7696]**

December 16, 2011

Performance Number: DM7696

Change Level: 01

SALES MODEL:	C27	COMBUSTION:	DI
ENGINE POWER (BHP):	1,214	ENGINE SPEED (RPM):	1,800
GEN POWER WITH FAN (EKW):	800.0	HERTZ:	60
COMPRESSION RATIO:	16.5	FAN POWER (HP):	39.3
APPLICATION:	PACKAGED GENSET	ADDITIONAL PARASITICS (HP):	52.2
RATING LEVEL:	STANDBY	ASPIRATION:	TA
PUMP QUANTITY:	1	AFTERCOOLER TYPE:	ATAAC
FUEL TYPE:	DIESEL	AFTERCOOLER CIRCUIT TYPE:	JW+OC, ATAAC
MANIFOLD TYPE:	DRY	INLET MANIFOLD AIR TEMP (F):	120
GOVERNOR TYPE:	ADEM4	JACKET WATER TEMP (F):	210.2
ELECTRONICS TYPE:	ADEM4	TURBO CONFIGURATION:	PARALLEL
IGNITION TYPE:	CI	TURBO QUANTITY:	2
INJECTOR TYPE:	EUI	TURBOCHARGER MODEL:	GTA5008BS-56T-1.60
REF EXH STACK DIAMETER (IN):	10	CERTIFICATION YEAR:	2010
MAX OPERATING ALTITUDE (FT):	7,999	PISTON SPD @ RATED ENG SPD (FT/MIN):	1,800.0

**General Performance Data**

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP
EKW	%	BHP	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
800.0	100	1,214	324	0.330	57.3	58.6	120.5	1,230.6	41.1	952.5
720.0	90	1,100	294	0.334	52.5	53.7	115.2	1,185.3	37.5	932.4
640.0	80	988	284	0.339	47.8	48.4	113.4	1,168.6	33.4	919.7
600.0	75	932	249	0.341	45.4	45.5	113.0	1,155.3	31.2	913.8
560.0	70	876	234	0.342	42.9	42.2	111.6	1,138.9	28.8	906.0
480.0	60	765	204	0.344	37.6	34.9	107.3	1,095.6	23.9	882.8
400.0	50	654	175	0.346	32.3	27.3	102.5	1,039.6	19.1	850.4
320.0	40	545	145	0.349	27.1	20.4	98.3	967.7	14.9	804.3
240.0	30	436	116	0.355	22.1	14.5	95.0	875.5	11.4	739.0
200.0	25	380	101	0.359	18.5	11.7	93.6	822.1	9.9	699.4
160.0	20	324	86	0.366	17.0	9.1	92.4	763.2	8.5	654.7
80.0	10	210	58	0.402	12.0	5.1	92.2	626.6	6.3	544.7

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR CUTLET TEMP	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
EKW	%	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
800.0	100	1,214	61	362.1	2,216.4	6,011.7	9,543.1	9,944.2	2,093.1	1,894.9
720.0	90	1,100	57	341.6	2,124.9	5,659.3	8,125.9	9,493.8	1,998.8	1,815.5
640.0	80	988	51	320.7	2,001.3	5,260.8	8,572.1	8,906.9	1,875.2	1,707.1
600.0	75	932	48	309.9	1,930.4	5,042.0	8,257.4	8,575.1	1,805.0	1,645.1
560.0	70	876	44	295.4	1,851.1	4,797.3	7,907.3	8,207.3	1,727.2	1,576.0
480.0	60	765	37	264.1	1,678.1	4,260.9	7,148.0	7,411.6	1,560.5	1,427.2
400.0	50	654	29	233.3	1,497.7	3,697.0	6,361.6	6,588.0	1,387.5	1,272.0
320.0	40	545	22	203.3	1,329.0	3,157.0	5,630.4	5,820.5	1,228.0	1,129.6
240.0	30	436	16	173.6	1,175.4	2,643.8	4,970.3	5,124.7	1,084.4	1,003.3
200.0	25	380	13	158.7	1,102.8	2,392.1	4,660.7	4,797.2	1,014.7	942.2
160.0	20	324	10	143.8	1,032.8	2,142.5	4,363.5	4,482.1	945.3	881.3
80.0	10	210	6	121.2	926.9	1,716.6	3,911.4	3,995.8	840.3	792.1

Heat Rejection Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHUAUST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
800.0	100	1,214	18,785	6,240	45,257	25,637	6,549	9,235	51,468	122,861	130,984
720.0	90	1,100	18,137	5,061	42,000	23,586	6,007	8,276	46,664	112,779	120,138
640.0	80	988	17,141	4,437	38,842	21,600	5,462	7,119	41,902	102,550	109,241
600.0	75	932	16,243	4,573	36,968	20,559	5,186	6,513	39,533	97,376	103,729
560.0	70	876	15,133	4,950	34,899	19,383	4,898	5,822	37,162	91,965	97,965
480.0	60	765	13,833	4,599	30,563	16,728	4,301	4,488	32,445	80,759	86,028
400.0	50	654	12,297	4,489	26,024	13,914	3,694	3,331	27,748	69,364	73,890
320.0	40	545	10,665	4,336	21,675	11,109	3,103	2,367	23,120	58,261	62,063
240.0	30	436	9,960	3,213	17,222	8,311	2,521	1,584	18,469	47,340	50,429
200.0	25	380	9,576	2,592	15,113	6,955	2,231	1,215	16,122	41,885	44,618
160.0	20	324	9,057	2,021	13,057	5,639	1,939	898	13,745	36,402	38,778
80.0	10	210	7,177	1,693	9,288	3,167	1,375	455	8,885	25,814	27,498



Emissions Data

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN	EKW	800 0	600 0	400 0	200 0	80 0
ENGINE POWER	BHP	1,214	922	654	380	210
PERCENT LOAD	%	100	78	50	25	10
TOTAL NOX (AS NO2)	G/HR	6,283	3,725	2,368	1,644	1,036
TOTAL CO	G/HR	276	344	337	275	303
TOTAL HC	G/HR	35	44	48	37	45
TOTAL CO2	KG/HR	563	445	315	188	116
PART MATTER	G/HR	28.4	26.7	44.2	51.1	52.3
TOTAL NOX (AS NO2)	(CORR 5% O2) MG/NM3	2,580.0	1,962.4	1,776.1	2,170.4	2,154.4
TOTAL CO	(CORR 5% O2) MG/NM3	115.1	183.6	258.9	383.5	733.8
TOTAL HC	(CORR 5% O2) MG/NM3	12.5	20.6	31.3	46.5	96.9
PART MATTER	(CORR 5% O2) MG/NM3	9.7	11.8	28.3	58.2	107.7
TOTAL NOX (AS NO2)	(CORR 5% O2) PPM	1,257	958	865	1,057	1,049
TOTAL CO	(CORR 5% O2) PPM	92	147	207	307	587
TOTAL HC	(CORR 5% O2) PPM	23	38	58	87	181
TOTAL NOX (AS NO2)	G/HP-HR	5.18	4.02	3.63	4.34	4.86
TOTAL CO	G/HP-HR	0.23	0.37	0.52	0.72	1.45
TOTAL HC	G/HP-HR	0.03	0.05	0.07	0.10	0.22
PART MATTER	G/HP-HR	0.02	0.03	0.07	0.13	0.25
TOTAL NOX (AS NO2)	LB/HR	13.74	8.21	5.22	3.62	2.28
TOTAL CO	LB/HR	0.61	0.76	0.74	0.61	0.67
TOTAL HC	LB/HR	0.08	0.10	0.11	0.08	0.10
TOTAL CO2	LB/HR	1,240	982	694	414	255
PART MATTER	LB/HR	0.06	0.06	0.10	0.11	0.12
OXYGEN IN EXH	%	8.9	10.0	11.1	13.1	15.4
DRY SMOKE OPACITY	%	0.2	1.1	2.6	4.3	5.3
BOSCH SMOKE NUMBER		0.14	0.39	0.96	1.51	1.69