

35

**Pennsylvania Technical Advisory Committee
On Diesel Powered Equipment**

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March 16, 2006

Joseph Scaffoni, Director
Bureau of Deep Mine Safety
Fayette County Health Center
100 New Salem Road, Room 167
Uniontown, Pa. 15401

RE: Brookville Equipment Corporation Deutz BF4M2012 100HP Diesel Power Package

Dear Mr. Scaffoni:

Article II-A of the Pennsylvania Bituminous Coal Mine Act (the act) provides for the use of diesel-powered equipment in underground bituminous coal mines. Section 224-A of the act created a Technical Advisory Committee ("TAC") for the purpose of advising the Department regarding implementation of Article II-A.

Background

On October 10, 2005, Brookville Equipment Corporation (Brookville) submitted a request to the Bureau of Deep Mine Safety (BDMS) for evaluation and approval pursuant to Article II-A of the act of a Deutz BF4M2012 100HP engine (MSHA Approval No. 07-ENA040002-0) with a M30 DST Management System in a Model 1044TC rubber tired tractor. Additionally, Brookville requested an alternative test procedure for the five minute carbon monoxide (CO) tests required under Sections 217-A and 218-A of the act. On October 24, 2005, the Director of BDMS requested the TAC to evaluate the diesel power package and to advise the Department regarding the TAC's recommendation as to whether the diesel power package meets the requirements of the act and for the TAC's recommendation on Brookville's request for an alternate test procedure for CO testing. The TAC was unable to begin its investigation until February 2006, because the equipment was not available until then.

The diesel power package includes the following items:

- Deutz BF4M2012 100HP turbo charged diesel engine (MSHA Certification No. 07-ENA040002-0)

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- Emissions Control System – DST Management System which includes:
 - Syncat Corp. Oxidation-Catalyst
 - Pass Technologies heat exchanger
 - Fleet Guard or DST particulate filter (MSHA efficiency rating 95%)

More detailed information on the specifications of the diesel power package is included on the General Specification Sheet which is attached as Attachment 1.

Investigation

On February 9, 2006, the TAC and DEP representatives traveled to the Brookville facilities to inspect the rubber tired tractor. On February 9, emissions testing of the engine and after-treatment system were performed, as well as exhaust gas temperature monitoring and stall test procedure. The results of that testing are included in Attachment 2.

The results of the emission tests showed the engine was performing within MSHA's approval specifications.

Monitoring of the exhaust gas temperature produced a high exhaust gas temperature reading of 160° F, which is well below the 302° F allowed by Section 203-A (b)(4) of Article II-A. It is our belief that the heat exchanger will maintain the exhaust gas temperature well below the required 302 ° F.

The after-treatment system is fitted with a Fleet Guard or DST disposable filter. The filter is rated by MSHA at a 95% efficiency rating, which meets the requirements of Section 203-A (b)(1) of Article II-A. The engine and filter extrapolations show that the diesel power package will result in an average ambient concentration of .0137 mg/m³ of diesel particulate matter when diluted by 100% of the MSHA approval plate ventilation rate for this engine, which is well below the .12 mg/m³ requirement of Section 203-A (a)(1) Article II-A.

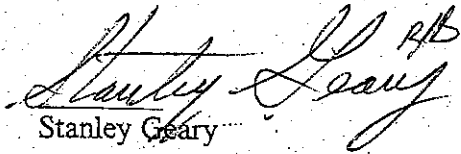
Also, on March 16, 2006 the TAC traveled to the Rosebud Coal Company Clementine Mine to inspect the tractor.

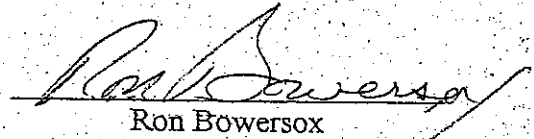
In addition to the testing that was conducted, our investigation and our observations confirmed that the diesel power package is capable of meeting all the requirements of Section 203-A of Article II-A of the act without reducing or compromising the level of health or safety afforded by the act.

Although the diesel powered package can withstand the emissions tests as described in Sections 217-A and 218-A of Article II-A, we recommend approval of the attached Alternative Stall Test Procedure (Attachment 3). Also, our test results of both the required test and the alternate test confirm comparable results and as such we will recommend the use of the alternate test.

Recommendation

Our recommendation is based upon the data supplied by Brookville, the results of the tests conducted on February 9, 2006, as well as the data acquired and observations made during our investigation. The TAC has determined that the Deutz BF4M2012 100HP engine (MSHA Approval No. 07-ENA040002-0) with a M30 DST Management System meets all requirements of Section 203-A of Article II-A of the Pennsylvania Bituminous Coal Mine Act. As such, we are recommending approval of the above described diesel power package. This recommendation is provided with the understanding that the General Specification Sheet (Attachment 1) be strictly adhered to. As discussed above, we are also recommending approval of an alternate test procedure for Sections 217-A and 218-A of the act.


Stanley Geary


Ron Bowersox

October 10, 2005

**BROOKVILLE EQUIPMENT CORP.
MODEL 1044TC
Diesel 10 Ton Rubber Tire Tractor**

General Specifications of the Diesel-Powered Equipment Package

Engine Manufacturer		Deutz		
Engine Model		BF4M2012		
Horsepower		100 HP		
Rated Speed		2500 RPM		
Manufacturer's Maximum Recommended Exhaust Backpressure (In H ₂ O)		40.15 Inches Water Gauge		
Maximum Exhaust Out Temperature		302 deg F		
MSHA Engine Approval		MSHA Part 7		
MSHA Certification No.		07-ENA040002-0 (Part 7)		
Rated Speed		2500 RPM		
Rated Horsepower		100 HP		
Exhaust GAS Flow (SCFM)		703 CFM @ 500 deg C		
ISO 8178-1 Average DPM (gr/hr)		4.51 gr/hr		
Average Ambient DPM Level (mg/m3)		0.0137 mg/m3		
MSHA Ventilation Rate (CFM)		6,000 CFM (Part 7)	CFM (Part 32)	
Pa. State Ventilation Rate (CFM)				
Emissions Control System			DST Management System	
Fuel Injection Pump	Make	Bosch		
	P/N	0 118 2384 KZ		
Oxidation Catalyst	Make	Syncat Corp.		
	P/N	M113-210-02		
Heat Exchanger	Make	Paas Tech.		
	P/N	M150-301-01		
DPM Filter	Make	Fleet Guard	Model	M 30
	P/N	M 30	Outer Filter Size	16 x 12 in Diameter
	Air Rating (CFM)	2100 CFM	Inner Filter Size	10 x 6 in Diameter
	Surface Area (in3)	42,231 in3	Filter Length	20 in
	Efficiency			
	Recommended Exhaust Back-Pressure			25 Inches Water Gauge

**ALTERNATIVE STALL TEST PROCEDURE FOR PA STATE ACT 182, ARTICLE II-A
DIESEL-POWERED EQUIPMENT**

ALTERNATE PROCEDURE, Section 217-A: (an alternative to items 8 through 14)

1. Place the equipment into an intake entry. Make sure no personnel are in front of or behind the equipment during test.
2. Set the brakes and chock the wheels.
3. Start the diesel engine and allow it to warm up to operating temperature.
4. Install the carbon monoxide CO sampling devices into the untreated exhaust gas port provided.
5. Allow CO sampling device to stabilize.
6. Put the transmission in high gear.
7. With brake still applied, put the engine at full throttle to induce converter stall for 90 seconds. Stop test immediately if any controls or indicators are not in their operating range, or if equipment moves while at stall.
8. Record three CO readings at 60, 75, and 90-second intervals during converter stall.
9. Return engine to low idle and put transmission in neutral. Allow the torque converter temperature to stabilize.
10. Take an average of the three readings.
11. Comply with record-keeping requirements pursuant to Section 214-A.

ALTERNATIVE PROCEDURE, Section 218-A: (an alternative to items 10-14)

1. Place the equipment into an intake entry. Make sure no personnel are in front of or behind the equipment during test.
2. Set the brakes and chock the wheels.
3. Start the diesel engine and allow it to warm up to operating temperature.
4. Install the carbon monoxide CO sampling device into the untreated exhaust gas port provided.
5. Allow CO sampling device to stabilize.
6. Put the transmission in high gear.
7. With brakes still applied, put the engine at full throttle to induce converter stall for 90 seconds. Stop test immediately if any controls or indicators are not in their operating range, or if equipment moves while at stall.
8. Record three CO readings at 60, 75, and 90-second intervals during converter stall.
9. Return engine to low idle and put transmission in neutral. Allow the torque converter temperature to stabilize.
10. Take an average of the three CO readings.
11. Install the carbon monoxide CO sampling device into the treated exhaust gas port provided.
12. Repeat steps (5) thru (10).
13. If CO reading for untreated exhaust gas is greater than twice the baseline established under 217-A(b), or if the CO reading for treated exhaust is greater than 100 ppm, the equipment has failed and must be serviced and retested before it is returned to regular service; and
14. Comply with record-keeping requirements pursuant to Section 214-A.