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Bureau of Mine Safety
Uniontown

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

Paul Borchick

(724) 485-4414 (Office)
(412) 736-9105 (Cell)
Email: paulborchick@consolenergy.com

Ron Bowersox

(724) 726-8987 (Home)
(724) 479-8692 (Office)
Email: umwarbowersox@yahoo.com

September 10, 2008

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

RE: Brookville Equipment Corporation Brookville Model 25T174D 25 Ton Locomotive modification to replace the previously approved engine with a Deutz BF4M1013FC 173 HP Diesel Engine and a DST Model M249 Emissions Control System using a M30 Filter.

Dear Mr. Sbaffoni:

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 February 13, 2008, Brookville Equipment Corporation (Brookville) submitted a request to the Bureau of Mine Safety for evaluation and approval pursuant to Article II-A of the act of a Deutz BF4M1013FC 173 HP engine (MSHA Approval No. 07-ENA040007-1) with a M249 DST Management System in a Brookville Model 25T174D 25 Ton Locomotive. This request was to modify a previously approved locomotive, by changing the engine only, to the Deutz BF4M1013FC 173HP engine. 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 February 27, 2008, 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 began its investigation on May 9, 2008 when the equipment became available and traveled to Brookville along with BMS to evaluate the equipment.

The diesel power package includes the following items:

- Deutz BF4M1013FC 173HP turbo charged diesel engine (MSHA Certification No. 07-ENA040007-1) (Part 7)
- Emissions Control System – DST Model 249 Management System which includes:
 - DST M113-210-02 Oxidation Catalyst
 - DST M115-301-21 heat exchanger
 - DST M30 particulate filter (MSHA efficiency rating 96 %)

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 May 9, 2008 the TAC and DEP representatives traveled to the Brookville facilities to inspect the locomotive. 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 190° 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 DST M-30 disposable filter. The filter is rated by MSHA at a 96 % 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 .016 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.

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.

The need for the Alternate Test procedure was also evaluated and the TAC recommendation for the Alternate Test procedure was addressed in a separate

recommendation to the Director in a letter dated May 13, 2008, with action taken during the July 9, 2008 TAC meeting.

Recommendation

Our recommendation is based upon the data supplied by Brookville, the results of the tests conducted on May 9, 2008, as well as the data acquired and observations made during our investigation. The TAC has determined that the Deutz BF4M1013FC 173HP engine (MSHA Approval No. 07-ENA040007-1) with a DST M249 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.

Should the Director receive a request for temporary approval to use this equipment prior to the next regular scheduled TAC meeting on October 8, 2008, the TAC will recommend temporary approval for the locomotive until permanent approval is recommended in the October 8, 2008 meeting.


Paul Borchick


Ron Bowersox

BROOKVILLE EQUIPMENT CORP.
MODEL 25T174D
Diesel 25 Ton Locomotive
General Specifications of the Diesel-Powered Equipment Package

Engine Manufacturer		Deutz		
Engine Model		BF4M1013FC		
Horsepower		173 HP		
Rated Speed		2300 RPM		
Manufacturer's Recommended Exhaust Back-pressure (InH ₂ O)		30 Inches Water Gauge		
Maximum Exhaust Out Temperature		950 deg F		
MSHA Engine Approval		MSHA Part 7		
MSHA Certification No.		07-ENA040007-1		
Rated Speed		2300 RPM		
Rated Horsepower		173 HP		
Exhaust GAS Flow (SCFM)		996 CFM		
ISO 8178-1 Average DPM (gr/hr)		6.2 gr/hr		
Average Ambient DPM Level (mg/m ³)		0.021 mg/m ³		
MSHA Ventilation Rate (CFM)		7,000 CFM (Part 7)	CFM (Part 32)	
Pa. State Ventilation Rate (CFM)				
Emissions Control System		DST Management System		
Fuel Injection Pump	Make P/N	Bosch – Belt driven rotary fuel lift pump		
Oxidation Catalyst	Make P/N	Dry Systems Technologies M113-210-02		
Heat Exchanger	Make P/N	Dry Systems Technologies M115-301-21		
DPM Filter	Make	Dry Systems Technologies	Model	M249 (Total System)
	P/N	M30-411-01R	Filter Size	M30 (Filter) 16 x 12 in Outer 10 x 6 in Inner
	Air Rating (CFM)	2100 CFM	Filter Length	20 in
	Surface Area (in ²)	42,231 in ²		
	Efficiency			
	Recommended Exhaust Back-Pressure			Less than 30 inches Water Gauge

