pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

BUREAU OF MINE SAFETY

(76b)

October 28, 2011

Mr. Carl R. Sanns
J. H. Fletcher & Company
P O Box 2187
Huntington, WV 25722

Re: Engine and emissions control package evaluation under Sections 403, 417 and 418 of the Act for a Cummins 4B3.3T engine (MSHA ID 07-ENA040017 Part 7) 85hp@2600 rpm diesel engine with DST M186 emissions control system using an DST Model M70- 417-01 DPM filter (95% efficient) and a DST Model M260-223-02 diesel oxidation catalyst in a J.H.Fletcher Model CMHC-D Diesel Power Manhole Cutter

Dear Mr. Sanns:

Chapter 4 of the "Bituminous Coal Mine Safety Act" (the Act) provides for the use of diesel-powered equipment in underground bituminous coal mines. Section 424 of the act created a Technical Advisory Committee ("TAC") for the purpose of advising the Department regarding implementation of Chapter 4 and evaluation of alternative technology or methods for meeting the requirements of Chapter 4.

On March 29, 2011 the Director of BMS requested the TAC to evaluate the J.H.Fletcher Model CMHC-D Diesel Power Manhole Cutter using a Cummins 4B3.3T engine (MSHA ID 07-ENA040017 Part 7) 85hp@2600 rpm diesel engine with DST M186 emissions control system using an DST Model M70-417-01 DPM filter (95% efficient) and a DST Model M260-223-02 diesel oxidation catalyst and to advise the Department regarding the TAC's recommendation as to whether the referenced equipment meets requirements of Section 403 of the Act. The engine and emissions control package has not been previously approved under Section 403 of the Act.

The diesel power package includes the following items:

- Cummins 4B3.3T engine, (MSHA ID 07-ENA040017 Part 7) 85hp@2600 rpm diesel engine
- DST M186 emissions control system:
  - DST Model M70- 417-01 DPM filter (95% efficient)
  - DST Model M260-223-02 diesel oxidation catalyst
  - DST Model M184-301-01 heat exchanger

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

On August 24, 2011 the TAC and DEP traveled to J.H.Fletcher in Ashland, Ky. to inspect the equipment when it became available. The TAC evaluated the engine and exhaust emissions package.

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 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 209° F, which is well below the 302° F allowed by Section 403 (b)(4) of the Act. The maximum surface

temperature observed was 185° F on the exhaust manifold after conducting all the CO testing. The maximum water temperature observed was 160° F, and the maximum engine oil temperature observed was 100° F.

The after-treatment system is fitted with a DST Model M70- 417-01 DPM filter. The filter is rated by MSHA at a 95 % efficiency rating. The engine and filter extrapolations show that the diesel power package will result in an average ambient concentration of .084 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 0.12 mg/m3 requirement of Section 403 (a)(1) the Act.

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 403 of the Act.

During the TAC investigation there was a concern regarding the audible and visual warning for the fire suppression system. This piece of equipment is operated by remote control, and the operator position may vary. This may cause the operator to not be able to see the warning as required by Section 408(d) of the Act. Fletcher made changes that incorporated a light visible from all operating positions to comply with Section 408(d). The TAC also asked Fletcher to provide an operating RPM label at the engine controls to identify the normal operating speed for the engine. A tag was provided to indicate the normal operating RPM's.

Our recommendation is based upon the data supplied by J.H. Fletcher, the results of the tests conducted on August 24, 2011, as well as the data acquired and observations made during our investigation. The TAC has determined that the Cummins 4B3.3T engine (MSHA ID 07-ENA040017 Part 7) 85hp@2600 rpm diesel engine with DST M186 emissions control system using a DST Model M70- 417-01 DPM filter (95% efficient) and a DST Model M260-223-02 diesel oxidation catalyst meets all requirements of Section 403 of Chapter 4 of the Pennsylvania Bituminous Coal Mine Safety 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 Sheets (Attachment 1-1 and 1-2) be strictly adhered to.

If you have any questions on this request, please contact Alan Martin at alamartin@pa.gov or at 724-439-7461.

Sincerely,

Joseph A. Sbaffoni
Director
Bureau of Deep Mine Safety

Attachment

cc: Bowersox
Borchick

JAS/ALM/cd

bcc: Martin
Antoon
Gaida
Elias (web)
Dunn/TAC file

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General Specification Sheet

I. Engine

Manufacturer	Cummins	High Idle (RPM)	2850RPM
Manufacturer Address	Box 3005 Columbus, IN. 47202-3005	Particulate Index (PI)	9500CFM
		Backpressure	41" wg
Model Number	4B3.3T	Gaseous Ventilation Rate (CFM)	4500 cfm
Serial Number	TBD	Raw DPM (gr/hp)	16.14 g/hr
Horse Power	85@2600RPM	MSHA 7E Approval Number	07-ENA040017
Max. dirty Intake Air Restriction (H^2O)	30 " wg	Type of Aspiration	Turbocharged
Max. Allowed Backpressure H^2O	41 " wg	Fuel Delivery System	Mechanical Injection
Turbocharger Boost Pressure	17 psi	Low Idle (RPM)	800

II. Filter System

Manufacturer	Dry System Technology
Manufacturer Address	8102 Lemont Road, Suite 700 Woodridge, Illinois 60517
Model Number	M194
System Type	Dry Paper
System Composition	Paper – DST - M70-417-01
Efficiency Rating	95 %
Type of Regeneration	N/A

III. Catalyst

Manufacturer	Dry System Technology
Manufacturer Address	8102 Lemont Road, Suite 700 Woodridge, Illinois 60517
System Name	Oxidation Catalyst
Model Number	M260-223-02

ATTACHMENT 1-2