



pennsylvania

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BUREAU OF MINE SAFETY

82A

April 5, 2012

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

RE: J.H. Fletcher Model DR-D Diesel Power Track Drill utilizing a Cummins QSB 4.5 diesel engine (MSHA ID 07-ENA07006 - Part 7) 130HP @ 2800 RPM with a DST M83 emissions control system using an DST Model M30- 411-01R DPM filter (95% efficient) and a DST Model M281-210-02 diesel oxidation catalyst.

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 April 7, 2011 J. H. Fletcher company submitted a request for evaluation of their Model DR-D (previously Model DD-D) Diesel Power Track Drill utilizing a Cummins QSB 4.5 diesel engine (MSHA ID 07-ENA07006 - Part 7) 130HP @ 2800 RPM with a DST M83 emissions control system using an DST Model M30- 411-01R DPM filter (95% efficient) and a DST Model M281-210-02 diesel oxidation catalyst.

On January 21, 2011 the Director of BMS requested the TAC to evaluate the J.H. Fletcher Model DR-D (previously Model DD-D)Track Drill engine and emission package 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 QSB 4.5 diesel engine (MSHA ID 07-ENA07006 - Part 7) 130HP @ 2800 RPM
- DST M83 emissions control system:
- DST Model M30- 411-01R DPM filter (95% efficient)
- DST Model M281-210-02 diesel oxidation catalyst

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 February 2, 2012 the TAC and DEP traveled to J.H. Fletcher in Huntington, WV 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 182° F, which is well below the 302° F allowed by Section 403 (b)(4) of the Act. The maximum surface temperature observed was over 302° F on the exhaust manifold in a specific location, and Fletcher agreed to have additional coating applied to the area before shipping. The remainder of the engine and exhaust system surface temperature measurements after conducting all the CO testing was found to be maximum 280° F, which is below the 302° F allowed by Section 403 (b)(3) of the Act. The maximum engine coolant temperature observed was 182° F, and the maximum engine oil temperature observed was 100° F.

The after-treatment system is fitted with a DST Model M30- 411-01R 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 .055 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. (Attachment 2)

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 location of the treated and untreated exhaust gas sampling ports. These 2 sampling ports were not located in the operator's compartment as required in Section 418(a) (5) of the Act. Fletcher agreed to relocate these ports to the operators cab before shipping. The TAC also asked Fletcher to provide a procedure for conducting the lug test to assure it is performed properly during the emissions testing. The TAC also requested that the fuel gage be more easily accessible to the operator since this is a requirement during pre op checks. Fletcher will provide a more accessible means to check the fuel gage before shipping.

Our recommendation is based upon the data supplied by J.H. Fletcher, the results of the tests conducted on February 2, 2012, as well as the data acquired and observations made during our investigation. The TAC has determined that the Cummins QSB 4.5 diesel engine (MSHA ID 07-ENA07006 - Part 7) 130HP @ 2800 RPM with a DST M83 emissions control system using an DST Model M30- 411-01R DPM filter (95% efficient) and a DST Model M281-210-02 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 Sheet (Attachment 1) be strictly adhered to.

Should the Director receive a request to use this equipment prior to the next scheduled TAC meeting, the TAC recommends temporary approval until the next regular scheduled TAC meeting on April 11, 2012 at which time permanent approval will be recommended.

If you have any questions on this request, please contact Joseph Scaffoni at jscaffoni@pa.gov or at 724-439-7461.

Sincerely,



Joseph A. Scaffoni
Director
Bureau of Mine Safety

cc: Bowersox
Borchick

Enclosure(s)

JAS/cd

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

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

JAS
ALM
Anton
Gaida
dum/original
(856)

Paul Borchick

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

Ron Bowersox

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

February 7, 2012

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



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Background

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The diesel power package includes the following items:

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Investigation

On February 2, 2012 the TAC and DEP traveled to J.H. Fletcher in Huntington, WV to inspect the equipment when it became available. The TAC evaluated the engine and exhaust emissions package.

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Recommendation

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Paul Borchick


Ron Bowersox

General Specification Sheet

I. Engine

Manufacturer	Cummins	High Idle (RPM)	2800
Manufacturer Address	Box 3005 Columbus, IN. 47202-3005	Particulate Index (PI)	8500CFM
		Backpressure	41" wg
Model Number	QSB 4.5	Gaseous Ventilation Rate (CFM)	6000 CFM
Serial Number	TBD	Raw DPM (gr/hp)	13.91 g/hr
Horsepower	130 hp	MSHA 7E Approval Number	07-ENA070006
Max. dirty Intake Air Restriction (H²O)	25 " wg	Type of Aspiration	Turbocharged
Max. clean Intake air filter (H²O)	15" wg	Fuel Delivery System	Mechanical Injection
Turbocharger Boost Pressure	24 psi	Low Idle (RPM)	750

II. Filter System

Manufacturer	Dry System Technology
Manufacturer Address	8102 Lemont Road, Suite 700 Woodridge, Illinois 60517
Model Number	M83
System Type	Dry Paper
System Composition	Paper – DST - M30-411-01R
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	M281-210-02

DPM Calculation Sheet

Engine Model	Cummins QSB 4.5
MSHA Number	07-ENA070006
Ventilation Rate	6000 cfm
Filter Type	Paper
Filter Efficiency	96%

Convert DPM From (grams/hr) to (mg/min)

$$(13.91 \text{ g/hr.}) \times (1 \text{ hr./60 min}) \times (1000 \text{ mg/g}) = 231.83 \text{ mg/min}$$

Convert Ventilation Rate from cfm to m³/min.

$$(6000 \text{ ft}^3/\text{min}) \times (.028315 \text{ m}^3/\text{ft}^3) = 169.89 \text{ m}^3/\text{min.}$$

Divide DPM (mg/min) by Ventilation Rate (m³/min.)

$$(231.83 \text{ mg/min}) \div (169.89 \text{ m}^3/\text{min.}) = 1.365 \text{ mg/m}^3.$$

Solve for Ambient DPM Level AT 95% Filter Efficiency

$$1.365 \text{ m}^3/\text{min} \times (100 - 96\% \text{ Filter Efficiency}) = .055 \text{ mg/m}^3$$