pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF MINE SAFETY

429

May 1, 2013

Mr. Justin Heydon
Morgantown Machine & Hydraulics
437 Goshen Road
Morgantown, WV 26508

RE: Morgantown Machine & Hydraulics Model DHPP-80 Diesel Hydraulic Power Pack utilizing a Deutz BF4M 2012 engine MSHA ID 07-ENA040002 100 HP@ 2500 RPM with a Dry System Technology Model M70-104-01 diesel oxidation catalyst and a Dry System Technology Model M70 DPM filter.

Dear Mr. Heydon:

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 February 1, 2013, Morgantown Machine & Hydraulics submitted a request to have this piece of equipment inspected. The DEP requested TAC to do so on February 14, 2013. On April 17, 2013, the TAC traveled to Morgantown Machine & Hydraulics to conduct their investigation.

The TAC gave recommended temporary approval in the enclosed report on April 25, 2013. All stipulations must be adhered to in operation of this equipment. They will recommend final approval at the meeting on July 10, 2013.

If you have any questions on this request, please contact Joseph Sbaffoni at jsbaffoni@pa.gov or at 724-439-7469.

Sincerely,

Joseph A. Sbaffoni
Director
Bureau of Mine Safety

cc: Bowersox
Borchick

Enclosure(s)

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Pennsylvania Technical Advisory Committee
On Diesel Powered Equipment

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

April 25, 2013

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

RE: Morgantown Machine & Hydraulics Model DHPP-80 Diesel Hydraulic Power Pack utilizing a Deutz BF4M 2012 engine MSHA ID 07-ENA040002 100 HP@ 2500 RPM with a Dry System Technology Model M70-104-01 diesel oxidation catalyst and a Dry System Technology Model M70 DPM filter.

Dear Mr. Sbaffoni:

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.

Background

On February 1, 2013 Morgantown Machine & Hydraulics submitted a request to the Bureau of Mine Safety (BMS) for approval for a Model DHPP-80 Diesel Hydraulic Power Pack utilizing a Deutz BF4M 2012 engine MSHA ID 07-ENA040002 100 HP@ 2500 RPM with a Dry System Technology Model M70-104-01 diesel oxidation catalyst and a Dry System Technology Model M70 DPM filter.

On February 14, 2013 the Director of BMS requested the TAC to evaluate the Morgantown Machine & Hydraulics Model DHPP-80 Diesel Hydraulic Power Pack 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 diesel power package includes the following items:

- Deutz BF4M2012 engine MSHA ID 07-ENA040002 100 HP@ 2500 RPM
- Emissions Control System DST Management System
    - Dry System Technology Model M70-104-01 diesel oxidation catalyst
    - Dry System Technology Model M70 DPM filter.
    - DST Model M198-301-01 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.

Investigation

On April 17, 2013 the TAC traveled to Morgantown Machine & Hydraulics in Morgantown, 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. Since this diesel unit is not capable of inducing an engine stall the same as a wheeled transportation unit, an alternate method was needed. The engine stall was achieved by bringing the engine up to operating temperature and following the repeatable procedures developed by Morgantown Machine which will become part of the training manual for this piece of equipment. The CO_2 values obtained during the stall test indicated the engine was in a proper stall condition. The results of the emission tests showed the engine was performing within MSHA's approval specifications.

The exhaust was cooled by a DST Model M198-301-01 heat exchanger. Monitoring of the exhaust gas temperature produced a high exhaust gas temperature reading of 195° F, which is well below the 302° F allowed by Section 403 (b)(4) of the Act. The maximum surface temperature observed was 222° F on the exhaust manifold after conducting all CO testing. The maximum engine coolant temperature observed was 170° F.

The after-treatment system is fitted with a Dry System Technology Model M70 DPM filter (96% efficient). The engine and filter extrapolations show that the diesel power package will result in an average ambient concentration of 0.0177 mg/m^3 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/m^3 requirement of Section 403 (a)(1) the Act. (Attachment 2)

The TAC requested that a strobe light be installed to give a better visual alarm for the fire suppression system and other visual alarms as required by the Act. The TAC also requested that better labeling be installed on all gages and valves to easier identify the gages and valves for operational purposes. MM&H agreed to install the TAC requested items and send picture confirmation to the DEP after installation.

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.

Recommendation

Our recommendation is based upon the data supplied by Morgantown Machine & Hydraulics, the results of the tests conducted on April 17, 2013, as well as the data acquired and observations made during our investigation. The TAC has determined that the Deutz BF4M 2012 engine MSHA ID 07-ENA040002 100 HP@ 2500 RPM with a Dry System Technology Model M70-104-01 diesel oxidation catalyst and a Dry System Technology Model M70 DPM filter 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.

The TAC acknowledges that since this particular unit is not a typical wheeled transportation unit there are certain specifications of the Act that must be complied with. These may be few examples of these requirements:

- The specific method used to induce the stall during the 100 hour tests (Section 418) should be part of the diesel mechanic's training.
- The unit must be attended during operation as required in Section 401(b) of the Act.
- Face plate ventilation must be maintained at all times while the unit is in operation as required in Section 404.
- An intake escapeway fueling plan may be necessary depending on where the unit will be located in a section for fueling as required by Section 411(a).
- Safety cans shall be used for emergency fueling only as required by Section 407(n).

Should the Director receive a request for temporary approval for use prior to the next TAC meeting, the TAC will recommend temporary approval until the next scheduled TAC meeting on July 10, 2013 at which time permanent approval will be recommended.

Paul Borchick

Ron Bowersox

General Specification Sheet

EQUIPMENT MANUFACTURER SWANSON INDUSTRIES MODEL DHPP-80 DATE 10/30/12

I. Engine

Manufacturer	DEUTZ	Particulate Index (PI)	3000
Manufacturer Address	Ottostr. 1 51149 Koln-Porz Germany		
Engine Model No.	BF 4M 2012	Gaseous Ventilation Rate (CFM)	6000
Engine Serial No.	10275420	Raw DPM (gr/hr)	4.51
HP/RPM (rated)	100/2500	MSHA Part 7 Approval #	07-ENA040002
Low Idle (RPM)	800	MSHA Part 7 Ventilation Rate (CFM)	6000
Max. Dirty Intake Air Restriction H^2O	24	Type of Aspiration	TURBOCHARGED
Max. Allowed Backpressure H^2O	30	Turbocharger Boost (psi)	12
High Idle (RPM)	2900	Fuel Delivery System	ROTARY FUEL LIFT PUMP-BOSCH # 0507 7944
Water-jacketed components	☒ Yes ☐ No	Engine Cooling via	WATER

II. Particulate Filter

Manufacturer	DRY SYSTEMS TECHNOLOGIES (DST)		
Manufacturer Address	10420 RISING COURT WOODRIDGE, IL 60517		
Model or Part Number	M70	System Type	PAPER FILTER
MSHA Efficiency Rating	96%	MSHA Listed	☒ Yes ☐ No
Treated DPM mg/m^3 when diluted w/100% Part 7 ventilation rate *(show calc on separate sheet)*	0.0177 mg/m^3		

III. Catalyst

Manufacturer	DRY SYSTEMS TECHNOLOGIES (DST)
Manufacturer Address	10420 RISING COURT WOODRIDGE, IL 60517
System Name	N/A
Model Number	M70-104-01

IV. Flame Arrestor

Manufacturer	DRY SYSTEMS TECHNOLOGIES (DST)		
Manufacturer Address	10420 RISING COURT WOODRIDGE, IL 60517		
System Name	N/A		
Model Number	M241-401-01	MESG	

V. Heat Exchanger

Manufacturer	DST	Model or Part #	M198-301-01

VI. Fire Suppression System

Manufacturer	ANSUL	Model or Part #	A101-20

ATTACHMENT 1

Swanson Industries, Inc.
437 Goshen Road
Morgantown, WV 26508
Phone (304) 284-5199 Fax (304) 292-3971

Treated DPM Calculation Sheet

ISO Test and Extrapolation For .12 mg/m^3

Engine:
MSHA Approved DEUTZ BF 4M 2012
100 HP @ 2500 RPM
Vent Plate Quantity – 6000 CFM (169.90 m^3/min)
Raw DPM – 4.51 gr/hr (75.17 mg/min)

Filter:
MSHA Listed Dry Systems Technologies M70
Efficiency Rating – 96%

$$\text{Ambient DPM Level} = DPM_{AMB} = \frac{PT}{V_{VENT\ PLATE}}$$

PT = Average DPM Level

PT = 75.17 mg/min

Average DPM after Filter

PT – 96% x (PT)

75.17 mg/min – (.96 x 75.17 mg/min) = 3.0068 mg/min

DPM_{AMB} = 3.0068 mg/min / 169.90 m^3/min = **0.0177 mg/m^3**

This calculation shows that with this engine in combination with this filter, the ambient DPM level will be below the 0.12 mg/m^3 requirement.

Justin Heydon
Design Engineer
Swanson Industries, Inc.
Phone: 304-284-5180
jheydon@swanasonindustries.com

ATTACHMENT 2