

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

95a

**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

October 10, 2011

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

Scaffoni  
Martin  
Waeker  
Guida  
Anton  
Dunn/original

RE: Engine and emissions control package evaluation under Sections 403, 417 and 418 of the Act for a Deutz BF4L 2011 (MSHA ID 07-ENA040004 Part 7) 78hp@2800 rpm diesel engine with DST M181 emissions control system using an DST Model M70- DPM filter and a DST Model M260-223-02 diesel oxidation catalyst in an American Mine Door Model 75 diesel track cleaner.

Dear Mr. Scaffoni:

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 September 26, 2011 the Director of BMS requested the TAC to evaluate the American Mine Door Model 75 diesel track cleaner using a Deutz BF4L 2011 (MSHA ID 07-ENA040004 Part 7) 78hp@2800 rpm diesel engine with DST M181 emissions control system using an DST Model M70- DPM filter 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:

- Deutz BF4L 2011 (MSHA ID 07-ENA040004 Part 7) 78hp@2800 rpm diesel engine
- DST M181 emissions control system:
  - DST Model M70- DPM filter (95% efficient)

- o DST Model M260-223-02 diesel oxidation catalyst
- o DST Model M184-301-01 heat exchanger
- o DST Model M241-401-01 flame arrestor

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 October 6, 2011 the TAC and DEP traveled to Rhomac, Inc. in Mount Storm, 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 150° F, which is well below the 302° F allowed by Section 403 (b)(4) of the Act. The maximum surface temperature observed was 280° F on the exhaust manifold after conducting all the CO testing.

The after-treatment system is fitted with a DST Model M70- 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 .0181 mg/m<sup>3</sup> 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<sup>3</sup> requirement of Section 403 (a)(1) the Act.

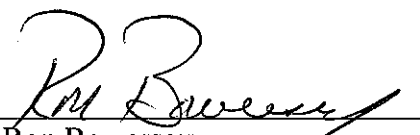
In addition to the testing that was conducted, our investigation and our observations confirmed that the diesel power package is capable of meeting all the requirements of Section 403 of the Act.

### **Recommendation**

Our recommendation is based upon the data supplied by Rhomac, the results of the tests conducted on October 6, 2011, as well as the data acquired and observations made during our investigation. The TAC has determined that the Deutz BF4L 2011 (MSHA ID 07-ENA040004 Part 7) 78hp@2800 rpm diesel engine with DST M181 emissions control system using an DST Model M70- DPM filter 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 Sheet (Attachment 1) be strictly adhered to.

  
Paul Borchick

  
Ron Bowersox

# General Specification Sheet

EQUIPMENT MANUFACTURER AMERICAN MINE DOOR MODEL 75 DATE 09/26/11

| I. <u>Engine</u>  |   |                                    |   |
|---|---|------------------------------------|---|
| Manufacturer  | Deutz   | Particulate Index (PI)             | 2500  |
| Manufacturer Address  | 3883 Steve Reynolds Blvd Norcross, GA 30093                         |                                    |   |
| Engine Model No.  | BF4L 2011   | Gaseous Ventilation Rate (CFM)     | 6000  |
| Engine Serial No.   | 10960596  | Raw DPM (gr/hr)                    | 3.7   |
| HP/RPM (rated)  | 78 / 2800   | MSHA Part 7 Approval #             | 07-ENA040004  |
| Low Idle (RPM)  | 900   | MSHA Part 7 Ventilation Rate (CFM) | 6000  |
| Max. Dirty Intake Air Restriction H <sup>2</sup> O  | 26  | Type of Aspiration                 | Turbocharged  |
| Max. Allowed Backpressure H <sup>2</sup> O  | 30  | Turbocharger Boost (psi)           | 11.6 - 15.9   |
| High Idle (RPM)   | 3150  | Fuel Delivery System               | Direct Injection  |
| Water-jacketed components   | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Engine Cooling via                 | Engine Oil  |
| II. <u>Particulate Filter</u>   |   |                                    |   |
| Manufacturer  | DST®  |                                    |   |
| Manufacturer Address  | 8102 Lemont Road, Suite 700, Woodridge, IL 60517                    |                                    |   |
| Model Number  | M 70  | System Type                        | Paper/Synthetic Fiber   |
| MSHA Efficiency Rating  | 95  | MSHA Approved                      | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Treated DPM mg/m <sup>3</sup> when diluted w/100% Part 7 ventilation rate (show calc on separate sheet) | 0.0181  |                                    |   |
| III. <u>Catalyst</u>  |   |                                    |   |
| Manufacturer  | DST®  |                                    |   |
| Manufacturer Address  | 8102 Lemont Road, Suite 700, Woodridge, IL 60517                    |                                    |   |
| System Name   | M181  |                                    |   |
| Model Number  | M260-223-02   |                                    |   |
| IV. <u>Flame Arrestor</u>   |   |                                    |   |
| Manufacturer  | DST®  |                                    |   |
| Manufacturer Address  | 8102 Lemont Road, Suite 700, Woodridge, IL 60517                    |                                    |   |
| System Name   | M181  |                                    |   |
| Model Number  | M241-401-01   | MESG                               | 0.064"  |
| V. <u>Heat Exchanger</u>  |   |                                    |   |
| Manufacturer  | DST®  | Model or Part #                    | M184-301-01   |
| VI. <u>Fire Suppression System</u>  |   |                                    |   |
| Manufacturer  | ANSUL   | Model or Part #                    | Checkfire SCN   |