pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

April 14, 2014

Mr. Jeremy Rohrbaugh
Rohmac, Inc.
P O Box 335
Mt. Storm, WV 26739

RE: Rhomac Inc. Model DP 100 Power Pack utilizing a Deutz BF4M2012 engine (MSHA ID 07-ENA040002) rated at 100HP@ 2500RPM with a DEL International Inc. MINE_X Model 2500-DQ-1R08-21 oxidation catalyst and a DCL International Inc. ceramic DPM filter Model 2500-DQ-5U55-21 (85% efficient)

Dear Mr. Rohrbaugh:

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 August 6, 2013, Rhomac submitted a request to the TAC and Bureau of Mine Safety to have this piece of equipment inspected. The DEP requested TAC to do so. On March 31, 2014, the TAC and DEP traveled to Brookville Equipment Corporation to conduct their investigation.

The TAC recommended temporary approval of this equipment in their report of April 1, 2014. Permanent approval was recommended at the TAC meeting on April 9, 2014.

Based on the recommendation of the TAC and the equipment approval staff, your request for approval is granted.

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)

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 1, 2014

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

RE: Rhomac Model DP 100 Power Pack utilizing a Deutz BF4M2012 engine (MSHA ID 07-ENA040002) rated at 100 HP@ 2500 RPM with a DCL International Inc. MINE-X Model 2500-DQ-1R08-21 oxidation catalyst and a DCL International Inc. ceramic DPM filter Model 2500-DQ-5U55-21 (85% efficient).

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 August 6, 2013 Rhomac, Inc. submitted a request to the Bureau of Mine Safety (BMS) for approval for a Rhomac Model DP 100 Power Pack utilizing a Deutz BF4M2012 engine (MSHA ID 07-ENA040002) rated at 100 HP@ 2500 RPM with a DCL International Inc. MINE-X Model 2500-DQ-1R08-21 oxidation catalyst and a DCL International Inc. ceramic DPM filter Model 2500-DQ-5U55-21 (85% efficient).

On August 19, 2013 the Director of BMS requested the TAC to evaluate the Rhomac Model DP 100 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) rated at 100 HP@ 2500 RPM
- Emissions Control System DST Management System
    - DCL International Inc. MINE-X Model 2500-DQ-1R08-21 oxidation catalyst
    - DCL International Inc. ceramic DPM filter Model 2500-DQ-5U55-21 (85% efficient)

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 March 31, 2014 the TAC and DEP traveled to Brookville Equipment Corporation 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 DP 100 Power Pack was installed in a track cleaning machine. 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 118° F, which is well below the 302° F allowed by Section 403 (b)(4) of the Act. The maximum surface temperature observed was 238° F on the exhaust manifold after conducting all CO testing. The maximum engine oil temperature was 140° F and the maximum engine coolant temperature was 160° F.

The after-treatment system is fitted with a DCL International Inc. ceramic DPM filter Model 2500-DQ-5U55-21 (85% efficient). The results of the engine and filter extrapolations show that the diesel power package will result in an average ambient concentration of .0663 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. The results of the smoke dot test was #1.

Through laboratory tests provided by Brookville Equipment Corporation, the TAC recognizes that DCL International, Inc. MINE-X SOOTFILTER test results show an efficiency rating of 92% when used with ULS diesel fuel. The 92% efficiency value is used to calculate the ambient DPM. The engine and filter extrapolations show that the diesel power package will result in an average ambient concentration of .0354 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)

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, Inc., the results of the tests conducted on March 31, 2014, as well as the data acquired and observations made during our investigation. The TAC has determined that the Deutz BF4M2012 engine (MSHA ID 07-ENA040002) rated at 100 HP@ 2500 RPM with a DCL International Inc. MINE-X Model 2500-DQ-1R08-21 oxidation catalyst and a DCL International Inc. ceramic DPM filter Model 2500-DQ-5U55-21 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 for temporary approval for use prior to the next TAC meeting, the TAC will recommend temporary approval until the next scheduled TAC meeting on April 9, 2014 at which time permanent approval will be recommended.

Paul Borchick

Ron Bowersox

General Specification Sheet

EQUIPMENT MANUFACTURER ROHMAC INC MODEL POWERPACK DATE 06/28/13

I. Engine

Manufacturer	Deutz	Particulate Index (PI)	3000
Manufacturer Address	3883 Steve Reynolds Blvd Norcross, GA 30093		
Engine Model No.	BF4M2012	Gaseous Ventilation Rate (CFM)	6000
Engine Serial No.	TBD	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	40	Turbocharger Boost (psi)	18-20
High Idle (RPM)	2750	Fuel Delivery System	Direct Injection
Water-jacketed components	☐ Yes ☒ No	Engine Cooling via	Coolant

II. Particulate Filter

Manufacturer	DCL International Inc.		
Manufacturer Address	241 Bradwick Dr. Concord ON L4K 1K5 Canada		
Model Number	2500-DQ-5U55-21	System Type	Ceramic
MSHA Efficiency Rating	92	MSHA Approved	☒ Yes ☐ No
Treated DPM mg/m^3 when diluted w/100% Part 7 ventilation rate *(show calc on separate sheet)*	0.0354		

III. Catalyst

Manufacturer	DCL International Inc.
Manufacturer Address	241 Bradwick Dr. Concord ON L4K 1K5 Canada
System Name	MINE-X Catalytic Converter
Model Number	2500-DQ-1R08-21

IV. Flame Arrestor

Manufacturer	Protectoseal		
Manufacturer Address	225 W. Foster Avenue, Bensenville, IL 60106		
System Name	End-of-Line Circular Plate Flame Arrestor		
Model Number	674	MESG	0.025"

V. Heat Exchanger

Manufacturer	ROHMAC INC	Model or Part #	DEC 1202

VI. Fire Suppression System

Manufacturer	ANSUL	Model or Part #	Checkfire SCN

ATTACHMENT 1

DPM Calculation Sheet

Engine	Deutz BF4M2012
MSHA Approval	07-ENA040002
Ventilation Rate	6000 cfm
DPM Emissions	4.51 g/hr
Filter Type	DCL MINE-X Soot filter
Filter Efficiency	92 %

DPM Unit Conversion

$$\frac{4.51\ \text{g/hr} * 1\ \text{hr/min} * 1000\ \text{mg/g}}{60} = 75.167\ \text{mg/min}$$

Ventilation Rate Unit Conversion

$$6000\ \text{cfm} * 0.0283\ \text{m}^3/\text{ft}^3 = 169.89\ \text{m}^3/\text{min}$$

Filtered DPM Emissions Calculation

$$\frac{75.167\ \text{mg/min} * 1\ \text{min/m}^3 * 8\ \text{filter eff}}{169.89 * 100} = \mathbf{0.0354\ mg/m^3}$$

ATTACHMENT 2