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April 14, 2014

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

RE: Rhomac Inc. Model Alternate Diesel Power Package for the Rhomac Mine Rover PC732 (BOTE-DEES 173-11) to utilize a KUBOTA V2403-M engine (49HP@7200RPM) and a Rhomac, Inc. Exhaust Conditioning System Model DEC 1202 that includes a DCL International, Inc. MINE-X Diesel Oxidation Catalyst Model A6M1-ID-1Rou-21, and a DCL International, Inc. Model 95QT-SA-5U57-21 ceramic Diesel Particulate Filter (92% 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 February 20, 2014, 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 traveled to Rosebud's Long Run Mine in Worthington, PA to conduct their investigation.

The TAC recommended temporary approval of this equipment in their report of April 7, 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 Scaffoni at jscaffoni@pa.gov or at 724-439-7469.

Sincerely,

Joseph A. Scaffoni  
Director  
Bureau of Mine Safety

cc: Bowersox  
Borchick

Enclosure(s)

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

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April 7, 2014

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

RE: Rhomac, Inc. request for an alternate diesel power package for the Rhomac Mine Rover PC732 (BOTE-DEES 173-11) to utilize a KUBOTA V2403-M engine (49HP@2700RPM) and a Rhomac Inc Exhaust Conditioning System Model DEC 1202 that includes a DCL International, Inc. MINE-X Diesel Oxidation Catalyst Model A6M1-ID-1R08-21, and a DCL International, Inc. Model 95QT-SA-5U57-21 ceramic Diesel Particulate Filter (92% 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 February 20, 2014 Rhomac, Inc. submitted a request to the TAC and Bureau of Mine Safety (BMS) for an alternate diesel power package for the Rhomac Mine Rover PC732 (BOTE-DEES 173-11) to utilize a KUBOTA V2403-M engine (49HP@2700RPM) and a Rhomac Inc. Exhaust Conditioning System Model DEC 1202 that includes a DCL International, Inc. MINE-X Diesel Oxidation Catalyst Model A6M1-ID-1R08-21, and a DCL International, Inc. Model 95QT-SA-5U57-21 ceramic Diesel Particulate Filter (92% Efficient)

The engine and emissions control package has not been previously approved under Section 403 of the Act.

On March 4, 2014 the Director of BMS requested the TAC to evaluate the Rhomac Mine Rover Model PC732 rubber tire personal carrier using a KUBOTA V2403-M engine (49HP@2700RPM) and a Rhomac Inc. Exhaust Conditioning System Model DEC 1202 that includes a DCL International, Inc. MINE-X Diesel Oxidation Catalyst Model A6M1-ID-1R08-21, and a DCL International, Inc. Model 95QT-SA-5U57-21 ceramic Diesel Particulate Filter (92% Efficient) 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:

- KUBOTA V2403-M diesel engine (49HP@2700RPM) with MSHA ID 07-ENA080011 (Part 7)
- Rhomac Inc Exhaust Conditioning System Model DEC 1202
- DCL International, Inc. MINE-X Diesel Oxidation Catalyst Model A6M1-ID-1R08-21
- DCL International, Inc. Model 95QT-SA-5U57-21 ceramic Diesel Particulate Filter (92% 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 April 7, 2014 the TAC traveled to Rosebud's Long Run Mine in Worthington, PA to inspect the equipment when it became available. The TAC evaluated the engine and exhaust emissions package, as well as engine exhaust gas temperature and surface temperature to see if they meet the requirements under Section 403 of the Act.

Testing of the engine and after-treatment system were performed, as well as exhaust gas temperature monitoring.

Monitoring of the exhaust gas temperature produced a maximum exhaust gas temperature reading of 151° F, which is well below the maximum temperature of 302° F allowed by Section 403 (b)(4) of the Act. The maximum engine coolant temperature observed was 151° F.

The after-treatment system is fitted with a DCL International, Inc. Model 95QT-SA-5U57-21 ceramic Diesel Particulate Filter (92% Efficient). The engine and filter extrapolations show that the diesel power package will result in an average ambient concentration of .103 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 below the .12 mg/m<sup>3</sup> requirement of Section 403 (a)(1) the Act. The result of the smoke dot test conducted on the filter with 12 hours of run time on it was less than #1.

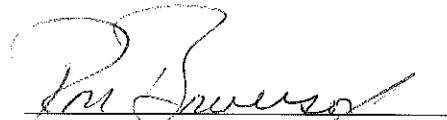
In addition to the testing that was conducted, our investigation and our observations confirmed that the diesel power package is capable of meeting all the requirements of Section 403 of the Act.

### Recommendation

Our recommendation is based upon the data supplied by Rhomac, the results of the tests conducted on April 7, 2014, as well as the data acquired and observations made during our investigation. The TAC has determined that the KUBOTA V2403-M engine (49HP@2700RPM) and a Rhomac Inc. Exhaust Conditioning System Model DEC 1202 that includes a DCL International, Inc. MINE-X Diesel Oxidation Catalyst Model A6M1-ID-1R08-21, and a DCL International, Inc. Model 95QT-SA-5U57-21 ceramic Diesel Particulate Filter (92% Efficient) 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 the equipment prior to the next TAC meeting, The TAC will recommend temporary approval for use prior to the next TAC meeting on April 9, 2014, at which time the TAC will recommend final approval.

  
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Paul Borchick

  
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Ron Bowersox

## General Specification Sheet

EQUIPMENT MANUFACTURER ROHMAC INC MODEL BOTE DEES 173-11 DATE 02/20/14

### I. Engine

Manufacturer	Kubota	Particulate Index (PI)	4000
Manufacturer Address	505 Schelter Road Lincolnshire, IL 60069		
Engine Model No.	V2403-M-DI-E3	Gaseous Ventilation Rate (CFM)	3000
Engine Serial No.	TBD	Raw DPM (gr/hr)	6.54
HP/RPM (rated)	49 / 2700	MSHA Part 7 Approval #	07-ENA080011
Low Idle (RPM)	950	MSHA Part 7 Ventilation Rate (CFM)	3000
Max. Dirty Intake Air Restriction H <sup>2</sup> O	20	Type of Aspiration	Natural
Max. Allowed Backpressure H <sup>2</sup> O	42	Turbocharger Boost (psi)	N/A
High Idle (RPM)	2700	Fuel Delivery System	Direct Injection
Water-jacketed components	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Engine Cooling via	Coolant

### II. Particulate Filter

Manufacturer	DCL International Inc.		
Manufacturer Address	2 41 Bradwick Dr., Concord ON L4K 1K5 Canada		
Model Number	95QT-SA-5U57-21	System Type	Ceramic
MSHA Efficiency Rating	92	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)	0.103		

### III. Catalyst

Manufacturer	DCL International Inc.		
Manufacturer Address	2 41 Bradwick Dr., Concord ON L4K 1K5 Canada		
System Name	MINE-X Catalytic Converter		
Model Number	A6M1-ID-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
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### VI. Fire Suppression System

Manufacturer	ANSUL	Model or Part #	Checkfire SCN
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DPM Calculation Sheet

Engine Kubota V2403 M DI E3  
 MSHA Approval 07-ENA080011  
 Ventilation Rate 3000 cfm  
 DPM Emissions 6.54 g/hr  
 Filter Type DCL MINE-X Sootfilter  
 Filter Efficiency 92 %

*OLSON-ECOLOGIC ENGINE TESTING LABORATORY, LLC  
 3-20-2009*

**DPM Unit Conversion**

$$\frac{\text{g/hr}}{6.54} \times \frac{\text{hr/min}}{60} \times \frac{\text{mg/g}}{1000} = 109 \text{ mg/min}$$

**Ventilation Rate Unit Conversion**

$$\frac{\text{cfm}}{3000} \times \frac{\text{m}^3/\text{ft}^3}{0.0283} = 84.945 \text{ m}^3/\text{min}$$

**Ceramic Filter DPM Reduction**

$$\frac{\text{mg/min}}{109} \times \frac{\text{m}^3/\text{min}}{84.945} \times \frac{\text{filter eff}}{100} =$$

<b>Total Diluted DPM Emissions</b> <b>0.103 mg/m<sup>3</sup></b>
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