



# pennsylvania

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BUREAU OF MINE SAFETY

86A

July 26, 2012

Mr. Jim Coe  
BUCYRUS  
4041 Wurno Road  
Pulaski, Virginia 24301

RE: CAT request for approval to use a CAT Part # 4099051 for Evarpar A16 diesel oxidation catalyst in a Caterpillar Model 482D Diesel Scoop equipped with a Deutz 1011 78 HP engine with a CAT Management System using a model FST-115-26 DPM filter.

Dear Mr. Coe:

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.

In June 2012, CAT submitted a request to the TAC and Bureau of Mine Safety for evaluation and approval pursuant to Chapter 4 of the Act to use a CAT Part Number 4099051 for Evarpar A16 diesel oxidation catalyst in a Caterpillar Model 482D Diesel Scoop equipped with a Deutz 1011 78 HP engine with a CAT Management System using a model FST-115-26 DPM filter. Enclosed is the TAC's report on their findings for this piece of equipment. All of their findings must be adhered to in regards to use of this equipment.

The TAC recommends temporary approval of this equipment in their report of July 25, 2012. Permanent approval will be recommended at the next scheduled TAC meeting on October 10, 2012.

If you have any questions on this request, please contact Joseph Sbaffoni at [jsbaffoni@pa.gov](mailto:jsbaffoni@pa.gov) or at 724-439-7461.

Sincerely,

Joseph A. Sbaffoni  
Director  
Bureau of Mine Safety

cc: Bowersox  
Borchick

Enclosure(s)

JAS/cd

bcc: Brower  
Antoon  
Gaida  
Timothy Young (web)  
Dunn/TAC file

\\epmsuns03\bms\$\AdvisoryCommittee\TAC - DIESEL LETTERS BY YEAR\2012\L\_TAC\_CAT (Bucyrus) Model 482D Diesel Scoop.doc

8/6

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

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**Ron Bowersox**

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July 25, 2012

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

RE: TAC recommendation on CAT request for approval to use a CAT Part # 4099051 for Evarpar A16 diesel oxidation catalyst in a Caterpillar Model 482D Diesel Scoop equipped with a Deutz 1011 78 HP engine with a CAT Management System using a model FST-115-26 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 June 2012 CAT submitted a request to the TAC and Bureau of Mine Safety for evaluation and approval pursuant to Chapter 4 of the Act to use a CAT Part Number 4099051 for Evarpar A16 diesel oxidation catalyst in a Caterpillar Model 482D Diesel Scoop equipped with a Deutz 1011 78 HP engine with a CAT Management System using a model FST-115-26 DPM filter.

The Caterpillar 482D Diesel Scoop is equipped with a:

- Deutz 1011 78HP engine MSHA Certification number 07 ENA040004-0 (Part 7)
- CAT Part # 4099051 for Evarpar A16 diesel oxidation catalyst (Attachment 3)
- CAT Part # 399823 Heat Exchanger
- Filter Service & Testing Model FST-115-26 DPM filter (95% efficient)

More detailed information on the specifications for the Model 482D Scoop diesel power packages are included on the General Specification Sheet attached. (Attachment1)

### **Investigation**

On July 18, 2012 the TAC and DEP traveled to Caterpillar in Beckley, WV to conduct emissions test and evaluate the CAT 482D diesel scoop. 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.

The maximum surface temperature observed was 253° F, which is well below the 302° F limit required by the Act. All significant surface areas were below 302° F as required by Section 403 of the Act. The maximum exhaust gas temperature observed was 121° F which is also below the 302° F allowed by Section 403 (b)(4) of the Act. The maximum engine coolant temperature observed during testing was 197° F.

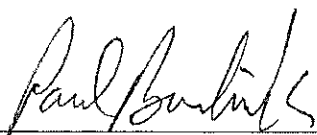
The results of the emissions tests showed the engine was performing within MSHA's approval specifications. The after-treatment system is fitted with Filter Service & Testing Model FST-115-26 DPM filter (95% efficient). The engine and filter extrapolations show that the diesel power package will result in an average ambient concentration of .017 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. (Attachment 2)

### **Recommendation**

Based on the information received, our investigation and our discussions the TAC believes that the diesel power package utilizing the CAT Part # 4099051 for Evarpar A16 diesel oxidation is capable of meeting all requirements of Section 403 of Chapter 4 of the Act without reducing or compromising the level of health or safety afforded by the Act.

As such, we are recommending approval of CAT's request to use an CAT Part # 4099051 for Evarpar A16 diesel oxidation catalyst in a Caterpillar Model 482D Diesel Scoop equipped with a Deutz 1011 78 HP engine with a CAT Management System using a model FST-115-26 DPM filter. 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 October 10, 2012 at which time permanent approval will be recommended.



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Paul Borchick



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Ron Bowersox

## General Specification Sheet

EQUIPMENT MANUFACTURER CATERPILLAR MODEL 482D DATE 7/11/12

<b>I. Engine</b>			
Manufacturer	Caterpillar / Deutz	Particulate Index (PI)	4500 cfm
Manufacturer Address	Houston, Pa / Norcross, Georgia		
Engine Model No.	1011	Gaseous Ventilation Rate (CFM)	6000
Engine Serial No.	tbd	Raw DPM (gr/hr)	3.50
HP/RPM (rated)	78/2800	MSHA Part 7 Approval #	07-ENA040004-0
Low Idle (RPM)	1000 rpm	MSHA Part 7 Ventilation Rate (CFM)	6000
Max. Dirty Intake Air Restriction H <sup>2</sup> O	26"	Type of Aspiration	Turbo Charger / After Cooled
Max. Allowed Backpressure H <sup>2</sup> O	60"	Turbocharger Boost (psi)	20
High Idle (RPM)	3100	Fuel Delivery System	direct injection
Water-jacketed components	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Engine Cooling via	oil cooled / Radiator

<b>II. Particulate Filter</b>			
Manufacturer	Filter Service and Testing		
Manufacturer Address	Price, Utah ;		
Model Number	FST-115-26	System Type	High Temp Fiberglass
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)	.017		

<b>III. Catalyst</b>	
Manufacturer	Caterpillar Configuration mfg by Engine Control Systems
Manufacturer Address	EVARPAR - Evansville, Indiana 47725
System Name	AZ 25 series
Model Number	Caterpillar p/n 4099051 for Evarpar A16

<b>IV. Flame Arrestor</b>	
Manufacturer	Caterpillar
Manufacturer Address	4041 Wurno Raod, Pulaski Va , 24301
System Name	Flame Arrestor - .064 Triangular
Model Number	606240
	MESG

<b>V. Heat Exchanger</b>	
Manufacturer	Caterpillar
Model or Part #	399823

<b>VI. Fire Suppression System</b>	
Manufacturer	Ansul
Model or Part #	A101 Series



**BUCYRUS**  
4041 Wumpo Road  
Pulaski, Virginia 24301, USA  
Tel. (+1) 540.980.4530 · Fax (+1) 540.980.6211

April 7, 2010

482D Diesel Emissions Calculations

Calculations for DPM

BF4L 2011

Power Rating: 58 kW / 78 HP @ 2800 rpm

Approval No: 07-ENA040004-0

Assigned Ventilation: 6,000 cfm / 169.90 m<sup>3</sup>/min

Actual Ventilation Rate: 5,518 cfm / 156.2 m<sup>3</sup>/min (see Auswertung\_C1\_MSHA\_EG Bau\_1215\_25052005.)

PM rate: 3.50 g/hr = 58.33 mg/minute

Fiberglass Filter Element Efficiency 95% MSHA rating.

Adjustment based on 95% efficiency =  $(.95)(58.33 \text{ mg/minute}) = 55.41 \text{ mg/minute}$

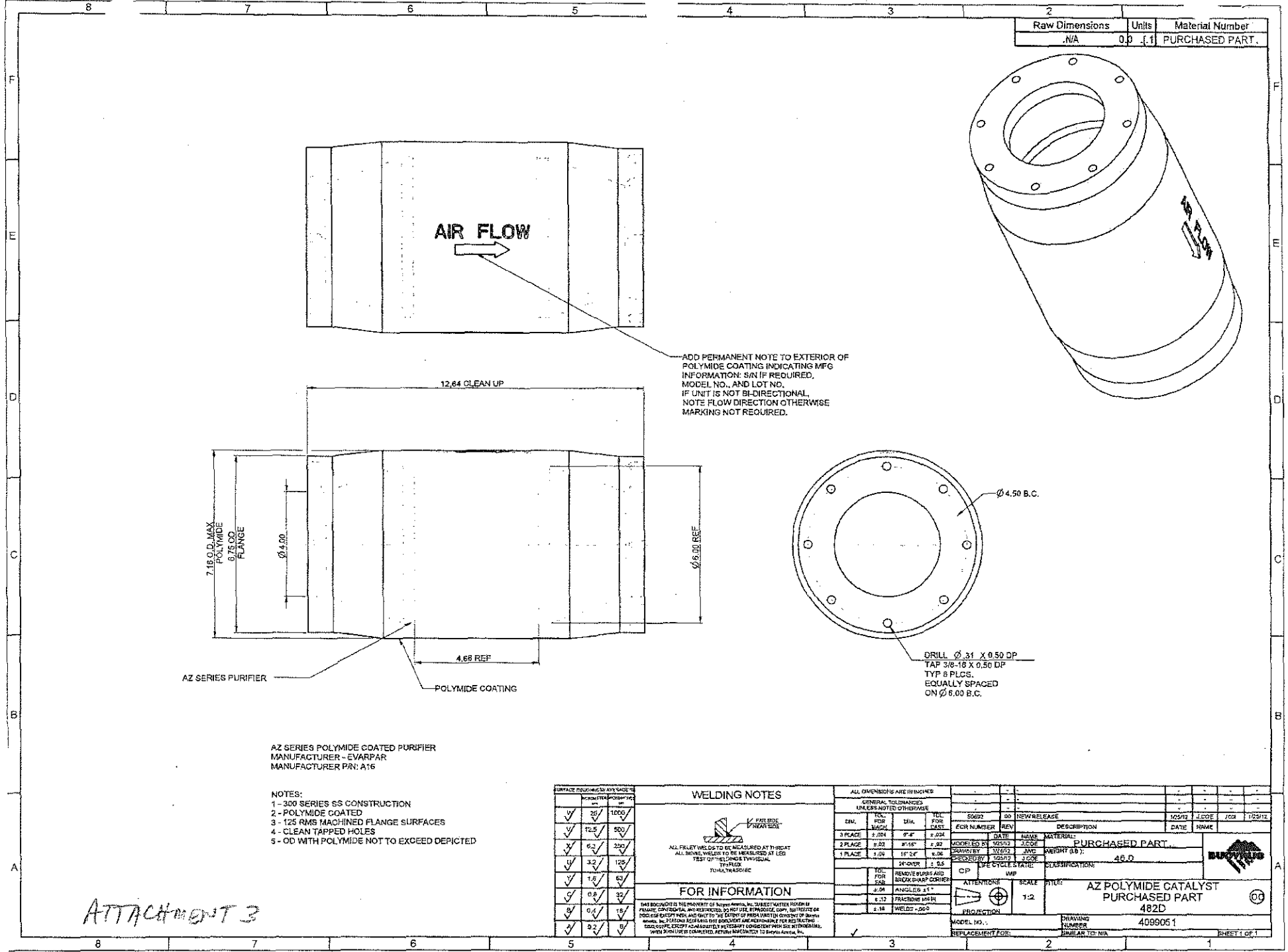
$58.33 \text{ mg/minute} - 55.41 \text{ mg/minute} = 2.91 \text{ mg/minute emitted}$

Calculating for mg/m<sup>3</sup>, which must be less than .12 mg/m<sup>3</sup> pursuant to 196-1-5.1 of West Virginia Rules for Operating Diesel Equipment in Underground Mines in West Virginia Title 196 & Pennsylvania Diesel Regulations Article II-A Section 203-A subpart (a)

$2.91 \text{ mg/minute} / 169.90 \text{ m}^3/\text{min} = \underline{.017 \text{ mg/m}^3}$

**Conclusion: This combination of power package and DPM control method meets the requirements for WV 196-1-5.1 and PA Article II-a Section 203 -A subpart (a).**

*ATTACHMENT 2*



Raw Dimensions	Units	Material Number
N/A	0.0 (.1)	PURCHASED PART.

ADD PERMANENT NOTE TO EXTERIOR OF POLYMIDE COATING INDICATING MFG INFORMATION: S/N IF REQUIRED, MODEL NO., AND LOT NO. IF UNIT IS NOT BI-DIRECTIONAL, NOTE FLOW DIRECTION OTHERWISE MARKING NOT REQUIRED.

AZ SERIES POLYMIDE COATED PURIFIER  
 MANUFACTURER - EVARPAR  
 MANUFACTURER P/N: A16

- NOTES:  
 1 - 300 SERIES SS CONSTRUCTION  
 2 - POLYMIDE COATED  
 3 - 125 RMS MACHINED FLANGE SURFACES  
 4 - CLEAN TAPPED HOLES  
 5 - OD WITH POLYMIDE NOT TO EXCEED DEPICTED

SURFACE FINISH	FINISH	APPROXIMATE TOLERANCE
✓	20	1000
✓	12.5	500
✓	6.3	250
✓	3.2	125
✓	1.6	63
✓	0.8	32
✓	0.4	16
✓	0.2	8

**WELDING NOTES**

ALL WELDS TO BE MADE AT 175°C  
 ALL WELDS TO BE MADE AT 175°C  
 TEST OF WELDS VISUAL  
 TYPICAL

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GENERAL TOLERANCES UNLESS NOTED OTHERWISE				LIFE CYCLE STATE				
FIN.	TOL.	SHA.	TOL.	DATE	REV.	DESCRIPTION	DATE	NAME
3 PLACE	±.004	Ø"	±.004	5/25/12	00	NEW RELEASE	1/25/12	JCOE
2 PLACE	±.002	"#16"	±.002	APPROVED BY	DATE	MATERIAL		
1 PLACE	±.001	"#2"	±.001	DRAWN BY	DATE	WEIGHT (G)		
				CP		CLASSIFICATION		
				ATTENTION		FILE		
				PROJECTION		SCALE		
				MODEL NO.		DRAWING NUMBER		
				REPLACEMENT FOR		SIMILAR TO N/A		

ATTACHMENT 3



AZ POLYMIDE CATALYST  
 PURCHASED PART  
 482D

409905 1

SHEET 1 OF 1