



# pennsylvania

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BUREAU OF MINE SAFETY

88a

November 13, 2012

Mr. Ken Neeley  
Sandvik Mining and Construction USA LLC  
P O Box 282  
6701 National Pike  
Brier Hill, PA 15415

RE: Sandvik Model LS195 permissible diesel scoop utilizing a 225HP (2500 RPM) Caterpillar 3126B Heui diesel engine (MSHA Part 7 approval 07-EPA060001-1) and an emission control package utilizing a Donaldson Model P604516 fiberglass DPM filter (>93% efficient), an Nett Technologies Inc. Model 01-EJ-03294-10295 MD diesel oxidation catalyst, an EAO Services Model 64558063 flame arrestor and a Sandvik Mining and Construction Model 64558127 heat exchanger.

Dear Mr. Neeley:

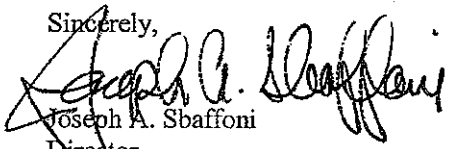
Chapter 4 of the "Bituminous Coal Mine Safety Act" (the Act) provides for the use of diesel-powered equipment in underground bituminous coal mines. Section 424 of the act created a Technical Advisory Committee ("TAC") for the purpose of advising the Department regarding implementation of Chapter 4 and evaluation of alternative technology or methods for meeting the requirements of Chapter 4.

On May 25, 2012, Sandvik sent a request to TAC to inspect this piece of equipment. The DEP requested TAC to do so on June 6, 2012. On August 23, 2012, the TAC and DEP traveled to Sandvik to conduct their investigation.

The TAC gave recommended approval in the enclosed report with several stipulations on August 28, 2012. All stipulations must be adhered to in operation of this equipment. They recommended final approval at the 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 724-439-7469.

Sincerely,

  
Joseph A. Sbaffoni  
Director  
Bureau of Mine Safety

cc: Bowersox  
Borchick

Enclosure(s)

886

**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](mailto:umwarbowersox@yahoo.com)

August 28, 2012

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

SEP 17 2012

RE: Sandvik Model LS195 permissible diesel scoop utilizing a 225 HP (2500 RPM) Caterpillar 3126B Heui diesel engine (MSHA Part 7 approval 07-EPA060001-1) and an emission control package utilizing a Donaldson Model P604516 fiberglass DPM filter (>93% efficient), a Nett Technologies Inc. Model 01-EJ-03294-10295-MD diesel oxidation catalyst, an EAO Services Model 64558063 flame arrestor and a Sandvik Mining and Construction Model 64558127 heat exchanger.

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**

Sandvik Mining and Construction Inc. submitted a request to the Bureau of Mine Safety (BMS) for approval for a Model LS195 permissible diesel scoop utilizing a 225 HP (2500 RPM) Caterpillar 3126B Heui diesel engine (MSHA Part 7 approval 07-EPA060001-1) and an emission control package utilizing a Donaldson Model P604516 fiberglass DPM filter (>93% efficient), a Nett Technologies Inc. Model 01-EJ-03294-10295-MD diesel oxidation catalyst, an EAO Services Model 64558063 flame arrestor and a Sandvik Mining and Construction Model 64558127 heat exchanger.

On June 6, 2012 the Director of BMS requested the TAC to evaluate the Sandvik Model LS195 permissible diesel scoop 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:

- 225 HP (2500 RPM) Caterpillar 3126B Heui diesel engine (MSHA Part 7 approval 07-EPA060001-1)
- Donaldson Model P604516 fiberglass DPM filter (>93% efficient)
- Nett Technologies Inc. Model 01-EJ-03294-10295-MD diesel oxidation catalyst
- EAO Services Model 64558063 flame arrestor
- Sandvik Mining and Construction Model 64558127 heat exchanger

More detailed information on the specifications of the permissible diesel power package is included on the General Specification Sheet which is attached as Attachment 1.

### Investigation

On August 23, 2012 the TAC and DEP traveled to Sandvik in Brier Hill, PA to inspect the equipment when it became available. The TAC evaluated the engine and exhaust emissions package, as well as procedures to check the permissible joints on the diesel engine and emission control 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 184° F, the maximum exhaust gas temperature measured was 160° F, and the maximum engine coolant temperature observed was 195° F. These temperatures were in compliance with Section 403 of the Act.

The results of the emissions tests showed the engine was performing within MSHA's approval specifications. The after-treatment system is fitted with a Donaldson Model P604516 fiberglass DPM filter (>93% efficient). The engine and filter extrapolations "A Test Data" show that the diesel power package will result in an average ambient concentration of 0.10 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, see (Attachment 2). Based on these calculation results being close to the 0.12mg/m<sup>3</sup> limit, the TAC requests and will recommend that a smoke dot test be conducted at each 100 hour maintenance. The results of the smoke dot test conducted by the TAC at the time of inspection were between a 1 and 2.

The TAC also evaluated the procedures to check the permissibility of the joints and gaskets on the engine and emissions control system. All joints and gaskets were not easily accessible. It was not clear if the permissible feeler gage was able to completely check all of the required locations with certainty. The TAC and DEP agreed that an alternate method was needed to ensure that no leaks were present on the connections. The TAC recommends that the feeler gage be used for permissibility on all readily accessible joints and gaskets. On the exhaust system the TAC recommends that a gas detector (sniffer) be used to check for leaks around joints or gaskets that are not readily accessible. The gas detector may detect CO, NO<sub>2</sub> or other exhaust gases. When the reading of the specific exhaust gas detected during the sniffing process is above ambient there is indication of a leak. All trained diesel mechanics that do the permissibility checks will be trained in the use of the specific gas detector (sniffer), the procedures to check for leaks using the detector and

the training will be recorded. The gas detector will be maintained and calibrated monthly or according to the manufacturer's recommendations.

During the inspection the TAC and DEP discovered there were no sampling ports located in the operator compartment for conducting the emissions tests under Section 418 of the Act. Sandvik agreed to install both treated and untreated sampling ports in the operator cab.

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 Sandvik, the results of the tests conducted on August 23, 2012, as well as the data acquired and observations made during our investigation. The TAC has determined that the Sandvik Model LS195 permissible diesel scoop utilizing a 225 HP (2500 RPM) Caterpillar 3126B Heui diesel engine (MSHA Part 7 approval 07-EPA060001-1) and an emission control package utilizing a Donaldson Model P604516 fiberglass DPM filter (>93% efficient), a Nett Technologies Inc. Model 01-EJ-03294-10295-MD diesel oxidation catalyst, an EAO Services Model 64558063 flame arrestor and a Sandvik Mining and Construction Model 64558127 heat exchanger 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 with the following stipulations. This recommendation is provided with the understanding that the General Specification Sheet (Attachment 1) be strictly adhered to.

### **Additional TAC stipulations for approval:**

- Permissibility testing on the engine and emissions control system shall be done as follows:
  - The TAC recommends that the feeler gage be used for permissibility on all readily accessible joints and gaskets.
  - On the exhaust system the TAC recommends that a gas detector (sniffer) be used to check for leaks around joints or gaskets that are not readily accessible.
    - The gas detector may detect CO, NO<sub>2</sub> or other exhaust gases.
    - When the reading of the specific exhaust gas detected during the sniffing process is above ambient there is indication of a leak.
    - All trained diesel mechanics that do the permissibility checks will be trained in the use of the specific gas detector (sniffer), the procedures to check for leaks using the detector and the training will be recorded.
    - The gas detector will be maintained and calibrated monthly or according to the manufacturer's recommendations.
- A smoke dot test will be required during each 100 hour service and the results recorded on the 100 hour maintenance record form. If the smoke dot results in a number over 3 the equipment will be checked to determine the cause and corrections will be made to bring the test result below 3 before the equipment is returned to operation.

If the Director receives 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.

  
Paul Borchick

  
Ron Bowersox

## General Specification Sheet

EQUIPMENT MANUFACTURER SANDVIK MINING & CONSTRUCTION MODEL LS195 DATE June 6, 2012

### I. Engine

Manufacturer	Caterpillar	Particulate Index (PI)	21,000 CFM
Manufacturer Address			
Engine Model No.	3126B Heui	Gaseous Ventilation Rate (CFM)	
Engine Serial No.		Raw DPM (gr/hr)	
HP/RPM (rated)	225 / 2500	MSHA Part 7 Approval #	07-FA060002 07-EPA060001-1
Low Idle (RPM)	800	MSHA Part 7 Ventilation Rate (CFM)	10,000
Max. Dirty Intake Air Restriction H <sup>2</sup> O	25	Type of Aspiration	Turbo Chareged / ATAAC
Max. Allowed Backpressure H <sup>2</sup> O	80	Turbocharger Boost (psi)	19.44
High Idle (RPM)	2640	Fuel Delivery System	Heui Injection
Water-jacketed components	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Engine Cooling via	Water jacket / CAC

### II. Particulate Filter

Manufacturer	Donaldson Co. Inc.		
Manufacturer Address	P.O. Box 1299, Bloomington, Minnesota, 55440		
Model Number	P604516	System Type	Fibreglass filter media
MSHA Efficiency Rating	> 93 %	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)	See Calcs		

### III. Catalyst

Manufacturer	Nett Technologies Inc.		
Manufacturer Address	2-6707 Goreway Drive, Mississauga, Ontario, Canada, L4V 1P7		
System Name	Diesel Oxidation Catalyst		
Model Number	01-EJ-03294-10295-MD		

### IV. Flame Arrestor

Manufacturer	EAO Services		
Manufacturer Address	1715 South Center Lawrence. P.O. Box 1325, Huntington, Utah, 84528		
System Name			
Model Number	64558063	MESG	

### V. Heat Exchanger

Manufacturer	Sandvik Mining and Construction	Model or Part #	64558127
--------------	---------------------------------	-----------------	----------

### VI. Fire Suppression System

Manufacturer	Ansul	Model or Part #	LT-A-101-30
--------------	-------	-----------------	-------------

ATTACHMENT 1



## LS195 PA DEP CALCULATIONS

### CALCULATION FOR PA DEP SECTION 401 (C)

FROM MSHA TEST: RATED HP = 225, VENT RATE=10,000 CFM  
10,000 CFM / 225 HP = 44.44 CFM / HP  
44.44 CFM / HP IS LESS THAN THE MAXIMUM ALLOWABLE OF 75 CFM / HP.

### CALCULATION FOR PA DEP SECTION 403 (a)(1)

FROM MSHA TEST:  
WEIGHTED AVERAGE PARTICULATE = 34.099 GR/HR (A TEST DATA), 21.7 GR/HR (B TEST DATA W/O 1% METHANE INJECTION)  
DONALDSON FILTER EFFECIENCY 95%  
MSHA VENT RATE = 10,000 CFM (283.2 M<sup>3</sup> / min)

A TEST DATA (with 1% methane)  
34.099 GR/HR X 1HR/60MIN = .568 GR/MIN ; .568GR/MIN X (1-.95 FILTER EFFECIENCY) = 28.4 mg/min  
DILUTED WITH FULL MSHA 10,000 CFM VENT RATE  
28.4 mg / min x (1/283.2 M<sup>3</sup> / min) = .10 mg / M<sup>3</sup> (less than .12 mg requirement)

B TEST DATA (w/o 1% methane)  
21.7 GR/HR X 1HR/60 MIN = .3617 GR/MIN ; .3617GR/MIN X (1-.95 FILTER EFFECIENCY) = 18.1 mg / min  
DILUTED WITH FULL MSHA 10,000CFM VENT RATE  
18.1 mg/min x (1/283.2 M<sup>3</sup> / min) = .06 mg / M<sup>3</sup> (less than .12 mg requirement)

BY KEN NEELY  
7/16/12

Sandvik Mining and Construction USA LLC  
345 Patton Drive SW  
Atlanta, Georgia 30336

www.sandvik.com

Sandvik Mining and Construction USA LLC  
P.O. Box 282, 6701 National Pike  
Brier Hill, Pennsylvania 15415

Main Phone: 1-404-589-3800  
Main Fax: 1-404-589-2900

Main Phone: 1-724-246-2901  
Main Fax: 1-724-246-2907  
Finance Fax: 1-724-246-0153

ATTACHMENT 2