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Lowering Miners' Exposure to Respirable Coal Mine Dust, Including Continuous Personal Dust Monitors

Document: MSHA-2010-0007-0364

Comment from Timothy Fenton, Thermo Fisher Scientific

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General Comment

Comments are attached in pdf format. On behalf of Thermo Fisher Scientific, thank you for the opportunity to comment.

Attachments

Thermo Fisher CPDM comments

AB64-COMM-91

June 20, 2011

Patricia W. Silvey
Director, Office of Standards, Regulations, and Variances
Mine Safety and Health Administration (MSHA)
1100 Wilson Blvd., Room 2350
Arlington, Virginia 22209-3939

RE: RIN 1219-AB64 Lowering Miners' Exposure to Respirable Coal Mine Dust, Including Continuous Personal Dust Monitors

Dear Ms. Silvey:

On behalf of Thermo Fisher Scientific Inc., I am commenting on the proposed rule to lower miners' exposure to coal mine dust. Thermo Fisher, the world leader in serving science, is a publicly traded (NYSE: TMO) company that manufactures and distributes, among numerous other scientific products, the Continuous Personal Dust Monitor (CPDM, or PDM3600).

These comments are in response to the issues raised at the seven public hearings and in communications with the various companies, miners, associations and regulatory groups involved. My comments address specific data regarding repair history of the product (average time to repair, average repair costs, warranties offered, support capabilities and types of failures observed), process improvements, pricing (instruments and filters) and future plans for product modifications. Finally, I include comments regarding our need for information and suggestions going forward.

Repair History

Many specific statements raised at the public hearings and in written comments regarding individual analyzers are difficult to answer because serial numbers were not provided. However, in these comments I have provided details regarding all repair and technical support requests received since the initial shipment of the product two years ago.

Thermo Fisher began shipping the PDM3600 on May 1, 2009, and has shipped 270 units. Of those units, 267 were sold to United States coal mining companies, MSHA or NIOSH; two were sold to a Swiss tunneling operation and one to NASA.

Of the 267 sold to the U.S. mining market, 166 units were purchased with some form of extended warranty. Five year warranty contracts were purchased for 123 units, three year warranty contracts purchased for 41 units and annual cleaning and calibration contracts purchased for 2 units. We anticipate a minimum five year life for the PDM3600, and the intent of the contract is to provide a level of cost containment for the expected life of the product. Annual cleaning and certification of the calibration and mass transducer is included with the three and five year contracts, as well as most repairs for normal wear and tear. A list of parts excluded from the contract is defined in the agreement, and the cost for any excluded repairs is at a reduced price. A copy of the contract, with an area in process of being modified highlighted in yellow (vendor negotiation), is included as addendum A.

Seventy seven different units (28.8 percent of the total shipped) have been returned a total of 115 times for repair in the past two years. It is important to note that the repair rate has decreased, quarter over quarter, after the first six to eight months of shipments. These improvements are mostly likely related to the process improvements we have implemented, as identified later in these comments. It is not atypical to experience initially higher return rates for a new production process, as evidenced by our more than 40 years of designing, manufacturing and supporting field monitoring instrumentation.

Of these returns, 81 were no charge repairs (52 covered under the standard one year warranty, another 16 under service contracts and 13 outside of the original warranty but repaired as goodwill). Thirty four units were returned for servicing under a time and material billing basis, with the average repair charge being \$837 (low of \$161 for replacement of an auxiliary board, up to a high of \$3996 for a damaged mass transducer; 13 repairs were over \$1,000). A total of 26 units have been returned more than once over this two year period, with one unit being returned six times for repair. On this specific unit, three returns were attributed to the filter being overloaded and dust was clogging the mass transducer (preventative maintenance issue). As an act of goodwill, this unit was replaced at no charge. Another unit was returned five times; two were returned four times; and one was returned three times. Nine CPDM units experienced out of box failures (failure within the first use), and there was no one failure mode that was prevalent among them.

Repair turnaround times since the product was launched in May, 2009, have averaged 19 days. For the first year of shipments, repairs were primarily handled by our Operations team (personnel that built the units) and research and development engineers to identify potential weakness in the unit and improve our processes. They performed 44 repairs during this time and averaged 26 calendar days per repair. We transitioned this to our Depot Repair Department shortly thereafter and dedicated a lead technician to handle the PDM3600 repairs (working with additional technicians as needed). Since July, 2010, the average turnaround time has been 15.1 days for 71 units. A dedicated work cell was established, and the average turnaround time in 2011 is now 4.7 days. Based on this data, and the increasing population of PDM3600 units in the field and a reduction in the number of units being returned for servicing, the actions taken to address reported field performance issues have been positive.

In addition to the 115 repairs performed, we issued repair authorizations for another 12 units that were never returned. Our process is to contact the customer monthly to check on the return status, and we consider the repairs unnecessary since the problems were resolved through technical support or by the end user. These repair orders were closed after 6 months of inactivity.

Our Technical Support Department is staffed by ten support professionals, including four with CPDM experience, from 8:00 AM to 8:00 PM EST, Monday through Friday. This service is available to all PDM3600 owners at no cost. In the past two years, we received 50 support calls on the PDM3600. Of these calls, 30 were a technical query (specification questions, troubleshooting or general questions); 12 were for part number identification; and eight for startup assistance. Call volume for the number of units deployed is quite low, and we are prepared to increase training and staffing to meet customer needs.

There have been several areas of repeat failures, and we have action plans to address all but one failure mode. The failures remain consistent with those addressed at the June 3, 2010, meeting held in Pittsburgh at NIOSH PRL. Those specific areas are:

- Melting of the housing on the charger connector
 - We have modified the material to one with a higher temperature rating, and new shipments include this modified material (PEEK). We will rework charger connector assemblies as units

are returned to our service department. A field remedy is to clean the contact with alcohol after use and prior to connecting for charging / downloading to ensure proper contact.

- Flow restrictions attributed to a mis-formed tapered element, causing the plastic filter holder to partially block the flow path
 - This has been resolved, and units returned to our service department are checked for this problem and corrected.
- Blinking red light on charger, indicating full charge not achieved
 - This is caused by circuitry on the board that did not recognize a full charge condition. This issue has been addressed on chargers shipped in the past few months, and any charger returned from the field with this issue will be replaced at no cost.
- Corrupted firmware and spurious software errors due to electrostatic discharge (ESD)
 - A firmware change will address the software errors and a change of the main board to protect against ESD damage will address the firmware corruption. Final resolution, including MSHA approval of changes, is expected by the end of August.
 - This may be minimized in the field by dissipating static electricity prior to connecting to the instrument.
- Mass offset errors created by extremely high dust loading over short periods
 - New firmware has addressed this issue and is undergoing final testing at this time. It will ship with new units in August, and returned units will be upgraded at no cost during normal servicing.
- Mass transducers going out of range
 - Radio frequency interference (RFI) can cause issues with the operation of the mass transducer. The new main board noted above is expected to address this issue and is undergoing testing at this time.
 - Additional shielding in the case may be required and is being tested. During the comment period for 30 CFR Part 75, a clarification regarding testing for IEC 61000-4-6 was submitted for RIN 1219-AB61 (comment AB61-COMM-3), and the instrument passed all required testing.
- Damaged display screens
 - A number of units have been returned for this problem, and it appears to be due to objects striking the display. This will be reviewed for possible improvements during future designs of the instrument to minimize potential damage.

Pricing for the CPDM

TEOM Series 3600 Personal Dust Monitor Production Pricing

TEOM Series 3600 Personal Dust Monitor with battery charger and compilation package	Price
1-49 units	\$12,900 each
50-149 units	\$11,750 each
150-499 units	\$10,370 each
500-849 units	\$9,570 each
850+ units	\$8,325 each

Filters	
Less than 1000	\$8 each
1,000 to 4,999	\$5 each

Improvements in Process & Future Development Plans

We have received many comments from users about improvements to the current design to improve usability and performance, two of which are in the process of being implemented. First is an option for shorter cap lamp cord (to 48 inches and 54 inches) to minimize tangling, especially in low coal. Second is an alignment of the error messages between the manual, PDM3600 screen display and the WinPDM software. These two modifications will be included with a RAMP submission to MSHA by August.

We have a five year plan that includes a redesign of the PDM3600 to include many requested modifications. Among these are removal of the cap lamp (due to recent approvals of wireless cap lamps), possible reduction in weight and modifications to the electronics to maintain cost and ensure continued availability of components. We will collect and, where possible, incorporate field input from users. I estimate a new design will be available in three to five years. All changes, and any final new product, will be submitted to MSHA and NIOSH for the necessary approvals.

Recommendations and Comments on Implementation

Thermo Fisher offers a number of suggestions for the implementation of the PDM3600 under these proposed rules.

1. Thermo Fisher recommends that the compliance communication software (used to transfer data between PDM3600 and computer) be controlled by MSHA. The data stored in the PDM3600 memory is encrypted, however extracting with the supplier WinPDM software provides this data in comma delimited format (csv) which can be altered. A version of encrypted software has been developed by NIOSH, which may satisfy this need.
2. MSHA should provide guidance on maximum unit down time (time a unit can be absent from a mine). This will necessarily guide Thermo Fisher's repair turnaround and could necessitate development of a loaner program. Due to the cost of the units and expenses attributed to freight charges and validation between loaner periods, this would need to be a "for fee" service.
3. We suggest MSHA establish criteria, with input from stakeholders, for an acceptable sample in the event of an error message during a sample run. Since the PDM3600 has data logging and error message capability (unlike the current manual method), it may be possible for some runs to experience an error (blocked flow, reduced flow, concentration error) that does not significantly impact the entire day's operation.
4. We suggest MSHA establish a periodic recertification requirement for the PDM3600. This would include actions required to ensure the instrument continues to meet the performance expectations. Among the suggested actions would be annual successful validation of tilt audit, KO audit, flow calibration, leak checks and mass transducer performance.

On behalf of Thermo Fisher Scientific and the team that has worked with all stakeholders to develop, refine, manufacture and deploy the CPDM over the past decade, thank you for the opportunity to comment on the rulemaking process. Please feel free to contact me for additional information, data or clarifications.

Respectfully submitted,



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attachment: Service contract

ADDENDUM A

Service Offering Overview

The following provides a summary of the features offered under the 3 Year Protection Plan, 5 Year Protection Plan, and the Annual Preventive Maintenance and Calibration Plan for the PDM 3600.

Available Protection Plans

*2Year Extended Warranty provides 3 full years of coverage**

*4Year Extended Warranty provides 5 full years of coverage**

- Offers predictable expenditure through fixed annual contract price
 - Must be purchased within thirty (30) days of initial product sale
 - Provides access to manufacturer's expertise and repair facilities
 - Provides 8 AM to 8 PM EST telephone technical support
 - Includes all parts and labor used in repairs*
 - *Includes one time replacement of the PDM Pump Assembly and One Battery Pack thru plan if malfunction occurs*
 - Includes one annual certification of calibration, flow and mass transducer per unit
 - Repairs typically completed within 5-10 business days
- * Excluding any parts on the list of exclusions as attached below after original manufacturer's 1 year warranty with the exception of one time Pump Assembly and Battery Pack replacement*

Preventive Maintenance and Calibration

Annual Preventive Maintenance and calibration performed at Thermo depot center.

Tasks to be performed include:

- Audit system performance
- Inspect and repair intrinsic safety features
- Re-tune Mass sensor electronics if required
- Audit and recalibrate mass sensor if required
- Audit and recalibrate flow
- Replace sample inlet tube strain relief
- Clean internal and external sample lines
- Tilt Verification
- Pump calibration
- Perform Leak Check of Sample Line and Case
- **Certificate of Calibration for Flow and Mass Sensors**
- Check additional items and repair or replace as needed (*not covered under annual PM but would be billed separately at current Time & Material rates; list of exclusions attached*)

Part #	Description	Price/Unit
PDM 3600 Protection Plan		
3600-EXT3	3600 PDM 3 Year Protection Plan	\$2,175.00
3600-EXT5	3600 PDM 5 Year Protection Plan	\$2,875.00
Preventive Maintenance and Calibration		
3600-CAL	Preventive Maintenance and Calibration	\$500.00

Parts Exclusions

List of exclusions not covered under the Protection Plan and PM/Calibration programs and will be billed in addition to the purchased service at a Flat Rate per event

(Factory Replacement ONLY)

Part No.	Description	Qty	List Price
35-009643	Pump Assy	1	\$500.00
50-010918	Auxiliary Board	1	\$715.00
35-009644	Modified Display	1	\$245.00
55-011115	Front Case Assy	1	\$200.00
34-010916	Rear Case Assembly	1	\$650.00
51-009639	PTO Cable Assy	1	\$265.00
50-008417	Digital Board	1	\$785.00
50-010920	Amplifier Board	1	\$540.00
56-010897-2300	Battery Pack	1	\$275.00
55-010902	TE Assy	1	\$950.00
56-010910-0152*	LED Cap Lamp Assy <i>*Includes cap lamp, cyclone, umbilical cord, bulkhead plate – individual pieces parts lower</i>	1	\$1,300.00 (TBD)