USER'S GUIDE

HAZ-DUST ™
ENVIRONMENTAL PARTICULATE
AIR MONITOR

MODEL EPAM-7500
DOC# HD71112

EDC   Innovative technologies for monitoring air quality

Haz-Dust
Model EPAM-7500
User's Guide

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Safety Notice

Repair of instrumentation supplied by Environmental Devices Corporation (EDC) should only be attempted by properly trained service personnel, and should only be conducted in accordance with the EDC system documentation. Do not tamper with this hardware. High voltages may be present in all instrument enclosures. Use established safety precautions when working with this instrument.

The seller cannot foresee all possible modes of operation in which the user may attempt to utilize this instrumentation. The user assumes all liability associated with the use of this instrumentation. The seller further disclaims any responsibility for consequential damages.

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Environmental Devices Corporation (EDC) warrants only non-expendable products (expendable items include batteries disposable filters and cassettes or other consumables), parts and labor, for a period of one year from date of shipment to the original purchaser. The warranty covers only product parts and labor that failed due to normal operation of the instrument and not due to abuse or negligence. The product will be delivered in accordance to its published specifications and free from defects in materials or workmanship.

If a product fails to conform to this one year limited warranty it may be returned to the factory for repair or replacement of the defected part(s). EDC must be notified of all returning warranty repair products, either in writing or by telephone. Shipping and insurance cost will be prepaid by the purchaser.

EDC makes no other express warranty and disclaims any implied warranty of fitness or merchantability.

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Chapter 1 Introduction to the Haz-Dust Model EPAM-7500

Introduction to the Haz-Dust Model EPAM-7500

Chapter Overview

Introduction   This chapter gives a complete overview of the Haz-Dust Model EPAM-7500.

This chapter:
- Introduces and describes EPAM-7500.
- Explains operating principles of the EPAM-7500.
- Identifies features, specifications and components of EPAM-7500.

In this chapter   This chapter contains the following topics.

Introduction to the EPAM-7500

Introduction   The Haz-Dust EPAM-7500 is a high sensitivity real-time particulate monitor designed for ambient environmental and indoor air quality applications. This unit combines traditional filter techniques with real-time monitoring methods. These techniques combined overcome limitations of all other aerosol monitoring products.

Figure 1.2. Picture of the Haz-Dust EPAM-7500

Introduction to the Haz-Dust EPAM-7500, Continued

Comparison of methods	The traditional and real-time dust monitoring methods are described below.
Description of traditional method	Air is drawn by a vacuum pump through a 47mm diameter membrane filter EPA FRM Style. The fibers and particles collected on the membrane filter must be counted or weighed in a laboratory for further analysis.
Advantages of traditional method[1]	• EPA or OSHA compliance reference method. • High level of specificity and accuracy. • Collection of dust particles, which are available for further chemical analysis.
Description of real-time method	Dust particles are drawn into the sensor head and are detected once every second. Dust concentrations are instantaneously calculated and displayed on the Haz-Dust EPAM-7500's LCD. All data points are stored in memory for later analysis.
Advantages of real-time method[1]	• Immediate estimations of the concentration of a contaminant, permitting on-site evaluations. • Provision of permanent 24-hour records of contaminant concentrations using continuous monitors. • Internal audible alarm to warn workers of approaching hazardous situations. • Reduction of number of manual filter tests. • Reduction of number of laboratory analyses. • Provision of more convincing evidence for presentation at hearings and litigation proceedings. • Reduced cost of obtaining individual results.

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[1] "The Industrial Environment - It's Evaluation & Control", U.S. Department of Health & Human Services, CDC, NIOSH, ©1973.

Overview of the EPAM-7500

Ease of use
- The user controls all functionality and programming using menus displayed on a high contrast LCD.
- A 24-hour rechargeable battery capacity.
- Automatic clean air purging of sensor for increased stability and accuracy.
- Internal temperature compensation for ambient use.

General Information
- The LCD displays real-time concentration in milligram per cubic meter (mg/m^3) in accordance with EPA or OSHA Reference Methods.
- Statistical information of TWA, STEL, Max and Min levels can be viewed instantly.
- The Haz-Dust is calibrated using Arizona Road Dust (ARD) against NIOSH method 0600 for Respirable dust with a $\pm$ 10% accuracy.
- The calibration of the Haz-Dust can be adjusted to compensate for changes in particle composition and distribution.
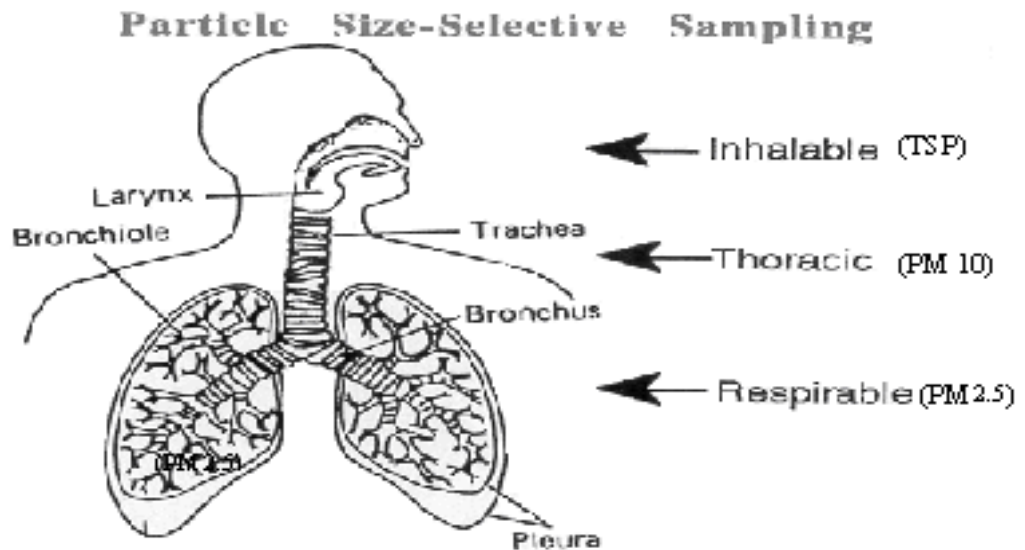
Figure 1.4. Diagram showing breathing zones of Inhalable, Thoracic, and Respirable dust particles.

Overview of the EPAM-7500, Continued

DustComm 7 Series Software

DustComm 7 Series supplied software is designed for more detailed analysis of sampled data.

Data can easily be exported in comma-delimited ASCII Text Files importable into spreadsheet programs such as Microsoft Excel and Lotus 1-2-3.

The EPAM-7500 data can be translated to a PC using DustComm 7 Series Software or Windows Mobile.

The data plots provided with DustComm 7 series enable:
· Detailed statistical analysis.
· Creation of charts.

Real-Time Dust Monitoring Principles

Principles
- The EPAM-7500 uses the principle of near-forward light scattering of an infrared radiation to immediately and continuously measure the concentration in mg/m^3 of airborne dust particles.

- This principle utilizes an infrared light source positioned at a 90-degree angle from a photo detector.

- As the airborne particles enter the infrared beam, they scatter the light. The amount of light received by the photo detector is directly proportional to the aerosol concentration.

- A unique signal processes internally and compensates for noise and drift. This allows high resolution, low detection limits and excellent base line stability.
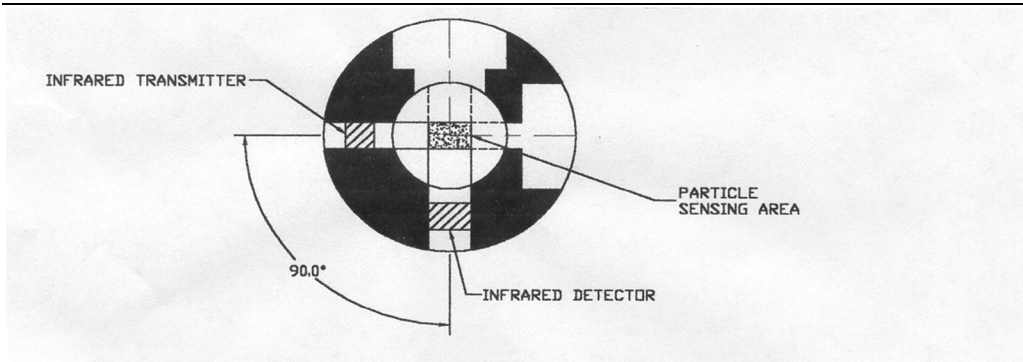
Figure 1.5. Diagram showing the principle of near-forward light scattering used in the Haz-Dust..
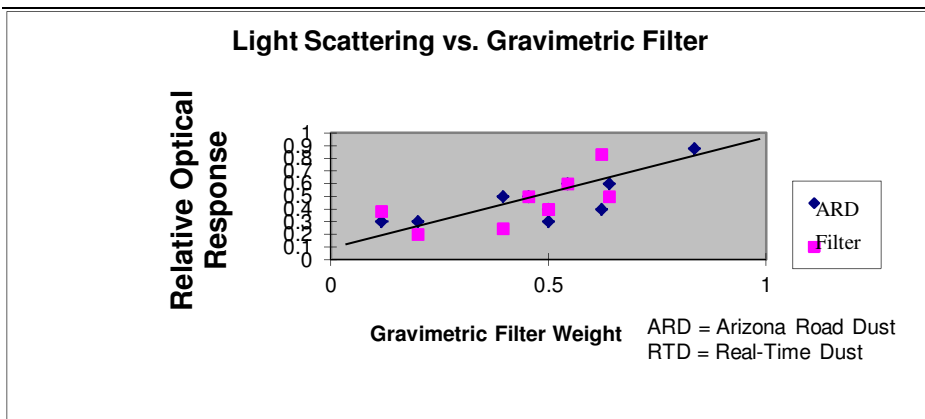
Figure 1.6. Graph illustrating the principle of near-forward light scattering.

Features

Introduction	The EPAM-7500 provides a unique combination of features to provide superior data quality, ease of use, and flexibility to the user. Below is a partial list of distinctive features.

Real-time display of

- Particulate exposure levels.
- TWA, STEL, Min, and Max levels.
- PM 1.0, PM 2.5, PM 4.0, PM 10, or TSP.
- Stored data by date and location code.
- Real-Time graphing capability
- Touch Display

Functional features

- Calibrated to NIOSH methods for lung damaging particles.
- In line concurrent filter samples for gravimetric analysis.
- High sensitivity of 0.001 to 40 mg/m^3 (1 µg/m^3 – 4000 µg/m^3).
- Optional sensitivity of 0.01 to 400 mg/m^3
- Interchangeable size-selective sampling inlets.
- Internal air sampling pump.
- Auto purging sensor.
- Easy user access to rechargeable battery and internal filter.

Operational features

- On-screen programming of sampling and data storage parameters.
- Real-time clock.
- User selectable audible alarm.
- In-field zero and span check of instrument calibration.

Data management

- Choice of 1 second, 5 second, 10 second, 1 minute, 15 minute, 30 minute, or 60 minute averaging/storage intervals.
- Memory storage of greater than 120,000 data points per location.
- Data translation to ASCII text files, importable into Excel or Lotus 1-2-3.
- DustComm 7 software offers comparative graphical and statistical analysis.

Specifications

Introduction   The EPAM-7500 meets the following specifications.

Specifications
Display: Graphical touch LCD
Operation: Touch menu driven
Calibration: NIOSH gravimetric method
Sensing range: .001-40.000 mg/m^3, 01-400.0 mg/m^3
Particle size range: 0.1-100 µm
Precision: +/- 0.003 mg/m^3 (3 µm/m^3)
Accuracy: +/-10% to NIOSH #0600 using ARD
Sampling flow rate: 2.0 liters/minute
Filter cassette: 47mm disposable EPA FRM Style
Alarm output: 90db at 3ft.
Recording time: 1 sec. To 15 months
Sampling rate: 1 sec., 5 sec., 10 sec., 1 min., 15 min., 30 min. and 60 min.
Data storage: Greater than 120,000 data points
Memory & time storage: > 10yrs
Real-time clock & data display
Data display: concentration in mg/m^3 & TWA, MAX, MIN, STEL, DATE/TIME
Digital output: USB
Operating Temperature: -10°C to 50°C
Storage Temperature: -20 to 60°C
DustComm 7 software: Windows^{TM} driven for graphical and data translation
Power: Rechargeable battery
Operating time: $\geq$ 24 hours
Charging time: 22 hours
Humidity: 95% non-condensing
Dimensions (case): 14.0" x 6.0" x 10.0"
Weight: 7 lbs.

Components

The following components ship with the EPAM-7500.

Components

* EPAM-7500
* Battery charger.
* Rechargeable battery pack
* EPAM-7500 Media CD-ROM Includes: DustComm 7 Software and Instruction Manual.
* USB cable
* TSP Sampling inlet (1.0 µm, 2.5 µm, or 10 µm sampling inlet optional. If ordered from SKC, Inc. distribution channel.).
* Flow Audit Measuring Device Adapter
* Flow Audit Measuring Device.

Chapter 2 - Operating Parameters of the EPAM-7500

Operating Parameters of the EPAM-7500

Chapter Overview

Introduction   This chapter describes the steps involved in starting the EPAM-7500 and configuring its operating parameters.

In this chapter   This chapter contains the following topics.

Topic	See Page
Turning the EPAM-7500 on and off.	2-2
Using the Main Menu.	2-3
Setting the Date and Time.	2-4
Setting the Alarm.	2-5
Clearing the Memory.	2-6

Turning the EPAM-7500 On and Off

Introduction Power can be supplied to the EPAM-7500 either from its internal battery or from the provided AC power transformer (Battery Charger).

Note: **THE BATTERY SHOULD BE FULLY CHARGED** before each use. To charge battery use the EDC supplied charger only. LED indicator on the EPAM-7500 will turn green when the battery is fully charged. Charge time is approximately 22 hours and will run for approximately 24 hours. To check battery status see Page 5-8.

Power-On Plug battery pack into EPAM-7500. When power is connected to the EPAM-7500, the instrument will turn itself on. There will be a blinking green LED on the front of the instrument when the EPAM-7500 begins to boot up.

If the EPAM-7500 does not turn on, press the green I/O power button on the front of the EPAM-7500.

Power-Off **Result:** Press the green I/O power button on the front of the EPAM-7500 to turn the EPAM-7500 off. Also, pressing the red I/O graphic on the display can turn the EPAM-7500 off or go to standby mode.

Using the Main Menu

The EPAM-7500 graphic menu appears on the graphical display.

Note: See Appendix A for menu option flow charts.

Accessing the main menu The Main Menu is displayed when the EPAM-7500 is first powered on.

Using the menu The EPAM-7500 is operated using the following menu selections.

Selection	Function
<ON/OFF>	Turns the EPAM-7500 off or into standby mode.
<Settings>	Changes the settings of the EPAM-7500.
< Upload To Card >	Allows the user to upload any data saved from the internal memory to the Compact Flash Card.
< Review >	Allows the user to look at the statistical data before uploading to the PC or Compact Flash Card
< Monitor >	Runs the EPAM-7500. The EPAM-7500 does not start logging when the monitor graphic is pressed. To start logging in monitor mode, press the record graphic.

Setting the Date and Time

Introduction   The date and time are pre-set by the factory to Eastern Standard Time and are maintained by an internal clock. It may be necessary to change the date and time due to local time zones or daylight savings time.

Note: It is important that the system date and time are correct for accurate record keeping.

Date and Time settings   Time is entered and displayed in military time format.
Date is entered and displayed in European format (i.e., 03-DEC-2011).

View settings   Follow the steps in the table below to check the unit's date and time.

Step	Action
1	Select **Settings** from the Main Menu**.**
2	**Date/Time** is shown on the first screen and in the first three boxes.

Change settings   Follow the steps in the table below to change the unit's date and time.

Step	Action	
1	Select **Settings** from the Main Menu**.**	
2	Press on time zone drop down menu and select your timezone.	
3	Press on the date drop down menu and select the year, month, and date.	
4	Press on the hour position on the time box.	
	To...	**Press...**
	Increase the value of the selected digit.	< >
	Decrease the value of the selected digit.	< >
	Change minutes or seconds	Press on minutes or seconds and change the value as described above.
5	Press Green check mark when the correct information has been entered.	

Setting the Alarm

Introduction   An audible alarm can be set to alert the worker of approaching threshold limits.

Alarm settings   The concentration level must be set to the defined agency standard for the particulate type being sampled.

Note: See Appendix B for a partial listing of the most common dust particulates and their corresponding concentration levels.

Using the alarm   Follow the steps in the table below to set the alarm level.

Step	Action	
1	Select **Monitor** graphic from the Main Menu**.**	
2	Select **Alarm** graphic.	
3	Enter the appropriate concentration level using the table below.	
	To...	**Press...**
	Increase the value of the selected digit.	**<** Scroll the bar to the or press on the concentration number and enter the value you would like to set. **>**
	Decrease the value of the selected digit.	**<** Scroll the bar to the or press on the concentration number and enter the value you would like to set. **>**
5	Click on Green check mark to accept the alarm set point.	
	To run unit with alarm, after setting alarm click on the alarm graphic. This will remove the red X on the alarm. Press the alarm again to put the red X back on mute the alarm. **Result:** The alarm has been set.	

Clearing the Memory

Introduction   The memory of the EPAM-7500 can be cleared at any time.

Note: User can select one data file or many data files at once to delete.

Clearing   Follow the steps in the table below to clear the memory of the EPAM-7500.
memory

Step	Action
1	Select **Upload To Card** graphic from the Main Menu.
2	Select the files you wish to remove.
3	Select the green check button to move the files to the Compact Flash Card.
4	Connect the Compact Flash Card to a computer and delete the files. **Note:** The EPAM-7500 can also be connected to a computer using a USB cable and files can be deleted from the PC.

Chapter 3 - Operating the Haz-Dust EPAM-7500

Operating the Haz-Dust EPAM-7500

Chapter Overview

Introduction   This chapter describes and diagrams operation procedures of the EPAM-7500.

In this chapter   This chapter contains the following topics.

Selecting The Particle Size

Introduction   The inlet system of the EPAM-7500 can be configured to sample TSP, PM 1.0, 2.5, 10.0 µm dust particulates. The following pages detail the selection process for each of these particle types. Impactor Sleeve holds one optional Impactor accessory.
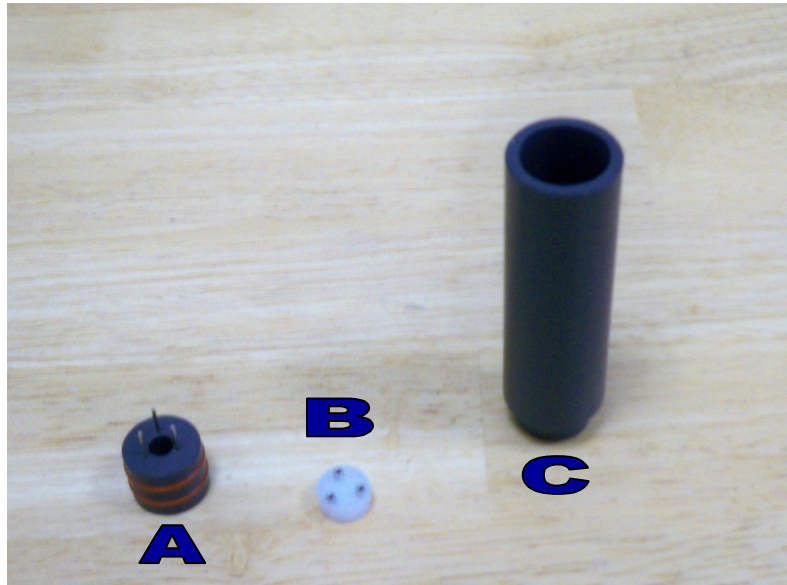
Figure 3-1. Picture: A) Impactor Jet, B) Impaction cup, and C) Impactor Sleeve. For TSP sampling use impactor sleeve without impactor. Impactor values are engraved on bottom of impactor jet.

EPAM-7500 Impactor Instructions
Impactor Part Number: EPAM-1.0, EPAM-2.5, EPAM-4.0, and EPAM-10
Impactor Sleeve Part Number: IMS-105

The Impactor consists of the cup and the impactor jet. The Impactor cup fits onto the impactor jet. The cup has three female connectors and the jet has three pins. User can easily remove for cleaning without the use of any tools.

Impactor Jet
Sizes 1.0um, 4.0, 2.5um, 10um

Impaction Cup
remove for applying
impactor grease & cleaning

STEP 1: The completed assembly of the impactor fits into the impactor sleeve. Insert the cup end of the impactor first into the impactor sleeve. You will need to insert the impactor approximately one inch or 25mm down into the impactor sleeve.
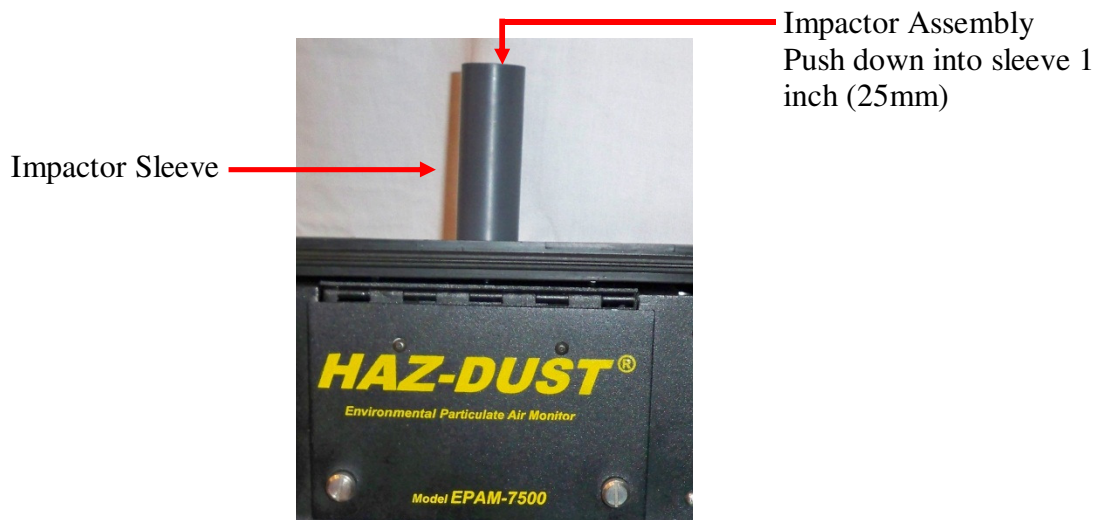
Impactor Assembly
Push down into sleeve 1 inch (25mm)

Impactor Sleeve

STEP 2: Place impactor sleeve with impactor inserted into sensor of EPAM-7500 monitor.

STEP 3: In order to change impactor to different size, to clean or to grease impactor cup, impactor must be removed. To remove impactor from sleeve, push upward with the trim stick provided with model EPAM-5000, a pencil, or similar from bottom of sleeve.

Push up to remove

1.0um Dust Particulates

Follow the steps in the table below to select PM-1.0 dust particulates.

Step	Action
1	Select **Settings** from the Main Menu**.**
2	Select **Sample Type**.
3	Select **1.0 um – E**.
4	Select **Green** check mark button to accept Changes.
6	Insert the sampling inlet into the sensor head of the EPAM-7500. <u>**Note:**</u> If also collecting concurrent 47mm EPA FRM Style filter samples place a clean gravimetric filter in the filter cassette. The flow rate should be checked each time a new gravimetric filter is used. See page 5-5 for information on checking the flow rate.
7	Attach the filter cassette to the sensor head of the EPAM-7500. See diagram below.
8	Turn to page 3-7 and follow the instructions to Manual-Zero the EPAM-7500.

Install 47mm filter if desired.
Remove filter holder by unscrewing bottom round cover.
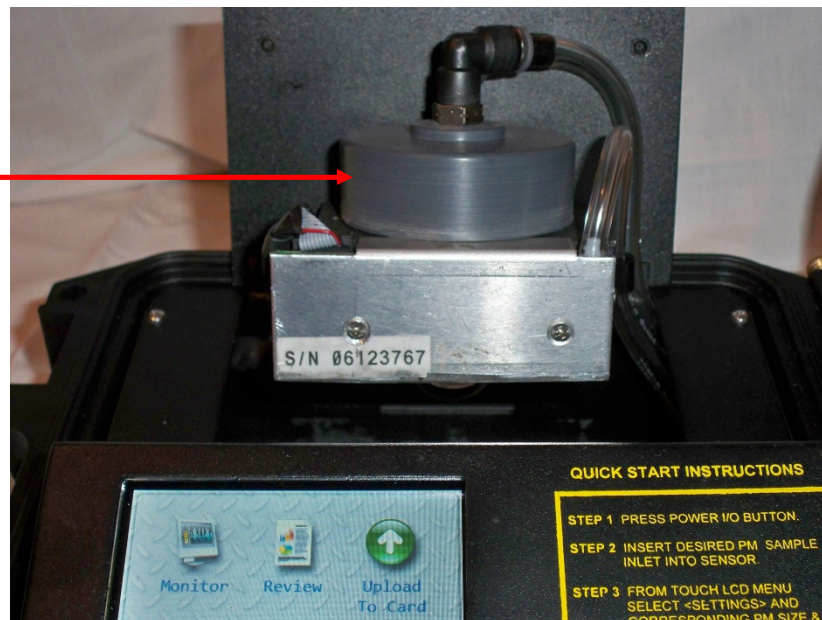
Figure 3-2. Diagram of sensor lid. To unlock sensor lid unscrew pem screw located on right side of sensor lid to expose the filter cassette. ***NOTE:** When closing sensor cover be sure not to tighten pem screw too tightly the spring inside the screw can break.

2.5 um Dust Particulates

Follow the steps in the table below to select PM-2.5 dust particulates.

Step	Action
1	Select **Settings** from the Main Menu**.**
2	Select **Sample Type**.
3	Select **2.5 um – S**.
4	Select **Green** check mark button to accept Changes.
6	Insert the sampling inlet into the sensor head of the EPAM-7500. **Note:** If also collecting concurrent 47mm EPA FRM Style filter samples place a clean gravimetric filter in the filter cassette. The flow rate should be checked each time a new gravimetric filter is used. See page 5-5 for information on checking the flow rate.
7	Attach the filter cassette to the sensor head of the EPAM-7500. See diagram below.
8	Turn to page 3-7 and follow the instructions to Manual-Zero the EPAM-7500.

4.0um Dust Particulates

Follow the steps in the table below to select PM-4.0 dust particulates.

Step	Action
1	Select **Settings** from the Main Menu**.**
2	Select **Sample Type**.
3	Select **4.0 um – SM**.
4	Select **Green** check mark button to accept Changes.
6	Insert the sampling inlet into the sensor head of the EPAM-7500. **Note:** If also collecting concurrent 47mm EPA FRM Style filter samples place a clean gravimetric filter in the filter cassette. The flow rate should be checked each time a new gravimetric filter is used. See page 5-5 for information on checking the flow rate.
7	Attach the filter cassette to the sensor head of the EPAM-7500. See diagram below.
8	Turn to page 3-7 and follow the instructions to Manual-Zero the EPAM-7500.

10.0um Dust Particulates

Follow the steps in the table below to select PM-1.0 dust particulates.

Step	Action
1	Select **Settings** from the Main Menu**.**
2	Select **Sample Type**.
3	Select **10.0 um – M**.
4	Select **Green** check mark button to accept Changes.
6	Insert the sampling inlet into the sensor head of the EPAM-7500. **Note:** If also collecting concurrent 47mm EPA FRM Style filter samples place a clean gravimetric filter in the filter cassette. The flow rate should be checked each time a new gravimetric filter is used. See page 5-5 for information on checking the flow rate.
7	Attach the filter cassette to the sensor head of the EPAM-7500. See diagram below.
8	Turn to page 3-7 and follow the instructions to Manual-Zero the EPAM-7500.

Auto-Zero

Introduction   Auto-Zero purging feature automatically adjusts for baseline drift due to severe ambient temperature change.
This feature is a default setting on the EPAM-7500.
The Auto-Zero feature purges the sensor optics with clean air and re-establishes the baseline every 30 minutes as a default.

Auto-Zero   To deactivate or reactivate the Auto Zero purging feature follow the table below.

Step	Action
1	Select **Settings** from the Main Menu.
2	Select blue ➡
3	Select **Auto Zero** drop down menu.
4	Select desired Auto Zero time.
5	Select **Green** check button to accept changes.

Sampling

Introduction   Once you have selected a Particle Size and completed the EPAM-7500 is ready to begin sampling.
Note: It is recommended to trial sample in the environment where you will be air monitoring for 15 minutes to allow EPAM-7500 to stabilize prior to beginning first sample.

Conditions   The following conditions should be met before starting the sampling process.

Condition...	For further Information See Page...
The correct particle size must be selected.	3-2
The correct sampling inlet must be attached.	3-2 to 3-8
The date and time must be checked and/or set.	2-4
The alarm level must be set if sampling with the alarm feature.	2-5

Sampling   Follow the steps in the table below to begin the particle sampling.

Step	Action
1	Turn unit on.
2	Select **Monitor**.
3	Select the **Record** graphic to start recording.
4	<u>**Note:**</u> See page 3-13 for explanation of location codes.
5	When in **Monitor**, select the information graphic to see the settings of the EPAM-7500.

Location Codes

Introduction	The EPAM-7500 assigns a location code to each sampling sequence. The active location is indicated in information screen (See figure 3.10).
Maximum location codes	The EPAM-7500 can store a total of greater than 120,000 data points.
Assigning location codes	The location code assigned to the site is determined by the date and runs for the day (ex. P10NOV2012-000).

Reviewing Stored Data

Introduction The EPAM-7500 provides extensive capabilities for reviewing internally stored data and statistics on the graphical display or downloading to a PC using DustComm 7 Software (Chapter 4).

Graphical display The following information can be displayed on the graphical display.

Display	Description Tag #
Date	Date of sampling.
Start	Time sampling began.
Stop	Time sampling was terminated.
Duration	Time of occurrence of reported statistic.
MAXIMUM Sample	Highest concentration of dust particles.
MINIMUM Sample	Lowest concentration of dust particles.
T.W.A.	Time weighted average concentration of dust particles.
Samples	How many samples were taken during the logging session.
S.T.E.L.	Short-term exposure limit.

Viewing data on the graphical display Follow the steps in the table below to review stored information and statistics.

Step	Action
1	Select **Review** graphic
2	Select **Record Name**.
3	Select **Green** check mark button.
4	Review Screen will have the data from the above chart.

Chapter 4 – DustComm 7 Software

Introduction to the DustComm 7 Software

Introduction DustComm 7 is a powerful and flexible Windows application software package designed for use with the EPAM-7500 Particulate Monitoring Equipment.

DustComm 7 is a data manipulation tool, enabling detailed analysis and reporting of sampled data.

Spreadsheet applications DustComm 7 easily translates data into spreadsheet ASCII text files. These files can be open into spreadsheet programs such as Microsoft Excel

Data plots The data plots provided with DustComm 7 enable:
- Detailed statistical analysis.
- The creation of charts.

Open a File To open a file in DustComm 7 software, press file, then open. Go to where the file was saved on the Flash Card and open the file.

Statistics DustComm 7 will display a graph of the data at the bottom of DustComm7. The statistical data is above the graph.

Notes Notes can be added to the DustComm 7. The notes field is on the right side of the statistical data.

Export to Excel To export the data into excel, press File and select export to CSV.

Import into Excel To import the data into excel, open Microsoft Excel. Press File and Open. Open the CSV data file from above. When importing the data, ensure to select comma delimited data.

DustComm 7 Software Screen Shot

File Menu ——

File Name ——

Statistical Data ——

—— Notes

Graphed Data ——

DustComm Series-7

File   About

Record Name: P17Jun2010-001

Notes

General

Start: 18:52:05 17-Jun-2010
Stop: 18:52:58 17-Jun-2010   Duration: 00:00:53

Sample Count: 55   Unit Name: HazDust7
Sample Rate: 1 sec   Unit SN: hd123
Data Type: 2.5 um - S

Statistics

Min: 0.21 mg/m3   TWA: 0.48 mg/m3
Max: 0.72 mg/m3   STEL: ----

Graph axis values: 0.6, 0.4
Time axis: 18:52:05   18:52:18   18:52:32   18:52:45   18:52:58

Connecting the EPAM-7500 to the PC USB

Introduction   The EPAM-7500 can also download the data through the USB connector on the top of the instrument. To download the EPAM-7500 through USB, the PC would need ActivSync. ActivSync can be downloaded from the Microsoft website. The address is http://www.microsoft.com/en-us/download/details.aspx?id=15 to download the ActivSync.

Windows Mobile can also be downloaded on Microsoft's website if your computer does not have the software included. The address to download Windows Mobile is http://www.microsoft.com/en-us/download/details.aspx?id=14 for a 32-bit system. Windows Mobile can be downloaded and installed instead of using ActivSync.

Windows Mobile   Windows Mobile can also be used on the PC with ActivSync to browse the files on the flash card as well as the internal memory.

Windows Mobile

Once the EPAM-7500 is connected, click on the browse files. You can drag the files you want onto the desktop and use the DustComm 7 software.

Chapter 5 - Maintenance

Maintenance

Chapter Overview

Introduction   This chapter covers the routine maintenance procedures for the Haz-Dust EPAM-7500.

In this chapter   This chapter contains the following topics.

Topic	See Page
Checking the Calibration Span. (Optional Accessory).	5-2
Checking the Flow Rate.	5-4
Adjusting the Flow Rate.	5-5
Battery Maintenance.	5-6
Cleaning the Impactors	5-8
Cleaning the Sensor Optics.	5-10

Checking the Calibration Span

Introduction   The Span Reference Insert Part Number CS-105 is a light scattering device that provides a constant value (termed a "k" factor).

The Span Reference should be used as a reference to check factory calibration of the EPAM-7500 Monitor.

When to check the calibration span   The calibration span should be checked under the following conditions:
- Once a month with normal usage. (Normal use is twice a week).
- If the EPAM-7500 is dropped or otherwise damaged.
- The first time you use the unit to double check the factory calibration.

Note: The EPAM-7500 must be sent into EDC annually for recalibration. In accordance with ISO procedures.

Conditions   The following conditions must be met before checking the calibration span.

Condition...	For further information see page...
The Environment must be clean.	---
The Battery must be fully charged.	5-7

Figure 5-1. Inserting CS-105 into Haz-Dust Sensor.

Checking the Calibration Span, Continued

Checking Calibration Span

Follow the steps in the table below to check the Span of the EPAM-7500 Monitor.

Note: Failure to follow this procedure in its entirety may cause an incorrect "k" value reading.

Step	Action
1	Turn EPAM-7500 on.
2	Press **Monitor** graphic.
3	When the EPAM-7500 starts to begin monitoring, the instrument will run an auto zero one minute after beginning.
5	Remove Auto Zero filter and impactor sleeve.
6	Insert the span reference into the sensor head (see diagram 5.1). Allow 2-3 minutes for reading to stabilize. **Note:** Be sure the locating pin on the calibration reference slides into the locating hole on the sensor head. **Also,** Push down on the calibration reference to be sure it is aligned properly. Slightly twist CS-105 clockwise when positioned in alignment hole. This will ensure the CS-105 is in the exact position and ensure reproducibility when "K" value is displayed on the EPAM monitor.
7	Observe the printed "k" value on the calibration reference. **Note:** The printed "k" value should match the concentration value shown on the Haz-Dust LCD to within $\pm$ 10%.

	IF	THEN	
	The numbers agree within $\pm$ 10%	The EPAM-7500 has passed the span check test.	
	The two numbers do not agree within $\pm$ 10%.	1. Repeat the process to rule out error, then: 2. Call EDC technical support or return the EPAM-7500 for recalibration.	
8	Remove Span Reference and place in its protective sleeve. **Note:** Optical windows on CS-105 cannot have fingerprints or contamination, please clean using KK-101 Cleaning Kit.		

Note: If the CS-105 is purchased from SKC or as an after-market accessory, the end user must assign "k" value. To assign "k" value repeat steps 1-6 three times. Take an average of the three numbers you recorded to get your "k" value.

Checking the Flow Rate

Introduction It is good technique to check the flow rate every time before and after a new gravimetric filter is used for sampling.

Checking the flow rate Use the steps in the table below to check the flow rate.

Notes:
- When using an impactor, be sure the proper sampling inlet is attached to the sensor head.

Step	Action	
1	Attach your airflow calibrator to the EPAM-7500 using the table below.	
	If sampling...	**Then...**
	PM-10, PM-4.0, PM-2.5, PM-1.0 or TSP	1. Attach one end of the calibration airflow tubing to flow adapter. 2. Connect the other end of the calibration airflow tubing to your airflow calibrator.
2	Activate the internal sampling pump using the steps below.	
	Step	**Action**
	1	Select **Monitor** from the Main Menu.
3	Observe the flow rate on your air flow calibrator.	
	If...	**Then...**
	The flow rate is 2.0 LPM.	The flow rate is properly calibrated. Detach the airflow calibrator tubing and continue with the "Selecting the Particle Size" process.
	The flow rate is not 2.0 LPM.	The flow rate must be adjusted. See page 5-7 for instructions.
	No flow is present.	See Troubleshooting section on Chapter 6.

Adjusting the Flow Rate

Introduction   The flow rate must be adjusted when it does not equal 2.0 LPM.

Adjusting the flow rate   Follow the steps in the table below to adjust the flow rate.

1	Press **Settings** from the main menu.
2	Press the ➡ button until you are on the last screen.
3	Press the **Lock** graphic to unlock the settings.
4	Press the **white box** to enter the security code.
5	Press **HD7** on the keyboard.
6	Press the **Enter** button on the keyboard.
7	Press the **Check Box** next to the **Force Pump On**.
8	Press the ⬆ or ⬇ to adjust **Pump** to 2.0 LPM.
9	Record the Flow Rate.
10	Detach the airflow calibrator and calibration airflow tubing.
11	Press **Green** check button to accept changes.

Battery Maintenance

Introduction   The battery pack is a 10.8-volt Li-Ion rechargeable battery. It is important to check the battery periodically and recharge when necessary.

Checking the Battery   The battery status can be checked from any screen on the EPAM-7500. The graphical icon is on the bottom middle of the screen.

Recharging the battery   Follow the steps in the table below to recharge the battery using the supplied charger.

Note: If the battery is too low, the EPAM-7500 will turn off. Charge the battery for 15 minutes before turning on.

Step	Action
1	Plug the battery charger into an electrical outlet.
2	Plug the battery charger into the battery charge jack on the top panel of EPAM-7500, or into the supplied charging cord. **Results:** • LED indicator on front of the EPAM-7500 should be Red. • When LED is green battery is fully charged. **Note:** Recharging time is approximately 22 hours when the instrument is not operating.

CAUTION: Do not charge in a hazardous environment. Use *only* the EDC approved charger designed for the EPAM-7500.

Battery Maintenance, Continued

Removing and replacing the battery pack

The battery pack can be removed and replaced whenever necessary.

Removing the battery

Follow the steps in the table below to remove the battery pack.

Step	Action
1	Loosen the two retaining pem screws from the top plate of the EPAM-7500. **NOTE:** These are special inserts and the screws are attached by a spring to tighten push the screw down and turn to loosen turn the screw and it will pop on the spring DO NOT pull the screw because you will break the spring and be unable to secure your battery pack.
2	Slide the battery plate sideways out of the unit.
3	To re-install reverse above proceeding

Figure 5-3. Diagram of battery being removed from Haz-Dust.

Cleaning the Impactors

Introduction   Impactors should be disassembled and cleaned and greased at regular intervals.

Example: You should clean impactors every thirtieth sample or once a month to start, but heavy loadings are observed on the target disk, as often as appropriate.

Cleaning the Impactors   Follow the Steps in the table below to clean the impactors.

Step	Action
1	Pushing with a pen from bottom remove the impactor through top of impactor sleeve into the palm of your free hand.
2	Rinse the impactor from top to bottom with a solvent (hexane, white gas, lantern gas) using a squeeze bottle, paying particular attention to the impaction target disks. An acceptable alternative method of cleaning involves the use of an ultrasonic bath with mild soapy water solution. **Note:** The impaction cup should be removed prior to re-greasing. This is accomplished by pulling the impaction cup apart from the impactor jet gently.
3	Let all parts of the impactor air-dry.
4	Prepare a mixture of solvent and impactor grease (Apiezon ® M, Glisseal ® Ht) or similar grease in a dropper bottle until thoroughly mixed and of a fluid consistency. Use a 1-inch length of grease to 30ml of solvent. Vigorously shake the mixture until an opaque, uniform suspension, free from grease globs, is obtained.

5	Put two or three drops of the solution on the impaction cup. The drops should saturate the disk, flowing freely to the edge.
6	Let the impaction cup "dry" by allowing the solvent to volatilize, leaving a thin film of grease on the impaction cup.
7	Replace the impaction cup onto the impactor jet. Re-insert the impactor into the impactor sleeve.

Cleaning the Sensor Optics

Introduction   Although the EPAM-7500 has an internal sensor purge it is important to keep the sensor optics of the EPAM-5000 clean to ensure the integrity of the optical sensor.

The sensor optics needs to be checked every 2 months or on a weekly basis, when used in a 2 to 3 mg/m^3 T.W.A. environment.

Cleaning the Sensor Optics   Follow the steps in the table below to clean the sensor optics.

Figure 5-4. Picture of the cleaning kit.

Step	Action
1	Remove the screws located on sensor cover.
2	Inspect internal sensor. Inspect cavities for residual dust. Blow the dust away with low-pressure air or wipe with foam tipped cotton swab.
3	Inspect the glass lens covers for dust. **Note:** Use one of the following methods to clean the glass lens. • Blow the dust away with low pressure air, or, • Use a small amount of isopropyl alcohol and wipe with cotton swabs. **CAUTION:** Do not spill any alcohol into the internal cavity of the EPAM-7500.
4	Replace the sensor cover.
5	Tighten the screws snugly into place. **NOTE:** If screws are not tightened enough the flow of the EPAM-7500 could be off.

Appendix

Appendix A Menu Screens

Introduction   This Appendix contains a complete overview of the Menu Screens for the EPAM-7500.

The following pages show diagrams of the Main Menu Screens.
Note: Selecting **Red X** button will cancel from any Menu Screen will back out of the current function.

Monitor	Review	Upload To Card	Settings	Power
Run Instrument	Unit/Card Files	Compact Flash Card	Date/time Sample type	OFF
Record			Auto Zero	Suspend
Alarm			Sensor Settings	
Instrument Settings			Flow Rate Adjustment	
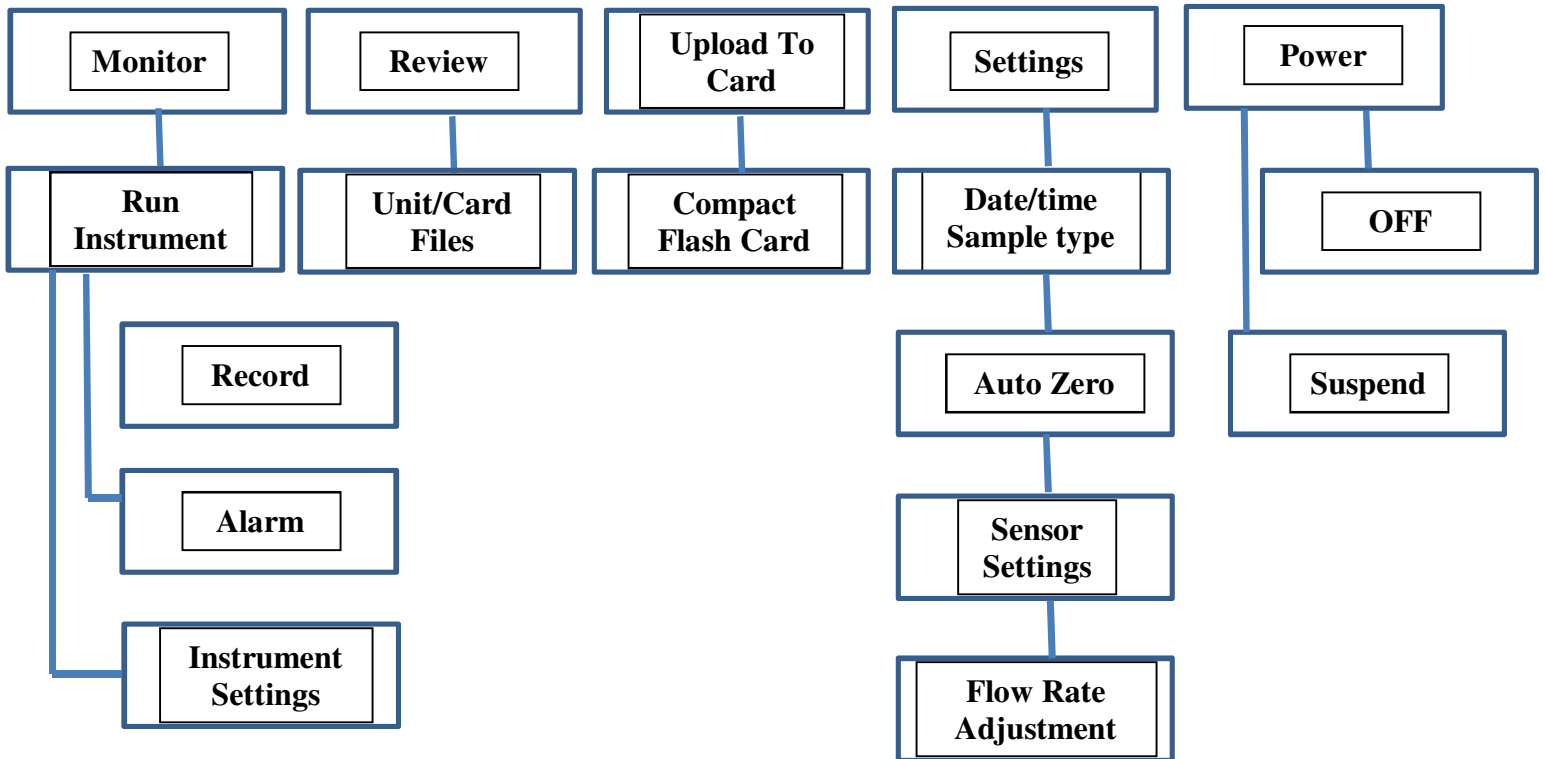
Appendix B NIOSH/OSHA Particulate Air Monitoring Reference

Dust/Hazard	Agency	Reference	TWA	STEL
alpha-Alumina (Respirable fraction)	OSHA	CIM	5 mg/m^3	
alpha-Alumina (Total dust)	OSHA	CIM	15 mg/m^3	
Aluminum, Pyro powders	OSHA	CIM	*	
Aluminum (Respirable fraction)			5 mg/m^3	
Ammonium nitrate	OSHA	CIM	*	
Ammonium sulfamate (Respirable dust)	OSHA	CIM	5 mg/m^3	
Ammonium sulfamate (Total dust)	OSHA	CIM	15 mg/m^3	
Ammonium sulfamate (Total dust)	OSHA	ID 188	15 mg/m^3	
Bismuth telluride, Se-Doped	OSHA	ID 121	5 mg/m^3	
Bismuth telluride, Undoped (Respirable dust)	OSHA	ID 121	5 mg/m^3	
Bismuth telluride, Undoped (Total dust)	OSHA	CIM	15 mg/m^3	
Boron oxide (Total dust)	OSHA	ID 125G	15 mg/m^3	
Boron oxide (Total dust) (Particulates, Total)	NIOSH	0500	10 mg/m^3	
Carbon black	NIOSH	5000	3.5 mg/m^3	
Carbon black	OSHA	ID 196	3.5 mg/m^3	
Chromium, Metal & Insol cpds	OSHA	ID 121	1 mg/m^3	
Chromium, Metal & Insol cpds	OSHA	ID 125	1 mg/m^3	
Chrysene	OSHA	58	0.2 mg/m^3	
Coal dust (<than 5% SiO2)	OSHA	CIM	2.4 mg/m^3	
Coal dust (>than 5% SiO2)	OSHA	ID 142	10 mg/m^3	
Coal tar pitch volatiles	OSHA	58	0.2 mg/m^3	
Copper dust	NIOSH	7029	1 mg/m^3	
Copper, Dusts & Mists	OSHA	ID 125G	1 mg/m^3	
Copper, Dusts & Mists	OSHA	ID 121	1 mg/m^3	
Copper (Elements)	NIOSH	7300	1 mg/m^3	
Copper fume	NIOSH	7029	0.1 mg/m^3	
Copper fume	OSHA	ID 121	0.1 mg/m^3	
Copper fume	OSHA	ID 125G	0.1 mg/m^3	
Cotton dust (Raw)	OSHA	CIM	1 mg/m^3	

* Refer to Agency Method

Dust/Hazard	Agency	Reference	TWA	STEL
Crag herbicide (Respirable dust)	OSHA	CIM	5 mg/m^3	
Crag herbicide (Total dust)	NIOSH	5(S356)	10 mg/m^3	
Crag herbicide (Total dust)	OSHA	CIM	15 mg/m^3	
Cresol, All isomers	NIOSH	2546	10 mg/m^3	
Cresol, All isomers	OSHA	32	15 mg/m^3	
Cyanide (as Cn)	OSHA	ID 120	5 mg/m^3	
Fluorides (Aerosol & Gas)	NIOSH	7902	2.5 mg/m^3	5.0 (HF)
Glass, Fibrous dust	OSHA	CIM	*	
Glycerin mist (Particulates)	NIOSH	0600	*	
Glycerin mist (Respirable)	OSHA	CIM	5 mg/m^3	
Glycerin mist (Total dust)	OSHA	CIM	15 mg/m^3	
Grain dust (Oats, Wheat & Barely)	OSHA	CIM	10 mg/m^3	
Graphite, Synthetic (Respirable dust)	OSHA	CIM	5 mg/m^3	
Graphite, Synthetic (Total dust)	OSHA	CIM	15 mg/m^3	
Iodine (Particulates)	OSHA	ID 212	*	0.1
Kaolin (Respirable dust)	OSHA	CIM	5 mg/m^3	
Kaolin (Total dust)	OSHA	CIM	15 mg/m^3	
Lead	NIOSH	7082	<0.1 mg/m^3	
Lead	NIOSH	7105	<0.1 mg/m^3	
Lead	NIOSH	7700	<0.1 mg/m^3	
Lead (Elements)	NIOSH	7300	<0.1 mg/m^3	
Lead, Inorganic fumes & dusts (as Pb)	OSHA	ID 121	0.05 mg/m^3	
Lithium (Elements)	NIOSH	7300	*	
Lithium hydride	OSHA	CIM	25 µg/m^3	
Magnesium oxide fume (Total dust)	OSHA	ID 121	15 mg/m^3	
Manganese (Elements)	NIOSH	7300	1 mg/m^3	3 mg/m^3
Manganese fume (as Mn)	OSHA	ID 121	*	5 mg/m^3
Methoxychlor (Total Dust)	OSHA	CIM	15 mg/m^3	
Oil mist (Mineral)	OSHA	ID 128	5 mg/m^3	
Oil mist (Mineral)	OSHA	ID 178SG	5 mg/m^3	
Oil mist (Vegetable) (see Dust, Total and Respirable nuisance)				
Pentaerythritol (Total dust)	OSHA	CIM	15 mg/m^3	
Pentaerytritol (Respirable dust)	OSHA	CIM	5 mg/m^3	

Dust/Hazard	Agency	Reference	TWA	STEL
Picloram (Tordon), Respirable dust	OSHA	CIM	5 mg/m^3	
Picloram (Tordon), Total dust	OSHA	CIM	15 mg/m^3	
Plaster of Paris (see Dust, Respirable nuisance)	OSHA	CIM		
Portland cement (Respirable dust)	OSHA	ID 142	5 mg/m^3	
Portland cement (Total dust)	OSHA	ID 142	15 mg/m^3	
Respirable nuisance	OSHA	CIM	5.0 mg/m^3	
Respirable nuisance (Particulates)	NIOSH	0600	*	
Total nuisance	OSHA	CIM	15 mg/m^3	
Total nuisance (Particulates)	NIOSH	0500	10 mg/m^3	
Rouge (Respirable dust)	OSHA	CIM	5 mg/m^3	
Rouge (Total dust)	OSHA	CIM	15 mg/m^3	
Silica, Amorphous	OSHA	CIM	20 mppcf	
Silica, Crystalline tripoli, Respirable dust	OSHA	ID 142	0.05 mg/m^3	
Silicon carbide (Respirable dust)	OSHA	CIM	5 mg/m^3	
Silicon carbide (Total dust)	OSHA	CIM	15 mg/m^3	
Silicon (Respirable dust)	OSHA	CIM	5 mg/m^3	
Silicon (Total dust)	OSHA	CIM	15 mg/m^3	
Soapstone (Respirable dust)	OSHA	CIM	20 mppcf	
Soapstone (Total dust)	OSHA	CIM	6 mg/m^3	
Wood dust (except Western red cedar)	OSHA	CIM	*	
Wood dust (Western red cedar)	OSHA	CIM	2.5 mg/m^3	
Zinc bromide (see Dust, Total and Nuisance)			*	
Zinc oxide dust (see Dust, Total & Respirable)	OSHA	CIM		
Zinc oxide fume	OSHA	ID 121	5 mg/m^3	
Zinc oxide fume	OSHA	ID 125	5 mg/m^3	
Zinc oxide fume	OSHA	ID 143	5 mg/m^3	
Zinc stearate (Respirable dust)	OSHA	CIM	5 mg/m^3	
Zinc stearate (Total dust)	OSHA	ID 121	15 mg/m^3	
Zinc stearate (Total dust)	OSHA	ID 125	15 mg/m^3	
Zirconium cpds (as Zr)	OSHA	ID 121	5 mg/m^3	

Appendix C Glossary of Terms

Term	Definition/Standard
µm	Micron, 1/1000 of a meter.
ARD	Arizona Road Dust
Inhalable Dust Particulates	Particulates having a 50% cut point at 100µm.
LPM	Liters per minute.
mg/m^3	Milligrams per cubic meter.
NIOSH	National Institute of Occupational Safety & Health
OSHA	Occupational Safety & Health Administration.
Respirable Dust Particulates	Particulates having a 50% cut point at 3.5µm.
STEL	Short-term exposure level. Maximum dust concentration over a 15-minute period.
Thoracic Particulates	Particulates having a 50% cut point at 10µm.
TWA	Time Weighted Average. Average particulate concentration over a period of time.