DUSTCANARY TREND 420 PERSONAL DUST MONITOR

Operating Guide

Revision | MAY 2024

www.DustCanary.com



CONTENTS

1. Overview	
2. Getting Started	4
Initial Battery Recharge	4
Mounting the Device	4
Recharging the Battery	4
3. Operating the Device	5
Switching Dust Detection On	5
Switching to Standby Mode	5
High Dust & Warning Alarms	6
Respirable Dust Measurement	6
Datalogging	6
Qualitative Dust Measurements	7
4. Menu Structure	8
Bluetooth	8
Alarm Settings	8
Battery	8
Alarm Status	8
Dust Level	8
5. Service Requirements	9
Regular Maintenance	9
Optional Prefilter	9
Device Sensor Checks	9
6. Annual Sensor Replacement	
7. DustCanary Browser Application	
Application Overview (Version 4XX)	
Live View	
Live View	
Live View Alarm Settings Other Settings	
Live View Alarm Settings Other Settings App Settings	





1. OVERVIEW

The DustCanary Trend 420 is a personal dust monitor designed to be worn within the breathing zone. Equipped with an internal battery, sensor, and secure clothing clip, the DustCanary is compact, unintrusive and does not require any additional tubing that can hinder the wearer's movement.

The unit uses an optical particle counter to take qualitative measurements of respirable dust in real-time (mass concentration of particles less than 4μ m in diameter), activating alarms based on these readings. Real-time qualitative respirable dust levels are displayed on the unit and may be transferred to a PC via Bluetooth.

Key features of the DustCanary:

- Respirable dust levels monitored and displayed in real-time
- Audible and visual warning and high dust alarms
- OLED display and menu
- Bluetooth coms for configuration and data transfer to PC via DustCanary browser application software

The monitor uses a rechargeable 5V Li-ion battery that provides power for 12 to 16 hours of operation. The battery takes approximately 4 hours to recharge.

The **DustCanary browser software** can be used to configure the device as well as download and export respirable dust levels records (see <u>DustCanary Browser</u> <u>Application</u> section).



2. GETTING STARTED

INITIAL BATTERY RECHARGE

To comply with freight regulations, the battery in a new unit will not be fully charged. To charge the battery:

- Connect a USB-C cable to a laptop or power outlet and plug into the base of the device.
- Charging is indicated by the left-hand LED flashing blue and will take 4 hours from a low charge at 1A. Once fully charged, the LED will stop flashing and remain blue. A fully charged battery will give a minimum of 12 hours operation even after 200 recharge cycles.

MOUNTING THE DEVICE

For personal monitoring, the DustCanary should be clipped to the outermost layer of clothing with the inlet facing forward. The location should be within the breathing zone, up to 300mm from the nose. This will ensure that the inlet experiences similar exposure to the individual and that the data is representative of the dust they are breathing.

For applications where the DustCanary is used to monitor dust levels at a particular location over time, the unit can be permanently connected to a power source via USB-C. The unit should be mounted on a tripod or orientated so that the inlet is horizontal.

RECHARGING THE BATTERY

The battery should be recharged overnight between uses with a USB-C cable. A full battery has sufficient capacity for over 12 hours of operation. If used in a fixed location, the device may be permanently powered by a USB-C cable.

The battery charge level is shown on the display. The LED will start to flash green and intermittently sound an alarm when the battery has less than 1 hour remaining.



3. OPERATING THE DEVICE

The instrument is controlled by two buttons on the left side of the front case:

- The upper **black button** which is used to scroll through the displayed screens.
- The lower **yellow button** which is used to toggle dust detection and enter commands such as exit, mute and toggling Bluetooth on or off.

To conserve battery life, the display remains illuminated for 30 seconds before dimming, and can be reactivated by pressing either button.

When dust detection has been switched on, alarms and data recording will become active, indicated by the green LED illuminating. After collecting data in field, records can be uploaded to a PC at the end of the day.

SWITCHING DUST DETECTION ON

Dust detection may be switched on and off by pressing the yellow on/off button on the front of the device and holding for 2 seconds. When the unit is switched on, the display becomes active (initialising and displaying the firmware version), and the green LED is constantly lit. A faint noise may also be heard from the fan drawing samples into the sensor.

If the unit does not switch on when the yellow on/off button is first pressed, this means that the unit is exiting standby mode. Repeat the 2 second press on the yellow on/off button until there is an audible beep.

To confirm that dust detection is on, check that the green LED is lit. The green LED will remain illuminated during dust detection, and only flash when there is less than one hour of battery remaining, indicating that the unit requires charging.

SWITCHING TO STANDBY MODE

To switch dust detection off and put the DustCanary into standby mode, press and hold the yellow button for 2 seconds. The display will show the words "shutting down", the LED lights will all switch off, and the fan will stop.

In standby mode, the menu can still scroll between Bluetooth and battery level menus. The green LED will not be lit in standby mode and no dust detection or recording occurs.





HIGH DUST & WARNING ALARMS

If alarms are enabled (via user settings in the DustCanary application software), they will be active whenever the instrument is in dust detection mode and the green LED is illuminated.

Upon entering the alarm state, the DustCanary:

- Produces an audible alarm (which can be muted by selecting the yellow button)
- Changes to the alarm state on the display.
- Illuminates a red LED for high dust alarm or a yellow LED for warning alarm.

Alarm levels should be set while considering normal dust levels experienced by an individual when dust controls are working correctly. They may in certain circumstances be set at higher levels for Short Term Exposure Limits (STELs) since this increased dust exposure contribution to the 15-minute average is only for the period where preventative action is not taken (which is generally seconds).

RESPIRABLE DUST MEASUREMENT

The DustCanary uses an advanced optical particle counter (OPC) sensor module to collect real-time measurements for respirable dust. A replaceable respirable foam filter may be fitted to the inlet of the device to filter out larger particles than 4µm before they enter the OPC module, helping to extend its life.

The valid measurement range of the device is 0.001 to 10mg/m³, however the device monitors respirable dust levels up to 15mg/m³.

The sensor module should be replaced annually. This will vary depending on the application and how the device is used. Each sensor will be supported with a manufacturer's reference calibration report. Consult your local Air-Met Scientific for specific recommendations to ensure your sensor stays healthy.

DATALOGGING

Data is automatically stored in the device whenever the instrument is in dust detection mode (indicated by the green LED). Different recording sessions are created each time dust detection is toggled on, and these sessions may be downloaded and viewed as excel graphs using the DustCanary application software (see <u>DustCanary</u> <u>Browser Application</u> section).

The default recording rate is once every 5 seconds, however this can be configured within the range of 1 - 60 seconds using the DustCanary application software.

The 15-minute rolling average of dust levels is also calculated by the DustCanary application software and may be graphed in addition to the recorded data. This data may be used to complement periodic compliance sampling and helps ensure exposure is being controlled between compliance samples.



QUALITATIVE DUST MEASUREMENTS

Real-time qualitative measurements from the DustCanary grant valuable insights into your safety program in several ways including:

- Complementing gravimetric samples taken for compliance with additional insights.
- Understanding the fluctuations in dust levels throughout the day.
- Monitoring personal exposure to respirable dust over short periods, particularly durations that gravimetric sampling cannot be used for.



4. MENU STRUCTURE

When activating dust detection mode, the device goes through a 20 second intialising process and displays the version of the firmware being run. Once the unit is running, pressing the black button will allow the user to cycle through the device's menus in the following order.

Bluetooth > Alarm Settings > Battery > Alarm Status > Dust Level

In standby mode (green LED off), the black button will only cycle between the Bluetooth and battery menus.

BLUETOOTH

The Bluetooth state is shown at the top of the screen. Use the yellow button to toggle Bluetooth on or off. While Bluetooth is activated, this screen will also display the Bluetooth identifier which is the same as the device's serial number. Bluetooth must be switched on to communicate with the DustCanary PC software.

ALARM SETTINGS

Here, current settings for warning and high dust alarms will be displayed in mg/m³ if they have been set. To change alarm settings, connect to the DustCanary browser software while Bluetooth is on. Here, you can set thresholds, the holdoff period and enable alarms (refer to <u>DustCanary Browser Application</u> section).

BATTERY

Here, the unit's current battery level will be displayed as a percentage. If the unit is connected to power, the charging status will also be displayed. It is recommended that the unit be recharged when battery reaches 20% or less. When there is less than 10% remaining, it will shut down.

ALARM STATUS

This screen displays the current alarm state ranging from the following:

- No dust alarm
- Warning alarm
- High dust alarm
- Dust protection mode (if activated)
- Sensor error

DUST LEVEL

The dust level is displayed in mg/m³ and is updated once every second. The maximum value that can be recorded and displayed is 15 mg/m³. To view the trend of dust levels from recorded sessions, switch Bluetooth on and connect to the DustCanary application software (see <u>DustCanary Browser Application</u> section).















5. SERVICE REQUIREMENTS

REGULAR MAINTENANCE

The DustCanary should be kept clean with excess dust deposits removed by a soft brush, cloth or vacuum. Excess dust on the inlet to the device should never be blown into the device, as this may contaminate the optical sensor.

OPTIONAL PREFILTER

The device has an aerosol filter to remove larger particles and protect the optical sensor from contamination. These particles are greater than $10\mu m$, meaning that they are not included in respirable dust measurements.

In cases where the dust level is regularly greater than $1mg/m^3$, the aerosol filter will not be able to cope in the long term. Instead, an optional prefilter can be installed on the inlet. This will remove particles greater than $4\mu m$ in size and will hence not affect the measurement. This filter should be replaced either after 40 hours of operation above $1mg/m^3$, or once per month, whichever is first.

DEVICE SENSOR CHECKS

The device continuously monitors the condition of its sensor to ensure accurate measurements. Should a sensor failure occur, the device will automatically shut down. The reason for sensor failure is recorded in the alarm log and can be reviewed by downloading the session. After exporting the session file, select the *Dust Log* tab. The alarm state is displayed in the last column.

Please note that if the alarm state reads "OPC degraded", this is not a failure and should not be a cause for concern unless it is happening more than 25% of the time.

А	В	С	D	E	F
DEVICE	DATE + TIME	TIME	QUALITATIVE DUST LEVEL	QUALITATIVE 15M AVERAGE	ALARM STATE
DCCCCCD	2023/06/02 08:08:36	8:08:36	0.36250	0.36250	OPC_DEGRADED, OPC_FAN_ERROR
DCCCCCD	2023/06/02 08:08:41	8:08:41	0.45870	0.41060	SENSOR_OK
DCCCCCD	2023/06/02 08:08:46	8:08:46	0.34080	0.38733	SENSOR_OK
DCCCCCD	2023/06/02 08:08:51	8:08:51	0.12400	0.32150	SENSOR_OK
DCCCCCD	2023/06/02 08:08:56	8:08:56	0.37210	0.33162	SENSOR OK

Potential failure states include:

- Laser error
- Memory error
- T/ RH error
- Fan error

Sensor replacement is normally required to solve a persistent sensor failure condition. Please contact your local Air-Met Scientific to arrange servicing and repairs where required.



6. ANNUAL SENSOR REPLACEMENT

DustCanary instruments should be returned to Air-Met Scientific for sensor replacement annually to maintain reading accuracy. The unit is programmed to display a reminder whenever a sensor calibration is due, however Air-Met Scientific will instead provide a replacement sensor directly from the factory to ensure optimal performance. The instrument will continue to operate after the reminder is displayed, however further measurements may not be reliable, and a sensor replacement should be organised immediately.



7. DUSTCANARY BROWSER APPLICATION

APPLICATION OVERVIEW (VERSION 4XX)

The DustCanary application software allows users to:

- Configure device settings (alarms, recorded sessions, logging intervals etc.).
- Download recorded sessions from the DustCanary, graph and export data into XLXS and CSV formats and NIOSH's EVADE software.
- View live data for fixed location installations and demonstrations.

The PC must be connected to the internet when first running the application, however further connection is not required to run the application with a unit (unless accessing browser application updates).

To run the application:

- Ensure Bluetooth is on for the DustCanary by scrolling through the menu until Bluetooth is displayed, and using the yellow button to toggle Bluetooth on.
- Navigate to <u>https://app.dustcanary.com</u> on your browser.
- Select
- Select DC XXXX where XXXX is the device's serial number, then pair the device. The serial number can be found in two locations; on the back of the instrument and on the Bluetooth menu while Bluetooth is connected.
- The display will show *connecting* and then *preparing* before moving to the *device recording* tab on the left menu.

Should there be any problems in connecting, exit the application and switch Bluetooth off for the unit before repeating the above steps.





LIVE VIEW

The *Live View* tab is used to show current results from the device. It is helpful for viewing operating parameters and demonstrating functionality.

Select the *Live View* tab on the top left of the screen to graph the current dust level against time. The alarm thresholds for alarms that are enabled will also be displayed on the same graph as a dotted line. Operating parameters of the device can be viewed on the bottom left of the screen.

C 🖞 https://dusto	nary.syronos.com/dev/v0.7/	A"	r 🕫	3	£≡	۵ 🕲		1
	DC581442				C	ेरि Disconne	ect	
Live view	Live view							
evice recording	Current dust and alarm readings from the connected Dust Canary while logging is enabled. You can view the last 5 minutes of data or all available data.							
listory								
larm settings	4.00 0.016 mg/m ³ SENSOR_OK							
Other settings	3.00							
actory setup								
og viewer	2.00 -							
	1.00 - HGHLEVIL - 1.00							
	WARNING LEVEL - 0.50							
	22:38:00 22:40:00 22:41:00 22:42:00							
tus: LOGGING mware: 0.1.62	Dust Level Tom Average							
ration: - cords: 0	Show data table Show All Reset chart Download Excel							
arms: 0 emory usage: 0%								
			© Dust	t Canary 20	023 v0	7.413 (INTE	RNAL)	
10°C		-			•		22:4	42

Dust levels shown on *Live View* may be downloaded as an Excel file via the Download Excel button. Note that the recorded data sessions in the device cannot be accessed with *Live View* and should instead be downloaded from the *Device Recording* and *History* tabs.



ALARM SETTINGS

To configure the dust alarm settings for your device, select *Alarm Settings* from the left menu.

Warning and high dust alarms can be set independently. When the DustCanary Trend 420 is used for making surveys, these alarms can be switched off. When worn as a safety device to warn the wearer of elevated dust levels, both warning and high dust alarms should be enabled. This will trigger both audible and visual alarms when the alarm conditions are met.

Standard dust conditions on site and intended effect of controls should be considered when setting alarm dust levels. Alarm settings are configured by sliding the indicator bars to the required values before selecting the save button.

Configurable alarm options include:

- Warning dust alarm 0 is Off, 1 is On
- Warning dust threshold Increments of 0.05 from 0 to 5mg/m³
- Warning dust alarm delay Can be used to avoid triggering alarms from momentary increased exposure.
- High dust alarm 0 is Off, 1 is On
- High dust threshold Increments of 0.05 from 0 to 5mg/m³
- High dust alarm delay Can be used to avoid triggering alarms from momentary increased exposure.

Once changed, settings must be saved to transfer settings to the device. If the current time on the device is not set correctly, a menu which gives the option to synchronise to the PC's time will appear when first connecting to the device.

🗖 💋 将 Dust	Canary	× +		- 0
CÔ	https://dustca	anary.syronos.com/dev/release/		A to 🕫 C t= G 😩 … (
			DC581442	2 Disconnect
Live view		Alarm settings		
Device recording	g	Device time:		
History		Current time on device: UTC time	2023-05-23 20:33:12	
Alarm settings		Warning dust alarm:		
Other settings		Enable warning dust alarm: 0 = disable, 1 = enable	1	
		Warning dust threshold: from 0.10 to 5.00 in 0.05 steps	0.50 mg/m ³	
		Warning dust alarm delay: from 0 to 20 seconds	5 seconds	
		High dust alarm:		
		Enable high dust alarm: 0 = disable, 1 = enable	1	
itatus:	LOGGING	High dust threshold: from 0.10 to 5.00 in 0.05 steps	1.00 mg/m ³	
Firmware: Duration: Records:	0.1.62	High dust alarm delay: from 0 to 20 seconds	5 seconds	
Alarms: Memory usage:	0	Reload Reset Save		
				© Dust Canary 2023 v0.7.413
Partly sunny		Q Search	🖬 🛱 🖬 🖿 🗴 🖸 🛱 🖷 🤅	ම Dust Canary 2023 v0.7 • 💽 🔹 ^ ල දා) 🖢



OTHER SETTINGS

C 🗅 h	https://dustca	anary.syronos.com/dev/release/			A" to	9 G	Γ	Ð	8	
	R		DC581442)	ेश Dis	connect	
Live view		Logging interval for session records:		5 seconds						
evice recording		Rolling average period: 1 to 60	0	1 seconds						
listory		Dust protection alarm:								
larm settings		Enable dust protection alarm: 0 = disable, 1 = enable	• 0							
ther settings		Dust protection threshold: from 0.20 to 5.00 in 0.05 steps	•	2.00 mg/m ³						
		Dust protection alarm delay: from 0 to 20 seconds	-	O 30 seconds						
		Device settings:								
		Bluetooth always on: 0 = disable, 1 = enable	0							
		Screen always on: 0 = disable, 1 = enable	• •							
itus: I mware:	LOGGING 0.1.62	Enable tilt switch: 0 = disable, 1 = enable	0							
ration: cords:	- 0	Calibration data:								
arms: emory usage:	0%	Calibration factor: from 0.10 to 10.00 in 0.01 steps	1							
						0	Dust Cana	rv 2023	v0.7.413	

To change recording settings and advanced settings, select Other Settings.

This screen is used to configure the following settings. Ensure you select save after making any changes.

- Logging interval This is the period between each dust level recording, which will also affect the
 refresh rate for plotted data in the *Live View* tab. The logging interval should typically be set to 5
 seconds. It may be reduced to 1 second if high resolution dust profiles are required, however this will
 slow down the transfer of recorded data.
- Rolling average The averaging period applied to the raw dust measurement. This is increased if the dust signal is too noisy to interpret.
- Dust protection alarm levels This high alarm is used to protect the sensor from avoidable contamination at high dust levels
 - When this alarm activates, the sensor is put into sleep mode and the sampling fan switches off until either the alarm is overidden by the wearer or normal dust levels resume.
 - Dust protection mode is typically set at a 3mg/m³ threshold and 30 second alarm delay to allow the sensor to detect short periods of elevated dust levels without suffering from contamination if persisting for more than 30 seconds.



- Device settings In order to conserve battery life, both the bluetooth connection and device display will automatically switch off after 30 seconds of not being used.
 - Bluetooth always on Can be enabled to allow live data to be continuously streamed.
 - Screen always on Can be enabled to keep the screen permanently active. This will allow it to constantly display dust levels without needing to press a button to wake up the screen.
 - Enable tilt switch The tilt switch function inverts the display when the device is upside down to keep the display upright. This option allows you to disable the tilt switch. Please note the tilt switch feature is not available on products shipped before July 2023.
- Calibration factor (please consult Air-Met Scientific before changing this setting)
 - This is a calibration scaling factor which can be applied to the qualitative output of the device to improve data quality when comparing to reference gravimetric samples.
 - The calibration factor is calculated as the ratio of the average dust result from a gravimetric sample to the averaged signal from the DustCanary. The device should be located close to the gravimetric sampler inlet and operated for the same period of time as the sampler.
 - Care should be taken in adjusting the calibration factor at dust concentrations less than 0.5mg/m³ where the uncertainty of the gravimetric sampler may be significant.
 - The calibration factor should not normally be changed without prior consultation with Air-Met Scientific.



APP SETTINGS

The App Settings tab allows the user to toggle which features of the software are shown or hidden including:

- Bluetooth addresses of devices previously connected to the browser app in the connection screen.
- Option to import Excel files
- CSV file export
- NIOSH EVADE project file export (to link data with video footage)

In addition, the *Backup / Restore* feature is available from this page. This allows the user to save a backup of all settings and files into a single file, either for safekeeping or to be transferred. The backup file can be restored on a different device, providing a convenient method of sharing and transferring data.

	Import Excel files:
	It is possible to import a Microsoft Excel file that has previously been exported from Dust Canary (on another system, for example). Enable this feature to show an Import Excel file button on the History page.
History	Please note that the Excel file must be in its original format for the import to be successful, including the Dust Canary serial number in the filename.
	CSV export:
Other settings	Enable this feature to support exporting recordings to a simple CSV file. The exported file will contain the date, time and qualitative dust readings only.
	NIOSH Evade:
	If you plan to use NIOSH Evade to visualise and explore the data from your Dust Canary, enable this feature to be able to export pre-built Evade project files that you can then open within the Evade application.
	For further information on NIOSH Evade, please visit their website.
	Backup / Restore:
	Use this feature to backup all of the settings and data from this system or restore from a previous backup. This will export all recordings held within this browser. When restoring from a backup (which can be from a different system), all current data will be overwritten. Always create a backup first.
	This feature is currently in development.
	Backup System



TRANSFERRING RECORDED SESSION DATA

Sessions

The device records data in separate sessions each time dust detection is switched on and off. The session is made up of dust level records over a period and includes a session header which summarises how the device was configured.

The device has sufficient capacity for a standard working week of data recording, however it is recommended to transfer the data at the end of each day of use to reduce download times.

Session data can be exported from the browser application into a variety of formats for analysis in external programs such as Excel and EVADE.

1. Downloading sessions from the device.

Select the Device Recording tab to view the recorded sessions of data in the device.

- a) To download a session, select the \mathcal{C} symbol.
- b) To view sessions which have not been downloaded yet, use the *Show New Only* filter. Recorded sessions that have not been downloaded will have the $\stackrel{\frown}{\sim}$ symbol on the right.
- c) Once you have confirmed that all required sessions have been downloaded, the device's memory can be cleared by selecting <a href="https://www.clear.edu/c

C C https://dustcana	ary.syronos.com/dev/re	lease/					AN to	Ø	3	£≡ G	è 🙎	
USTCANARY WERKARDS BALT DEECT												
.ive view				DC581442						8	2 Disconnec	:t
	Device reco	ording										
Device recording	Download recorde Note: Stop the cur	d sessions from the connecte rent recording session to dov	ed Dust Canary. vnload the latest readin	igs.								
listory	Momenteentr	als										
larm settings	► Start	ihow New Only	from Device	ar Memory								
ther settings	Available recor	dings										
	# DEVICE	TIME	DURATION	DUST	ALARMS							
	0 DC581442	2023-05-23 18:44:34	4 hours	2,168	4	Q						
	1 DC581442	2023-05-23 23:15:06	6 hours	4,579	4	\odot						
tus: OFF												
nware: 0.1.62												
ation: 10 hours												
rms: 8												
emory usage: 1%												
									© Dus	t Canary 2	023 v0.7.4	113



2. Selecting downloaded sessions from History.

Select the *History* tab to view the sessions which have been downloaded. Sessions which have been previously downloaded can be accessed without needing to connect a device.

	History							
	The following that once you	ecordings have been download have downloaded files to your	led to this browser and computer that you remo	are ordered oldes	t to newes browser.	st. It is recommended		
History	Saved recor	dings						
	# DEVICE	TIME	DURATION	DUST	ALAR	MS		
	1 DCCCC	CD 2023-04-27 08:40:32	4 hours	2,593	10			
App settings	2 DCCCC	CD 2023-06-01 08:09:31	8 hours	5,493	0			
	3 DCCCC	CCD 2023-06-02 08:08:36	8 hours	5,553	4	2 8 8 8 0		
	4 DCCCCC	CD 2023-07-26 11:49:22	16 minutes	188	0			
	5 DC5814	2023-07-27 07:47:41	8 hours	5,522	0			
	6 DC5814	39 2023-07-28 06:54:20	7 hours	5,315	0			
	7 DC5814	39 2023-07-31 09:39:23	a day	15,540	8	12 6 6 6 0		
	8 DC5814	39 2023-08-02 08:00:31	9 hours	6,485	0	L 6 6 6 0		
	9 DC5814	39 2023-08-03 07:55:28	9 hours	6,360	0	Le 6 6 6 0		
		0 2022 00 00 07:52:05	8 hours	5,905	6	レめるの		

- 3. Viewing a graph for recorded dust levels.
 - a) Hover the cursor over the icons on the right of each row to view their labels.



b) Select *View Recording* to bring up a graph for the recorded dust levels.



- c) To exit the graph and return to the previous screen, simply click *History* again.
- d) To zoom in on a particular section of the graph, click and drag the cursor over the section of interest.



- e) The toolbar $\oplus \bigcirc @ @ \square \square @ = on the top right can be used to:$
 - Zoom in and zoom out
 - Zoom in on a selected part of the graph
 - Drag the view
 - Reload the complete graph
 - Superimpose alarm threshold levels on the graph
 - o Download the image in svg, png and csv formats

4. Exporting and reviewing with Excel.

Downloaded sessions can be exported through the History tab, allowing for analysis with external software.

Excel can be used to analyse the recorded data in detail and can also be used to graph the recorded data to see peaks and variability in dust levels.

Where a separate video has been taken simultaneously (e.g. with a Helmet camera) NIOSH's **EVADE software** can be used to synchronise the recorded dust levels and video, allowing the user to understand what activities the wearer was performing and where the device was located while particular readings were recorded. This may be useful for identifying tasks that caused the readings to peak to help optimise your safety program.

To export the data to Excel:

- a) Select the symbol on the session of interest and an Excel file will be downloaded with the filename, "DCXXXXXX YYYY-MM-DD HH-mm NNNNNN.xlsx", where "NNNNNN" is the number of the record.
- b) Open the Excel file and select Enable Editing located directly below the toolbar.
- c) View the Session Summary tab. The following details are recommended to be added to the sheet to help when referring back to the record in the future.
 - o Wearer
 - o Activity
 - o Observations
- d) To create a dust level graph, select the *Dust Log* tab at the bottom of the spreadsheet.



	· · · ·				~
1	Device	DC581	442		
2	Session index			1	
3	Start time		2023/05/2	23 23:15:06	
4	Duration			22899	
5	Logging interval (s)			5	
6	Dust readings			4579	
7	Alarm entries			4.00	
8					
9	Warning threshold			0.50	
10	High threshold			1	
11	Protection threshold			0	
12	Calibration factor			1	
13					
14	Wearer				
15	Activity				
16	Observations				
17					
18					
19					
20					
21					
22					
23					
24					
25					
20					
28					
29					
30					
	Session Su	mmary	Ductlog	Alarm Log	+



e) Select the data in column C, D and E for graphing by holding down the Ctrl key on your keyboard while selecting each of these three columns.

Home Inse	rt Draw Page Layout Form	ilas Data Review	v View Help						Com	ments	숨 Sh
vtTable Recommend PivotTable	led Table Illustrations	dd-ins dd-ins dd-ins td-	mmended (3) (1) (1) (2)	Maps PyotChart	Line Column Win/ Loss	Slicer Timeline	Comment	A Ω Symbols			
Idures	(C)	ooning .	Cran	10015	spanones	Pillers Units	Comments				
• I ×	√ Jx TIME										
A	B	C		CHARTER THE STAT		+		G	н		
EVILE CERTARD	DATE + TIME	11ME 22:15:0	QUALITATIVE DUST LEVEL	QUALITATIVE 15M	AVERAGE ALARM ST	ATE					
C581442	2023/05/23 23:15:00	25:15:0	0.01	450	0.01450 SENSOR_C	JK W					
C581442	2023/05/23 23:15:11	23:15:1	0.01	480	0.01405 SENSOR_C						
C501442	2023/03/23 23:13:10	23:15:1	0.00	200	0.00005 SENSOR_C	NK					
C581442	2023/05/23 23:15:26	23:15:2	5 0.00	610	0.00933 SENSOR_C)K					
C581442	2023/05/23 23:15:21	22-15-2	0.00	510	0.00950 SENSOR (NK					
C581442	2023/05/23 23:15:3/	23:15:3	5 0.00	510	0.00801 SENSOR_C)K					
C581442	2023/05/23 23:15:41	23:15:4	1 0.00	570	0.00772 SENSOR ()K					
C581442	2023/05/23 23:15:46	23:15:4	5 0.00	390	0.00730 SENSOR (Ж					
C581442	2023/05/23 23:15:51	23:15:5	0.00	530	0.00710 SENSOR (Ж					
C581442	2023/05/23 23:15:56	23:15:5	5 0.00	720	0.00711 SENSOR (Ж					
C581442	2023/05/23 23:16:01	23:16:0	1 0.00	540	0.00697 SENSOR 0	Ж					
C581442	2023/05/23 23:16:06	23:16:0	5 0.00	530	0.00684 SENSOR (ж					
C581442	2023/05/23 23:16:11	23:16:1	1 0.01	430	0.00737 SENSOR 0	Ж					
C581442	2023/05/23 23:16:10	23:16:1	5 0.01	430	0.00783 SENSOR 0	Ж					
C581442	2023/05/23 23:16:21	23:16:2	1 0.00	610	0.00772 SENSOR_0	Ж					
C581442	2023/05/23 23:16:26	23:16:2	5 0.00	400	0.00751 SENSOR_0	Ж					
C581442	2023/05/23 23:16:31	23:16:3	1 0.00	260	0.00723 SENSOR_0	Ж					
C581442	2023/05/23 23:16:30	23:16:3	5 0.00	410	0.00707 SENSOR_0	Ж					
C581442	2023/05/23 23:16:41	23:16:4	1 0.00	650	0.00704 SENSOR_0	ж					
C581442	2023/05/23 23:16:46	23:16:4	5 0.00	880	0.00712 SENSOR_0	Ж					
C581442	2023/05/23 23:16:51	23:16:5	1 0.00	700	0.00712 SENSOR_0	Ж					
C581442	2023/05/23 23:16:56	23:16:5	5 0.00	290	0.00693 SENSOR_0	Ж					
C581442	2023/05/23 23:17:01	23:17:0	1 0.00	320	0.00678 SENSOR_0	ж					

f) Select the *Insert* tab from the toolbar, then click the *Insert Line or Area Chart* button as shown below. Choose the first option, the 2D line graph.

Inse	rt Draw Page Layout Formula	s Data Review View	Help					Col 🖓 Col	nments	් Sha
tTable Recommend PivotTable	ed Table Illustrations	ins v 🛃 Charts		Line Column Win/ Loss	Slicer Timeline	Comment	Text Symb) uls		
				\$	11102					
• I A				-						
A	В	C			F		G	н		
EVICE	DATE + TIME T	IME QUAL	\sim	AVERAGE ADARM ST	ATE					
C581442	2023/05/23 23:15:06	23:15:06		0.01450 SENSOR_0	ĸ					
C581442	2023/05/23 23:15:11	23:15:11	3-D Line	0.01465 SENSOR_0	K					
(581442	2023/05/23 23:15:18	23:15:10		0.01197 SENSOR O	K					
C581442	2023/05/23 23:15:21	23:15:21		0.00995 SENSOR O	×					
C501442	2023/05/23 23:15:20	23.13.20	· · · ·	0.00918 SENSOR_0	~					
001442	2023/05/23 23:15:31	23.15.31		0.00801 (550508_0	~					
C591442	2025/05/25 25:15:50	25.15.50	2-D Area	0.00773 SENSOR_0	×					
C581442	2023/05/23 23:15:44	23:15:46		0.00730 SENSOR_0	×					
581442	2023/05/23 23-15-51	23:15:51		0.00710 SENSOR_O	ĸ					
(581442	2023/05/23 23:15:56	23:15:56		0.00711 SENSOR ()	ĸ					
581442	2023/05/23 23:16:01	23:16:01	3-D Area	0.00697 SENSOR O	ĸ					
C581442	2023/05/23 23:16:06	23:16:06		0.00684 SENSOR O	K					
C581442	2023/05/23 23:16:11	23:16:11		0.00737 SENSOR O	K					
581442	2023/05/23 23:16:16	23:16:16		0.00783 SENSOR O	к					
581442	2023/05/23 23:16:21	23:16:21	198 More Line Charts	0.00772 SENSOR_O	ĸ					
581442	2023/05/23 23:16:26	23:16:26	E How Charles	0.00751 SENSOR O	ĸ					
581442	2023/05/23 23:16:31	23:16:31	0.00260	0.00723 SENSOR_O	ĸ					
C581442	2023/05/23 23:16:36	23:16:36	0.00410	0.00707 SENSOR_O	ĸ					
581442	2023/05/23 23:16:41	23:16:41	0.00650	0.00704 SENSOR_O	ĸ					
581442	2023/05/23 23:16:46	23:16:46	0.00880	0.00712 SENSOR_O	к					
581442	2023/05/23 23:16:51	23:16:51	0.00700	0.00712 SENSOR_O	к					
581442	2023/05/23 23:16:56	23:16:56	0.00290	0.00693 SENSOR_O	ĸ					
0581442	2023/05/23 23:17:01	23:17:01	0.00320	0.00678 SENSOR O	K					

This will create a graph like below showing dust levels and the 15-minute average for the session's duration. The 15-minute average may be useful for linking trends in dust levels to work patterns.

AutoSave 🔘 off) 🔚 🍤 Y (? 🐨 🔍 DC581442	2023-05-23 23-15 (6 hours) ¥	P Search			William Av	erdieck WA	⊕ <i>4</i>	- *	0
e <u>Home</u> Insi	ert Draw Page Layout Formu	las Data Review Vi	ew Help					PO	omments	ය Share
aste 🗳 Kormat Pai	Calibri v 12 v B I U v ⊞ v 🖄 v		· → B Wrap Text	General → © ~ % ♪ 100 + 80 Fo	inditional Format as matting ~ Table ~	Cell Insert Delete Format	∑ AutoSum ⊸ III Fill ∽ ∳ Clear ∽	Sort & Fit Filter * Sel	nd & Analy, ect * Data	ze
Clipboard	f5 Fort	6	Algement E	a Number Ka	Styles	Cells	Ed	iting	Analys	is .
• I >	f_x TIME									
A	В	С	D	E		F	G	н	1	J
JEVICE	DATE + TIME	TIME QUA	ALITATIVE DUST LEVEL	QUALITATIVE 15M AVERAGE	ALARM STATE					
C581442	2023/05/23 23:15:06	23:15:06	0.01450	0.0145	0 SENSOR_OK					
C581442	2023/05/23 23:15:11	23:15:11	0.01480	0.0146	5 SENSOR_OK					
C581442	2023/05/23 23:15:16	23:15:16	0.00660	0.0119	7 SENSOR_OK					
C581442	2023/05/23 23:15:21	23:15:21	0.00390	0.0099	5 SENSOR_OK		Chart Tit	le		
C581442	2023/05/23 23:15:26	23:15:26	0.00610	0.0091	8 SENSOR_OK	0.01500				
C581442	2023/05/23 23:15:31	23:15:31	0.00510	0.0085	0 SENSOR_OK	0.04900				
C581442	2023/05/23 23:15:36	23:15:36	0.00510	0.0080	1 SENSOR_OK	0.03500				
IC581442	2023/05/23 23:15:41	23:15:41	0.00570	0.0077	2 SENSOR_OK	0.03000				
C581442	2023/05/23 23:15:46	23:15:46	0.00390	0.0073	0 SENSOR_OK	0.02500				
IC581442	2023/05/23 23:15:51	23:15:51	0.00530	0.0071	0 SENSOR_OK	0.01500	ւ և և			
0C581442	2023/05/23 23:15:56	23:15:56	0.00720	0.0071	1 SENSOR_OK	0.01000	hinidi a di	to kingti		a dha a shekara a sh
0C581442	2023/05/23 23:16:01	23:16:01	0.00540	0.0069	7 SENSOR_OK	0.00500			1.1.1.1.1.1.1	111.1
0C581442	2023/05/23 23:16:06	23:16:06	0.00530	0.0068	4 SENSOR_OK	00000.0				10 10 10
0C581442	2023/05/23 23:16:11	23:16:11	0.01430	0.0073	7 SENSOR_OK	01120000	10.000	0.00	118223	23:2
C581442	2023/05/23 23:16:16	23:16:16	0.01430	0.0078	3 SENSOR_OK	282	аннаяя	****	88444	4 10 10
C581442	2023/05/23 23:16:21	23:16:21	0.00610	0.0077	2 SENSOR_OK	QUALITATIVE DU	ST LEVEL -	QUALITATIN	E 15M AVERAGE	6
DC581442	2023/05/23 23:16:26	23:16:26	0.00400	0.0075	1 SENSOR_OK					
DC581442	2023/05/23 23:16:31	23:16:31	0.00260	0.0072	3 SENSOR_OK					
DC581442	2023/05/23 23:16:36	23:16:36	0.00410	0.0070	7 SENSOR_OK					
DC581442	2023/05/23 23:16:41	23:16:41	0.00650	0.0070	4 SENSOR_OK					
C581442	2023/05/23 23:16:46	23:16:46	0.00880	0.0071	2 SENSOR_OK					
0C581442	2023/05/23 23:16:51	23:16:51	0.00700	0.0071	2 SENSOR_OK					
DC581442	2023/05/23 23:16:56	23:16:56	0.00290	0.0069	3 SENSOR_OK					
DC581442	2023/05/23 23:17:01	23:17:01	0.00320	0.0067	8 SENSOR_OK					
) C	Durtles u									-



g) Select Alarm Log to view a history of alarms during the session.

Note that *OPC degraded, OPC fan error* is related to sampling fan transition at sensor start up and shut down and is not a cause for concern. Remember to save the spreadsheet in an appropriate location for a permanent record and to capture notes added in session header and any graphs created.

A	В	C	D	E	F	G
DEVICE	DATE + TIME	TIME	DUST LEVEL	PEAK DUST LEVEL	ALARM STATE	
DC581435	2023/04/27 08:55:03	8:55:03	0.00000	0.00000	OPC_DEGRADED, OPC_FAN_ERROR, START_EN	D_ALARM
DC581435	2023/04/27 08:55:10	8:55:10	0.00000	0.00000	SENSOR_OK	
DC581435	2023/04/27 11:34:37	11:34:37	0.00000	0.00000	OPC_DEGRADED, OPC_FAN_ERROR, START_EN) ALARM
DC581435	2023/04/27 11:34:38	11:34:38	0.00000	0.00000	SENSOR_OK	
1						
1 1						
< > Se	ssion Summary Dust Log	rm Log +			: •	



5. Importing an Excel file to the browser application.

Files previously exported from the browser application to Excel can be reimported. This also allows files to be shared between users. If this feature is required, it should be enabled in the *App Settings* tab.

a) Select the Import Excel file button at the bottom of the list of sessions from the *History* tab of the browser application. Select the file you wish to import. Note that the file name, contents and structure must be in the same format as it was originally exported in, as originally generated by the application.

DUSTCANARY WEARABLES THAT DETECT							
	48	DC581439	2023-06-27 09:08:37	an hour	815	0	
	49	DCCCCCCD	2023-06-27 09:11:40	an hour	799	0	🗠 5 🗴 🛍
Device recording	50	DC581442	2023-06-28 17:45:41	14 hours	10,100	2	2 d 🕽 🕯
History	51	DC58142B	2023-06-28 17:45:48	14 hours	10,099	2	12 d 🗴 🛍
	52	DC58142B	2023-07-06 10:14:04	3 minutes	41	0	<u>لا ک</u> 🖞 🖒
	53	DC581439	2023-07-10 08:07:43	9 minutes	108	0	
	54	DC581439	2023-07-10 09:52:18	a few seconds	6	0	🗠 🔂 🖹 🟛
App settings	55	DC581442	2023-07-11 06:27:36	32 minutes	385	0	12 d 🗴 🛍
	56	DC58142F	2023-07-13 08:53:15	2 minutes	9	0	12 b k 🛈
	57	DCCCCCCD	2023-07-26 09:06:02	an hour	809	0	<u>لا</u> ه ال
	58	DCCCCCCD	2023-07-26 11:49:21	16 minutes	188	0	2 d 🕽 🕯
	59	DC584AD7	2023-08-15 12:34:02	3 hours	1,985	2	12 d 🗴 🛍
	60	DCCCCCB5	2023-08-15 15:04:35	8 minutes	93	0	2 d 🕽 🕯
	61	DC58141E	2023-09-07 11:07:10	22 minutes	264	0	12 d 🗴 🛍
	62	DC58141E	2023-09-07 11:35:30	4 minutes	50	0	12 d 🗴 🛍
	-5	Import Excel file)				



6. Exporting a file to NIOSH's EVADE software.

Records can be exported to NIOSH's EVADE software to be synchronised with any videos taken. If this feature is required, it should be enabled in the *App Settings* tab. There are two ways to export the data into EVADE. The first is by exporting the CSV file by selecting a from the *History* tab before importing the data into EVADE. The second and recommended method is outlined below.

- a) From the History tab, export the dcf file by selecting the $bar{bar}$ icon.
- b) Once the file has downloaded, open it to either run the EVADE program or download and run the program if it has not been used before. This process may take a while.

C581439 2023-05-11 08-21 (14 minutes) (4).dcf2 - EVADE	- 0 X
Home View	^ ()
Add Edit Previous Play Next Rolemark Boolmark Playtock Add College Playtock Boolmark Boolmark Boolmark Boolmark Boolmark Boolmarks Bo	tow Add Options Help Report Councel Help
Project Editor 💌 🕸 🗧	Dust Levels 👻 🕸 🛪
highet description: Doct Carey OCS1493 Project start time: @a2118 ₪ Selected segment: Time OCS1492 @3225 05-11 09-21 (14 minutes) X	1.00 (E.14) 0.999 0.900 0.455
Duration: 0.0142.000 Segment start time: 0.021:10 Image: Control of the control	0.800
Dott Levels 20 Deta mg/m3 DCS81449 2023-05-11 08-21 (14 minutes)	0.700 0.650 0.600
	0.550
Bookmanks + # 7	0.450
Name Time Show Description	0.400
	0.350
	0.200
	0.250
	0.200
	0.150
	0.100
	0.050
	0.000 08:21:29 08:22:09 08:22:29 08:22:53 08:23:09 08:23:29 08:23:49 08:24:09 08:24:29
	Dust Levels - Analysis

c) To select the file containing the relevant data, click on the arrow on the top left of the screen, select *Open Project* and navigate to your downloaded file.

DC581439 2023-07-28 06-54 (7 hours).dcf2 - EVADE					
	New Project	Recent Projects			
	Open Project	DC581439 2023-07-28 06-54 (7 hours).dcf2 C:\Users\willi\Downloads			
	Save Project	C:\Users\will\Downloads			
뭠	Save Project As				
<	Share Project				
	Screen Shot				
<i>.</i> **	Open Plugins Folder				
тўз	Usage Data				
Log	View Logs				
\mathbf{N}	More NIOSH Mining Resources				
Ť	Report Bug or Issue				
0	About				
→	Exit				
-					



d) To add a video, select the Add File button and simply select the video you wish to add.





AIR-MET SCIENTIFIC PTY LTD

Head Office

7-11 Ceylon Street Nunawading VIC 3131 Australia

Postal Address

P.O. Box 133 Nunawading VIC 3131 Australia

Phone: 1800 000 744 +61 3 8878 3300

Web: <u>www.airmet.com.au</u> Email: <u>sales@airmet.com.au</u>

> Air-Met Scientific Pty Ltd, Australia © 2024 Air-Met Scientific All rights reserved.

