DustScan

Dust Monitoring and Dust Consultancy Services

Reference Guide - No. 1: Monitoring System

The directional dust gauge is the principal component of DustScan dust monitoring equipment. DustScan is a 'passive' method that does not need a power supply. It samples all sizes of ambient dust and is ideal for nuisance dust monitoring. The directional gauge can be used in any location where dust movement occurs and can help to detect dust pathways and potential nuisance. Directional gauges are used at quarries, landfills, opencast coal sites, demolition and construction sites, remediation works, materials stockpiles and recycling plants.

DustScan gauges are discreet and unobtrusive, and are easy to install and operate. They can be installed and used by most site staff after basic training.

The photos above show the wide range of sites where our gauges can be used

DustScan directional gauges use a special adhesive dust collection slide ('sticky pad') which is mounted on a replaceable cylindrical monitoring head. The monitoring head fits onto a 2-metre stand. An alignment peg is provided as the gauge must be aligned to north when it is first installed. An alignment tool can be supplied to facilitate orientation. Correct alignment ensures repeatable dust sampling each time the dust monitoring heads are changed. The monitoring head collects fugitive dust coming from 360° around the gauge.

Once the protective layer is removed the dust monitoring head samples continuously whilst exposed. It is normally left to sample for 1 to 2 weeks. At the end of the sampling period, the head is removed and placed in the protective carrying flask and a replacement head fitted. Used sampling heads are sent to the DustScan offices for computer analysis in the transport boxes provided.

Griffin House, Market Street,
Charlbury, Oxford, OX7 3PJ, UK
Tel: (44) 1608 810110
Fax: (44) 1608 810227
Email: info@DustScan.co.uk
www.DustScan.co.uk

DustScan

Dust Monitoring and Dust Consultancy Services

Reference Guide - No. 2: Analysis

PROCESSING

The directional dust samples are sealed and processed by us. Samples are analysed by our computer scanning system and entered into a client database. Completed samples are archived at our offices for further analysis (such as geochemical testing) if required.

Directional dust levels are measured on the sealed collection sealed slides using DustScan software. Two measures of nuisance dust are determined:

- **Absolute Area Coverage (AAC%): dust coverage irrespective of colour; and**
- **Effective Area Coverage (EAC%): dust soiling or loss of reflectance.**

AAC% is used as a measure of the significance of a dust source. EAC% is used as a measure of the potential nuisance of the dust. Directional nuisance dust criteria using these measurements have been established. Please refer to our Reference Guide No. 3 “Dust Standards and Criteria”.

MEASUREMENT

This is an illustration of how AAC and EAC differ and how they can provide two different indications of dust coverage. Each square with a number represents a particle; the number represents the darkness of the particle. The higher the number the darker the particle. The analysis is conducted in strips (or columns in the example opposite) corresponding with a given direction.

AAC

AAC is a “presence or absence” measure and will reach 100% when all the spaces are filled even if they are pale coloured.

EAC

EAC is the average level of discolouration from the particles present. It is a measure of the darkness of the dust present.

	20			80	60	80	100
		20	20	60	60	80	100
			40	40	60	80	100
		20	20	20	60	80	100
			40	80	60	80	100
		20	20	60	60	80	100
	20		40	40	60	80	100
		20	20	20	60	80	100
	20		40	80	60	80	100
		20		60	60	80	100
	60	100	240	540	600	800	1000
EAC	6	10	24	54	60	80	100
AAC	30	50	80	100	100	100	100

Griffin House, Market Street,
Charlbury, Oxford, OX7 3PJ, UK
Tel: (44) 1608 810110
Fax: (44) 1608 810227
Email: info@DustScan.co.uk
www.DustScan.co.uk

DustScan

Dust Monitoring and Dust Consultancy Services

Reference Guide - No. 3: Dust Standards & Criteria

There are no standard definitions, or universal monitoring methods, for nuisance dust. It is becoming accepted that dust above 10 µm may be considered "nuisance dust". Nuisance dust can be long-term (or chronic) – such as the long-term soiling of paintwork – or short-term (acute) – such as a short-lived dust cloud. Dust nuisance is the *effect* caused by dust.

The effect of dust is a matter of human perception, thus is difficult to quantify. How it is perceived varies according to characteristics of the dust such as its colour, contrast and rate of accumulation; and local factors such as socio-economic conditions and employment.

A number of "custom and practice" nuisance criteria have become established. These relate to the dust mass deposition rate or the change in the optical properties of a surface. DustScan is an optical dust measurement system which we consider to be a more reliable approach to nuisance assessment than dust mass alone.

The two DustScan measurements of AAC% and EAC% can be used singly or together. Our criteria for nuisance dust soiling are:

- **100% AAC across a single 45 sector over a 7 day period or**
- **The dusting effect or discolouration where EAC is greater than 25% for a 15 sector within the same period.**

Due to the sensitivity of DustScan computer analysis, the AAC% and EAC% values can be graded (as indicated right).

AAC Criteria

Source Significance		AAC% Value
Very Low	0	<80%
Low	1	80% - 95%
Medium	2	95% - 99%
High	3	99% - 100%
Very High	4	100% for 45º

EAC Criteria

Nuisance Potential		EAC% Value
Very Low	0	<2.5%
Low	1	2.5-5%
Medium	2	5-15%
High	3	15-25%
Very High	4	>25%

These may be combined in an assessment matrix for potential impact (as shown right).

		AAC – Source Significance Level				
		0	1	2	3	4
EAC – Nuisance Potential	0	V Low	V Low	V Low	Low	Med
	1	Low	Low	Low	Med	High
	2	Med	Med	Med	High	High
	3	High	High	High	High	V High
	4	V High	V High	V High	V High	V High

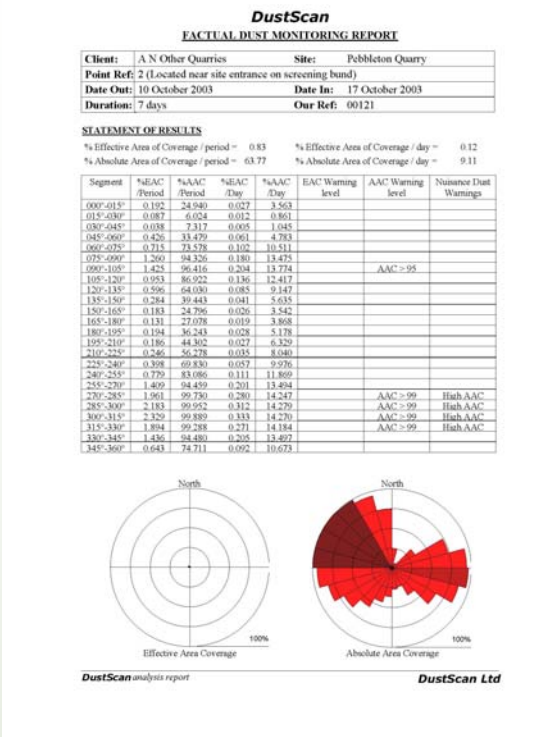
Griffin House, Market Street,
Charlbury, Oxford, OX7 3PJ, UK
Tel: (44) 1608 810110
Fax: (44) 1608 810227
Email: info@DustScan.co.uk
www.DustScan.co.uk

DustScan

Dust Monitoring and Dust Consultancy Services

Reference Guide - No. 4: Reporting

A standard report is issued for each directional sample processed. This can be in paper or electronic formats. The standard report provides a statement of overall AAC% (Actual Area Coverage) and EAC% (Effective Area Coverage), directional data for each 15º segment of the 'sticky pad' and directional 'dust rose' plots for each of these measurements. AAC represents the dust coverage of a surface irrespective of colour. It is useful in identifying dust sources. EAC is a measure of dust soiling, or the loss of reflectance of a surface. It takes into account the colour of dust and therefore is used to determine the nuisance potential of a dust source. Please refer to our guidance note No. 3 for more information.



DustScan

FACTUAL DUST MONITORING REPORT

Client:	A N Other Quarries	**Site:**	Pebbleton Quarry
Point Ref:	2 (Located near site entrance on screening bund)		
Date Out:	10 October 2003	**Date In:**	17 October 2003
Duration:	7 days	**Our Ref:**	00121

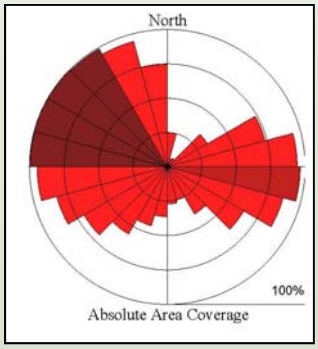
STATEMENT OF RESULTS

% Effective Area of Coverage / period = 0.83 % Effective Area of Coverage / day = 0.12

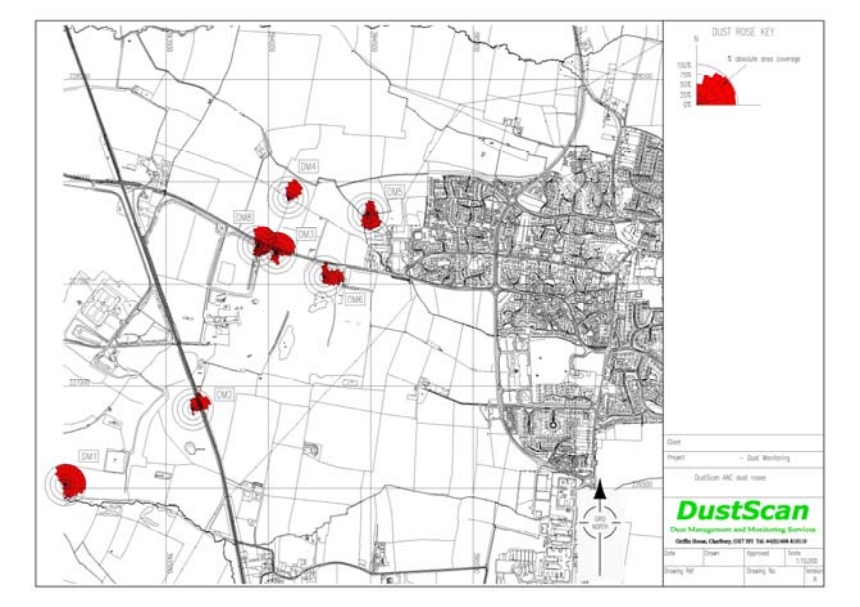
% Absolute Area of Coverage / period = 63.77 % Absolute Area of Coverage / day = 9.11

Segment	%EAC /Period	%AAC /Period	%EAC /Day	%AAC /Day	EAC Warning level	AAC Warning level	Nuisance Dust Warnings
000°-015°	0.192	24.940	0.027	3.563			
015°-030°	0.087	6.024	0.012	0.861			
030°-045°	0.038	7.317	0.005	1.045			
045°-060°	0.426	33.479	0.061	4.783			
060°-075°	0.715	73.578	0.102	10.511			
075°-090°	1.260	94.326	0.180	13.475			
090°-105°	1.425	96.416	0.204	13.774		AAC > 95	
105°-120°	0.953	86.922	0.136	12.417			
120°-135°	0.596	64.030	0.085	9.147			
135°-150°	0.284	39.443	0.041	5.635			
150°-165°	0.183	24.796	0.026	3.542			
165°-180°	0.131	27.078	0.019	3.868			
180°-195°	0.194	36.243	0.028	5.178			
195°-210°	0.186	44.302	0.027	6.329			
210°-225°	0.246	56.278	0.035	8.040			
225°-240°	0.398	69.830	0.057	9.976			
240°-255°	0.779	83.086	0.111	11.869			
255°-270°	1.409	94.459	0.201	13.494			
270°-285°	1.961	99.730	0.280	14.247		AAC > 99	High AAC
285°-300°	2.183	99.952	0.312	14.279		AAC > 99	High AAC
300°-315°	2.329	99.889	0.333	14.270		AAC > 99	High AAC
315°-330°	1.894	99.288	0.271	14.184		AAC > 99	High AAC
330°-345°	1.436	94.480	0.205	13.497			
345°-360°	0.643	74.711	0.092	10.673			

A 'dust rose' is quite similar to a wind rose, in that the length of the bars represents the magnitude of the dusting. In the example on the right, most of the dust came from the north-west, so it was heading in a south-easterly direction. Dust roses can be used to help predict where generated dust may travel away from a site, or to see if dust is arriving at a site from a different source.



Dust roses can also be superimposed onto site plans and can be used to make up part of a more detailed assessment of a sites performance.



Griffin House, Market Street,
Charlbury, Oxford, OX7 3PJ, UK
Tel: (44) 1608 810110
Fax: (44) 1608 810227
Email: info@DustScan.co.uk
www.DustScan.co.uk