
ASBESTOS FIBRE REGULAR INFORMAL COUNTING ARRANGEMENT (A F R I C A)

INTRODUCTION

The AFRICA (Asbestos Fibre Regular Informal Counting Arrangement) is an international proficiency testing scheme for laboratories measuring airborne asbestos fibre concentrations using the standard optical microscopy method. Its purpose is to allow participating laboratories to compare their counting standards with those of other laboratories and against reference counts in order to assist them in the quality control of their counting performances. The scheme began in 1983 and its operational procedures are similar to the UK Regular Interlaboratory Counting Exchanges (RICE).

OUTLINE OF OPERATION

Currently there are two sample distributions per annum. Each distribution is a round robin wherein batches of reference slides are circulated between various small groups of laboratories. Laboratory counts are compared with reference counts and each laboratory can assess its own performance using the guidance for performance limits specified in the RICE scheme (Appendix 1).

LABORATORIES, GROUPS AND BATCHES

Participating laboratories may be located in any part of the world. The laboratories may be run by government bodies, asbestos product manufacturers, and private companies which provide hygiene services, or other types of organisation. The scheme usually operates with about 30 members, representing countries in most continents.

All participating laboratories are split into groups dependent on their location. Each group is normally assigned between five and six laboratories each.

Several batches, each of eight reference samples of varied types and fibre densities are formed from the available samples. There are two additional samples in each batch which are classed as 'candidate samples'. The extra samples are used to collect counts to provide reference counts for future use.

SAMPLES AND REFERENCE COUNTS

AFRICA uses membrane filter reference samples, permanently mounted on glass microscope slides. The samples have a fibre density (i.e. the number of fibres per square millimetre on the surface of the filter) of between zero and 700 fibres/mm². Most of the samples come from two distinct sources: i) chrysotile samples from the asbestos products industry, and; ii) "clearance" samples from asbestos removal operations. The "clearance" samples typically contain amphibole asbestos fibres in densities of less than 100 fibres/mm².

Before a sample is accepted for use in AFRICA, it is screened and must be of adequate quality in terms of the standard of preparation and the nature of the sample itself. Samples which are judged to have a very uneven distribution of fibres, too many dust particles or other serious faults are excluded.

A *reference count* is assigned to each sample. The reference count is normally the *median of at least 15 counts* from various laboratories. At the end of each round, as more counts are received from participating laboratories, the reference count is compared with an average of these counts, to ensure that it is reliable.

ROUNDS

Prior to the round commencing, an email along containing a copy of the circulation register, electronic results form and the operational procedures shall be sent to all participating laboratories.

Each batch is sent by courier to the first participant in each group. Along with the slides, the pack shall also contain a copy of your Circulation Register and paper results forms for in-house use only.

Once received, they then evaluate the samples and send the batch on to the next laboratory, and so on until the final laboratory in the group returns the samples to IOM.

Each laboratory is allowed seven working days in which to make all its counts. If, for any reason, a laboratory is not able to count the samples when they first arrive, it must pass them on to the next participant as soon as possible, informing the IOM at the same time. In such cases the batch samples will be offered again to the laboratory after the scheduled circulation has been completed.

Participants use their routine methods for evaluating asbestos fibre concentrations (for example, the WHO all-fibre counting method). Laboratories with 1-4 microscopists are asked to submit at least one count per sample; those with 5-8 microscopists, 2 counts per sample; those with more than 12 microscopists, 3 counts per sample. Counts should be allocated evenly between the available counters. Each microscopist should count at least two samples.

ANALYSIS OF RESULTS

Once complete, the electronic results forms are sent directly to the IOM. These results are processed and a provisional results report (Appendix 4) is sent back to the laboratory as soon as possible. The procedure followed in analysing results is based on that developed by the RICE scheme.

The reference counts, performance bands, and numbers of evaluations within each of the performance bands are included on the result form. Participants are able to assess their own performances (for guidance, using the RICE system, which is explained in Appendix 1) and take remedial action where required and if they wish to do so.

At the end of each round the samples are screened again by an IOM microscopist. Counts based on samples which are rejected at this point may also be retrospectively excluded from the analysis. In such cases the results form is updated and sent back to the laboratory.

In practice, the number of samples excluded for this reason is very small; and the performance rating is rarely changed as a result of such exclusions.

Further reports, including a summary of counts obtained within each group (Appendix 5) and participants achieving a '1' or '2' rating are also issued with an individual laboratory certificate suitable for display.

Please note: Where slides are screened by an IOM microscopist at the start or end of the round, the WHO all-fibre counting rules are used or referred to. These rules are available from the [WHO website](#) and the implementation of these rules in U.K. guidance is described in [HSG 248](#) "Asbestos: the analysts' guide for sampling, analysis and clearance procedures".

MEMBERSHIP APPLICATIONS

Membership of AFRICA is renewed annually, for two rounds at a time. Renewal application forms dispatched from IOM to all current participants in November. All applications must be returned by the end of November to secure a place in the AFRICA Exchange. Once applications have been received you shall receive confirmation by email and invoiced by our finance team. Membership fees must be received by the end of January otherwise you shall not be granted a place in the

exchange for the forthcoming year. The current cost is shown on the application form and the membership fees are non-refundable.

Prospective members should contact IOM at the address given under "Further Information".

CONDITIONS OF MEMBERSHIP

Laboratories are accepted as members of the AFRICA scheme for a particular year based on the following conditions:

- To pay the appropriate membership fees by the end of January for the year ahead
- To abide by the rules of the scheme (as defined in this document);
- That they do not act unreasonably in any other way which is damaging to the operation or reputation of the scheme.

Please note: We are now introducing a fee for any damaged, lost or broken slides.

A fee of £195.00 shall be applied where slide/s have been damaged but deemed useable within the scheme by the PT Team.

A fee of £380.00 shall be applied where slide/s have been lost and/or damaged resulting in their withdrawal from the scheme. The damaged slide will be returned to the participant (if required) once full payment has been received.

Failure to pay any outstanding fees may result in reports and slides being withheld and ultimately exclusion from scheme participation.

BENEFITS OF MEMBERSHIP

The membership fee for the AFRICA Scheme provides the participant with:

- Twice yearly batches of test samples to analyse. These batches include a range of all asbestos type samples as well as MMMF and organic matter.
- A provisional results report comparing the participant's results to reference counts shall be sent directly to the participant following submission of counts.
- A group summary report shall be sent out at the end of each round outlining the counts obtained within each group. This allows the participant to compare their results to those of other laboratories within their group.
- An end of round report that provides a general overview of the performance during the round. This allows laboratories to compare their performance to that of the other participants as a whole.
- An individual laboratory certificate at the end of each round (grade dependent), which can be displayed and shown to others (authorities, clients etc.)
- Feedback for any participants who failed to achieve a good or satisfactory grade.

Additional benefits of membership include:

- For experienced asbestos laboratories, comparison with similar organisations in other countries.
- For less experienced laboratories, performance improvement through comparison with international asbestos fibre counting standards.
- A link between proficiency testing schemes in different countries.
- Contribution to participants' internal quality assurance programmes.
- Opportunities to exchange news, advice and opinions on asbestos monitoring matters.

FURTHER INFORMATION

Enquiries about AFRICA should be referred to Amy Clark - AFRICA Scheme Coordinator.

Institute of Occupational Medicine
Research Avenue North
Riccarton, Edinburgh
EH14 4AP
UK

Email: amy.clark@iom-world.org or pts@iom-world.org

APPENDIX 1. Explanatory note on “RICE” performance assessment

The RICE performance limits are the means by which laboratory counts may be compared with the sample reference counts. Each count is placed in a target band A, B or C, depending on how close it lies to the reference count. If the reference count is denoted by R , the following formulae give the performance limits which define the target bands.

(a) High density samples ($R \geq 63.7$ fibres.mm⁻²)

Target band A: **0.65R to 1.55R**

Target band B: **0.50R to 0.65R** [band -B] and **1.55R to 2.00R** [band +B]

Target band C: **less than 0.50R** [band -C] and **greater than 2.00R** [band +C]

(b) Low density samples ($R \leq 63.7$ fibres.mm⁻²)*

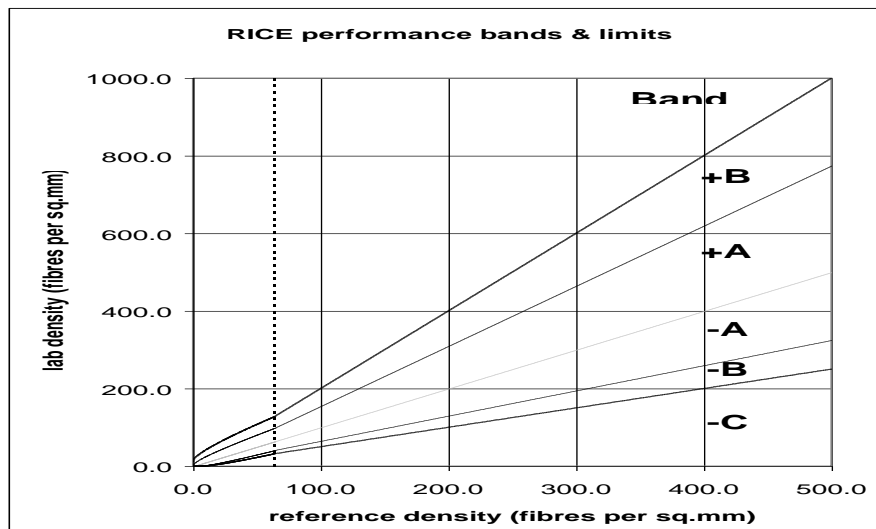
Target band A: $(\sqrt{R-1.57})^2$ to $(\sqrt{R+1.96})^2$

Target band B: $(\sqrt{R-2.34})^2$ to $(\sqrt{R-1.57})^2$ [band -B] and $(\sqrt{R+1.96})^2$ to $(\sqrt{R+3.30})^2$ [band +B]

Target band C: **less than $(\sqrt{R-2.34})^2$** [band -C] and **greater than $(\sqrt{R+3.30})^2$** [band +C]

The plot shows the positions of the performance limits in relation to the reference counts, up to reference density 500 fibres per mm². Most AFRICA reference counts lie within this range.

* For samples < 63.7 fibres.mm⁻² the lower limit is set to zero if the component within the brackets $(\sqrt{R-n})$ is less than zero.



When the counts on all 8 reference samples in that round have been assigned to target bands, the percentage of counts within each band is calculated:

- A laboratory achieving $\geq 75\%$ of its results within Band A receives a *rating 1* (“good” performance) for that round.
- If the laboratory has $< 75\%$ in Band A, but $\geq 75\%$ within Bands A and B combined, it receives a *rating 2* (“acceptable” performance).
- If the laboratory has $< 75\%$ of its results in Band A or Band B, it receives a *rating 3* (“unsatisfactory” performance).

APPENDIX 2. Instructions sent with samples during circulation

ROUND No.:	34	BATCH No.:	99	GROUP No.:	88
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COUNTING INSTRUCTIONS

Time limit. Please evaluate the enclosed slides and dispatch them to the next laboratory on the list WITHIN SEVEN WORKING DAYS.

Counting method. Please use your routine counting method, for example the European Reference Method.

Distribution of slides for evaluation. Distribute the slides as evenly as possible amongst your available microscopists. If you have 1-4 available microscopists, your laboratory should enter ONE result for each slide on the form (a total of 9 counts). If you have 5-8 microscopists, TWO results should be entered for each slide (a total of 18 counts). If there are 9 or more microscopists, THREE results should be entered for each slide (a total of 27 counts). If possible, each microscopist in your laboratory should make at least two evaluations in the exchange, each evaluation being on a different slide.

Completion of results form. Each individual evaluation must be recorded in the electronic Excel worksheet *Form/1/AF* which will be emailed to you from IOM prior to the start of the round – any results submitted via photograph or paper copies shall not be processed. At the top of the form, please enter (i) your laboratory name, (ii) the date or dates the slides were counted, and (iii) the fibre counting rules you use. Enter the date of dispatch of the samples at the bottom of the form. There is a space for a representative (e.g. Quality Manager) to sign the form if this is your laboratory's normal practice.

Dispatch of samples. Enter the dates of receipt and dispatch and 'counted' in the appropriate columns on the circulation register. Leave the other results forms (and these instructions) with the slides and dispatch the slides either to the next laboratory on the list, or, if yours is the last laboratory, to the Scheme Coordinator, Amy Clark, at the IOM, 49 Research Avenue North, Riccarton, Edinburgh EH14 4AP, UK (phone +44 131 449 8096; fax +44 131 449 8084). Use Air Mail or an express courier service. Take care to check whether the circulation register has been extended by previous laboratories adding their names (see *Skipping your turn*, below). The full addresses of the laboratories in your group are attached and address labels are provided. Please ensure the slides are carefully packed to avoid breakages.

Dispatch of results. Return your completed Excel results form by email to the Scheme Administrator at AFRICA@iom-world.org. If the results form cannot be returned immediately on counting the slides, you should still notify the Scheme Administrator of the dispatch of the slides. In any case, the results form should be dispatched to the IOM within two weeks of the counts being completed.

Skipping your turn. If you think that you will not be able to obtain the counts within the permitted seven days, send the slides IMMEDIATELY to the next laboratory on the register (or to the Scheme Administrator if no laboratories remain). Enter the dates of receipt and dispatch and 'uncounted' in the appropriate columns on the circulation register. Sign the register where indicated. Notify the Scheme Administrator by email or phone. (If you wish, the Scheme Administrator will return the slides to your laboratory later, after the other members of your group have counted.) If yours is the last laboratory in your group to count, and you require additional time, contact the Scheme Administrator for authorisation or advice.

APPENDIX 3. Example of a Circulation Register, sent with slides during the circulation (the actual addresses have been omitted)

ROUND No.:	34	BATCH No.:	99	GROUP No.:	88
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CIRCULATION REGISTER

Order	Laboratory abbreviation	Date received	Date dispatched	Counted/Uncounted	Signed
1	Lab A				
2	Lab B				
3	Lab C				
4	Lab D				
5					
6					

When no more laboratories remain on the circulation register, the slides should be returned to Emma Carnaghan at IOM, Research Avenue North, Riccarton, Edinburgh, EH14 4AP, UK.

LABORATORIES IN GROUP 1

<u>ABBREVIATION</u>	<u>LABORATORY CONTACT ADDRESS</u>
Lab A	Name of contact person, laboratory/organisation name, laboratory address, telephone number, fax number, e-mail address.
Lab B	Name of contact person, laboratory/organisation name, laboratory address, telephone number, fax number, e-mail address.
Lab C	Name of contact person, laboratory/organisation name, laboratory address, telephone number, fax number, e-mail address.
Lab D	Name of contact person, laboratory/organisation name, laboratory address, telephone number, fax number, e-mail address.

Samples should be dispatched by Air Mail or express courier.

PLEASE KEEP THIS PAGE WITH THE SAMPLES


APPENDIX 4. Example of results form RES1AF(h): rapid feedback of results to participants

RES1AF(H)/34/999

A F R I C A

ASBESTOS FIBRE REGULAR INFORMAL COUNTING ARRANGEMENT

PROVISIONAL ONE-ROUND REPORT ROUND 34

Name of Contact Person Laboratory/organisation name Laboratory address	 Report issued by: Institute of Occupational Medicine, Research Park North, Riccarton, Edinburgh, U.K. 1 September, 2022
	Laboratory Number 999
	Group 88
	Batch 99
	Evaluation Date 25/06/2003

This is a provisional report on your laboratory's AFRICA results and is for guidance only. The details of each count are given, together with the reference count for that slide and the performance band (A, B or C) awarded. Formal performance classification is carried out at the end of each round. Details of the performance assessment procedures are given in the AFRICA Operational Procedures, available from IOM.

Slide	Microscopist	Number of		Graticule area (mm ²)	Density (fibres/mm ²)		Performance range						
		Fibres	Fields		Laboratory	Reference	Low		Mid	High			
							-C	-B		A	+B	+C	
99.01	AB	101.0	64	0.00785	201.0	430.0	C	
99.04	CD	47.5	200	0.00785	30.3	28.7	.	.	A	.	.	.	
99.09	AB	101.5	200	0.00785	64.6	36.9	.	.	A	.	.	.	
99.10	CD	100.0	113	0.00785	112.7	89.4	.	.	A	.	.	.	
99.12	AB	.5	200	0.00785	.3	3.5	.	.	A	.	.	.	
99.15	CD	102.0	44	0.00785	295.3	310.7	.	.	A	.	.	.	
99.20	AB	8.9	99	0.00782	8.9	7.6	.	.	A	.	.	.	
99.26	CD	100.0	43	0.00785	296.3	155.9	.	.	.	B	.	.	
99.30	AB	89.0	200	0.00785	56.7	NR	.	-No reference count-					.
							Totals:	-1	0	6	1	0	
Number of valid results		8		(100%)									
Results within Band A		6		(75%)									
Results Within Band A & B		7		(87%)									

APPENDIX 5. Example of a summary of the results from laboratories in the same circulation group (one of the reports provided at the end of the round)

A F R I C A

ASBESTOS FIBRE REGULAR INFORMAL COUNTING ARRANGEMENT

GROUP SUMMARY OF RESULTS

Laboratory: Laboratory Name and Address		Round: 34								
		Group: 88								
		Batch: 99								
		Evaluation date: 25/06/2003								
Fibre densities (fibres per mm²)										
Slide number	99.01	99.04	99.09	99.10	99.12	99.15	99.20	99.26	99.30	
Your laboratory	201.0	30.3	64.6	112.7	0.3	295.3	8.9	296.3	56.7	
Other laboratories in your group[†]	579.2	27.9	44.8	120.0	0.3	411.2	12.4	196.1	77.0	
	244.5	23.6	30.1	64.7	5.1	216.7	3.3	122.9	48.3	
	375.3	35.2	29.0	94.8	2.7	346.4	7.3	163.0	60.3	
	484.9	18.8	33.3	80.6	0.0	188.4	5.1	132.5	51.3	
Reference count	430.0	28.7	36.9	89.4	3.5	310.7	7.6	155.9	*	

[†] Each laboratory produces between one and three results per slide, depending on the number of active microscopists in the laboratory.

* An asterisk in the last row indicates a “candidate” slide or a slide excluded because of failure to meet post-screening criteria.