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Report on the Training Exercise to help RICE laboratories prepare for the change to the new counting rules

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The fibre counting method for measuring concentrations of airborne asbestos will change with the introduction (scheduled for October 2006) of the revised Control of Asbestos at Work Regulations. The change affects the counting of fibres touching-particles; currently, they should be excluded (if the particle diameter is > 3 µm) whereas they will be included under the new rules.

The training exercise focussed analysts' attention on this aspect of the method. A high proportion of the analysts and laboratories in the RICE scheme participated. The analysts counted the fibres specified by the current (MDHS 39/4) rules, and noted how many extra fibres (on the same fields of view) would be counted under the new rules. This gave a direct estimate of the increase in count.

A few expert laboratories had produced initial estimates of the percentage increase in count for each slide. These estimates were consistent with consensus (median) values from the laboratories in this exercise. Conversion factors, derived from expert laboratories' data, will be used to convert reference values for RICE slides to values appropriate to the new rules.

Most laboratories produced results consistent with those from expert laboratories and satisfactory counts by the usual RICE proficiency testing criteria. However, a significant minority (about 25%) of laboratories produced more poor counts (relative to the normal RICE criteria) than usual. The implications of this finding are discussed and advice offered for laboratory managers.

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SUMMARY

Introduction

The introduction (scheduled for October 2006) of the revised asbestos regulations in the UK will bring a change in the method used to count fibres for the determination of asbestos fibre concentrations. Fibres on membrane filter samples are counted by phase contrast optical microscopy, after the membrane filter sample has been mounted on a glass slide. Under the current method, fibres that appear to touch particles are excluded if the particle diameter is > 3 μm; under the new method they will be included in the count.

The training exercise was undertaken using samples from the UK asbestos fibre proficiency testing scheme, the RICE (Regular Inter-laboratory Counting Exchanges) scheme. In routine RICE, laboratories are sent batches of samples mounted on glass slides. The laboratories return their counting data to RICE. Their measurements of the density of fibres on the slide (fibres/mm^2) are compared to reference values which are median densities from (a minimum of 15) previous counts by other participants in the scheme. The reference values are thus a consensus estimate of the density by the current counting method.

The training exercise focussed analysts' attention on the main change in the method. There were two aims: (1) to help achieve consistency in the methodology used by analysts when the new method comes into effect; and (ii) to confirm that conversion of the reference values assigned to the samples used in RICE will produce new values appropriate for the new method.

Laboratories had been asked to treat this as a training exercise and to involve as many analysts as possible, with the assurance that there would be no pass/fail assessment of individual results. However, the data are examined to see how laboratory performance would compare to the usual RICE criteria so that laboratory managers are informed of possible implications.

Methods

The training exercise has taken place over approximately two years. In this report, data returned by 168 laboratories are analysed; data from a preceding pilot trial with 42 laboratories are included in the analysis.

Each laboratory received a batch of samples over that period. The analysts were asked to produce a count keeping a tally of three quantities (i) the number of fields, (ii) the number of fibres countable under the current method, and (iii) the extra fibres that are currently excluded because of contact with particles but which become countable under the new rules. The data give a direct estimate of the percentage increase in count due to the change in rule. These counts are referred to in this report as "*special difference counts";* each count gave densities (fibres/mm^2) by the current method and new method and the percentage difference (new method compared to the current method).

The slides in the training exercise had estimates of the expected percentage difference based on a limited number of special difference counts from "expert" laboratories.

The preceding pilot study had demonstrated that the consensus estimates of the percentage differences from the voluntary participants were consistent with the estimated percentage differences from the expert laboratories. The first analysis examined whether this was confirmed by the full data set.

The second analysis examined the extent of variation between individual analysts in the estimate of percentage difference.

The data were also examined to see how many counts would be considered poor as judged by the routine RICE assessment criteria.

Results

A comparison of consensus estimates (based on data from many analysts) of the percentage difference in count, on 107 samples, shows reasonable consistency with the estimates derived from limited data produced by "expert" laboratories. There is some variation, as would be expected, but the expert estimates appear to be an unbiased estimate of the value that would be obtained were it possible to have estimates based on large amounts of data for every slide in RICE. This supports the intention to use conversion factors based on limited numbers of counts from "expert" laboratories to convert the reference values on all RICE slides when the new method comers into effect. Therefore, the interpretation of the data continued on the basis that reference values will be converted in that manner.

The individual estimates of percentage differences (5627 estimates in total on the 107 slides) showed substantial variation. Much of this variation arises from the random selection of fields of view; the numbers of fibres varies but also the proportion of fibres that touch particles varies from field to field. For example, the number of estimates of percentage difference over 100% were equivalent to 24 in 1000 estimates. The high percentage differences were mainly on the lower density slides (where fewer fibres in total are counted).

In the RICE proficiency testing, the performance of laboratories is assessed in terms of the proportion of counts that fall within bands that are defined in terms of distance from the assigned reference values. Good performance is achieved by 75% of counts within the good band ("A counts"); acceptable performance by 75% of counts within a wider band ("B counts"); unsatisfactory performance is defined as 25% or more of counts outside these bands. The counts made in the training exercise gave a count by the current (MDHS 39/4) method and a count by the new (WHO) method.

For the counts by the MDHS 39/4 method, the proportions of counts falling into each band ("A", "B" or "C") were calculated for each round of the training exercise, for the pilot study, and – for comparison – for the most recent rounds of routine RICE. In the pilot study and the routine RICE rounds, the percentage of counts in band "C" was about 5%, whereas in each round of the training exercise, the percentage was about 10% (i.e. double). If the proportions were calculated just for the chrysotile asbestos samples, then the percentages of "C counts" were greater, but again the proportion for the training rounds was double that in the pilot study or routine RICE. Most of the "C counts" came from about 25% of the laboratories. About 40 laboratories had no "C counts", and 110 laboratories had less than 15% "C counts".

Discussion

Conversion of reference values

The training exercise results have confirmed that the expert laboratories' estimates of the conversion factors are generally acceptably close to the values that would be produced if it were possible to obtain data from multiple laboratories for every slide in RICE.

The current reference values, based on a minimum of 15 counts, have an uncertainty which is taken into account in the setting of target bands for counts to be considered good or acceptable.

There is also uncertainty in the estimates of conversion factors, but generally that uncertainty appears small compared to the variation in repeat fibre counts.

Subjective decisions made by analysts regarding fibres touching particles

The current rule about excluding fibres that appear to touch particles (with diameter > 3 μm) involves a subjective decision by the analyst as to whether a fibre and particle are in contact, and an estimation of the particle size. These decisions may lead to quite different patterns between individuals, and that may lead to different issues in keeping satisfactory performance in RICE.

What to expect on RICE samples after the change in rule

After the change in rule, the reference counts on RICE samples will be converted to correspond to the counting level expected under the new rule. For many RICE samples, the reference value may change very little if at all. On some samples, the reference count will change by a substantial amount. The training exercise has included a relatively high proportion of samples with an increase in count.

If a laboratory had a higher proportion of poor counts ("C counts") than usual

There are several possible reasons why more poor counts than usual could have occurred for some laboratories (e.g. more trainees involved, or some analysts finding the special procedure difficult). However, a higher proportion of "C counts" could be indicative that an analyst previously tended to compensate for counting low by including fibres attached to particles. High proportions of "C counts" may therefore indicate future counting problems. Where the training exercise data do indicate a higher proportion of "C counts", it is important that the laboratory examines the causes of that result.

Conclusions

By providing training samples to 175 laboratories, most analysts in the UK have been well informed of the main change in the counting rules. The majority of analysts in the UK have participated.

The amount of data available for this analysis was sufficient to determine the general pattern of results and reach clear conclusions. In particular, the data confirm that the consensus estimates of the effect of the new rules is consistent between the UK analysts and the expert laboratories. That confirms that conversion factors, based on limited data generated by expert laboratories, can be used to convert reference values on all the other reference slides in the RICE scheme.

More laboratories than usual had a high proportion of poor counts ("C counts"). Only the laboratory management and their UKAS assessors will be in a position to decide if the individual laboratory's results require any action prior to the implementation of the new rules.

Laboratories have been sent the reports on their individual results.

Recommendations

After the change to the new method, RICE should use converted reference values based on conversion factors derived from data produced by expert laboratories. Prior to reporting to individual laboratories on results in that first round of RICE under the new counting method, the data should be analysed to assess the extent to which the overall pattern of results differs from

the usual pattern in RICE, and to recommend how to deal with the issues arising from the findings. For example, it might be appropriate to allow for the additional uncertainty in the converted reference values by temporary adjustment of the definition of target bands for counts to be considered satisfactory.

The participating laboratories were advised that their results should be treated as training data. The objective of the exercise was to focus analysts' attention on the aspect of the rule that changes with the new counting method. Most analysts have recorded extra fibres, and the numbers are generally consistent with the differences to be expected from the initial estimates by expert laboratories. A minority of analysts have produced some extreme estimates of percentage difference. Those are worth checking, for example to see if an analyst was misinterpreting the training exercise instructions and to ensure that he/she has a correct understanding of the new counting method.

The participating laboratories were also advised that the assessment of the proportion of counts in bands "A" "B" and "C" should not be interpreted as strictly as in routine RICE. A high proportion of counts in band "A" indicates that satisfactory performance in RICE is to be expected. However, the converse is not necessarily true because the use of a special counting procedure may have affected the level of count for some analysts.

1 INTRODUCTION

1.1 BACKGROUND

1.1.1 Counting asbestos fibre by the membrane filter method

The measurement of airborne asbestos fibre concentrations involves the counting of fibres collected on filters and mounted on glass slides, by phase contrast optical microscopy (PCOM) following a standard method described in MDHS 39/4 (HSE, 1995). Variation arises in the counts because only a sample of the filter area is examined, but this variation tends to be small in comparison with that arising from several other factors including the proficiency of the analyst in discerning fibres that may only just be visible, and whose visibility may depend on fine adjustment of the focus of the microscope. Consistency in following the detailed counting procedures is another factor that affects consistency. The overall consistency between laboratories and analysts is dependent on the cumulative effect of all these factors.

In the UK, the RICE (Regular Inter-laboratory Counting Exchanges) scheme tests the proficiency of laboratories counting membrane filter samples of asbestos. There are almost 200 laboratories in the RICE scheme. The proficiency testing involves sending laboratories batches of reference samples mounted on glass slides. The laboratory returns counting results to RICE, and the reported results are compared to a reference value for each sample. The reference values are consensus values derived from a minimum of 15 previous counts by the RICE participant laboratories.

1.1.2 Implication of an impending change in fibre counting rules

The method for counting samples of asbestos fibre by PCOM in the UK will change with the introduction of revised asbestos regulations, and that is scheduled for the beginning of October 2006. The change in the method is expected to affect some of the counts produced, as described below. The new method was published originally by the World Health Organisation (WHO, 1997), and has been described in Appendix 1 of "the Analyst's Guide" (HSE, 2005).

The main change in the rules concerns the treatment of fibres that appear to touch particles. Fibres touching particles larger than 3 µm diameter are excluded from the count under current MDHS 39/4 rules, but they will be included under the new rules. The extent to which this affects the count on any individual sample will depend on how much particulate (i.e. non-fibrous) dust is on the sample.

The amount of particulate dust on samples in the RICE scheme varies greatly. On many samples, there is so little particulate dust that the effect on the count will be negligible. On some samples, there is enough particulate that the count can be expected to increase by as much as 50% (or perhaps more in a few cases) due to the change in rule.

Two requirements arise from the expected change in counts:

- all the RICE laboratories will need to ensure that analysts are adequately trained in the implementation of the revised rules;
- the reference values on some of the RICE samples will need to be amended to correspond to the counting level expected under the new rules.

This report describes how these requirements have been addressed.

1.2 CONVERSION OF REFERENCE VALUES

Producing a set of new counts on every RICE sample to derive a new consensus value would have involved a lot of counting (e.g. for reference values based on medians of 15 counts). Therefore, we adopted a more efficient approach that gave a direct estimate of the difference in counts. This involved producing for each RICE sample at least one, perhaps three, counts with a tally count kept of three things: (i) fields, (ii) fibres countable under current rules, and (iii) fibres that would currently be excluded but would become countable. We will call such counts "*special difference counts"* in this report.

As most of the samples' reference values were likely to change little due to the rule, an initial assessment of the difference was based on fewer fields than would normally be counted. If the initial assessment indicated that the percentage of extra fibres would be small (e.g. less than 10%), then that would be a sufficient indication of the new reference value. From samples evaluated so far, an assessment of that type is expected to suffice for about 70% of the sample stock. On samples where the initial assessment indicates a larger change, then further special difference counts (based on the normal number of 100 or 200 fields) will be needed.

In principle, the estimate of the expected increase in count for each individual sample should enable a new reference value to be derived from the extensive data for counts by the current method. For example, if special difference counts made by a group of "expert labs" indicate that the count on a particular sample should increase by say 30%, then its new reference value would be estimated as 1.3 times the current reference value.

However, it was recognised that the conversion factors were based on data from a group of expert labs (applying the rules exactly as specified) whereas the RICE reference values are the consensus values (medians) of the counts produced by the laboratories in routine participation in the scheme. There is a subjective judgement in deciding whether a fibre should be excluded from a count due to contact with a particle. That subjective judgement might be treated somewhat differently by the "expert labs" compared to the analysts routinely counting RICE slides. Therefore, it was important to check that the conversion factors produced by "expert labs" were consistent with the difference in count that the participant laboratories were likely to produce. This check was addressed by a pilot study (in 2003) in which 42 RICE laboratories voluntarily took part (i.e. a substantial subset as it represents more than 20% of all RICE labs). They were asked to produce the "*special difference counts*" on sets of samples, i.e. to make simultaneous counts on the same fields of the *currently countable fibres* and the *fibres that will become countable*. The instruction provided for analysts was that each analyst should take "*currently countable fibres*" to mean fibres that they usually would count when counting RICE samples in the regular RICE exchanges.

The results of the pilot trial showed that there appeared to be reasonably good agreement between the estimates (of the change in count) from the experts and those from the participants. There was the variation that is typical of fibre counting data, but no indication that the conversion would be noticeably biased by using estimates from the few expert labs rather than from a large group of participants. The trial led to the conclusion that the revised reference values could be derived by conversion factors based on the *"special difference counts"* from expert labs.

1.3 TRAINING EXERCISE

1.3.1 Outline of the training exercise

The fact that the change from one set of rules will take place on the date that the new regulations come into effect means that laboratories will need to have analysts trained in the new method by that date.

It was therefore decided by the HSE's Committee on Fibre Measurement that the RICE scheme should provide "training rounds" in which analysts could become familiar with the main aspect of the change in rules. This involved sending each laboratory a batch of samples with the instructions for producing the "*special difference counts"* with the intention that it should focus the analysts' attention on this aspect of the rules.

This exercise has been taking place over approximately two years, and the results are now summarised in this report.

1.3.2 Purpose of training rounds

The purpose of the training rounds was to help analysts to become aware of how counts should change with the switch to the new rules. At the start of the training exercise, laboratories were told that the feedback would be provided as training data and there would be no pass or fail assessment. However, they were advised that they should keep the data to show to, and discuss with, their UKAS accreditation team. The information from the exercise was intended to help laboratories keep satisfactory performance in RICE when the scheme moves over to WHO based reference values.

Additionally, the data generated in the training rounds provided a basis for checking on the consistency between estimates of the difference between the two rules. That consistency had been demonstrated already in the findings of the pilot trial with 42 laboratories. However, confirmation was seen as important as the entirely voluntary participation in the pilot trial might have been not fully representative of what would happen for the full RICE membership. The slides selected for the training exercise were ones with at least one "special difference count" from the expert labs.

1.4 REPORTING

This report summarises the results obtained in the training exercise, describes the features of the general trends that are likely to help laboratories (and their UKAS assessors) in interpreting the significance of the results for each individual laboratory or analyst.

At the time when this report is being completed, each laboratory that returned results is being provided with a brief report on their individual results.

Not all the counts have yet been returned by the laboratories. However, there is no reason to expect that the awaited data will be other than consistent with that returned so far as regards the general trends. The amount of data available for this report is more than adequate for its purpose.

The report is being completed in time to be available prior to the implementation of the new fibre counting rules, scheduled for October 2006.

2 METHODS

2.1 ORGANISATION OF TRAINING EXERCISE

The training exercise was announced to the RICE laboratories in summer 2004 with invitations to participate. The fibre counting was then undertaken in three rounds of sample circulations. The schedule for the rounds is outlined in Table 2.1. Each laboratory was allocated to one of the rounds, thus each laboratory received a batch of slides once during the training exercise.

The laboratory was asked to arrange for as many counters as possible to participate in the training exercise, and for each analyst to count as many of the samples as possible. This led to 5627 counts being produced by 151 laboratories and collected for inclusion in the analysis described in this report. Enough data was available by June 2006 to give a reliable analysis of the main trends. The analysis was conducted in June in order to have a sound basis for giving good advice to the laboratories on the results prior to the scheduled (October 2006) implementation of the revised regulations and new counting rules.

Prior to the training exercise, a pilot study was conducted with 42 laboratories participating. This used 65 slides and produced 1146 counts by the same counting procedure as used in the main training exercise. Forty of these slides were included in both pilot study and training exercise. Data were returned by 37 of the laboratories in the pilot study. Seventeen of the laboratories in the pilot study also participated in the main training exercise.

The pilot study data were included in the analysis described in this report, thus giving results from 168 laboratories and a total of 6773 counts on 107 samples in the data analysis.

Table 2.1 The numbers of laboratories, counts and slides in the training exercise, in total and for each round

Round	Training exercise		Number of laboratories		Counts	Slides counted
	Start date	End date	Allocated to round	Counted samples		
1	November 04	May 05	51	50	2053	73
2	April 05	July 05	52	47	1741	80
3	August 05	Sept 06	67†	54‡	1833‡	72
		Total	176	151♦	5627	83*

†Still running for new labs;
‡counts completed by beginning of June 2006;
♦ by the beginning of June 2006
* most slides re-used after each round.

A further 5 laboratories have subsequently submitted data and about 10 more may yet participate. Their results will be reported to the individual laboratories.

2.2 INVITATION TO PARTICIPATE

The initial letter about the training rounds sent to the laboratories is reproduced in Appendix 1. The essential information given to the laboratories about the nature of the exercise was as follows:

What is involved?

We send you a batch of samples, with detailed instructions to pass to the analysts. You are advised to retain copies of all of the counting data generated, as part of the analysts' training records; this data will be examined by the UKAS assessors during subsequent visits.

How does this help your laboratory?

The application of the special counting rules (in the training round) is intended to help focus the analyst's attention on the difference in the rules. So participation in the training exchange is intended to help your laboratory to be aware of how much counts should change with the switch to the new rules. The information should help you keep satisfactory performance in RICE as and when the scheme moves over to WHO based reference values.

What happens to your data?

There is no pass or failure. You are given feedback as to whether your analysts produce WHO counts that are consistent with those from other laboratories.

Is this separate from the normal RICE exchanges?

Yes, this will be a separate batch of samples. They will be labelled differently from the normal RICE samples, and will be accompanied by clear instructions.

2.3 SAMPLES USED

2.3.1 Selected samples

The samples selected for the training rounds came from the RICE reference sample stock, and they all had one or more special difference count produced by an expert laboratory. They were chosen to include a relatively high proportion of samples with significant particulate content, so that the rule regarding fibres touching particles could be relevant to several samples in each batch sent to a laboratory.

The samples, being RICE reference samples, all had assigned RICE reference values (relevant to counts by MDHS 39/4). Figure 2.1 shows the cumulative number of training round samples relative to their assigned density samples. This indicates that 75% of these samples had reference density less than 100 fibres.mm^{-2}.

The samples were supplied to the laboratories in batches of 8 samples. Each batch contained some samples with percentage differences over 20% ranging up to about 75% and some samples with percentages differences less than 10%. Each batch also contained several types of sample: chrysotile (between 1 and 3 slides), one laboratory generated amosite sample with particles, and about 5 samples from asbestos clearance work.

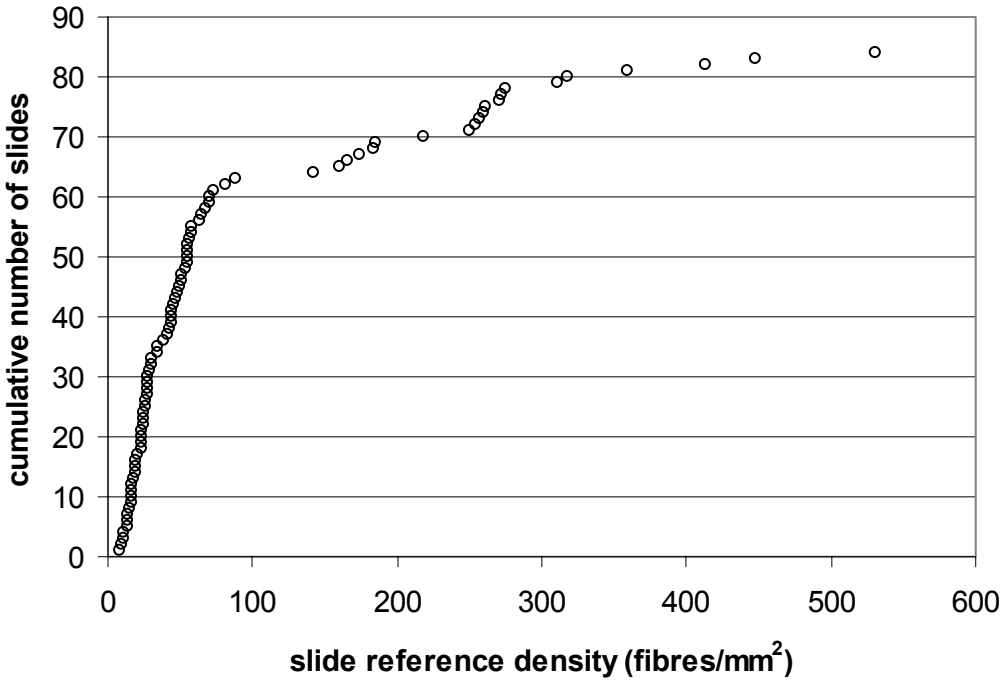

Figure 2.1 Cumulative number of slides in the training exercise, plotted against their current reference value (reference density by MDHS 39/4 counting method)

2.4 DATA COLLECTION AND PROCESSING

2.4.1 Schedule

The training exercise started in November 2004, and counting of samples by laboratories is being completed at the time of writing (July 2006). Samples have been sent to 174 laboratories out of a total of about 190 laboratories currently in RICE. In this report, the data returned from 154 laboratories by beginning of June 2006 is analysed. This provides a sufficient body of data to characterise the general features of the results. There is no reason to expect that there will be any important differences in the data yet to be returned by up to 24 more laboratories.

2.5 ANALYSIS

2.5.1 Percentage differences

Each *special difference count* estimates the number of extra fibres that would be counted under the new rules, over and above the number counted under the current MDHS 39/4 rules. The number of extra fibres was expressed as a percentage difference (on the current MDHS 39/4 count). Then, for each slide a median percentage difference was calculated from all the results on that slide in the training exercise and pilot study.

There are two ways of calculating the median for a slide: either as medians of all analysts' data or as medians of averages from each laboratory. The latter would prevent the possibility of any trend being dominated by results from large laboratories with multiple analysts; however, in fact both ways gave similar results. The median of all results was used for the presentations in this report.

2.6 REPORTING TO LABORATORIES

Participation in the training exercise was intended to familiarise analysts with the main aspect of the change in rule, albeit in some cases many months before the new rule comes into effect.

The reports to laboratories are intended to help the laboratory in the following ways:

- give an indication of how counts on some RICE samples will change, when the new counting rules come into effect;
- demonstrate how their analysts compare with others regarding the main change in the counting rules;
- indicate how the change in rule is likely to affect their laboratory's performance in RICE.

The results presented in the next chapter describe the overall pattern of results, and provide a basis for comparison that may help the interpretation of results for each individual laboratory.

3 RESULTS

3.1 THE TRAINING ROUND

3.1.1 The training exercise data

Section 2.1 summarised the numbers of laboratories participating, the numbers of slides circulated, and the number of counts produced. From the pilot study and the training exercise, the data available in time for the analysis in this report comprised a total of 6934 counts on 107 samples in the data analysis.

The laboratories had been encouraged to return data from as many analysts as possible. The data returned by the 151 laboratories in the training exercise included results from 901 analysts. For comparison, in RICE round 69 (the round taking place at the start of the exercise), 1050 analysts in 188 labs returned data. Across all RICE laboratories, the number of analysts listed as potentially available to participate in Round 69 amounted to 1367. That suggests that the training reached a very high proportion of the analysts in RICE in general, and especially in the laboratories that participated in the training exercise.

3.2 CONSISTENCY OF THE LABORATORIES' COUNTS WITH EXPERT LABS

3.2.1 Comparison of laboratories' and experts' estimates of differences for each sample

The number of extra fibres (countable under the new rules) was expressed as a percentage difference (on the current MDHS 39/4 count). Then, for each slide a median percentage difference was calculated from all the results on that slide in the training exercise and pilot study. These medians are plotted against the estimated percentage difference from the expert laboratories in Figure 3.1. There are results for 107 slides in Figure 3.1. The solid diagonal line is the line of equality between expert estimates and analysts' medians. The two sets of boundaries (broken lines) intercept the axes at values of 10% and 20%.

The main features of the data in Figure 3.1 are that most of the data points lie quite close to the line of equality (the solid diagonal line). Some of the data are between the inner and outer broken lines, that is the data points lie between 10 and 20% off the equality line. Five data points are almost on the outer broken lines; two data points are outside the outer broken lines. Thus, only about 7 data points (out of 107) lie on or outside the outer boundary lines. That suggests that if it were possible to have similar data from multiple RICE laboratories on all RICE slides, then the consensus estimates of percentage difference would mostly lie within these bounds; the majority within the inner bounds, and almost all within the outer bounds.

Despite the overall consistency between expert estimates and consensus values from all analysts, Figure 3.1 also shows that the laboratories' median values tend to be slightly higher than the estimates from the experts at the lower percentages (e.g. less than 10%). Over all slides in this set of samples, the average of the median differences for the analysts was 20.1% compared to 20.3% for the expert laboratories.

The important issue is whether the estimates from expert laboratories would be seriously biased compared to consensus values based on data from many participating laboratories. The evidence from Figure 3.1 is that any bias is small. There is of course also variation in the estimates, and variation of an estimate depends on the amount of data. Figure 3.1 indicates approximately how much variation there is. For example, where the expert labs estimate a difference of approximately 35%, most of the labs estimates (based typically on about 50

special difference counts per slide) would be within the inner range of 25 to 45 percent difference.

For the slides in Figure 3.1, we have extensive data from RICE participants. However, that is not the case for the majority of slides in RICE. Therefore, when RICE changes over to the new counting method, the conversion factors for the reference values on most RICE slides will be based on data from the expert labs only. Therefore, it is important that Figure 3.1 confirms that those "expert" estimates will be reasonably close to the consensus conversion factors that would be derived if multiple special difference counts were obtained from many analysts on all RICE samples. The "expert" estimates are not biased estimates of consensus values (from many laboratories), but they do have variation as described.

Given the above findings, the further analyses of the training exercise data proceed on the assumption that RICE reference values on all RICE slides will be converted using factors derived from special difference counts by a few expert laboratories.

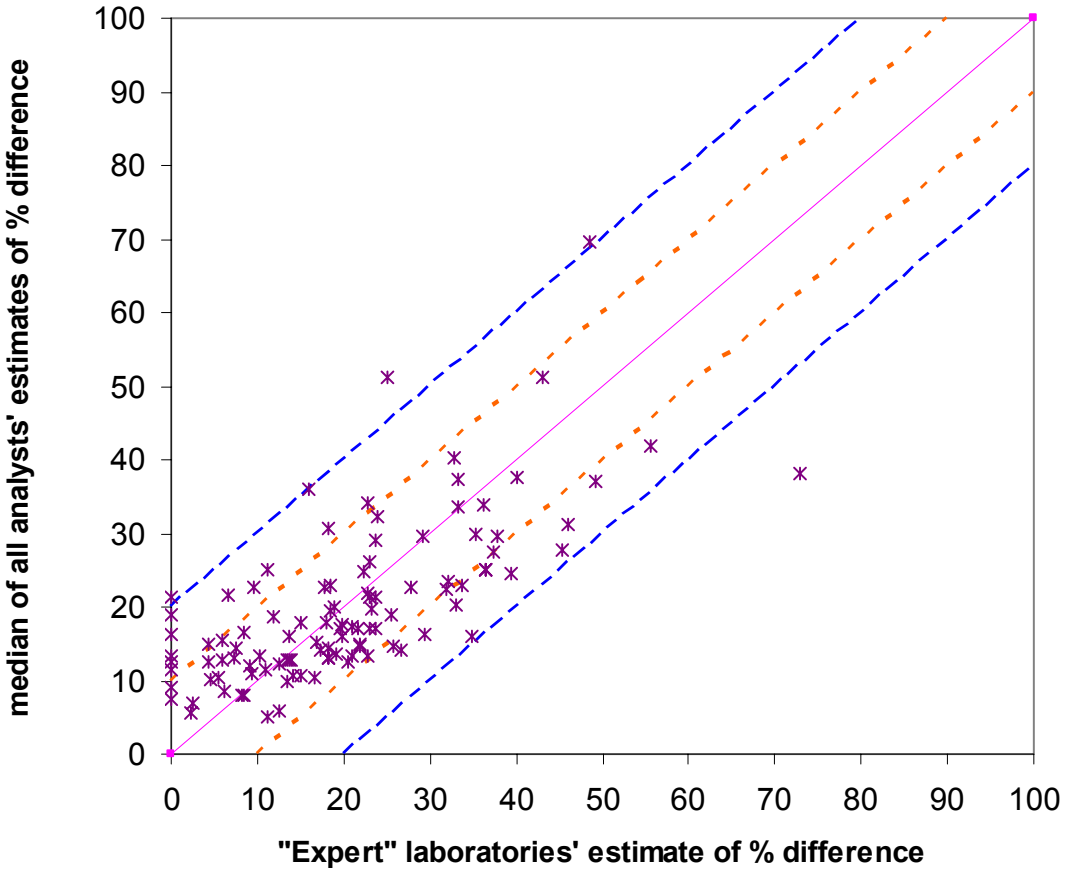

Figure 3.1 Percentage difference between MDHS 39/4 count and the new count on each slide, as estimated from the data from the 168 laboratories compared to the estimates from the "expert laboratories".

3.2.2 Variation in estimates from individual analysts

The median values (in Figure 3.1) demonstrated consistency between the consensus values from the laboratories in the training exercise and the "expert" laboratories.

The data from individual analysts showed considerable variation in estimates of percentage differences (Figure 3.2). The variation between analysts may reflect the subjective nature of decisions as to whether fibres touch particles, and of course includes the inherent variation due to the random selection of different fields of view by each analyst. The random selection of fields of view might well lead to some counts being based on fields where there happen to be relatively more particles touching fibres, and with thousands of counts that will have occurred. The random variation in recorded numbers of fibres touching particles may be more evident on slides where relatively few fibres in total are counted, i.e. on the lower density slides.

In Figure 3.2a and 3.2b, the percent difference is plotted against the MDHS 39/4 reference density for that slide. For each slide, there is one data point for the estimate from the "expert laboratories", and multiple data points for results from individual analysts. Some of the slides have very similar reference densities and hence appear very close together on the horizontal axis. The results have been presented over the two graphs (Figures 3.2a and 3.2b) to split the set of slides into two density ranges. Even with two graphs, some of the individual slides overlap one another (i.e., they have almost the same reference density The first graph (Fig 3.2a) is for slides with density less than 100 fibres.mm^{-2}, and the second (Fig 3.2b) is for slides with higher density. The expectation of more variation in the results on lower density slides was indeed a feature of the data, and the vertical scales of the two graphs are therefore different.

Two laboratories included some counts that were made separately by MDHS 39/4 and by the new (WHO) method. The variation between repeat counts led to two estimates of fewer fibres touching particles by the WHO method; these two results (with negative percentages) are included in Figure 3.2b.

Some individual estimates of percentage difference (in Figure 3.2a and b) exceeded 100% (i.e. some individual counts reported more than twice as many fibres by the new method). The relative frequency of the values above 100% is perhaps difficult to assess visually from Figures 3.2a and 3.2b because of the large number (5040) of data points in the less than 50% range on the vertical scale. Out of 5627 estimates of percentage difference by the laboratories' analysts, 134 estimates were over 100%; that is equivalent to 24 in every 1000 estimates.

With the volume of data, there may have been data recording errors which were not detectable (because they were plausible values) or data transcription errors (in entering data from hand written results sheets). Data supplied by laboratories may have had less checking than in the routine RICE, given the different purpose of the data. For example, some of the percentages over 100% may have been due to analysts writing, instead of the extra fibres, the total number. A few false data values would not affect the medians (which are robust estimates of the consensus values as they are not affected by outliers). However, they might be the cause of some of the very high individual values.

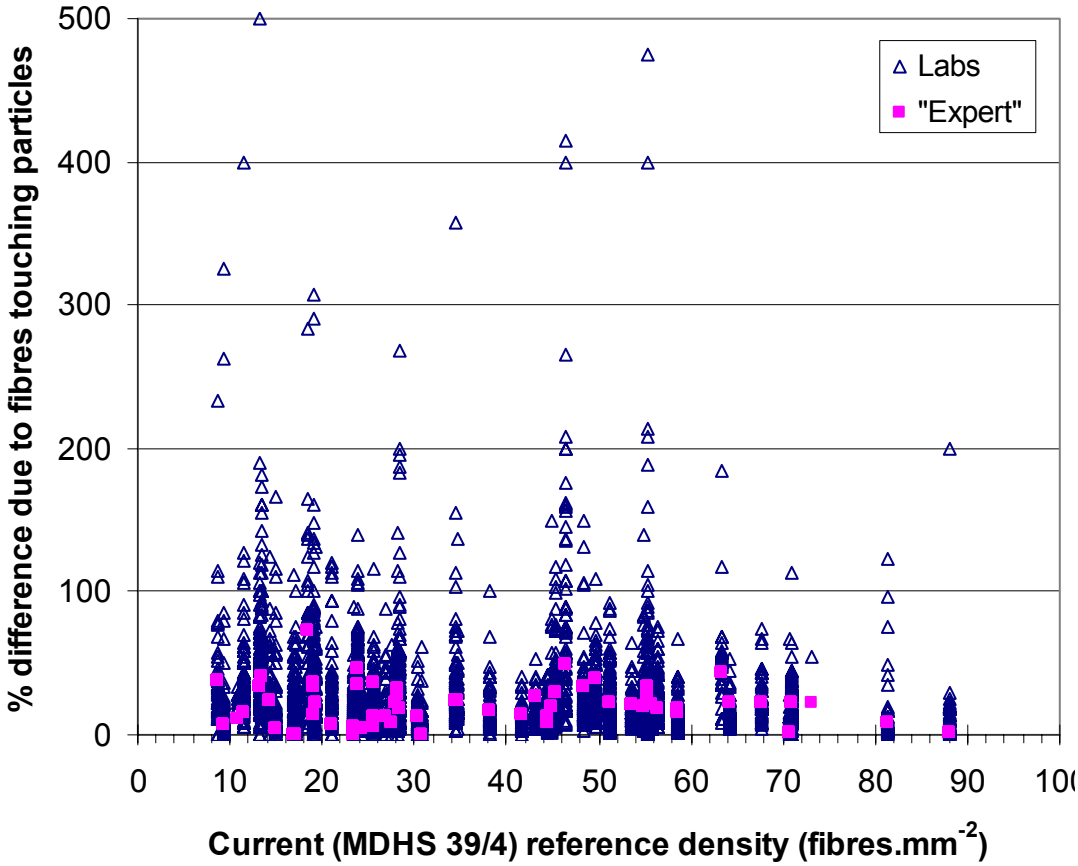

Figure 3.2a Percentage difference between MDHS 39/4 count and the new count, as estimated by each analyst in the 168 laboratories ("Labs"), with the estimates from the "expert laboratories", plotted against the current reference density for the samples. *Graph for samples with reference density less than 100 fibres.mm^{-2}.*
Note that three data points are not shown as they were off scale (i.e. above 500%).

Higher density samples are shown (in Figure 3.2 b) on the following page

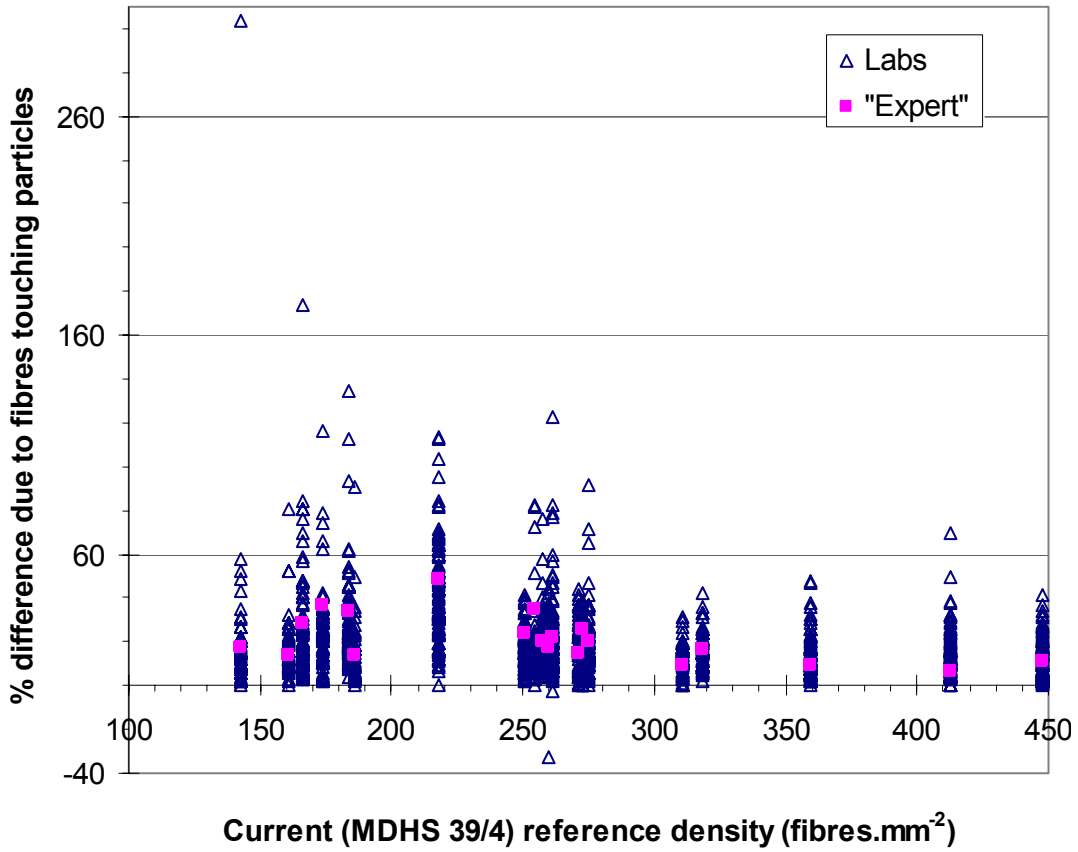

Figure 3.2 Percentage difference between MDHS 39/4 count and the new count, as estimated by each analyst in the 151 laboratories in the training exercise ("Labs"), with the estimates from the "expert laboratories", plotted against the current reference density for the samples.
Samples with reference density greater than 100 fibres.mm^{-2}.
Note that data from two laboratories included *separate* counts by new and current methods, and that led to two negative percentages (due to variation between repeat counts)

3.3 AVERAGE PERCENTAGE DIFFERENCE REPORTED BY EACH ANALYST

3.3.1 Numbers of slides counted by each analyst

Most analysts counted all the slides in their batch as shown in Figure 3.3. Batches were dispatched with 8 slides, but a breakage between one laboratory and the next may have led to some laboratories counting only 7 or even 6 slides. Minor discrepancies in the expression or reading of initials from a few analysts could have led to some inflation of the numbers apparently counting less than 8 samples; for example, if two slides counted by "PM" were actually counted by "BM" at one laboratory, then the numbers in the "6" and "2" columns would have been reduced by one, and the number counting 8 slides would have increased by one.

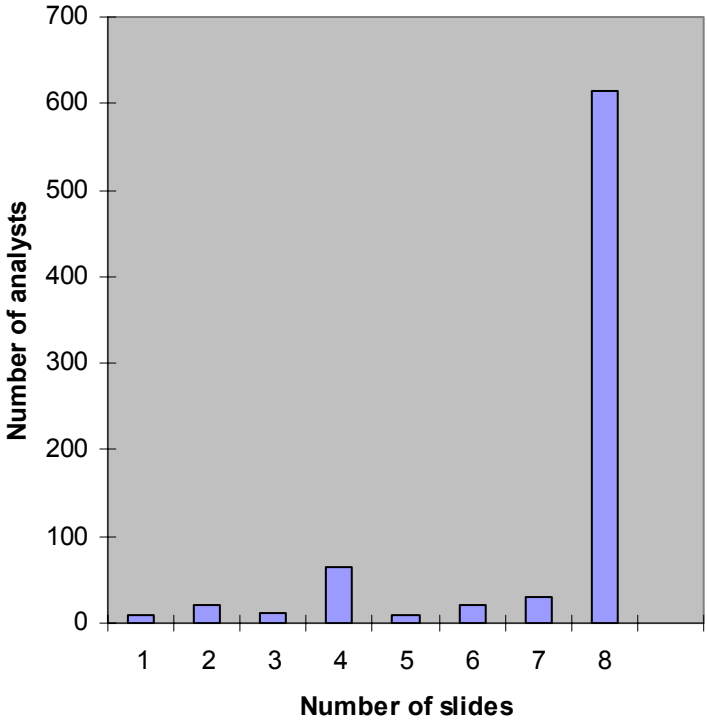

Figure 3.3 Number of analysts counting the given number of slides out of the 8 slides in each batch.

3.3.2 Average percentage difference for each analyst

When the percentage difference reported by each analyst was averaged over however many slides he/she counted, the mean percentage differences were indicative of the extent to which analysts were generally reporting similar effects of the new rule on fibre counting level. There were differences between the batches, and in terms of the average percentage difference based on the expert laboratories' data, the batches ranged from a mean percentage difference of 16% to 27%, with an overall mean of 20%.

The analysts produced mean percentage differences (over however many slides each analyst counted) which ranged more widely, as shown by the histogram in Figure 3.4 However, most of the analysts produced mean values which were close to the 20 to 30% range that might have been expected from the expert estimates.

There were a few outliers. For example, 7 analysts produced mean percentage differences over 100%. Three of them had counted only 1, 2 or 3 slides. The analyst counting only one slide happened to have counted a slide with a relatively high percentage difference according to the expert laboratories (his estimate of about 140% was double the expert estimate). One of the other results was strongly influenced by a 600% difference for one slide where the data were not impossible but might have contained a decimal place error in the analyst's recorded number of extra fibres. The four analysts who counted 7 or 8 slides and produced mean differences over 100% had counted four different batches, so these means were not explained by being from a particular batch of the slides. Therefore, the outliers are a feature that is probably more likely to be due to departures from the special difference counting procedure or incorrect recording of the data than due to real differences in counting level.

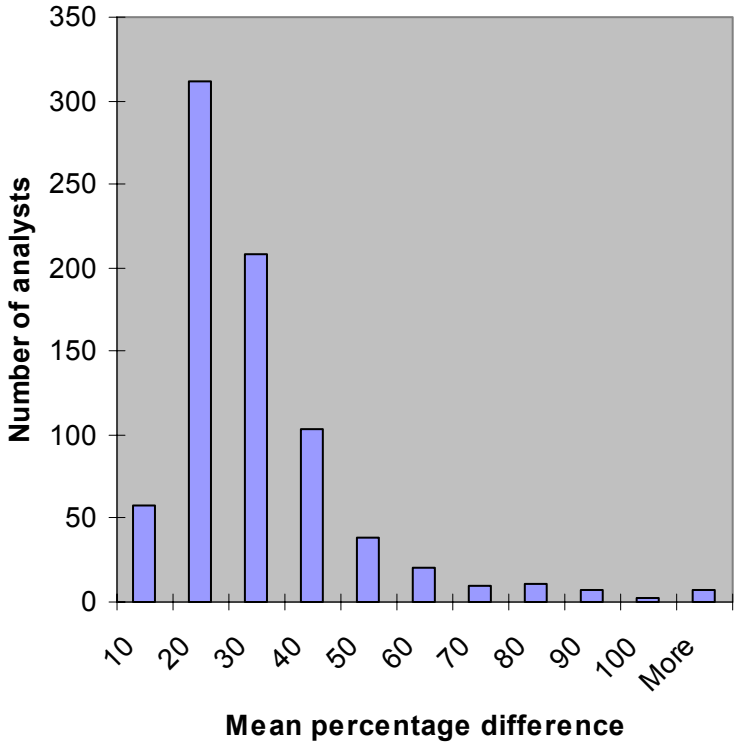

Figure 3.4 Numbers of analysts who produced mean percentage differences (for the slides he/she counted) in the range up to 10%, or 10 to 20% etc.

3.4 REFERENCE VALUES ON *RICE* SLIDES

3.4.1 Reference values for the current counting method

The samples in the training exercise were all reference samples from the RICE scheme and their current reference values had been calculated as the median of densities from counts made by laboratories during participation in the scheme. The data for producing reference values had been obtained by including in each batch of reference samples one or two candidate samples that were counted in the same way as the reference samples (i.e. the laboratories were not told which two samples were candidates at the time of counting). At certain stages in the operation of the scheme, reference values have been recalculated using the more extensive data collected while the samples have been counted as reference samples. The current reference values are thus based on large numbers of counts (minimum of 15, often more than 50), from many participants.

3.4.2 Reference values for the new counting method

The new reference value for the new counting method (the WHO method) is derived from the current database of fibre counts by multiplying the *median density* (fibres/mm^2) by the *conversion factor* derived from the special difference counts produced by the expert laboratories. The new reference values on the training exercise samples were derived in the way that is planned for the conversion of all RICE reference values when the new regulations and rules come into effect.

3.5 PERFORMANCE OF ANALYSTS AND LABORATORIES IN THE TRAINING ROUNDS

3.5.1 Performance indicators

In the training exercise, laboratories are not being assessed for performance in the same way as in the routine RICE. However, an important part of the information for the laboratories is an indication of how their data fare under the normal RICE assessment.

In the RICE proficiency testing, the performance of laboratories is assessed in terms of the proportions of counts that fall within bands that are defined in terms of distance from the reference values. Good performance is achieved by 75% or more of counts within a relatively narrow band ("A counts"); acceptable performance by 75% of counts within a wider band ("B counts"); and unsatisfactory performance as more than 25% of counts outside those bands ("C counts").

3.5.2 MDHS 39/4 counts

Table 3.1 summarises the percentages of counts in the relevant bands for the data from the training exercise (151 labs), from the pilot study (with 42 labs), and, for comparison, from some recent RICE rounds (about 190 labs).

- The pilot study, with 42 laboratories participating voluntarily, showed very slightly higher percentages of good ("A counts") and very slightly fewer poor counts ("C counts") than the recent RICE rounds. The percentages in each category are so similar that performance in the pilot study is essentially the same as the average performance of all participants in RICE. For chrysotile samples (in the lower half of the table), the percentage of poor counts is higher (about 13%) than for all samples (about 5%), but it is the same pattern for both the pilot study and routine RICE.

- The training round results show consistently lower percentages of good counts ("A counts") and higher percentages of poor counts ("C counts") than the recent rounds of RICE or the pilot study. For example, the percentage of "C counts" (on all sample types) is 5% in the recent RICE rounds but approximately 10% in the training rounds. The percentages of "C counts" are generally higher on chrysotile samples, and again the training data show a clearly higher value with 26% compared to 13%.

The majority of "C counts" in RICE are usually low counts (e.g. about 85% of "C counts" in recent RICE rounds were too low rather than too high). In the training rounds, (89.9%) of "C counts" were low counts. Thus, about 90% of C counts are typically counts that are too low rather than too high. The training rounds produced about twice as many "C counts" as would occur in a typical RICE round, and thus produced a much higher proportion of low counts than is usual in RICE.

Table 3.1 Percentages of counts in the performance bands used to assess laboratory performance in RICE. Counts by the current MDHS 39/4 method, compared to current RICE reference values.

Source	Sample type	Percentage of counts in each band				No. of counts
		A	B	C	Total	
Training – pilot	**All**	**86.8**	**8.0**	**5.0**	**99.8**	**1148**
Training Round 1	All	76.7	11.6	11.6	100.0	2054
Training Round 2	All	77.8	12.5	9.6	100.0	1741
Training Round 3	All	77.1	12.1	10.8	100.0	1833
Training Rounds 1-3	**All**	**77.2**	**12.1**	**10.7**	**100.0**	**5628**
RICE Rounds 70-73	*All*	*84.6*	*9.8*	*5.6*	*100.0*	*11746*
Training – pilot	**Chrysotile**	**72.8**	**13.8**	**13.4**	**100.0**	**224**
Training Round 1	Chrysotile	53.9	16.5	29.6	100.0	558
Training Round 2	Chrysotile	58.0	18.6	23.4	100.0	505
Training Round 3	Chrysotile	57.8	15.7	26.5	100.0	521
Training Rounds 1-3	Chrysotile	**56.5**	**16.9**	**26.6**	**100.0**	**1584**
RICE Rounds 70-73	*Chrysotile*	*70.2*	*17.0*	*12.8*	*100.0*	*4000*

Table 3.1 demonstrates the higher proportion of poor counts ("C counts") than in RICE. The individual reports that have been sent to each laboratory show their own proportion of counts in each band.

3.5.3 Counts by the new (WHO) rules

The training round data for counts by the new method obviously need to be compared to the converted reference counts. When that comparison was made, the percentage of counts in each of the performance bands were similar to those obtained in the comparison with current MDHS 39/4 reference values, as shown in Table 3.2.

Table 3.2 Percentages of counts in the performance bands used to assess laboratory performance in RICE.

Source	Fibre counting method	Percentage of counts in each band				No. of counts
		A	B	C	Total	
Training Rounds	†Current (MDHS 39/4)	77.2	12.1	10.7	100.0	5628
	‡New (WHO)	74.1	14.4	11.4	99.9	5628

† Counts by the current (MDHS 39/4) method compared to current RICE reference values.
‡ Counts by the new (WHO) method compared to converted reference values.

3.5.4 Laboratory performance

In this data set, most of the "C counts" in the training rounds came from a minority of the laboratories:

- 25% of the laboratories produced 71% of the "C counts";
- 13% of the laboratories produced 50% of the "C counts".

However, for each individual laboratory, its performance in a RICE assessment would be determined by the percentage of its counts which fall in each performance band. More than 25% of its counts in the "C band" (over four rounds of RICE) would mean classification as unsatisfactory. Figure 3.5 plots the cumulative number of laboratories with percentage of "C counts" below the value on the horizontal axis. There are 151 laboratories in total in Figure 3.5, where:

- 42 laboratories had no "C counts";
- 82 laboratories had less than 10 % "C counts";
- 127 laboratories had less than 20 % "C counts";
- 138 laboratories had less than 25 % "C counts";
- 13 laboratories (9% of laboratories) had *more than 25%* "C counts". For comparison, this was 4.1% in recent RICE rounds.

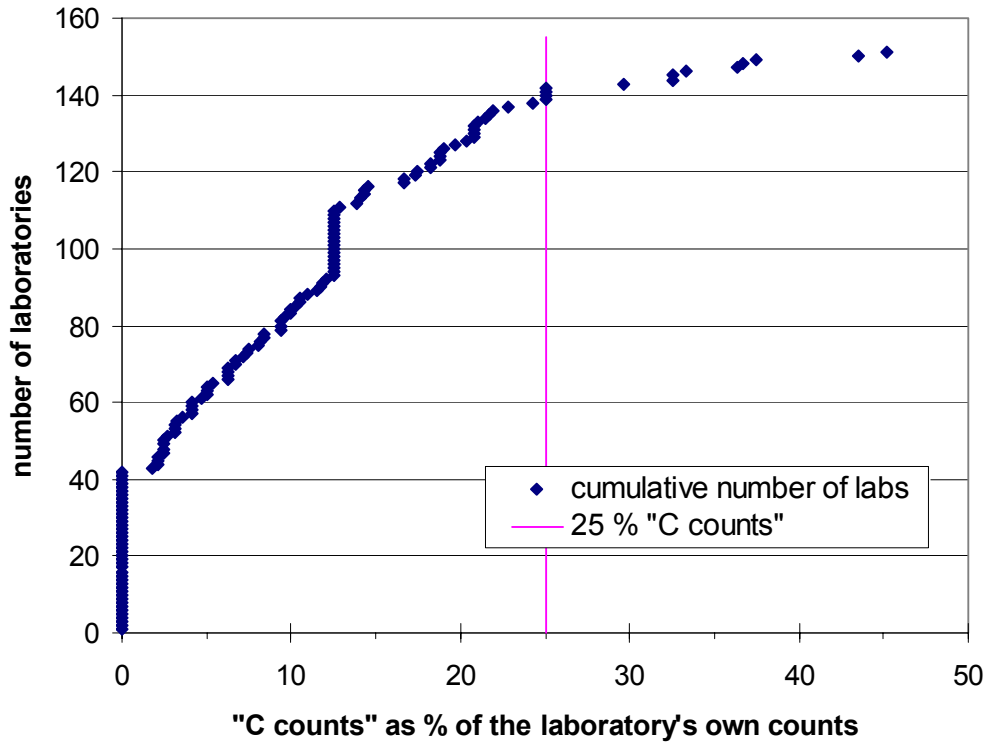

Figure 3.5 Cumulative number of laboratories with percentage of C counts at or below the value on the horizontal axis. There are 151 laboratories in total in this data.

4 DISCUSSION

4.1 CONVERSION OF REFERENCE VALUES

4.1.1 Converted reference values and the training exercise

Regular proficiency testing (in RICE) is a check on inter-laboratory consistency in the level of fibre counts (i.e. the reported fibre density in fibres/mm^2), by comparing each laboratory's reported densities to assigned reference values. When the new counting rules come into effect, the assigned reference values on the RICE reference samples will be converted to correspond to the new rules.

The training exercise has focussed on a specific aspect of the fibre counting rules, and that is quite different from the usual RICE proficiency tests. The training was intended to help laboratories be consistent in applying the new rules when they come into effect.

The training exercise results have shown that the expert laboratories' estimates of conversion factors for individual samples are generally acceptably close to the values that would be produced if we were able to obtain data from multiple laboratories for every slide in RICE. This suggests that the rationale for proceeding with the conversion of assigned reference values is valid. Therefore, the discussion of the outcomes of the training exercise is based on the decision that the RICE scheme will proceed to use conversion factors to convert the reference values on RICE samples.

In due course, when enough counts have been produced under the new rules, it will be possible to review and if appropriate amend the converted reference values.

4.1.2 Uncertainty in the converted reference values

Each reference value, being the median of at least 15 counts, is based on substantial data. Of course, a different set of 15 counts would give a slightly different median value. Due to variation between any set of counts, there is uncertainty in the median values. That uncertainty is one of the factors that influenced the selection of the width of the bands for accepting counts as being "good" or "acceptable".

The conversion factor also has uncertainty, and that contributes to the overall uncertainty in the converted reference values. Figure 3.1 indicates that the conversion factors estimated from only a small number of special difference counts from the expert labs correspond reasonably closely to the values that would be obtained if all conversion factors could be generated from multiple analysts. Most conversion factors have an uncertainty which appears small compared with the variation in repeat fibre counts. For example, the mean difference (in the data in Figure 3.1) between expert laboratories and the consensus values from the training data for the 107 samples is a percentage difference of 0.21, with a standard deviation of 9.7.

4.2 ADVICE TO LABORATORIES ON THEIR ANALYSTS' PERFORMANCE IN THE TRAINING ROUNDS

4.2.1 Training samples and samples in routine RICE

The samples in the training exercise were RICE samples but had been selected to include a relatively high proportion of samples containing enough particulate dust for counts to be affected by the rule concerning fibres touching particles. Therefore, the influence of this rule is

much more likely to be evident in the training exercise than in a typical batch of samples in RICE.

The current rule about excluding fibres that touch particles larger than 3 μm diameter involves a subjective decision by the analyst as to whether a fibre and particle are in contact. Some analysts may accept any visible overlap as contact and exclude those fibres from current counts; others may tend to err towards including fibres if in doubt about the contact. The former approach will lead to a large estimate of the percentage difference between counting rules; the latter will lead to a small percentage difference but probably a relatively high value for a count by the current method. This can lead to quite different patterns between individuals, and may lead to different issues in keeping satisfactory performance in RICE.

4.2.2 What to expect on RICE samples after the change in counting rules

After the change in counting rule comes into effect, the reference values on RICE samples will be increased by conversion factors derived by special counts of the type undertaken in the training exercise. For many RICE samples, the reference value may change very little if at all. On some samples, the reference values will change by a substantial amount. However, we expect that change will approximately match the amount that most analysts' counts will increase due to the new rule. That expectation was supported by the data from the pilot study and it appears to be confirmed by the data from the main training exercise.

4.2.3 If a laboratory had a higher proportion of poor ("C counts") than usual

If a laboratory's training data show that their analysts' counts would achieve good or acceptable performance by the above criteria, then that is a useful indication that the transition to new counting rules should not adversely affect their performance in RICE. The converse is not necessarily true because there might be good reasons why a laboratory's training exercise counts are not to their analysts' normal standard in RICE. For example, as laboratories were asked to include as many analysts as possible in the exercise, and as they had been told that laboratory performance would not be subject to a pass/fail test, they may justifiably have let trainees participate. A subset of the data was checked to see if the initials of the analysts indicated more trainees in laboratories that returned more "C counts"; this examination did not eliminate the explanation but nor did it demonstrate that it was the cause. Another possible explanation could be that the special difference counting method may have adversely affected some analysts; it is not the routine method and it was intended to focus attention on a specific aspect of the method, not to check on the level of routine counts.

However, it should not be assumed that training results with high proportions of "C counts" are never signs of problems. High proportions of "C counts" may indeed indicate future problems. For example, if an analyst had previously tended to compensate for low counts by including fibres touching particles, then that might explain low counts in the training exercise and be a sign that his/her counts may be at risk of being low when the new rules come into routine use.

Where the training data do include a higher proportion of "C counts", it could be an indication of a problem and therefore it is important that the laboratory examines the causes of that result. Therefore the results, and reasons for them, need to be examined by the laboratory manager and perhaps discussed with the UKAS assessment team.

4.2.4 Non-response

Data have yet to be returned by a minority of laboratories. However, there is no reason to believe that their data (when and if it is returned) will be importantly different from the substantial data set analysed for this report.

A simple check on the extent to which there might be any difference between the two groups of laboratories was attempted by examining the proportion of good counts ("A counts") produced by laboratories in recent RICE rounds. The laboratories which have already returned training round results showed an average of about 80% of counts as "A counts" in the most recent four RICE rounds. The percentage was slightly higher for the laboratories that had participated in the pilot study. It was slightly lower for the 24 laboratories that have yet to return results for the training exercise. If the lower proportion of "A counts" in RICE is an indicator of likely performance in the training exercise, then the results yet to be returned might show a slightly higher percentage of poor counts. However, the pattern of the enlarged total data set would be dominated by the already analysed results for the majority of the laboratories.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

The conclusions from the training exercise are that:

1. by providing training samples with instructions to 175 laboratories, most analysts in the UK will have been well informed of the main aspect of the change in the asbestos fibre counting rules;
2. over 900 analysts (the majority of analysts in the UK) have completed the training exercise;
3. the amount of data available for this analysis was sufficient to determine the general pattern of results and reach clear conclusions;
4. the data confirm that the consensus estimates of the effect of the new rules are consistent between UK analysts and the "expert" labs who are generating the conversion factors for all the other reference slides in RICE;
5. a significant minority of laboratories had a high level of poor counts. This minority was larger than in routine rounds of RICE. However, the higher proportion of poor counts might have arisen from several reasons as described in the discussion. Only the laboratories and their UKAS assessors are in a position to decide if the individual laboratory's results require any action prior to the implementation of the new rules.

Laboratories have been sent the reports on their individual results. Those reports should be considered (by laboratory managers) in conjunction with the information in this report. At the start of the exercise, laboratories were encouraged to treat the exercise as a training opportunity and were told that there would be no pass/fail test; however, they have been informed of how their results would have fared under the normal RICE assessment criteria. They have also been provided with advice on how to interpret their results.

5.2 RECOMMENDATIONS FOR THE CONDUCT OF THE FIRST ROUND UNDER THE NEW METHOD

The recommendations for the conduct of the first round of RICE after the change to the new rules are:

1. the assigned reference values on the RICE slides should be converted by using the conversion factors derived from expert laboratories;
2. although the converted reference values are expected to be in line with counts by the new method, there will be additional uncertainty in the converted reference values (arising from the uncertainty in the estimates of conversion factors) so that the overall pattern of results should be reviewed before sending reports back to laboratories;
3. an analysis and review of the first round results should be undertaken as soon as there is adequate data (e.g. when about 70% of the data has been returned);
4. the outcomes of the analysis should be reported to the steering committee, for review of the findings and any recommendations coming from that analysis; (for example, it might be appropriate to allow for the additional uncertainty in the converted reference values by temporary adjustment of the definition of target bands for counts to be considered satisfactory);
5. laboratories should be kept informed of the process, but not sent reports on results until the overall analysis and review has been completed;

6. since fibre counting laboratories are accustomed to interim reports in RICE, the interim data should be scrutinised at RICE to check for any gross errors that could be drawn immediately to the attention of a laboratory.

6 REFERENCES

Health and Safety Executive (2005) Asbestos: the analysts' guide for sampling, analysis and clearance procedures. HSG 248.

WHO (1997) Determination of airborne fibre number concentrations. A recommended method by phase contrast optical microscopy (membrane filter method). World Health Organisation, Geneva. ISBN 92 4 154496 1.

APPENDIX 1 INITIAL LETTER TO LABORATORIES ABOUT THE TRAINING

Dear RICE Participants,

Preparation for the change to WHO all fibre counting method.

You are probably aware that the asbestos fibre counting method in the UK is due to change from the current method to the new WHO all fibre method. The exact date will depend on completion of changes in the relevant Regulations, but CFM have asked us to proceed on the expectation that it will be January 2006. That may seem a long time ahead, but some of the preparations for the change are already taking place.

The RICE scheme is going to operate a special training round which will be available to every RICE laboratory. We have tried to answer the questions you may want answered below.

Which laboratories need to participate?

If your laboratory is UKAS accredited, then you will no doubt be aware that participation in the training round (offered by RICE) will be required by UKAS (in order to maintain accreditation). You may have read about this in the Fibre Aspects newsletter this summer or discussed this with your UKAS assessor.

If your laboratory is not UKAS accredited, you may still want to undertake the same preparations.

Some laboratories (listed below) have already participated in a pilot training round, and if your laboratory did so then that would normally suffice. However, if you are aware of subsequent changes in circumstances (such as a high proportion of new analysts) then you may wish to participate in another round. You should consider whether the UKAS assessment team is likely to regard your circumstances as requiring repetition of the training exercise. Please let us know if you think that is the case.

Is there a fee for participation?

The HSE is providing funding for the RICE scheme to provide the training round for RICE laboratories, so there is no charge to your laboratory for participation in the training round provided that you take part at the time allocated to your laboratory.

What is involved?

We send you a batch of samples, with detailed instructions to pass to the analysts. Each analyst is asked to count the fibres he or she would normally count under the current MDHS 39/4 rules and then count how many extra fibres he/she would count under WHO rules before moving on to the next field. This special counting procedure should help make the analyst aware of the change in the rules, and the data that you return to the RICE scheme will be used to inform you as to how your analysts compare with each other, experts and other RICE labs, in respect to the effect of the change in the counting rule.

You are advised to retain copies of all of the counting data generated, as part of the analysts' training records; this data will be examined by the UKAS assessors during subsequent visits.

How does this help your laboratory?

When the standard counting rule becomes the WHO all fibre counting rule, labs will be expected to use the new rules from that date (expected to be 1 January 2006) for routine counts and for counting quality assurance samples such as the RICE samples. The reference values on the RICE samples will be revised values that are right for WHO counts. The recalibration of the RICE samples will be based on special counts such as those your laboratory will produce in the special training exchange.

The application of the special counting rules (in the training round) is intended to help focus the analyst's attention on the difference in the rules.

So participation in the training exchange is intended to help your laboratory to be aware of how much counts should change with the switch to the new rules. The information should help you keep satisfactory performance in RICE as and when the scheme moves over to WHO based reference values.

What happens to your data?

There is no pass or failure. You are given feedback as to whether your analysts produce WHO counts that are consistent with those from other laboratories.

Is this separate from the normal RICE exchanges?

Yes, this will be a separate batch of samples. They will be labelled differently from the normal RICE samples, and will be accompanied by clear instructions.

When will the training round happen?

The training rounds are being run over the period between now and the end of 2005. Because there are a limited number of batches of RICE samples which already have comparable (special count) data, the rounds have to be run over these 14 or 15 months.

We might not be able accommodate everyone's preference as to when they would best like to be included in a special round. Therefore, we are going to allocate labs to a particular slot in the programme on a random basis. If you have a strong preference as to when you would prefer to participate and you let us know in advance, we will endeavour to meet your requests if it is possible. But obviously, it would be impossible to meet all requests if everyone wants the same slot!

Contact us for any further questions

If you have any questions about this, please contact either myself or your regular contacts in the RICE team Elizabeth McGoldrick or Patrick Brown.

Yours faithfully

Dr Alan Jones
Head of Proficiency Testing, IOM

APPENDIX 2 INSTRUCTIONS PROVIDED WITH THE TRAINING SAMPLES

Instructions
for the
RICE Special Training Exercise 2004-5

(Preparation for the W.H.O. All-Fibre Counting Method)

This note provides instructions on how to count the samples in the training round. Therefore, it must be read before counting the Samples! It also answers some anticipated questions about the exercise.

INFORMATION ABOUT THE TRAINING ROUND

What is the purpose of the training exercise?

This training exercise is aimed at helping analysts be ready to switch to the WHO rules, when the UK changes from the current asbestos fibre counting rules to the WHO all-fibre counting rules. Training rounds are being conducted now, and the change to the new rules is expected to happen at the start of 2006.

The important difference in the rules concerns a subjective judgement regarding whether fibres touch. Under current MDHS 39/4 rules, if an analyst considers that a fibre is touching a particle with diameter greater than 3 µm, then the fibre should be excluded from the count. We realise that some analysts may tend to exclude any fibre that appears to overlap such a particle whereas another analyst might be less easily convinced that the fibre and particle are touching, and tend to include the fibres.

The training round focus on this part of the counting rules, the inclusion of extra fibres that may have been excluded under present practice. The application of special counting rules (defined below) in the training round, is intended to help focus the analyst's attention on the difference in the rules.

So participation in the training exchange is intended to help you and your laboratory to be aware of how much counts should change with the switch to the new rules. The information should help you keep satisfactory performance in RICE as and when the scheme moves over to WHO based reference values.

Why do laboratories need to participate?

If your laboratory is UKAS accredited, then you will no doubt be aware that participation in the training round (offered by RICE) will be required by UKAS (in order to maintain accreditation). You may have read about this in the Fibre Aspects newsletter this summer or discussed this with your UKAS assessor.

If your laboratory is not UKAS accredited, you may still want to undertake the same preparations.

Some laboratories have already participated in a pilot training round, and if your laboratory did so then that would normally suffice. However, if there have been subsequent changes in your

laboratory's circumstances (such as a high proportion of new analysts), then your laboratory may have chosen to participate in another round, perhaps after considering whether the UKAS assessment team is likely to regard your circumstances as requiring repetition of the training exercise.

What happens to your data?

There is no pass or failure. You are given feed back as to whether you produce WHO counts that are consistent with those from other laboratories.

You are advised to retain copies of all of the counting data generated, as part of the analysts' training records; this data will be examined by the UKAS assessors during subsequent visits.

Is this training round separate from the normal RICE exchanges?

Yes, the training batch of samples is a separate batch from the normal RICE rounds. They are labelled differently from the normal RICE samples. The counting method defined below should be used for the training samples.

Will the reference values on the regular RICE samples change (with the new rule)?

We will be using estimates of the difference to adjust RICE reference values. We have data from about 40 laboratories that contribute to the estimates of the adjustment. However, your data will also help ensure the appropriateness of the adjustment. So the change in the reference counts will tie in with the way that the change in rule affects counts from RICE analysts. So, if the change in rule produces no change in your count (on RICE samples) then it is important that we know! Conversely, if the change in rule produces a large number of extra fibres (on some samples), then it is important that we estimate the change based on information from a large enough group of RICE analysts.

The information from this exercise is intended to help you and your laboratory prepare for the change to the new rule. It will help us to derive correction factors for RICE reference values that are based on previous counts from your lab and other RICE labs.

Is there a fee for participation?

The HSE is providing funding for the RICE scheme to provide the training round for RICE laboratories, so there is no charge to your laboratory for participation in the training round *provided that you take part at the time allocated to your laboratory.*

INSTRUCTIONS PROVIDED FOR ANALYSTS

METHOD FOR MAKING DIFFERENCE COUNTS IN THE TRAINING ROUND

We are asking you to count the 8 samples in the batch, but keeping a tally of three things:

[1] The fields, as usual;
[2] The fibres that you personally would normally count on a RICE sample;
[3] Any fibres that you personally would normally exclude (from a count on a RICE sample) because of contact with particles greater than 3 μm.

For each graticule area, count the fibres as defined by [2] – your present method – and then the additional fibres (if any) as defined by [3] before moving to the next graticule area.

In this exercise, there is no right or wrong number of additional fibres; it should reflect only the way that the change in rule affects your own count.

The number of graticule areas to be evaluated

Continue until either the tally [2] for fibres by your present method reaches 100 or until 200 graticule areas have been examined. A minimum of 20 graticule areas is to be examined even if this contains more than 100 fibres.

Note that this stopping rule is defined by the tally for type [2] fibres, and is not affected by the tally for type [3].

Number of counts and analysts

We are asking each analyst to count all eight slides in the batch you receive. This will give better training data for each analyst. Each counter should put their results on a separate form (even if they did not have time to count all the samples).

The more counters who participate the better. We would like to have data from as many of your analysts as possible. But please do not retain the slides for more than the maximum of 10 working days.

Data recording

Please record the data on the *Form DC2004* provided, one form for each analyst. We prefer you to use the electronic version (sent separately to laboratories with email addresses), but you may use the paper version if this is more convenient. Extra copies of the form are available from us if needed. The following data is requested:

Enter at the top of the form:
(i) the name of the laboratory,
(ii) the RICE number of the laboratory (if known),
(iii) the name of the microscopist,
(iv) the date(s) of the counts,

For each count, enter:
(i) the slide label number,
(ii) the number of fibres which you would normally count in a routine RICE count,
(iii) the number of additional fibres which would be counted by the WHO method,
(iv) the number of fields evaluated,

You may also wish to comment briefly on the quality of the samples and any features which affect the difference counts: a “comments” box is provided for each slide.

Time limit

The slides may be kept for a **maximum of ten working days** following receipt.

If you have any queries about this method or how to record your results, please contact
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