

## P401 – Identification of Asbestos in Bulk Samples by PLM

### Practical Assessment & Examination Guidance

This document provides advice and guidance with regards to the practical assessment which must be carried out during the P401 course and also the practical examination which is taken upon completion of the course. The document is split into part A and part B. Part A deals with the practical assessment and part B deals with the practical examination.

#### Part A – The Practical Assessment

##### 1. Introduction and Overview:

Candidates taking the P401 – Identification of Asbestos in Bulk Samples by PLM module are required to have the requisite skills to safely manipulate samples and to prepare slides for identification purposes.

The practical assessment **MUST** be carried out by the Tutor **DURING** the relevant part of the course for all candidates. This is to ensure that every candidate can demonstrate their individual ability and correct method for:

1. Working safely at a fume cupboard whilst using a stereo microscope to examine samples
2. Correctly preparing slides for examination under a polarising microscope
3. Setting up a polarising microscope to allow identification of asbestos types within a sample

Candidates are permitted access to written reference materials and written procedures during these tasks.

Candidates are required to complete each aspect of the assessment before proceeding to take the written and practical examinations.

The tutor should provide coaching to the candidate, at the required level, to ensure they are capable of demonstrating the correct ability and methods outlined above.

##### 2. Practical Requirements:

Candidates must demonstrate proficiency in **ALL** of the following areas:

- Sample Handling
- Pre-treatment of Samples and Extraction of Fibres
- Use of Stereo Microscope
- Preparation of Slides for Polarising Light Microscopy
- Set up of Polarising Light Microscope
- Use of Polarising Light Microscope

### **3. Equipment:**

A list of the equipment required to undertake this assessment is as follows:

- Microscopes (stereo and polarised light)
- Fume cupboards
- Sample pre-treatment reagents
- Appropriate tools and slide components
- RI liquids, microscope slides and cover slips

### **4. Marking and Reporting:**

The course tutor responsible for assessing candidates must complete a Practical Assessment Report Form for each candidate. This is provided as a separate document.

The Report must clearly show if each candidate has achieved a satisfactory or unsatisfactory level of proficiency for each assessment element.

Candidates are required to achieve a satisfactory level of proficiency for each element to complete the assessment.

A copy of the Practical Assessment Report Form must be supplied to BOHS on completion of the course. A copy may also be given to the candidate.

### **5. Results:**

The results for each candidate must be sent electronically to BOHS upon completion of the course.

It is acceptable to scan and email the completed documents to BOHS and return as one set per course. The reports are necessary to confirm the candidate's suitability to proceed to take the formal examinations.

### **6. Quality Assurance:**

The assessment is a mandatory part of the assessment and examination process for P401 and is subject to BOHS external quality assurance arrangements, to ensure compliance with requirements and to promote consistency and continuing improvement.

## **Part A - Assessment Elements**

The following six elements must be included in the practical assessment:

### **1. Sample Handling:**

- understanding of fume cupboard characteristics
- safe opening of sealed bags or containers inside fume cupboard
- initial visual examination of samples

### **2. Pre-treatment of Samples and Extraction of Fibres:**

- use of tools to break samples and/or extract fibres
- use of dilute acids to dissolve inorganic binders
- use of solvents to remove organic binders

### **3. Use of Stereo Microscope:**

- aim of stereo microscopy
- use of tools to separate different fibrous components
- knowledge of asbestos fibre morphology

### **4. Preparation of Slides for Polarising Light Microscopy:**

- selection of RI mounting liquid
- preparation of microscope slides for PLM examination
- procedure for samples that showed no fibres under stereo microscope

### **5. Set up of Polarising Light Microscope:**

- adjustment to give Köhler illumination
- stage centring
- insertion of polariser and analyser

### **6. Use of Polarising Light Microscope:**

- observation of fibre morphology, colour and pleochroism
- observation of birefringence and extinction characteristics
- determination of sign of elongation
- assessment of fibre RI by dispersion staining

## **Part B – The Practical Examination**

### **1. Introduction:**

Candidates taking the P401 – Identification of Asbestos in Bulk Samples by PLM module are required to identify asbestos types in six samples of materials, in accordance with safe working practices.

### **2. Facilities and Equipment:**

The P401 examination requires training providers to provide suitable facilities, including an appropriate examination room and equipment with the necessary safety features.

This is normally checked as part of course providers' prior approval to run this course.

The equipment must include:

- Microscopes (stereo and polarised light)
- Appropriate fume cupboards or dust control cabinets
- Sample pre-treatment reagents
- Appropriate tools
- RI liquids, microscope slides and cover slips

BOHS appoints a Specialist Invigilator for each examination who checks that the facilities and equipment are fully adequate for the purpose before each examination.

Specialist Invigilators are authorised to postpone or suspend an examination if facilities and equipment are not adequate.

The Specialist Invigilator is required to confirm that all ventilated enclosure units and vacuum cleaners to be used are within check date and fully functional and labelled. (The cabinet checks would include a relevant DOP test which has been done within the last six months which is also the same for the vacuum cleaner. In addition, the cabinet should also have a daily face velocity check record).

The Specialist Invigilator will also check that Cargille/McCrone liquids are in date or recently checked and have relevant contamination check information displayed on them. They will also confirm that all tools are clean, safe and operable.

### **3. The Examination:**

The examination is open book which means that candidates may have access to relevant reference material during the examination. However, candidates are not permitted to access electronic databases or electronic communication devices such as mobile phones, tablets or computers. In addition to this, candidates are not permitted to communicate with each other.

As the samples are provided from HSL and other sources and are listed samples, candidates must not have access to any HSL or BOHS records during the practical examination.

Specialist Invigilators ensure that candidates understand the examination requirements, and that all candidates complete all relevant documentation, including:

- Examination Attendance Record
- Sample Access Record Sheet
- Candidate Practical Examination Answer Form
- Candidate Information Form (if required)

Specialist Invigilators are responsible for returning the completed documentation to BOHS.

In addition to the safety check on facilities and equipment before the examination, Specialist Invigilators are responsible for all safety arrangements during the examination and may postpone the examination if risks to health and safety have been identified.

Where a serious breach of safety requirement occurs, the specialist invigilator may exclude the candidate concerned, if necessary, from continuing the examination and all details of the incident must be recorded in the Specialist Invigilator's report.

Specialist Invigilators must record any destruction or cross contamination of samples and/or breach of safety protocol on the appropriate form with individual attribution where relevant.

Where the candidates are split into two or more groups and are examined sequentially, Specialist Invigilators will ensure that sample numbers and other information is not passed between groups.

Where groups are examined on different days, different sets of samples are used in order to maintain examination integrity.

BOHS Head Office must be advised of this requirement in advance so that multiple sets of samples can be provided. Samples will be labelled with the relevant dates for use.

#### **4. Destruction or Cross Contamination of Samples:**

If a sample is contaminated or destroyed to such an extent that it is no longer useable for examination purposes, the Specialist Invigilator will contact BOHS Head Office and advise of the relevant sample number.

BOHS will advise the Specialist Invigilator of the category of the sample concerned, and the Specialist Invigilator should then try to obtain a similar sample from the course provider or from the examination sets supplied as stock at the provider's premises. (e.g. a new sample from the examinations sets stock would be best.)

Alternatively, a previously used AIMS sample of a similar category can be used. If using an AIMS sample, the Specialist Invigilator should advise of the AIMS number in their report.

If an AIMS sample is not available, the sample used must be returned to BOHS who will arrange for it to be independently analysed to give a reference analysis and hence a result.

## **5. Samples:**

Samples of materials are provided by BOHS for the examination. Only Specialist Invigilators are authorised to open the samples and training providers must keep samples secure.

Each sample set is designed to be sufficient for five to six candidates and should contain enough diversity to fully test the candidates' abilities.

Each individual sample is labelled with a BOHS sample number and is sealed in a laminate pack. Six of these samples are then placed in a polythene bag and sealed. This constitutes a set of samples.

Where more than eight candidates are being examined at the same time, a second set of samples is supplied.

To control consistency of the practical examination process, all identification of samples has been classified as follows:

- A.** More than two components present (usually three)
- B.** Contains a rare type plus another common component or is more difficult to analyse
- C.** Contains one component only (C (R) is used for single component of the less common types)
- D.** Contains two components
- E.** Contains no asbestos

To make up a sample set, one sample in category A or B, two from each of categories C and D and one in category E are normally selected.

All sample sets should have one sample with no asbestos.

Normally sample sets will only contain one sample containing the rare types of Asbestos. (Actinolite, Anthophyllite or Tremolite)

Samples with C (R) designation may be used as normal category C samples but only one is normally used per sample set. These may be used in place of categories A or B if necessary.

The number of samples in category D may be increased within a set from two to three, with a reduction in the number in category C from two to one, but this is normally only implemented when samples in categories A or B have also been substituted by a sample from C (R).

If a sample is damaged or destroyed to such an extent that it is no longer useable for examination purposes, the Specialist Invigilator will contact BOHS and advise them of the relevant sample number.

BOHS will advise the Specialist Invigilator of the category of the sample concerned, and the Specialist Invigilator should then try to obtain a similar sample from the course provider. These may be from the examination sets already on the course provider site or possibly a laboratory quality assurance sample.

If the replacement sample used is not a BOHS exam sample, it must be returned to BOHS who will arrange for it to be independently analysed to give a reference analysis and hence a result.

The Specialist invigilator must report the circumstances of the loss or destruction of a sample and if a candidate is deemed negligent, they will receive a supercritical error for that sample.

## 6. Marking and Results:

Marking is carried out against a full and detailed marking scheme.

Points are allocated to candidates for each analytical error made. The magnitude of the score is dependent on the seriousness of the error.

For example, failure to identify a non-significant component in a two asbestos component mixture would not score as high as the failure to identify a significant component in a two-component mixture; or a non-significant asbestos component where no other asbestos type is present.

Candidates are assessed as having satisfactory performance if their cumulative score over the six samples is less than or equal to 18. Scores of 19 or above will result in failure of the examination.

Three types of error are considered as follows:

- **Supercritical Error**

A supercritical error scores 20 points. This is an error which is analytically unacceptable, and which would have serious consequences if committed in reality. Such an error might be the failure to detect a single asbestos component of significant proportion\* (see below) in a matrix that would not be expected to impair detection.

Recording the sample number erroneously, analysing the same sample twice, destroying, or cross contaminating samples, or not observing safety protocols during sample analysis, are all regarded as analytically unacceptable and could have serious consequences if committed in reality. They are scored as super critical errors and therefore score 20 points.

- **Critical Error**

A critical error scores 12 points. This is an error, which though analytically unacceptable, might not have significant consequences if committed in

reality. Such an error might be the failure to detect a significant proportion of one asbestos component in the presence of already detected asbestos or to report asbestos where none exists.

- **Non-Critical Error**

A non-critical error scores 7 points. This is an error which is analytically less unacceptable than the other two types and would have no significant consequences if committed in reality.

Such an error might be a false positive identification of one or more asbestos types in the presence of an already detected amphibole asbestos, or the failure to detect a non-significant proportion of asbestos in the presence of other asbestos species, or the misidentification of Tremolite or Anthophyllite as Actinolite or vice versa.

The incorrect designation of Tremolite as Anthophyllite (or vice-versa) in a sample where either are present does not score as an error. In addition, the use of the term "Fibrous Grunerite" as an alternative to "Amosite" or vice-versa does not score as an error.

The results of the examination are sent directly to training providers after each examination. Examination results are also sent to candidates by post.

## **7. Feedback:**

Feedback is provided to all candidates on a routine basis. Feedback indicates the grading of the results produced by the candidate along with a series of error codes as relevant.

## **8. Disposal of Samples:**

Training providers are asked to retain samples after the examination for a period of one month in case of any analysis disputes. Training Providers are then responsible for disposing of samples.

### **\* Footnote**

A significant proportion is defined by the analysis frequency in the AIMS scheme results being in excess of 66.6% of all of that sample's AIMS results.

Where the AIMS result is less than 66.6% (eg. false positives and/or false negatives in excess of 33.3%), then the sample is deemed to have a less than a significant proportion (non-significant).

A failure to detect a non-significant proportion of asbestos in a single sample would be regarded only as a critical error scoring 12 points.