

# RPA 2000

## THE RPA 2000 COMPETENCE CERTIFICATION SCHEMES

### Document E

### Instructions for the creation of the portfolio of evidence for Specialist Certification in Radiological Instrumentation

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#### 1. INTRODUCTION

All Portfolios of Evidence must observe these instructions, since no other construction of a portfolio is acceptable to RPA 2000. Portfolios that do not closely adhere to these instructions will be returned to applicants. The objective of these instructions is to create a portfolio through which the assessors can easily navigate and obtain the necessary information to enable them to reach a decision with regards to certification. ***Applicants should be very clear that the onus is on them to demonstrate competence, not on assessors to seek it out from a less than adequate portfolio.***

You are required to provide sufficient evidence from education, training, knowledge and practical experience to meet the requirements of the scheme. Your portfolio of evidence should therefore contain details of your training and relevant examples of your work that together provide evidence to demonstrate your core competence to act as an Ionising Radiation Instrumentation Specialist (IRIS).

## 2. PRESENTATION OF THE PORTFOLIO

### 2.1 Construction

2.1.1 The preferred way to present the portfolio is to place the various items of evidence, suitably numbered and indexed, in an A4 ring folder.

2.1.2 It often proves helpful to separate the various sections of the portfolio using a simple system such as numbered, tabbed dividers.

### 2.2 Length

2.2.1 The exact length of the portfolio clearly depends on the amount and type of evidence being presented. However, as a guide, portfolios fitting into a one inch ring folder have provided more than sufficient evidence to convince the assessors that the applicant should be awarded certification.

2.2.2 The emphasis should be on ***the quality of the evidence rather than its quantity***. Remember that the assessors will have to read carefully through each piece of evidence presented in the portfolio some two to three times.

2.2.3 In general, one 'significant' item of evidence should be supplied (and should normally be sufficient) to demonstrate any particular practical competence. Where an applicant has doubts about the value of an item of evidence, it is acceptable to supply not more than 3 additional items of supporting evidence.

2.2.4 The term 'significant' is related to both the nature of the evidence and the ease with which an Assessor can judge the relevant competence of the Applicant from that evidence.

### 2.3 Navigation

2.3.1 Good navigation aids are essential, since aiding the assessors in their navigation through the portfolio is beneficial for all parties.

2.3.2 Essential items of evidence may be contained within a larger document to give context, in which case the relevant parts of the larger document should be clearly identified in Linking Notes attached to the item of evidence, or in the Contextual Note provided in the summary (see section 4).

2.3.3 The essential navigational elements of the portfolio are included in the list of portfolio contents that follows in section 4.

## 3. PORTFOLIO CONTENT

Listed below are the necessary contents of the Portfolio.

- A comprehensive **contents list**, detailing and indexing all your items of evidence.
- A **summary section**, not exceeding 5-6 pages in length, in which each of the major items of your evidence is summarised into a ***short contextual paragraph*** that clearly identifies the competence(ies)/experience(s) that it supports.
- **Cross Reference Table No. 1** (see Appendix 1), linking the relevant pieces of your evidence to the topics of the ***basic knowledge syllabus*** for Ionising Radiation Instrumentation Specialist (IRIS). Included is a small table on which to list your relevant training courses.

- **Cross Reference Table No. 2** (see Appendix 2), linking the relevant pieces of your evidence to the required practical competencies/experiences.
- **Cross Reference Table No. 3** (see Appendix 3), linking the relevant pieces of your evidence to the required detailed understanding elements that are not covered by Table No.2.
- All the documents that you are submitting as your **items of evidence**, the major ones having been summarised into a **short contextual paragraph** as described above. In some cases there may be a longer Linking Note attached to an item of evidence that explains and expands on what is being demonstrated.
- **Authentication**, by a Referee, that the contents truly reflect the extent and nature of your own work.

#### 4. GENERAL GUIDANCE

4.1 To determine the suitability of a potential piece of evidence, examine it and ask yourself 'How does this evidence show that I have the basic knowledge/competence/experience'. This will help in deciding what material to include to ensure adequate coverage of all the requirements. Evidence can be generated specifically to demonstrate knowledge, understanding and competence.

4.2 Evidence must be from your own work, dated and predominantly taken from work carried out over the last five years. Evidence of training and education may precede the five years where there is additional evidence that knowledge and skills have not been lost, for example by having been kept up to date through professional development and practical application. Also, some unique evidence of practical competency/experience may also precede the five years. However applicants should note that the value of any evidence used for demonstrating current competence diminishes with time.

4.3 An item of evidence consisting of workplace documentation alone is unlikely to provide an adequate demonstration of performance. It will usually need some Linking Notes written by you, which will explain the intellectual process you went through at the time and perhaps the background and details of the situation involved. Include details of numerical calculations, logical reasoning behind decisions and reference to legislation, where appropriate.

4.4 Items of evidence that include contributions by other people should be annotated to clearly show the extent of your contribution to the work and your relationship to the others (eg if you are the Department Head).

4.5 The portfolio must be authenticated by a suitable Referee, who has agreed that the contents truly reflect the extent and nature of your own work.

4.6 Where the portfolio covers work for more than one client, (eg consultancy), then the separate parts could be authenticated by different people, as appropriate.

#### 5. BASIC UNDERPINNING KNOWLEDGE FOR IONISING RADIATION INSTRUMENTATION SPECIALISTS (see Appendix 1)

5.1 This area of the portfolio has frequently been neglected by applicants, often causing unnecessary and long delays in completing the assessment. Points that are relevant are listed below.

5.2 The basic syllabus specifies the topics of the underpinning knowledge and also the depth of knowledge required for each topic of the syllabus, namely: GA (general awareness), BU (basic understanding), DU (detailed understanding) and PC (practical competence).

5.3 Sufficient evidence must be provided to demonstrate that each topic of the basic syllabus has been covered, to the required depth of knowledge, either:

- (i) in the applicant's degree, postgraduate study, professional training courses, certificated study or other local training events; and/or
- (ii) as part of the applicant's work experience. This evidence should be in the form of a resume of the applicant's work history and should detail the positions held and relevant work experience, clearly highlighting those aspects that demonstrate the necessary knowledge for each relevant topic.

5.4 Course outlines, syllabus information, meeting programmes attended or similar items would usually suffice for the evidence in those areas where general awareness or basic understanding is required, provided the evidence is sufficient to demonstrate the necessary knowledge.

5.5 Information should be provided as to whether or not performance on the training course(s) was formally assessed. If it was, a brief description of the method(s) of assessment should be provided together with the result(s) achieved by the applicant (see section A1.4 in Appendix 1).

5.6 In addition to course based knowledge, evidence of Practical Competency (PC) is necessary for five topics of the basic syllabus. Such evidence should normally be from a workplace environment (see Section 7 and Appendix 2).

5.7 In addition to course based knowledge, evidence of Detailed Understanding (DU) is necessary for ??? topics of the basic syllabus. Such evidence would be expected to be provided in the form of a written piece of work to supplement evidence of these areas having been covered in training courses or similar. (See Appendix 3).

5.8 The table in Appendix 1 has been specifically designed to identify all the evidence that the applicant needs to supply and to provide a convenient format for:

- the applicant to provide the evidence;
- the assessors to record the outcome of the assessment; and
- RPA2000 to automatically request further evidence, where judged necessary.

## 6. DEMONSTRATION OF PRACTICAL COMPETENCIES (see Appendix 2)

7.1 Applicants must provide evidence to demonstrate practical competence in each of the five topic areas of the Basic Syllabus that require *practical competence*. Guidance to assist applicants in providing evidence in support of practical competencies follows below.

- As a general principle, and where appropriate, it is acceptable for one significant item of evidence to be used to demonstrate more than one competence. If doing so, the applicant must be careful to maintain clarity in the presentation of the evidence.

- Items of evidence might include operating data or documentation produced in the workplace, reports, minutes or notes on meetings, schedules, programmes, objectives/goals achieved, details of work on special projects, photographs, plans, drawings, etc.
- When using minutes or notes of meetings, you should ensure that they are from meetings where you have made a contribution, and are detailed enough to clearly show your contributions or actions. A contextual statement describing your involvement may be of benefit.

6.2 The tables in the Appendices have been specifically designed as a convenient format for:

- the applicant to cross-reference all items of portfolio evidence to the appropriate competence(ies)/experiences;
- the assessors to record the outcome of the assessment; and
- RPA 2000 to automatically request further evidence, where judged necessary.

## **7. SIMULATION AND MENTORED PRACTICAL EXERCISES**

7.1 Some applicants may have difficulty in obtaining practical experience in some areas of radiological instrumentation and hence may wish to use simulation in place of, or to supplement, their workplace evidence. Simulation involves the creation of a realistic workplace scenario incorporating relevant radiation protection issues that a Ionising Radiation Instrumentation Specialist would be expected to address. The applicant submits evidence to demonstrate the necessary practical competence to resolve those radiation protection issues. Such simulation is the basis for the 'mentored practical exercises', which are undertaken by students on some Training Courses in Radiation Protection.

7.2 Where applicants provide evidence of practical competencies based on simulation, the following guidance, which is based on experience and on detailed discussion with assessors, will be relevant.

- Evidence from simulation must only be used when the applicant's workplace is unable to provide the opportunity to demonstrate the competency. In all cases, the reason for submitting this type of evidence must be fully explained.
- There should not be a problem awarding certification if a 'good portfolio' includes no more than 10% of the competencies that are demonstrated by evidence from simulation (i.e. at least 90% are from direct work experience).
- It is unlikely that certification would be awarded if more than 50% of the competencies are demonstrated by evidence from simulation (i.e. less than 50% are from direct work experience).
- In all situations, the award of certification will be greatly influenced by the quality of the evidence from the simulation and the reasons for having to use simulation.

## **8. APPLICANTS FROM OUTSIDE THE UK**

8.1 Any person may apply for a Specialist Certificate in Ionising Radiation Instrumentation, irrespective of where they live or work. All evidence submitted must be in English. A translation from an original document is acceptable.

8.2 Such persons must demonstrate the ability to give adequate advice to duty holders, employers and Radiation Protection Advisors.

## 9. THE ASSESSMENT PROCESS

9.1 The full assessment process is described elsewhere in RPA2000 Operating Procedures. Of relevance to the portfolio assessment is that:

- the **full portfolio** is sent to the lead assessor; and
- the **summary section** is sent to the two supporting assessors.

9.2 The supporting assessors can ask to see the full portfolio, or the lead assessor can send the full portfolio to another (or both) assessor(s) for a second opinion. Most often, the lead assessor reaches a conclusion and puts this to the supporting assessors for their confirmation.

9.3 It is possible that Assessors may wish to interview Applicants in borderline cases.

Professor Peter Sharp  
Chairman  
RPA 2000

December 2008

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## Appendix 1 – CROSS REFERENCE TABLE No. 1

### Basic Underpinning Knowledge (Basic Syllabus) for Ionising Radiation Instrumentation Specialists

#### A1.1 Introduction

The three levels of the depth of knowledge are defined as follows:

Depth of knowledge	Definition
<b>GA</b>	<b>General Awareness.</b> Knows that the topic exists and aware of its significance to work activities in context. Also knows how and where to obtain help on the topic if needed.
<b>BU</b>	<b>Basic Understanding.</b> Has a basic understanding of the topic with a level of detail that allows the IRIS to apply it to familiar work activities in context. If necessary, can research further knowledge using readily available sources and apply it in less familiar circumstances.
<b>DU</b>	<b>Detailed Understanding.</b> Has a good understanding of the topic and the underlying principles and can apply the knowledge in appropriate contexts. Can apply the knowledge working from basic principles to deal with instrumentation and monitoring issues in new or unfamiliar areas and can identify and influence the peripheral and long-term issues arising from its application.

#### A1.2 Instructions for completion of Cross Reference Table No. 1

1. For each topic of the Basic Syllabus, provide suitable evidence to demonstrate that you have the necessary knowledge at the appropriate depth of knowledge.
2. In the 'evidence' column of the Table, provide a clear cross-reference to the relevant item(s) of your portfolio evidence, possibly using information from a course provider who may be able to provide information directly relating the course syllabus to the Basic Syllabus for IRISs.
3. Leave the 'assessment' columns blank, for use by the assessor.
4. **If this Table is subsequently returned to you,** it means that you are deemed to have provided insufficient (or unsuitable) evidence in respect of one or more of the topics of the basic syllabus. Please then provide additional evidence for each of the topics for which your initial evidence has been deemed to be insufficient.

#### A1.3 Cross Reference Table No.1

##### Basic Underpinning Knowledge (Basic Syllabus) for Ionising Radiation Instrumentation Specialists

Areas	Level required	Assessment	
		Sufficient	Insufficient
Basic atomic and nuclear physics	BU		
Interaction of radiation with matter	BU		
Detection and measurement Monitoring methods			
- Uncertainties	DU		
- Limits of Detection	DU		
- Averaging techniques	DU + PC		
- Response times	DU + PC		
- Statistical fluctuations	DU + PC		

<b>Practical radiation fields</b> <ul style="list-style-type: none"> <li>- Spectra emitted</li> <li>- Changes in angle and energy</li> <li>- Attenuation</li> <li>- Conversion to other forms</li> <li>- P factor for contamination</li> <li>- Influence of radiation fields</li> </ul>	BU BU BU BU BU BU		
<b>Typical instrument problems</b> <ul style="list-style-type: none"> <li>- Light leaks</li> <li>- Punctured detectors</li> <li>- Failed scintillators</li> <li>- Battery contacts</li> <li>- Cable damage</li> <li>- Damaged meters and displays</li> </ul>	BU + PC BU + PC BU BU + PC BU + PC BU + PC		
<b>Quantities and Units</b> <ul style="list-style-type: none"> <li>- Primary Physical quantities</li> <li>- Limit quantities</li> <li>- Operational quantities</li> <li>- Activity (per unit area, per unit volume, per unit mass)</li> </ul>	DU DU DU DU		
<b>International guidance requirements</b> <ul style="list-style-type: none"> <li>- ISO 4037</li> <li>- ISO 8769</li> <li>- ISO 7503</li> <li>- IEC 60532</li> <li>- IEC 60846</li> </ul>	GA* GA* GA* GA* GA*		
<b>Signal processing and display</b>	BU		
<b>Power supplies</b> <ul style="list-style-type: none"> <li>- Batteries</li> <li>- Mains supplies</li> <li>- Internal instrument supplies generating high voltages</li> </ul>	BU BU BU BU		
<b>Statutory requirements</b> IRR99 regulation 19 or current regulation dealing with the selection use, maintenance or testing of Radiation instrumentation	DU		
<b>UK guidance</b> Relevant current NPL Good Practice guides <ul style="list-style-type: none"> <li>- E.g. GPG 14 Portable Radiation Protection Instruments</li> </ul>	DU		
<b>Principles of operation</b> <ul style="list-style-type: none"> <li>- Ion chambers</li> <li>- Proportional counters</li> <li>- GM detectors</li> <li>- Scintillators</li> <li>- Solid state detectors</li> <li>- TLD</li> <li>- OSL</li> </ul>	DU DU DU DU DU BU BU		

\* BU of those standards relevant for job area

<b>Operational Radiation Protection</b> <ul style="list-style-type: none"> <li>• Types of sources</li> <li>- Sealed</li> <li>- Unsealed</li> <li>- X-ray units</li> <li>- Accelerators</li> <li>- Monitoring</li> <li>- Area monitoring</li> <li>- Personal dosimetry</li> </ul>	       	       	       
Ergonomics ( user-friendly design and layout of instruments)	GA		
Operating rules	GA		
Emergency procedures	GA		
<b>Organisation of radiation protection</b> <ul style="list-style-type: none"> <li>- Role of Qualified Expert</li> <li>- Role of instrumentation specialist</li> <li>- Role of RPA</li> <li>- Role of qualified person</li> </ul>	    		
Appreciation of the competence and requirements of the end user	GA		
Communication skills ( ability to communicate instrument shortcomings)	BU		
Record keeping (certificates, sources etc)	BU		
Quality control/ auditing	BU		
Dealing with contractors	GA		
<b>Calibration facilities</b> <ul style="list-style-type: none"> <li>- Traceability to National standards</li> <li>• Types of facility and their essential attributes</li> <li>- Gamma dose rate</li> <li>- X-ray</li> <li>- Beta dose rate</li> <li>- Neutron dose rate</li> <li>- Surface contamination</li> <li>• Phantom for personal dosimeters</li> <li>• Safety</li> <li>• Statutory obligation</li> <li>- Controlled and supervised areas</li> <li>- Leak testing</li> <li>- Source accountancy</li> <li>- Staff dosimetry provision</li> </ul>	                   		
<b>Setting up instruments</b> <ul style="list-style-type: none"> <li>- Energy thresholds</li> <li>- HT</li> <li>- Dead time</li> <li>- Overload current</li> <li>- Averaging times</li> <li>- Alarms</li> </ul>	      		

<b>Repairing equipment</b> - Judgement of scope of test after repair - Re-foiling of scintillators - Replacing GM tubes and PM tubes - Replacing cables	DU GA GA GA		
<b>Transport of radioactive materials</b>	GA		
<b>Understanding the environment (both for calibration and routine operation)</b> - Temperature - Pressure - Humidity - Radon - EMC - Vibration and impact - Bright light - Magnetic fields - Pulsed fields	BU BU BU BU BU BU BU BU		
<b>Advising the employer and RPA</b> - Advise on instrument selection - Clear account of why an instrument has failed - Advise on the implications of failure if the instrument was used - Explanation of varying indications from different types of instrumentation	DU + PC DU + PC DU + PC DU + PC		

# A basic understanding of at least one type of calibration facility is required. This should be described in detail in Appendix 2 A2.2 Table 2 section 3.

#### A1.4 Training courses attended

Use the following table to list the training course(s) that you attended to cover the knowledge required by the Basic Syllabus, and please also specify:

- whether or not your performance was formally assessed;
- if so, the method of assessment (brief description only); and
- the result that you achieved.

Title of course	Date attended	Whether assessed?	Method of assessment	The result you achieved
		Yes/No		
		Yes/No		
		Yes/No		
		Yes/No		

## Appendix 2 – CROSS REFERENCE TABLE No. 2 : Evidence to demonstrate Practical Competencies

### A2.1 Instructions for completion of Cross Reference Table No.2

1. For each of the five PC topic areas in **Cross Reference Table 2** provide suitable evidence from your work to demonstrate the corresponding elements of competence.
2. The ‘Advisory and additional notes for the applicant’ provide a clearly defined route as to specific evidence situations that are likely to demonstrate competence to the assessors. RPA 2000 hopes that most applicants will follow this defined route although applicants are free to submit whatever evidence they deem to be most appropriate to demonstrate their competence. Sections are provided within the Table for applicants to record this additional/alternative evidence.
3. In the ‘Evidence reference’ column of the Table, provide a clear cross-reference to the relevant item(s) of your portfolio evidence
4. Leave the ‘Assessor Decision’ column blank, for use by the assessor.
5. **If this Table is subsequently returned to you**, it means that you are deemed to have provided insufficient (or unsuitable) evidence in respect of one or more of the chosen competencies. Please then provide additional evidence for each of the competencies for which your initial evidence has been deemed to be insufficient.

### A2.2 Cross Reference Table No.2

Extended description of the five PC areas	Elements of the competence required of an IRIS	Evidence reference	Assessor Decision	Advisory and additional notes for the applicant
<b>1. Detection and Measurement</b> Monitoring methods	A practical understanding of : 1.1 The limitations associated with different instruments; and 1.2 The associated monitoring techniques that can be utilised in order to mitigate for any less desirable instrument characteristics	<b>Training records</b> SIRA course content <b>Portfolio item 5a, 5n</b> Uncertainty in measurement lecture and notes		<i>Provide one or more items of suitable evidence from your work to demonstrate competence in both 1.1 and 1.2. Competence is likely to be demonstrated if your evidence address each of the following:</i> Determining the average indication and describing the technique used, including consideration of statistical independent readings, the response time of the instrument, its averaging time and the influence of detector sensitivity and the magnitude of the dose rate or level of contamination being measured. Statistical dependence on the number of counts collected Speed of monitoring Limits of detection Maximum missable activity Minimum detectable activity Narrow beams or hot spots Averaging area, Scattered radiations

Extended description of the five PC areas	Elements of the competence required of an IRIS	Evidence reference	Assessor Decision	Advisory and additional notes for the applicant
<p><b>2. Typical Instrument problems</b></p>	<p>The sound ability to:</p> <p>2.1 Identify common modes of failure; and</p> <p>2.2 Describe the effect that the failure has on the use of the instrument</p>	<p><b>Training records</b>  PGRP LN 15 and LN63  Lecture  <b>Portfolio item 5c</b>  Failure modes for monitors</p>		<p><i>Provide one or more items of suitable evidence from your work to demonstrate competence in both 2.1 and 2.2. Competence is likely to be demonstrated if your evidence address each of the following:</i></p> <ul style="list-style-type: none"> <li>• Light leaks</li> <li>• Punctured detectors</li> <li>• Aged or damaged scintillators</li> <li>• Battery failure/contacts</li> <li>• Cable damage</li> <li>• Damaged meters and displays</li> <li>• User maladjustment</li> </ul>

Extended description of the five PC areas	Elements of the competence required of an IRIS	Evidence reference	Assessor Decision	Advisory and additional notes for the applicant
<p><b>3. Calibration Facilities</b></p>	<p>A thorough understanding of;</p> <p>3.1 Traceability</p> <p>3.2 Levels of uncertainty associated with the establishment of the calibration reference field;</p> <p>3.3 How this relates to the final instrument response figure derived.</p> <p>3.4 Essential attributes of at least one type of calibration facility</p>	<p><b>Portfolio item 5o, 5e, 5m, 5a</b></p> <p>Lecture traceability and standards and Lecture Uncertainties.</p>		<p><i>Provide one or more items of suitable evidence from your work to demonstrate competence. Your evidence should include the following:</i></p> <ul style="list-style-type: none"> <li>• Assessment of uncertainty budget relating calibration field uncertainty to National standards. This may include contributions from; <ul style="list-style-type: none"> <li>- Transfer standard</li> <li>- Room Scatter</li> <li>- Set up distance</li> <li>- Temperature</li> <li>- Pressure</li> </ul> </li> <li>• Followed by assessment of uncertainty in final response figure calculated for instrument under test / use in the field for a number of different types of instruments. This may include contributions from; <ul style="list-style-type: none"> <li>- True dose rate</li> <li>- Monitor reading</li> <li>- Background reading</li> <li>- Parallax</li> <li>- Beam non-uniformity</li> </ul> </li> </ul> <p>Demonstration of unbroken chain of calibration to show traceability to National Standards</p>

Extended description of the five PC areas	Elements of the competence required of an IRIS	Evidence reference	Assessor Decision	Advisory and additional notes for the applicant
<p><b>4. Setting up instruments</b></p>	<p>4.0 Understanding the principles of setting up a range of instrument types.</p>	<p><b>Portfolio item 5n</b> Fidler probe Delta 5 package monitor</p>		<p><i>Provide one or more items of suitable evidence from your work to demonstrate competence. Competence is likely to be demonstrated if your evidence addresses each of the following situations:</i></p> <p>4(a) Setting of appropriated energy thresholds dependant on detector and proposed use</p> <p>4(b) Establishment of appropriate HT setting according to type of detector and proposed use</p> <p>4(c) Evaluation and application of detector dead time</p> <p>4(d) Setting appropriate overload current</p> <p>4(e) Setting appropriate averaging times</p> <p>4(f) Setting appropriate alarm levels</p>

Extended description of the five PC areas	Elements of the competence required of an IRIS	Evidence reference	Assessor Decision	Advisory and additional notes for the applicant
<p><b>5. Advising the employer and RPA</b></p>	<p>5.1 Advice on appropriate instrument selection</p> <p>5.2 Advice in implications of instrument failure or inappropriate selection</p>	<p><b>Portfolio item 5j</b></p>		<p><i>Provide one or more items of suitable evidence from your work to demonstrate both elements of competence (5.1 &amp; 5.2).</i></p> <p><i>Competence is likely to be demonstrated if your evidence addresses each of the following situations:</i></p> <p>5(a) Interpretation of Type test data to demonstrate that the instrumentation is radiologically fit for purpose</p> <p>5(b) Consideration of non-radiological issues such as:</p> <ul style="list-style-type: none"> <li>- Maintenance costs and availability of spares (Batteries, foils etc)</li> <li>- Suitability for the environment ( Robustness, EMC, weather etc)</li> <li>- Ergonomically suitable for the user ( Clarity of display, Weight, single or dual handed etc)</li> </ul> <p>5(c) Advice on the implications for the final monitoring results if an instrument was used that had failed mid-use or was an inappropriate instrument for the use.</p>

## Appendix 3 – CROSS REFERENCE TABLE No. 3: Evidence to demonstrate Detailed Understanding for elements not covered in cross reference table No.2.

### A3.1 Instructions for completion of Cross Reference Table No.3

1. For each of the DU topic areas in **Cross Reference Table 3** provide suitable evidence to demonstrate the corresponding elements of competence.
2. The ‘Advisory and additional notes for the applicant’ provide a clearly defined route as to specific evidence situations that are likely to demonstrate competence to the assessors. RPA 2000 hopes that most applicants will follow this defined route although applicants are free to submit whatever evidence they deem to be most appropriate to demonstrate their competence. Sections are provided within the Table for applicants to record this additional/alternative evidence.
3. In the ‘Evidence reference’ column of the Table, provide a clear cross-reference to the relevant item(s) of your portfolio evidence
4. Leave the ‘Assessor Decision’ column blank, for use by the assessor.
5. **If this Table is subsequently returned to you**, it means that you are deemed to have provided insufficient (or unsuitable) evidence in respect of one or more of the chosen competencies. Please then provide additional evidence for each of the competencies for which your initial evidence has been deemed to be insufficient.

### A3.2 Cross Reference Table No.3

Extended description of the DU areas	Elements of the competence required of an IRIS	Evidence reference	Assessor Decision	Advisory and additional notes for the applicant
Quantities and Units	Knowledge of: Fluence, air kerma, absorbed dose, ambient, directional, personal and effective dose equivalents. Activity, activity per unit area, activity per unit volume and activity per unit mass.	<i>Portfolio item 5d, 5a</i>		Demonstrate an understanding of all listed quantities and describe how they are derived. Also describe which quantity is the most appropriate for making a measurement for a variety of radiations and situations.
Statutory requirements	Fully conversant with IRRs reg 19 and the relevant parts of the ACOP and guidance.	<i>Portfolio item 5g</i>		
UK guidance	Demonstrate understanding of relevant Good Practice Guides and HSE guidance from the Ionising Radiation Protection Series.	<i>Portfolio item 5h, 5g</i>		

Extended description of the DU areas	Elements of the competence required of an IRIS	Evidence reference	Assessor Decision	Advisory and additional notes for the applicant
Principles of operation of various detector types	Detailed Understanding of: <ul style="list-style-type: none"> <li>• Ion chambers</li> <li>• Proportional counters</li> <li>• GM detectors</li> <li>• Scintillators</li> <li>• Solid state detectors</li> </ul>	<i>Portfolio item 5i</i>		<ul style="list-style-type: none"> <li>• Ion chambers likely to include, Current generating mechanism, including recombination, relationship between physical construction materials and the relevant measurement quantities. Effect of volume of the chamber and the typical currents generated. Insulator requirements. Why temperature and pressure affect the indication. Why suitable for pulsed fields.</li> <li>• Proportional counters likely to include, Basis physics of the device, including the electric field and why the output is proportional. Why the different types are shaped as they are. The effect of gas quality and the properties of different types. The relationship between gain and the HV. Consideration of gamma dose rate types. Proportional counters in neutron detectors considering gas filling, mechanisms, gamma rejection, energy dependence and the use of moderators.</li> <li>• GM detectors likely to include, basis physics of the device, including the electric field how the discharge is spread including reference to fill gases, quencher and detector pressure. Typical construction materials. What happens at high count rates and why some GM's fail to danger. Why an uncompensated GM has the observed photon dose rate response and how compensation filters work for both steel walled and end window types.</li> <li>• Scintillation detectors likely to include, method of operation e.g. how the light is generated. What makes a scintillant more appropriate for a particular application. Popular scintillant materials. How a photomultiplier works and the affect of a magnetic field. What happens if the detector has a light leak.</li> <li>• Solid state detectors are likely to include the concept of a diode and the depletion layer. Magnitude of charge collection and comparison to gas filled detectors. Use in spectrometry, swab counters, alpha in air monitors and personal dosimeters.</li> </ul>
Role of the IRIS and the qp	Role of the IRIS Role of the qp	<i>Portfolio item 5p</i>		Detail the principle role of the IRIS and their obligations. Detail the role of the qp, their method of appointment and their legal role and responsibilities under the Ionising Radiation Regulations.

Extended description of the DU areas	Elements of the competence required of an IRIS	Evidence reference	Assessor Decision	Advisory and additional notes for the applicant
Scope of test after repair	Repairs to include: Refoiling of a scintillator Replacement of a GM detector Replacement of a PM tube Replacement of cables	<i>Portfolio item 5c, 5g</i>		Detail how the following are likely to impact on an instrument's response and what are the minimum tests that should be performed in order to assess this.

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