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Nuclear Health Physics Monitor Apprenticeship – Assessment Plan

Introduction

This document focusses predominantly on the 'end-point assessment' that must be carried out to enable a Nuclear Health Physics Monitor (NHPM) apprentice to be tested in a consistent and fair manner to determine successful completion of the Apprenticeship. The On Programme training and assessment recommended to ensure an apprentice is working on the right track / right level to be ready for end-point assessment is provided for guidance in Annex 1.

Health Physics Monitoring is a specialised field of radiological protection and is the term used to describe the protection and control of exposure of people and environment to the effects of ionising radiation. Protection is achieved by various means such as regulations, standards, measurements and physical controls.

The nuclear industry requires a high level of confidence that health physics monitoring activities are undertaken to the highest possible standards for the continued safe operation of nuclear facilities. The Nuclear Health Physics Monitor (NHPM) performs this vital role to ensure that radiation and contamination levels within nuclear facilities are maintained within safe limits of this highly regulated industry to ensure the health and safety of nuclear personnel, the general public and the environment.

There is compelling evidence that there is a shortage of experienced nuclear health physics monitors and this shortage will become more apparent due to the current demographics of an ageing nuclear workforce and resource demands for extensive nuclear construction and decommissioning programmes over the next 5 to 50 years' lifetime. Historically, many health physics personnel have come from operational roles or external recruitment, requiring extensive reskilling and retraining over a period of years, however this option is in short supply and not sufficient to enable the required numbers to support the industry going forward.

The Level 2 NHPM apprenticeship will typically take 2 years to complete and will provide a vital route to recruitment of young talent for employers. It will produce competent nuclear health physics professionals achieving all of the skills, knowledge and behavioural requirements of the role, for the current and future UK nuclear civil programme (current operations, decommissioning, new build) and UK nuclear defence.

The NHPM Apprenticeship Standard and Assessment Plan will replace and build on the current 'Nuclear Working' Apprenticeship Framework ID: FR02915 (England), which has a pathway for radiological protection. The development has been carried out by the Nuclear Employer Group specifically set up for the nuclear industry. The group comprises nuclear site licence holders, various companies (large and small) within the supply chain for nuclear who directly have a responsibility for radiological protection and health physics monitoring, and The Nuclear Institute (NI).

Section A

Summary of assessment

The responsibility for developing and delivering the End Point Assessment (EPA) rests with the Apprenticeship Assessment Organisations (AAO) that are approved to offer their services to employers for the NHPM apprenticeship standard. Only AAO that appear on the Skills Funding Agency (SFA) Register of Apprentice Assessment Organisations (RoAAO) can be used.

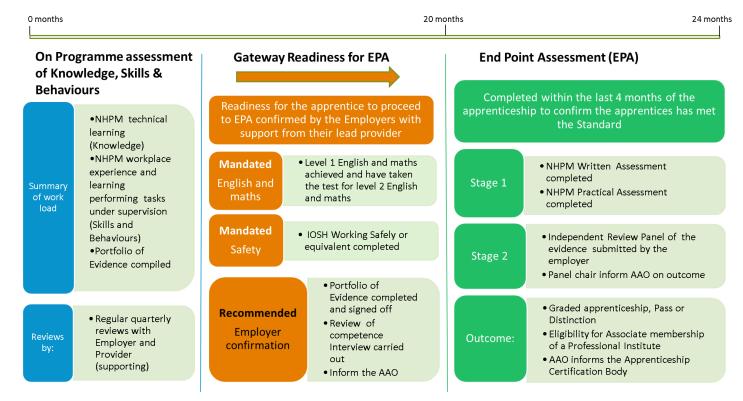
This Assessment Plan has been developed to provide a structured approach to enable the apprenticeship to be completed in accordance with the approved Apprenticeship Standard and for the apprentice to be successful in achieving a minimum of a 'pass' grade at completion.

A successful apprentice is one who is deemed by their employer to be competent for the specific role and has achieved all of the requirements stipulated within the published Apprenticeship Standard. This Assessment Plan details the requirements that apprentices, employers and further education providers must meet to ensure all apprentices, irrespective of company and location are assessed in a rigorous, robust and consistent manner.

Diagrammatic representation of the Assessment requirements:

The EPA will be synoptic and assess skills, knowledge and behaviours in an integrated way at the end of the apprenticeship programme. The EPA assessment will start typically after 20 months into the 2 year programme, once the apprentice, employer and lead training provider (if applicable) are satisfied that all

requirements have been met and the apprentice is ready to be able to fully undertake the NHPM occupational role.



Recommended On Programme Assessment

The Apprenticeship will typically take 2 years to complete and for EPA readiness it is anticipated that an apprentice without prior knowledge or experience should have completed typically 20 months of their apprenticeship before undertaking the EPA. Having a robust process of on-programme training and continual assessment will ensure that apprentices make good progress towards their readiness for the EPA.

Whilst not mandatory the following are recognised as good practice to help ensure the apprentices are ready for the EPA:

- Apprentices should maintain a portfolio of evidence against each of the competencies illustrating the application of knowledge, skills and behaviours. The process of collating a portfolio of evidence will encourage the apprentice to continuously reflect on their learning and development and help to identify gaps where they need to apply further development to achieve the Standard.
- Employers should review the progress of their apprentices every 3 months. This can be done in the form of a quarterly review meeting where the apprentice can be questioned on their progress and allowing the apprentice to speak about what they have learned, how they are developing and how they are performing. The employer may act as a mentor in these instances, providing balanced strengths and development-based feedback. The quarterly review acts as a good opportunity to review goals and learning objectives and put in any additional measures that will help and support the apprentice to achieve the vocational and academic requirements of their apprenticeship.

Additional information on the On Programme training and assessment recommended to ensure an apprentice is working on the right track / right level to be ready for EPA is provided in Annex 1.

Assessment Gateway

Readiness for End Point Assessment (EPA)

Before going forward for the EPA, the apprentice must have completed:

- Level 1 maths and English and have taken the test for level 2 English and maths
- IOSH working safely or equivalent safety training

It is recommended that the employer carries out a final review of competence with the apprentice, to ensure the vocational and academic knowledge, skills and behavioural requirements of the Apprenticeship Standard have been fully covered and the apprentice is ready to undertake the EPA.

When satisfied that the apprentice is ready for EPA, the employer will directly (or via their lead provider) inform their selected AAO for the EPA requirements to be planned and carried out.

Section B

Detailed explanation of the End-Point Assessment (EPA)

What will be assessed?

The apprentice will be assessed on their ability to demonstrate the broad range of Knowledge, Skills and Behaviours detailed in the NHPM apprenticeship standard. Further explanation on this is provided under 'How' the assessment will be carried out.

The EPA will take place typically within the last 4 months of the apprenticeship and will comprise of the following methods:

Stage 1:

- A written assessment, to test the apprentice's knowledge and understanding of the NHPM role, as defined in the apprenticeship standard
- A practical assessment, to test the apprentice's ability to correctly carryout NHPM tasks critical to the
 role, demonstrating the integration of the broad range of knowledge, skills and behaviours defined in the
 apprenticeship standard

Stage 2:

 A panel review, to confirm the apprenticeship standard has been achieved and the overall grading of the apprenticeship to be awarded

How will the assessment be carried out?

Stage 1: Practical and Written Assessments

Assessment Competence for the NHPM role by the AAO

- Independently set and marked Written and Practical Scenario based Assessments
- Broad range of knowledge, skills and behaviours tested

The Practical and Written Assessments will be developed by the selected AAO registered with the SFA. The Assessments will be developed, published and the marking schemes controlled to ensure that required independence is achieved and that all assessments and subsequent grading are undertaken in a consistent manner, irrespective of the location and size of the employer.

The Practical and Written Assessments will be carried out at either the employers or providers premise and will be invigilated to ensure a fair and rigorous process is demonstrated for all apprentices.

The Practical Assessment will be used to assess the broad range of skills attained throughout the apprenticeship. This will be scenario based to ensure the NHPM apprentice can demonstrate their ability to undertake the health physics monitoring occupational role in a variety of practical situations related to the radiological protection of people, plant and the environment. The scenarios will cover normal and abnormal operational conditions. The practical assessment should be carried out in a realistic environment that does not expose the apprentice to the risks associated with radiation, for the sole purpose of the assessment. The assessment will be developed to enable a competent apprentice to complete the required scenarios tested within 1 day.

The AAO will be responsible for the design and generation of the qualitative assessment, as agreed with the nuclear employers. The Practical assessment will be carried out by an assessor appointed by the AAO, to make a judgement on whether an apprentice can or cannot do the task and make a final score based on a Pass or Fail. The successful apprentice will be provided with a record of achievement.

Because of the safety critical nature of the work and the importance of NHPM tasks being carried out correctly (to ensure that radiological protection is maintained for plant, personnel and the environment) it is not appropriate to score on the basis of an actual grade and therefore the practical assessment will not require grading and a binary Pass or Fail is sufficient.

The Written Assessment will be used to assess the broad range of knowledge attained throughout the apprenticeship. The assessment will be 2 hours duration and will comprise a range of multiple-choice, true/false and short answer questions covering normal and abnormal operational conditions.

The AAO will be responsible for the design and generation of the questions and answers for the assessment. The question bank developed will allow for sufficient questions to be randomly selected providing coverage of the higher level knowledge and behaviours, for a number of assessment papers to be produced. The assessment will take place in a suitably controlled environment and administered as either an electronic online test or paper based test, including clear instructions for reasonable adjustments, appeals and complaints. The AAOs will take responsibility for invigilation, safe handling of the test papers, answer keys and associated control documentation. The test can be delivered at the employers or their providers premise or a test centre and must be invigilated. The result of the test will be graded and recorded:

- Fail = <60% correct answers
- Pass = 60% to 69% correct answers
- Merit = 70% to 79% correct answers
- Distinction = 80%+ correct answers

On successful completion of the Written and Practical Assessments, the employer on behalf of the apprentice will submit the achievement evidence to the AAO for Stage 2 assessment of overall competence.

Stage 2: Panel Review

Assessment of overall competence

Independent Review of evidence by the AAO to confirm:

- Apprenticeship standard achieved
- Sign off overall competency
- Alignment of competence to enable Associate
 Membership

The culmination of the apprenticeship end-point assessment will be an independent review of evidence. The AAO will appoint 2 panel members from a relevant Professional Institution (PI) licensed by the Engineering Council or the Science Council.

The AAO will organise and hold sufficient judging panels to meet the demand of NHPM EPA required. The panel will carry out a review of the evidence submitted to determine whether the apprentice has met the required criteria for the Apprenticeship Standard. An apprentice who meets the required criteria will be awarded a graded Apprenticeship certificate from the Apprenticeship Certification Body. An apprentice who has not yet achieved the required criteria will be informed of the panel's decision and areas for improvement prior to resubmission.

Who will carry out the assessment?

The assessment responsibilities are set out in Annex 2.

The **Practical and Written assessments** of competence for the NHPM role will be carried out by independent assessors appointed by the AAO. The independent assessors will be nuclear health physics professionals, recognised by the nuclear industry as Suitably Qualified Experienced Person (SQEP) approved by the AAO.

The minimum requirements for SQEP is:

- Have > 3 years of nuclear health physics industry experience
- Have undertaken a recognised training course in Assessment
- Provide curriculum vitae describing the education, qualifications, health physics work experience and experience of assessing competence

The **Panel Review** to determine the overall assessment of competence will be decided by the AAO using a panel of 2 independent assessors from relevant Professional Institutions (PI) working in the nuclear sector and licensed by the Engineering Council or the Science Council, and will be a desk top review of the evidence submitted for each apprentice. Working with the assessing PI the AAO will select a suitable panel from the PI's membership who are not directly associated with the employer or training delivery to provide independency, impartiality and ensure all apprentices are assessed in a fair and objective manner. The PI will utilise an approved method and process to enable all apprentices to be assessed in the same manner and same criteria for scoring. This external assessment will be required for all apprentices and the independent assessors will make the final judgement on whether an apprentice has achieved the requirements of the standard for the NHPM apprenticeship to be awarded.

The minimum requirements for the independent assessor are:

- Hold professional membership of a PI working in the nuclear sector
- Provide curriculum vitae describing the education, qualifications and work experience relevant to working in the nuclear sector

Currently, the Nuclear Institute (NI) has provided its support for the NHPM apprenticeship and agreed to provide independent assessors for the panel review. Additionally, the NI has agreed that NHPM apprentices can initially register (should they so wish to) as an Affiliate member (non-paying) at the starting point of their apprenticeship and provide eligibility for Associate membership (paying) at the successful end point of the apprenticeship. The NI will introduce an alignment of competence of the NHPM apprenticeship to NI Associate Membership. This Associate Membership notifies to the apprentice they have reached a recognised level of nuclear professionalism providing access to professional development opportunities that can support them in acquiring the competences required for professional registration with either the Engineering or Science Council and professional Membership of the NI at an appropriate time in their future. An apprentice who joins the NI as an Associate Member will have access to professional development opportunities to support them in acquiring the competences required for professional registration and professional Membership of the NI.

Where required by the nuclear industry, other suitable PI's may also be considered by employers to provide independent assessor for the panel review for the NHPM apprenticeship.

Quality Assurance

Internal QA

The AAO on the RoAAO for the NHPM EPA will be responsible for the internal quality assurance and will have suitable and appropriate quality assurance processes in place so that all aspects of the EPA are carried out in a consistent and fair manner for all Apprentices. The QA arrangements will typically include:

- The management of risk and malpractice/maladministration, appeals and complaints
- Communication processes for apprentices, employers, providers, and external bodies in relation to the EPA
- Third parties the management of third parties, including independent review panel members, examiners, assessors
- Information about fees, clarity of invoicing
- Setting and delivering panel assessment need for confidentiality, reasonable adjustments and special consideration
- Marking and issuing results marking and moderation, results determination and issuing

The AAO will set the assessment and marking criteria for the Written and Practical Assessments and Panel Review, working with the relevant Professional Institutions (PI) to ensure alignment and eligibility for Associate Membership on successful completion of the apprenticeship requirements.

External QA

External quality assurance of the EPA for this apprenticeship standard will be managed by the Institute for Apprenticeships (IfA).

Section C

Grading

The Review Panel will grade apprentices as 'Distinction', 'Pass' or 'Fail' following the EPA. The independent assessor chair will make the final decision. An apprentice who has achieved at least a 'Pass' will be deemed competent against the Nuclear Health Physics Monitor Apprenticeship Standard.

The final grading will be based on how evidence from the two methods of assessment demonstrates that the apprentice has met the requirements of the Standard.

Assessment methods	Assessment Grade	Assessment Grade	Assessment Grade
Written Assessment	Pass	Merit	Distinction
Practical Assessment	Pass	Pass	Pass
Overall Grading of the NHPM Apprenticeship	Pass	Pass	Distinction

Where an apprentice does not achieve the overall grading requirements, the AAO will advise the apprentice and their employer on the shortcomings identified by the Review Panel. The apprentice will be required to resubmit evidence requested by the AAO that addresses the shortcomings. Typically, this should be carried out within 3 months and not more than 6 months from the date of the original panel.

An apprentice who has achieved a pass will be deemed competent against the NHPM Apprenticeship Standard.

Section D

Implementation

Predicted cost of the Apprenticeship and End-Point Assessment (EPA)

The major costs for delivering the NHPM apprenticeship are:

- The On Programme training and assessment, including:
 - IOSH safety course or equivalent (mandated)
 - o nuclear awareness course
 - o human performance fundamentals course
 - the delivery of the Occupational Health Physics course (see Annexe 3)
 - the Level 2 knowledge qualification in Radiation Safety Practice or equivalent
 - the ongoing support and progress monitoring of the individual apprentices
- The Synoptic EPA, including
 - o the external practical and written assessments
 - the overall assessment of competence by the AAO
 - o the quality assurance of all the processes involved in the delivery.

The cost of the EPA is currently estimated to be of the order of 25% of the overall cost of the NHPM apprenticeship.

Delivery of the EPA across the country and in a variety of businesses

The Nuclear Employer Group recognises that the delivery of the EPA is the responsibility of the relevant AAO's registered on the SFA RoAAO. The internal and external quality assurance processes mean that the EPA outcomes will be consistent and reliable, allowing a fair and proper comparison of apprentices employed in different types and sizes of organisations. The agreed approach of using a panel of 2 independent

assessors from relevant PI's working in the nuclear sector to undertake the final end point overall assessment of competence gives assurance to nuclear employers that the assessment of their apprentices is:

- ✓ Undertaken by nuclear specific experts
 ✓ Carried out in a rigorous and consistent manner by an independent body
 ✓ Subject to external quality assurance arrangements
 ✓ Consistent with the methods deployed to ensure that Associate Membership entry requirements have been met and provide Continuing Professional Development (CPD) for future eligibility for Professional Registration and Professional Membership)

Annex 1 - On Programme Training and Assessment

Introduction

The Nuclear Employer Group recommends to employers who adopt the NHPM Apprenticeship to train and develop their apprentices, to use an approach of 'On Programme Training and Assessment' so that an apprentice is being continuously monitored, assessed and provided with feedback on their performance, to help ensure the EPA can be successfully achieved. Additionally, where qualifications and training courses exist that help to underpin the knowledge, skills and behaviours for the NHPM occupational role; these should be included during the apprenticeship delivery.

There will be two main components to the NHPM apprenticeship:

- On Programme Training and Assessment typically from 0 to 20 months
- End Point Assessment (EPA) typically to be completed within the last 4 months (month21 to 24) of the apprenticeship programme

On Programme Training and Assessment:

This is the recommended approach to ensure an apprentice is ready to undertake the EPA.

Typically, it will be a 20-month phase where the apprentice will develop the skills, knowledge and behaviours required for the NHPM occupational role. This will comprise Foundation and Consolidation phases, during which a portfolio of evidence is recommended to be compiled by the apprentice, to show to their employer and lead provider that they have attained the required level of knowledge, skills and behaviours as part of the gateway for readiness for EPA.

Foundation Phase (0 –10 Months)

The first year will build the foundations for the occupational role and may take place in the workplace or in a largely simulated working environment. This will consist of a period of off-the-job training and will include operational health physics training covering familiarisation of radiological protection equipment to introduce the apprentice to the theoretical and practical elements of the subject. Knowledge based modules will be delivered throughout the period to underpin skills and behavioural development and will be delivered by suitably qualified and experienced personnel from the employer or their nominated training partner. Employers must choose to use IOSH Working Safely or an equivalent course or internal training appropriate to their organisation to ensure an apprentice has a good understanding of how to work safely in the nuclear industry. Employers will ensure an apprentice has undertaken and completed an occupational health physics course (see Annex 3) to ensure the apprentice has a technical understanding of the requirements of the NHPM role. Employers may choose to use the Human Performance Standards developed by the UK Nuclear Human Performance Forum as the recognised industry standards, to help ensure an apprentice has a good appreciation and understanding of Human Performance Fundamentals for individual and team working to reduce the frequency of errors whilst building in better defence mechanisms.

Completion of the Foundation stage will provide assurance to the employer that the apprentice has a fundamental understanding of operational health physics monitoring, nuclear safety and radiological safety.

Consolidation Phase (11 – 20 Months)

The next 10 month phase will be used to embed further skills capability, knowledge and nuclear behaviours whilst working on plant, supported by further knowledge based learning modules thus enabling the apprentice to ultimately work effectively and independently at the end of the apprenticeship without supervision. At the end of the Consolidation stage the apprentice will have completed their training and through on-going assessment they will have generated a range of evidence to show they meet the Apprenticeship Standard. The apprentice should have completed all the requirements of On Programme training and assessment to be ready to undertake the EPA.

It is recommended that the apprentice:

Generates a portfolio of evidence on the work they have undertaken during their apprenticeship
including the application of knowledge, skills and behaviours for this to be reviewed by their employer
and lead provider

As part of the gateway readiness for EPA, it is recommended that the employer:

- Holds regular quarterly reviews with the apprentice to determine their level of progress and consider any measures required to provide support to the apprentice to maintain timely achievement.
- Reviews and signs off the portfolio of evidence, thereby having assurance that the scope of the NHPM job role has been covered
- Holds a final competence interview with the apprentice, to ensure the vocational and academic knowledge, skills and behavioural requirements of the Apprenticeship Standard have been fully covered and the apprentice is ready to undertake the EPA.

Guidance on the Portfolio of Evidence

Portfolio of Vocational Competence The apprentice will present a completed portfolio of evidence for the employer or lead provider to undertake a review. This will ensure that throughout the apprenticeship, the apprentice has undertaken a broad range of health physics monitoring activities and gained sufficient and suitable experience to meet the broad range of skills and knowledge requirements of the Apprenticeship Standard. The portfolio will be signed off by the employer or provider.

The portfolio will typically take a number of forms consistent with the skills and knowledge being assessed and could include:

- Products such as drawings, reports and presentations
- Reflective accounts/personal statements
- Professional discussion
- Expert witness evidence/testimony
- On the job and task observation

Guidance on the Competence Interview

Employer Competence Interview:

- To ensure Knowledge, Skills and Behaviours for the occupational role have been achieved
- Readiness for EPA

This will be used to assess the ability of the apprentice to undertake the occupational role. The interview will be a minimum of 30 minutes and a maximum of 60 minutes duration to allow sufficient time for questioning and responses and to record the details of the interview. The Nuclear Employer Group has decided that a scenario based interview is crucial when determining the overall competency of the NHPM. The apprentice will be asked a series of questions to enable the employer to determine role competence skills, knowledge and behaviours have been achieved. The employer will present to the apprentice

a range of situations to:

- find out what course of action they would take
- ensure the behaviours stipulated in the apprenticeship standard have been embedded.

The interview should be carried out by nuclear health physics SQEP.

End-Point Assessment (EPA):

Please refer to Section B in the main body of this Assessment Plan.

Nuclear Health Physics Monitor Apprenticeship – Assessment Plan Annex 2 End Point Assessment Responsibilities

1. Summary of roles in relation to the EPA Process

Practical and Written Assessment:

	Preparation	Assessment
Apprentice	 Prepares by fully reviewing the NHPM role and how to ensure understanding and application of routine and non-routine radiological situations 	Completes the practical and written assessment to the best of their ability
Employer	 Advises the apprentice on how the assessment will be conducted Allows time away from the workplace to prepare and take the assessments Puts apprentices forward at the appropriate time for the EPA 	
Assessors	 Produces assessment to be used Produces assessment brief and assessment marking criteria Advises the employer on suitable dates and locations for the assessments 	 Quality assures the assessment process Ensure appropriate invigilation of the assessments taking place, at the employer's workplace, training provider premises or their own test centre Scores the assessments using the marking criteria Produces feedback on assessments for the apprentice

Panel Review for Overall Competence:

	Preparation	Assessment
Apprentice	 Is clear on the submission process and due date Gathers any other documents the AAO requests 	 Provides responses to any questions that are raised by the AAO panel within the requested timescale. Provides further supporting information as requested
Employer	Provides the required evidence for the apprentice to the AAO directly or via lead Provider.	Enables PI Members & Fellows who are employed by the organisation to be called upon by the AAO to support the EPA panel review process. Note: Panel members selected will be independent from the apprentices being reviewed.
AAO	 Advises the apprentice and their employer on the application process and the criteria to be followed to provide evidence required for review by the panel Organises the independent panel to review apprentice applications and selects a panel Chair Produces the assessment criteria Maintains a register of independent assessors who can undertake 	 Assess the apprentice's application against the agreed criteria. Probes/explores aspects of evidence and quality of the apprentice's work Uses the evidence provided by the apprentice to inform the final decision on the Apprenticeship Standard having been achieved Advises the Apprenticeship Certification Body on the outcome for the Apprenticeship to be awarded

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the practical assessment and panel review

• Advises apprentice on the outcome and offer of membership

Annex 3 Occupational Health Physics course or equivalent

The Industry Radiological Protection Co-ordination Group (IRPCG) has established that an occupational health physics course is a recommended approach as best practice for NHPM apprentices to undertake to gain the required understanding.

Course Aim

To enable delegates to demonstrate sufficient theoretical and practical knowledge to develop as Health Physics Monitors.

Target Audience - Health Physics Apprentices

Course Objectives:

Upon successful completion of this course, you will be able to:

- Demonstrate knowledge of basic atomic physics
- Demonstrate knowledge of basic mathematics
- Demonstrate knowledge Radiological Legislation
- Demonstrate a working knowledge of radiation, its hazards and how to control it
- Demonstrate a working knowledge of radioactive contamination, its hazards and how to control it
- Demonstrate a working knowledge of airborne contamination, its hazards and how to control it

Typical course content is:

- Radiological Quantities and Units
- Biological Effects of Ionising Radiations
- Risk & Dose Restriction
- ALARP
- Biological Effects
- Designation of Controlled Areas
- Radioactive Source Management
- Waste Management/ Clearance & Exemption
- Transport
- Radiation Incidents
- Environmental Monitoring
- Radiation, Surface and Airborne Contamination.

End Assessment to be completed (Pass Mark is set at 60%).

Further training on plant is required typically up to 24 months.