Development of instructors for nuclear power plant personnel training

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FOREWORD

In 1996 the IAEA published Technical Reports Series No. 380, Nuclear Power Plant Personnel Training and its Evaluation, A Guidebook, which provides guidance with respect to development, implementation and evaluation of training programmes. The IAEA Technical Working Group on Training and Qualification of Nuclear Power Plant Personnel recommended that an additional publication be prepared to provide further details concerning the development of instructors for NPP personnel training.

The quality of nuclear power plant personnel training is strongly dependent on the availability of competent instructors. Instructors must have a comprehensive practical as well as theoretical understanding of all aspects of the subjects being taught and the relationship of the subject to nuclear plant operation. Instructors should have the appropriate knowledge, skills and attitudes (KSAs) in their assigned areas of responsibility. They should thoroughly understand all aspects of the contents of the training programmes and the relationship between these contents and overall plant operation. This means that they should be technically competent and show credibility with the trainees and other plant personnel. In addition, the instructors should be familiar with the basics of adult learning and a systematic approach to training, and should have adequate instructional and assessment skills.

This TECDOC provides practical guidance on various aspects of instructor selection, development and deployment, by quoting actual examples from different countries. It highlights the importance of having an appropriate training policy, especially considering the various organisational arrangements that exist in different utilities/countries. This should result in: plant performance improvement, improved human performance, meeting goals and objectives of the business (quality, safety, productivity), and improving training programs. This publication is available in two formats — as a conventional printed publication in English, edited into a common style from contributions of Member States, and also as a CD-ROM providing Member States' original contributions, which contain additional material in their national languages.

Appreciation is expressed to all the participants who contributed to this publication, listed at the end of this TECDOC. Particular thanks are due to C.R. Chapman (United Kingdom) and J. Yoder (United States of America) for their assistance in the compilation of this publication.

The IAEA officer responsible for this publication was A. Kossilov of the Division of Nuclear Power.

EDITORIAL NOTE

CONTENTS

1. INTRODUCTION

1.1. BACKGROUND

The safe and efficient operation of a nuclear power plant relies on quality personnel being recruited, qualified and trained on a timely basis. The IAEA Safety Guide: Recruitment, Qualification and Training of Personnel for Nuclear Power Plants, No. NS-G-2.8 [1], clearly states that only qualified persons shall be entrusted with functions important to safety. This concept depends very much on the availability of competent instructors. All instructors must have a comprehensive practical as well as theoretical understanding of all aspects of the subjects being taught and the relationship of the subjects to nuclear plant operation. Hence, it is preferable for an instructor to have held a post at an NPP relevant to the field of training responsibility. For example, control room simulator instructors should have held a shift operations post at an appropriate level of seniority in a plant of the same design as that for which they are providing instruction.

All instructors must have, or acquire through training, appropriate instructional knowledge, skills and attitudes (KSAs) – specifically those KSAs that are needed to impart and enhance training and learning. In addition, instructors should be trained in the application of all phases of the systematic approach to training (SAT), particularly the phases to which they contribute – although it has been found beneficial for instructors to participate in all phases of SAT.

Instructional KSAs are also needed for occasional (part time) instructors, including those who are involved in on the job training in the plant. Training provided for these KSAs should be customised to the particular training setting or settings in which an occasional instructor will participate.

To gather data in order to compile this report, Member States of the IAEA were invited to submit examples of documentation regarding the selection, recruitment, training, roles, development and deployment of instructors in their countries, whether by utilities, operating organisations, NPPs or by training organisations, departments and centres. Selected examples are included in the appendices to this TECDOC, while all of the examples that were submitted, together with related items, are included on the CD-ROM that accompanies this report.

To ascertain more detailed information on current practices regarding instructor training and development in the Member States, a questionnaire was prepared and sent out for them to complete and return to IAEA. A copy of the questionnaire is provided in Annex 1 of this report and also on the CD-ROM, as described in Section 1.3. Copies of the completed questionnaires may be found on the accompanying CD-ROM, also as described in Section 1.3. The responses from the Member States were analysed (see Section 2) by a team of consultants whose names and affiliations are given at the end of this publication.

It is recognised that the training arrangements of operating organisations vary greatly according to organisational history and structure, national culture, industrial and professional staff demography, etc. However, in spite of these variations, there are common practices which are worthy of consideration for application in many situations.

1.2. PURPOSE

The purpose of this report is to provide practical guidance on various aspects of instructor selection, development and deployment, by quoting actual examples from different countries. It highlights the importance of having an appropriate training policy, especially considering the various organisational arrangements that exist in different utilities and countries.

1.3. SCOPE

This publication considers instructors who have a range of roles and responsibilities according to the operating organisation's training arrangements. It is, therefore, applicable to operating organisations, NPPs, and internal and external organisations having responsibilities for the training of NPP personnel.

The main text of this publication is contained within eight formal sections, including this introduction. Section 2 provides a summary in narrative form of the analysis of four important aspects of current practices regarding instructors, Section 3 examines the role of management in training, Section 4 discusses the roles of instructors, Section 5 describes some categories of instructors, Section 6 looks at aspects of developing the competence of instructors, Section 7 discusses instructor career development while Section 8 draws some conclusions and offers some recommendations on this topic.

The eight sections are followed in the printed form of this report by a list of publications that are referred to in the preceding sections, fourteen appendices (A to N) giving examples of instructor training documentation, Annex 1 containing the questionnaire sent to the IAEA Member States, Annex 2 containing the contents of the accompanying CD-ROM (see below), a key to abbreviations and code elements for country names used in this report, and finally the names and affiliations of experts who have contributed to the preparation of this publication.

The CD-ROM that accompanies this publication contains, in five parts, a copy (identical to Annex 1) of the original questionnaire sent to the Member States, the full responses to the questionnaire, the examples provided by Member States on the selection, development and deployment of instructors of NPP personnel, the entire text in a pdf format of the printed form of this TECDOC, and a list of many IAEA published materials relating to the training and qualification of NPP personnel. For the convenience of the reader, the contents of the accompanying CD-ROM are given in Annex 2 here.

1.4. TERMINOLOGY

The terms related to NPP personnel training, as used in this report, are consistent with the terms introduced in the IAEA-TECDOC-1358 [2]. For convenience, key terms used here, or terms that may require clarification, are given below.

Competence (competency) – (1) The ability to put skills, knowledge and attitudes into practice in order to perform activities or a job in an effective and efficient manner within an occupation or job position to identified standards. (2) A combination of knowledge, skills and attitudes in a particular field, which, when acquired, allows a person to perform a job or task to identified standards. Competence (competency) may be developed through a combination of education, experience and training.

It may be noted that competence (plural competences) and competency (plural competencies) are different forms of the same word, competence being used primarily in GB and competency in US.

Continuing Professional Development – Following the successful completion of an individual's initial training programme and appointment to a job position, a structured programme of additional education, experience and training; this normally continues throughout the working life of an individual to enhance that individual's competence and opportunity for career advancement.

Effectiveness (of training) – An indication of improved plant performance and/or human performance resulting from trainees participating in training modules and sessions. Not to be confused with efficiency of training.

Efficiency (of training) – (1) An indication of a trainee having completed a training programme with the minimum of time and resources expended by the trainee and the instructor, and that these compare favourably with the predicted values. (2) An indication of the time and resources expended in using one training method compared with another to achieve the same objectives. Training efficiency is often measured in terms of cost of provision per trainee. Not to be confused with effectiveness of training.

Full-Scope Simulator – A simulator incorporating detailed modelling of those systems of the referenced plant with which the operator interfaces in the actual control room environment; replica control room operating consoles are included.

Instructor – A competent and authorised individual who delivers training, assesses trainees and is involved in the evaluation of training sessions, modules, courses and programmes and who may also participate in analysis, design and development activities. Also termed a trainer.

Instructor Qualification - A process of determining and verifying that an individual meets the required training and technical competences, or the written confirmation of this.

Occasional Instructor – An individual who is a qualified instructor and is involved in training on an occasional basis, but whose full time job position is not that of an instructor; also termed a part time instructor.

Professionalism – The admired characteristics and high standards as displayed by an individual usually qualified in a particular discipline or learned profession.

Proficiency – The ability to perform a specific activity (e.g. a task) to demonstrate mastery of that activity.

Qualification – A formal statement that an individual possesses the education, training and experience required to meet specified job performance requirements. A formal statement of competence. The qualification may enable an individual to work independently, depending on local and national policies.

Training – A combination of activities, including coaching and instruction, with the purpose to prepare an individual or a team to perform a specific task or job or series of jobs, usually through achieving a set of training objectives. Training, with education and experience, is used to develop an individual's competence. Training may be undertaken In-Plant, On the Job, On-Site, Off the Job, Off-Plant or Off-Site.

2. SUMMARY OF PRACTICES FROM MEMBER STATES

A survey designed to obtain information from the Member States on the Development of Instructors for NPP Personnel Training was developed by the IAEA with assistance from a team of international experts. The survey in the form of a questionnaire (Annex 1) was sent to potential respondents representing the Member States' operating organisations, NPPs, utilities, nuclear facilities, training centres, and organisations involved in rendering training services for nuclear power plants and nuclear facilities. Responses from fourteen countries were received, collated and analysed by the international experts. A summary of these responses is presented in this section. The actual responses to the questionnaire may be found in Part 2 on the CD-ROM that accompanies this report.

It will be noted that in the summary of the completed questionnaires given in the following paragraphs certain countries are identified as following particular practices. It should be emphasized, that to keep this section within a reasonable size, examples only of countries are quoted; in many cases other countries, not quoted, follow similar practices. However, the identification of a specific country will enable the reader to refer to the appropriate name in Annex 2, and from there, to the relevant sections of Parts 2 and 3 on the CD to discover further details on instructor training in that country.

In quoting Member States of the IAEA in this section, abbreviations or code elements taken from the International Standard Codes for the Representation of Names of Countries (ISO-3166 Part 1: 1997) [3] have been used in preference to stating a country's full name. The relevant code elements are identified in the Abbreviations and Code Elements section of this report.

2.1. POLICY ISSUES REGARDING INSTRUCTORS

The survey indicated that the responsibility for training activities varies within the utilities of IAEA Member States, lying either with the NPP top manager, termed variously a station manager or plant manager (AM, ES, IN, RO, RU, UA, US), or with the Human Resources Director (CZ, FR, GB) of the operating organisation, or in one case (CA) with the Vice President - Training.

In almost all Member States the training is organised by the NPP in partnership with a training organisation, department or external centre (CA, CZ, FR, GB, RU, US). In some Member States (UA, US) the NPPs alone organise the training; in one case (SK) the organisation of training is undertaken by contractors.

In all Member States the role of the instructor is included in the utilities' suite of training policy documentation, but for different countries at different hierarchical levels; furthermore, this policy documentation contains different amounts of detail for different Member States. In some cases, instructors' roles are given in training centre procedures (BR, SK), in some cases in the training organisations' procedures (ES, RO), or in both of these procedures (RF), but in some cases in job descriptions and plant administrative procedures (CH, FR, RU, US). In other cases (IN) very detailed responsibilities are identified in a policy document and these include developing and delivering training materials, aids and programmes, and facilitating soft skills training.

Standards for the identification, selection and training of instructors are imposed by statutory (legal) authority or by consensus national standards in some Member States (CZ, SK, UA, US). In other Member States (CA, FR, GB) the utilities set and monitor adherence to

similar standards. Some Member States (ES) appear to have no national standards, while others follow standards set by other authorities (such as Russian Federation norms used in AM, and IAEA/INPO Guidelines used in BR).

The training organisations of the utilities in most Member States do not have a direct relationship with a country's nuclear regulatory body. The normal interface is between the regulator and the utility head office (GB), or between the regulator and the NPP manager (FR, RO, RU, ES, UA). However, in some countries (CZ, SK) the training department or organisation is licensed and inspected directly by the regulatory body. In the US, simulator instructors are expected to hold (or to have held) operator licences, and in BR the regulatory body is in direct contact with the training centre to approve and review, and then audit, the training programmes. In CH the regulatory body attends the licensing examinations for selected safety-related functions.

The responsibilities specifically for instructor training and its coordination in most Member States (CH, FR, US…) are placed upon the same individuals as for all training activities, already summarised above. However, in the majority of cases, where the NPP manager or chief engineer or human resources director has the ultimate responsibility for training (AM, UA), the training centre manager is involved in coordinating that training.

All Member States make use of occasional (part time) instructors in their training programmes. Some countries rely more than others on training being delivered by personnel who are permanently employed elsewhere – such as at NPPs, equipment suppliers' works or specialist training organisations. CH, for example, "borrows" most of its instructors (it has no full time instructors at all) from its NPP operations and maintenance departments, and uses contractors for its management training. On the other hand, ES uses external training organisations for only 5% of its training activities; SK has no part time simulator instructors but uses NPP specialists as part time instructors to provide theoretical instruction. In RO, university lecturers are used as occasional instructors but they follow training centre documentation, while GB and US use previously employed instructors under short term contracts for occasional instruction. IN uses only NPP specialists or subject matter experts as occasional instructors. On the job instructors are almost all exclusively part time instructors, their normal jobs being to work at the NPP.

2.2. PRE-REQUISITES AND INSTRUCTOR SELECTION

Because the competence of instructors is based on a combination of theoretical knowledge, adequate training and experienced skills, most Member States recruit their potential training instructors from NPPs. In some Member States (FR, UA) recruitment is additionally taken from a university, depending on quality, or from related nuclear industries such as a naval facility (FR, RU, US).

The selection and recruitment processes for instructors are similar throughout the majority of Member States: a selection panel or interview board of two or three persons from the training department or centre, one often being the training manager, asks oral questions. In some cases candidates take a written examination as well. Some utilities also have a senior NPP engineer sitting on the panel. Recruitment processes in some Member States follow the country's government procedures while in other countries the methods of selection and recruitment follow precisely the same pattern as for NPP personnel.

The utilities of some Member States (CA, FR, GB, US) have a policy of rotating instructors between the NPPs and the training centre, other Member States (ES, RU) have no

such policy and rely on permanently employed training staff. In contrast, CH has no permanent training staff and recruits only part time instructors. In most Member States some full time instructors are on long term contracts, others are appointed or seconded for shorter terms. Occasional or part time instructors are also recruited by the majority of countries, and accordingly these instructors are rotated very frequently.

The entry level requirements for instructors in most Member States are a university degree in a relevant technical subject plus three to five years (ten years in IN) experience of working at an NPP. Almost no utility (apart from SK), requires the individuals at the time of recruitment to have any formal training skills, although an interest in, and aptitude for, imparting knowledge is sought by many selection panels or interview boards during their questioning processes.

The numbers of instructors recruited per year vary greatly between the Member States, depending on whether a country's nuclear generating industry is expanding or declining, and the numbers of NPPs it has under construction, being commissioned, in operation, or being decommissioned. In some Member States (CH, GB) the numbers of these recruits are very low, in others (IN) about 15 to 25 per year, and similar in UA (20) and FR (25).

Most Member States seem to experience some difficulties in recruiting instructors of the right calibre. Many very competent engineers and technicians are not good communicators. Most instructors receive a lower (10% to 20%) salary or wage than their comparably competent NPP colleagues, although in some utilities the difference in income is compensated by a personal allowance; some temporarily assigned engineers are permitted to retain their shift allowances. Some utilities overcome this problem by recruiting part time retired NPP personnel or instructors who thereby use their expertise to supplement their pension.

2.3. INSTRUCTOR COMPETENCE DEVELOPMENT

Almost every Member State has instructor task lists of one style or another, ranging from actual task lists (RO, US) to job descriptions (AM, CA, CZ, FR, RU, UA). Task lists take the form of training profiles in one case (GB), while they are incorporated into procedures in other cases (BR, ES). SK has no equivalent lists, whereas they are planned for CH.

The process of integrating a newly appointed instructor into the existing instructor team is, in the majority of countries, identical to that of integrating all new NPP personnel into the work teams. In some countries these procedures are formalised but in many cases there are no written procedures and the new employee's supervisor makes appropriate arrangements (FR). A very formal system is used in the US with qualification cards being completed to monitor the integration process.

Instructors in all Member States contribute to many aspects of training from the analysing of training needs, designing and developing training sessions, delivering technical and soft-skills training in a variety of settings by various methods, including simulations and on the job training, assessing trainees, evaluating the effectiveness and efficiency of the training and, if necessary, as a result of such evaluations, modifying the training materials, methods, settings or assessment techniques. In some countries this is formalised in procedural documents (BR) or quality assurance provisions (SK). Instructors in most countries appear to perform a variety of roles from tutoring, mentoring and coaching, to delivering initial and continuing training and providing remedial training when necessary. In many cases instructors feed back technical information to NPPs that may be considered for modifying plant operating

procedures, and many instructors are able to assist with plant operation when needed. Instructors assist in incident investigations in some countries (RU, UA). In some Member States (ES, GB, RO, RU) instructors are involved in knowledge management or the preservation of knowledge that might be lost as a result of the retirement of very experienced and competent personnel.

Every Member State, apart from AM, has a formal training programme for its instructors, both for initial training and subsequently for continuing training. Some countries (CZ, ES, CH, FR, GB, UA, US) have established procedures to be followed when implementing their training programmes. In many cases individuals who train the instructors are required to have formal qualifications in education or allied subjects, or to have considerable practical experience in training and instruction. In a few cases those who train instructors have to be licensed, or certified as competent, for this task.

The acknowledgement of competence of an instructor takes different forms in the various Member States. Some countries operate a formal initial certification or authorisation process with an external assessor making the recommendation, while others require the training centre manager or training department manager to make the decision, or allocate the decision to the instructor's immediate supervisor.

The processes by which new competences are defined for an instructor vary from country to country. However, in every case the necessity for an instructor to gain a new competence, or to be retrained in a previously held competence, is first established. This can be identified before the proposed training is implemented (FR, RO), as a result of a change at the training centre, such as the acquisition or installation of a new item of training equipment — a new simulator being an extreme example. This can also be identified immediately after the training is delivered when it is evident that the instructor has not performed successfully, possibly as a result of losing, or never having acquired, a particular competence. The latter problem may not be apparent until trainees' return to their normal jobs and their line supervisors discern no improvement, or even a deterioration, in the performances of their subordinates. As changes to NPP procedures, or modifications to NPP equipment or the installation of different plant items, are also likely to require new competences to be defined for instructors, most Member States use this situation to define new competences if required. CH conducts an annual review of training objectives.

Many Member States (CZ, FR, GB, RO, SK…) evaluate the performance of their instructors by scrutiny of formal reports completed by trainees at the conclusion of a training session or course; such reports invariably include the trainees' perspective of instructor performance. Some countries (AM) scrutinise trainees' examination results, some countries (CA) have regular formal observations of instructors by their supervisors (once a year in CH and US, although for new instructors this is more frequent in US). In most cases instructors are observed in every training setting in which they are expected to instruct.

Targets for instructor performance indicators, such as the amount of time that every instructor spends on each phase of SAT, are set and monitored in some Member States. In these cases, the instructors or their supervisors complete check lists (AM, SK). In some countries (CZ) only the time spent in implementing training is monitored. Some utilities regard it important for instructors to spend 50% of their time on the implementation phase, others quote different values, while yet others believe it depends on the training needs of the NPP personnel and so such indicators are of no practical use. Consequently utilities in some Member States (CH, ES) have no performance targets. Utilities in other Member States (BR)

follow OSART recommendations while others (IN) utilise normal performance management as applied to all their personnel.

In some Member States (CA, FR, GB, RO, US) all instructors participate in every phase of SAT, in other countries (CZ) only the full time instructors are involved in this manner while the parttime instructors are concerned only in the implementation and evaluation phases of SAT. AM follows a similar pattern, having specialists who concentrate on certain SAT phases but all instructors are familiar with all SAT phases. CH does not use SAT.

2.4. INSTRUCTOR CAREER DEVELOPMENT

In the majority of the Member States (AM, BR, CA, RU, UA) instructors keep their job positions and rarely return or transfer to a NPP after working in training. In some other countries (FR, GB, US), instructors typically return or transfer to a NPP. In a few countries (CH), people continue their original task and from time to time they are asked to train plant personnel.

When instructors are rotated between the NPP and the training function, the period of rotation depends on the country and on the NPPs. It can vary from between six months to two years (GB) to 4–5 years (FR). In order to maintain quality training, some instructors undertake a further period of time in training (about 10% in FR).

During temporary assignment, individuals who are recruited as instructors are provided with training sessions in technical subjects or human factors topics, either to obtain a licence (US) or to upgrade their knowledge (FR, GB). Prior to resuming NPP duties, training programmes, including on the job training, are almost always made available that are directly linked with the new job position (CA, FR, GB, US). In some cases, an examination or an observation period is required before returning to NPP work, for example as senior shift supervisor or safety engineer (FR), or as an operator, especially if the qualification or certification period has expired (CA, US).

In most cases, the job position considered for an instructor returning to an NPP depends on the individual's experience and area of competence (operation, maintenance, chemistry, radiological-protection, etc.). In some Member States (FR, GB, US), individuals who originally came from operations are allocated to new job positions, such as licensed or senior operators, senior shift supervisors, safety engineers or operations engineers. Individuals who originally came from maintenance sections or departments are allocated to job positions such as maintenance engineers or supervisors. In a few countries (CA), they are allocated to the same function that they had before performing as an instructor.

Experience as an instructor in many Member States is not essential in procuring a job position in the organisation; indeed, in most of the Member States (BR, CA, FR, US), before a returning instructor takes up full responsibility in the new job position, a re-training programme has to be undertaken, especially if a licence or other formal qualification is needed. However, it is desirable, and it is recognized as value added, because of the skills and competences acquired, that a former instructor finds it easier to be promoted in the original workplace. In at least one country (GB) NPP personnel who have been temporarily assigned to the training department have progressed more in their operating careers on returning to the NPP than staff who have not undertaken instructor roles. In some cases (AM, ES), it is a prerequisite for certain job positions, for example in engineering involving simulator maintenance or equipment modernisation that some experience has been gained as an instructor.

Generally, as far as licensed personnel are concerned, the training strategy or project regarding the first of a particular design or new design of NPP for a Member State is based mainly on JTA/JCA and on some training process such as SAT. Some specific training programmes are also delivered by equipment suppliers. Some instructor training programmes currently in progress (GB) deal with decommissioning of NPPs.

Some Member States or utilities are involved in training activities in other countries or utilities by providing temporarily assigned instructors (CA, ES, FR, RU) or other expertise. The adaptation of training practices or methods from other countries or utilities are facilitated as a result of the IAEA, INPO and WANO feedback experience systems.

3. THE ROLE OF MANAGEMENT

The operating organisation is responsible for the recruitment and training of NPP personnel and for the definition of competence levels [4]. The responsibility for ensuring that individuals are appropriately qualified, and remain so, rests with the operating organisation. The plant manager has the overall responsibility for, and plays an important role in, the development and implementation of training programmes to ensure the qualification and competence of NPP personnel. The attitude of plant management towards the training and qualification of NPP personnel is another important factor for safe and reliable plant operation. If plant management does not actively support and reinforce the standards for safety and quality established for training programmes, these standards are unlikely to be applied at the NPP.

3.1. TRAINING POLICY

It is necessary that operating organisations formulate and promulgate an overall training policy — in the form of a written document — dealing with the training, qualification and performance of NPP personnel. This policy is the commitment by the operating organisation and the NPP to personnel training, and an acknowledgement of the critical role of training for the safe, reliable operation and maintenance of the NPP. The operating organisation should clearly define the responsibilities for all aspects of the training process. Such information, on responsibilities should be included in the training policy and in the written procedures for SAT. This concept is endorsed by the IAEA in its Guidebook on Nuclear Power Plant Personnel Training and its Evaluation; Technical Reports Series No. 380 [5]. For organisations that operate several NPPs, the overall training policy is formulated at the operating organisation level, with individual NPP policies formulated from the overall policy.

It should be clearly understood that the nature of this policy, and the level of commitment to it by the operating organisation, by the NPPs and by any identified training function, will have a significant impact on the roles and responsibilities of instructors, and their ability to fulfil these roles and responsibilities.

Appendix A contains an example of factors that might be considered when formulating a training policy, including the need to support instructor development. Additional examples of training policy and administrative procedures for instructor training are provided on the accompanying CD-ROM.

3.1.1. Components of a training policy

Several considerations should be taken into account when a training policy is formulated.

3.1.1.1. Goals and scope of the training policy

The internationally-agreed requirement for all personnel whose work may have an impact on safe and efficient NPP operation and maintenance is that they are qualified for, and competent, on the basis of education, training and experience, to perform their jobs. SAT is now recognized worldwide as the best method of ensuring that personnel are appropriately qualified, because it:

- identifies all the training needed for achieving competence;
- provides quality assurance (QA) of training, and thus builds quality into training and qualification programmes;
- provides tools for management to monitor, evaluate and control continually the effectiveness of the training provided and the competence of NPP personnel.

It is assumed that the published training policy, or other high level document of the operating organisation, require the use of SAT for training personnel whose jobs impact on safe and reliable NPP operation. The SAT approach should also be used when developing the instructor training programmes.

3.1.1.2. Responsibilities for training

For the purpose of this publication, and considering the roles of instructors, the following responsibilities are usually assigned to a plant training manager; (even though some, or all of these tasks may be undertaken on the manager's behalf, by a central function or an external training organisation):

- Co-ordinate all training for NPP personnel, including that provided by external sources.
- Lead the analysis, design and development of all training for NPP personnel including OJT.
- Procure and maintain all training tools, equipment, materials, including simulators and mock-ups.
- Provide a programme for training and qualification of all instructors in technical and instructional abilities, including those who provide training at the plant.
- Provide QA of training from internal and external sources.
- Assess trainees.
- Lead the overall training evaluation and feedback processes, with continual support from and interaction with plant departments for which training is provided.
- Provide periodic reports to the plant manager and plant department managers on the results of evaluation of training programmes.
- Maintain records on the training and qualification of all NPP personnel.
- Oversee contractors, and non-plant staff who have functions to perform at the plant.

Appendix B provides an example of training manager and supervisory staff responsibilities supporting instructor development.

3.1.1.3. Monitoring, evaluation and control of training

The plant manager and plant department managers need to make it clear to their personnel through their actions that they consider the success of training programmes to be their responsibility, even though much of the training is provided by the training organisation.

These actions can take a variety of forms. Good practices that have been observed include the following:

- Regular observation of the conducting of training, e.g. operations department managers observing the conducting of simulator training, participating in the assessment of shift supervisors, and supporting the feedback provided by simulator instructors.
- Routine reviewing of evaluation outputs with subordinates during staff meetings.
- Establishment of joint NPP/training organisation groups to review training needs.
- Regular rotation of personnel between plant departments and full time instructor positions.

Appendix C gives an example of an instructor observation form. Appendix D shows an example of a training review committee administrative procedure. Further examples are provided on the accompanying CD-ROM.

3.1.2. Training policy and human resources policy

To be most effective, the training policy must be consistent with the human resources policy (in some organisations, training is part of the human resources policy). The human resources policy addresses areas such as recruitment and selection, career planning and development, and the retention of personnel. In this context is should also include the benefits of undertaking instructor duties in individual development and career planning. Human resources practices should assist, rather than inhibit, the transfer of staff between training and NPP roles.

3.1.2.1. Broadening of training content

Constant striving to improve production efficiency, safety and reliability (and thus quality) has led to an increasing emphasis on training for human factors in areas such as communication, teamwork, reliability, man-machine interfaces, management and supervision, and analytical methods. This emphasis on human factors has led to a need for greater integration of training and human resources management activities.

Instructor training programmes should reflect soft skills competences. Section 6 includes details on the development of instructor competences.

3.1.2.2. Selection, recruitment and qualification

Based on the summary of responses received from Member States, it is generally recognised that, wherever possible, staff with NPP experience are selected as instructors, as they have not only appropriate technical knowledge, but also operational experience. Where this has not been possible, for reasons of distance or NPP staff shortages, considerable technical training is required for the instructors in the KSAs needed for their roles, and for their credibility with trainees.

Where there are limitations in the number of experienced staff available, a mixture of external and NPP experienced staff should be considered, or the use of NPP staff temporarily assigned to assist with the development of and support to externally recruited staff.

Most Member States quote instructor entry-level requirements of at least engineering degree level (2–3 years university study) as a qualification, with 2–3 years of plant

experience. Where trainee instructors are recruited without the necessary plant experience, a considerable period of on-site training is likely to be required. Many countries require instructors to be qualified/certified to the same level as are the trainees that they will instruct. (e.g. simulator instructors are required to obtain or maintain a reactor operator licence).

Some countries have different 'grades' or 'levels' of instructor for different complexities of training. In this way, instructors recruited from outside the organisation progress in terms of responsibility as their competences develop.

Appendix E contains an example of criteria that may be used when recruiting and selecting instructors.

3.1.2.3. Motivation and career development

In acknowledging the desire to have experienced NPP staff as instructors, it is important to recognise the need to have mechanisms both to encourage plant staff to apply for instructor roles, and to facilitate their re-integration into the NPP organisation after their period in training. How this is achieved will depend on the nature of the operating organisation, but some good examples include:

- NPP staff gaining experience as a simulator instructor as a pre-requisite for promotion from reactor unit operator to assistant shift supervisor.
- NPP staff being seconded (temporarily assigned) as an instructor for a fixed period, typically 1 to 2 years, as a requirement of the job position.
- Instructors undertaking "real" roles on-site during NPP outages.
- Instructors returning to the NPP regularly to attend team briefings and plant update training with their NPP peers.

NPP staff who have moved into training for a period of time, and after returning to the NPP are then promoted on the basis of their broader experience from training, become positive role models for supporting training. Such individuals also often undertake an ongoing liaison role between the NPP and the training function, formally or otherwise, to the benefit of both parts of the organisation.

It is important that staff are not disadvantaged personally by transferring from the NPP into training. Hence appropriate compensation arrangements should be made (e.g. retention of shift payment during temporary assignments, promotion for new responsibilities and loss of shift payment, etc.)

3.1.2.4. Organisation and management of training staff

The organisation and management of training staff will vary greatly depending on the assignment of responsibilities (i.e. the balance of responsibilities between the NPP, local, central or external instructors). However, there are some important common principles that should be maintained:

- The organisation of training functions should be such that instructors can easily obtain the necessary support to deliver effective training.
- Unnecessary demarcation between groups of instructors should be avoided (e.g. simulator instructors should also deliver classroom training).

- Appropriate interfaces should be established across functional boundaries to enable instructors to work closely with NPP staff to identify training needs and ensure that the training provided is appropriate.

Instructor turn over, and identification of suitable replacements, may be a significant issue for training management. This problem may be mitigated by rotation arrangements with NPPs or other parts of the operating organisation. If this approach is not possible, it may be necessary to have a pool of instructors receiving training, ready to fill any vacancies that arise.

3.1.2.5. Integration of new instructors into the training organisation

The integration of new instructors can be a particular challenge, especially if the core team of instructors is a stable one, or if a new instructor has come from outside the organisation. One proven solution is to assign an experienced instructor as a mentor to the new instructor, assisting with the learning of the training procedures and methods used in the organisation, offering coaching through the initial training programme and observing training modules that the new instructor delivers. This mentoring role does not replace the responsibilities of the instructor's supervisor. Indeed, the mentor is acting under the supervisor's direction.

3.2. MANAGEMENT OF TRAINING

3.2.1. Interfaces between NPP management and the training organisation

For the relationship between the training organisation and the NPP to be successful, the training organisation must recognise that its primary purpose is to provide a training service to the NPP manager thereby enabling that manager to fulfill total responsibility for ensuring that only competent personnel undertake activities on the plant which may affect safety.

Equally the NPP manager must give the training organisation the necessary authority, and NPP support, including financial and human, to enable the training organisation to discharge this purpose effectively. Visible support for the training organisation by NPP management will encourage the right relationships between instructors and trainees, and will assist instructors to enforce management expectations of performance and behaviour. To assist this it may helpful to have formal interface arrangements, including details of review meetings, reporting requirements, and information sharing processes.

When the operating organisation utilises a central training function to provide training for several sites, this may be used as a channel for corporate standards and expectations. If this is to be the case it should be reflected in the goals, scope and responsibilities within the training policy, to avoid tension between the training organisation and individual NPPs.

3.2.2. Interfaces between plant departments and the training organisation

Training provided by organisations separated from the NPP structure will be most effective when there are good working relationships between instructors and NPP staff. Instructors need assistance from NPP management and staff for a variety of activities:

- input to the design of initial and continuing training programme content;
- integration of classroom and on the job training;

- subject matter expert (SME) input to the development and delivery of specific training modules;
- participation in the assessment of trainees;
- information on plant and procedure changes;
- feedback on the effectiveness of the training given.

Where necessary, training and NPP management should establish formal interface arrangements to ensure effective co-operation between instructors and plant staff. Good co-operation will help to ensure effective training. In addition it will add to the understanding of each other's roles and may help with staff recruitment of staff to and from the NPP.

3.2.3. Interfaces with other training providers

When external training providers are engaged (especially by a separate internal training organisation), it is important that the training they deliver is to the same standards and quality as that from internal providers, unless there is agreed justification for specific differences. It is important, therefore, to establish appropriate formal arrangements to ensure that contracting organisations understand what is expected of them.

It may also be appropriate for the NPP or the internal training organisation to consider 'certifying' contract instructors even if it is the contract organisation's responsibility to ensure their competence.

3.2.4. Interfaces with regulatory body

Since the training organisation's role is to assist the NPP manager in ensuring the competence of the NPP staff, regulatory bodies are most likely to want evidence that the training organisation is itself a competent supplier. In some cases this relationship is managed through the NPP or the operating organisation. However, there may be advantages in having a direct relationship, thus giving the regulatory body confidence in the independence of the training organisation in assessing the competence of trainees.

4. THE ROLE OF INSTRUCTORS

It is evident from the responses to the questionnaire that the role of instructors covers a variety of activities which differ between Member States according to:

- the organisation of the training department;
- the distribution of responsibilities between instructors, training management and training support;
- the number of individuals recruited to the training department;
- the involvement of instructors in job positions or activities at the NPP and so their availability for training activities;
- whether instructor activities are considered as a main role or as a secondary role;
- the training tools used;
- cultural aspects such as social barriers, ability to change jobs, and management systems.

Appendix F contains an example of a job description of an instructor. It includes a list of instructor activities.

4.1. ROLE OF INSTRUCTORS IN TRAINING PROCESS

The approach taken in implementing a SAT methodology within a given operating organisation will largely define the overall duties and responsibilities of the instructors within that organisation. Detailed information on the implementation of SAT is provided in other IAEA publications [6] but the following sections outline typical responsibilities of instructors within the five main phases of the SAT process.

4.1.1. Analysis phase

Instructors should be able to assist in the analysis of training needs by:

- Helping NPP management to identify the training needs associated with plant job positions.
- Reviewing feedback from plant events to identify gaps in training.
- Conducting interviews with job incumbents to identify training needs.
- Reviewing changes to plant hardware, configuration, operating procedures, etc., to identify any necessary changes to training requirements.
- Participating in 'table-top' or job competence analysis (requires significant NPP experience).
- Providing training in analysis techniques to other staff.
- Overseeing the analysis of training needs for particular projects or job positions, undertaken by contractors and consultants.

4.1.2. Design phase

Having access to training needs analysis data, instructors need to be able to convert this data into learning objectives and group these appropriately to identify discreet training modules. Appropriate training settings and methodologies, together with any necessary training aids and environments, should also be identified by the instructor as part of the design phase.

Instructors should also be involved in the design phase by:

- Identifying overall training programme objectives as well as individual course objectives.
- Defining the training objectives in accordance with the entry level knowledge and skills of the trainees.

4.1.3. Development phase

Using the standards and procedures provided by the training function, instructors should develop all necessary training materials for the effective delivery of the training module including a lesson plan, trainee handouts, any visual aids and any specific procedures required.

Instructors should also be involved in the development phase by:
- Ensuring that the training objectives are adequately addressed in the training materials they develop.

- Optimizing the technical content, the duration, and the chronology of the courses necessary to achieve the training objectives.
- Defining the assessment criteria to be met by the trainees.
- Maintaining the training materials.

4.1.4. Implementation phase

Instructors should deliver effective training, using proven techniques, including regular questioning of trainees to check understanding, reviewing information given and proposing case studies, as appropriate, to test the trainees' ability to apply the knowledge and skills. In the case of simulator training, and other hands-on training, the instructor should create a realistic environment.

Instructors should also be involved in the implementation phase by:

- Imparting those knowledge, skills and attitudes (KSAs) that are necessary for the job environment. These should include safety culture and human factors issues as well as the technical content.
- Obtaining trainee feedback by conducting an end-of-course training assessment and periodically (e.g. annually) synthesizing all the end-of-course assessments.
- Updating the training documents.

4.1.5. Evaluation phase

When delivering training, instructors should provide feed back to the appropriate individual, any aspects of the training which were not fully effective, especially where critical feedback is provided by the trainees themselves.

In any event, instructors should seek feedback from trainees on completion of any training activity for which they are responsible to ensure any shortcomings in the training provided are corrected. Procedures should provide for subsequent feedback on training effectiveness from the NPP and that the feedback is acted upon.

Instructors should also be involved in the evaluation phase by:

- Contributing to the assessment of the trainees:
  - The instructor is responsible for the knowledge of the trainees at the end of the session and should participate in the assessment of the trainees.
  - The instructor contributes to the licensing process delivered by another authority (e.g., the NPP, the Safety or Regulatory Authority).
- Evaluating the conformity, efficiency and pertinence of the training aids.
- At the end of each training session, taking into account the training feedback in order to update training files such as training materials, students handouts, and examinations.
- At the end of each training session, identifying any improvements needed relating to normal, abnormal, and emergency operation procedures, and to maintenance procedures and providing this information to the procedure designers.
- Registering every updated document in a database.

4.2. ROLE OF INSTRUCTOR IN PRESERVATION OF KNOWLEDGE

The preservation of knowledge covers two questions in an ageing workforce environment:

- How to ensure a minimum level of KSA for young employees in order to be able to operate NPPs with a high level of safety.
- How to capture the knowledge and skills of individuals who are about to retire.

This will be soon a major issue the nuclear industry. It is the responsibility of all parties involved in the nuclear arena (e.g. international organisations such as the IAEA, and WANO, and NPPs, training centres and research centres) to be concerned. As a consequence, the preservation of knowledge is an important activity that should be supported by instructors.

To enforce this activity, the following responsibilities should be considered:

- Contributing to the identification of the critical knowledge that needs to be retained.
- Participating in NPP activities and incorporating experience into training materials.
- Exchanging information with NPP experienced personnel to capture the know-how in training materials.
- Capturing NPP experience in training files where occasional instructors are used.
- Identifying and updating routinely the critical knowledge that is needed.

Information on knowledge management is available in the report of the IAEA Technical Meeting on Managing Nuclear Knowledge in 2002 [7]. In this report, the role of the IAEA is described in the maintenance and the preservation of knowledge and expertise in nuclear science. The INSAG note 4 – June 2001 report "Maintaining Knowledge, Training and Infrastructure for Research and Development in Nuclear Safety" [8], also discusses this issue.

4.3. OTHER ROLES

Between other responsibilities and tasks, instructors may also have the following roles in their training organisations:

- Maintaining the simulator and other training devices (from simple to complex activities).
- Coordinating with technical departments (procedure designers, simulator designers, etc).
- Supporting wider utility projects.
- Participating in the training of new instructors.
- Maintaining and developing their own competences.
- Identifying good practices performed in other training centres (benchmarking, exchanging experiences).
- Participating in NPP activities. For more information, see Section 6.3.
- Designing development processes for competences or skills for job positions at different levels of responsibility.
- Organising training files (training materials, students files, assessment files, etc)
- Identifying training needs for all those in the training organisation.

5. CATEGORIES OF INSTRUCTORS

In the following sections detailed information is provided in terms of categories and specializations of instructors.

5.1. CATEGORIES OF INSTRUCTORS

The NPP training organization, or contracted training organization, should define the formal approaches to be used for NPP personnel training. As described in Section 3.2, a variety of approaches may be required for NPP personnel training that will determine the number of instructors who are needed.

Some NPP-related topics, such as training on NPP modifications, new procedures, etc., may require NPP specialists from operations, maintenance, and other departments to become involved temporarily or for short periods. This will also require varying approaches for instructor staffing.

As described in Section 2.1.2.2, there are many ways to recruit instructors. Based on existing training policy, the NPP training organisation should decide on the approach to instructor staffing, including the ratio between full time and occasional instructors, and the development of instructors for different training settings (e.g. classroom, simulator, on the job training).

Descriptions of different categories of instructors are provided in the following paragraphs.

5.1.1. Full time instructors

Full time instructors are individuals who usually are permanently assigned to the training organisation. Depending on training policy and national requirements, the duties of full time instructors will differ from one training organisation to another. In many cases, full time instructors are involved in all training activities within their training organisation. For this category of instructors, formal training should be given as described in Section 6.2.

5.1.2. Occasional instructors

Occasional, or part time, instructors are individuals who usually are formally qualified instructors, but who are involved in training only on an occasional basis. These personnel may belong to NPP departments and may include but not be limited to:

- Engineers from Operations, Maintenance, and other NPP departments.
- Managers of NPP departments.
- Control room operators (during their free time on shifts).
- For this category of instructors, formal training should be applied as well, but may be limited, as described in Section 6.2.

5.1.3. Contracted instructors

Contracted instructors are individuals who usually belong to an organisation that is on a contract. They are qualified instructors and are involved in training on a contractual basis. These personnel may include but not be limited to:

- Design or vending companies' engineers and technicians.
- Instructors of a contracted training organisation.
- External consultants.
- University lecturers.

For this category of instructors, their formal training should be managed by their employers. The scope of such training may vary according to the scope of the training services being provided. The main approach to instructor training as described in Section 6.2 should be considered.

5.2. SPECIALIZATION OF INSTRUCTORS

Based on international practice, the specific aspects of instructor performance differ from one training setting to another. The competences needed when providing training in different training settings vary significantly. Specialization by instructors in terms of a training setting demand different methods and techniques to be used during instructor training, and in most cases such requirements are reflected in the job position descriptions.

An explanation of different specialities of instructors is provided in the following sections.

5.2.1. Classroom instructor

Classroom instructors are individuals who usually provide training mainly in a classroom setting. Instructor training programmes should include relevant classroom training methods and techniques and hands-on practice of training in a classroom setting.

Depending on training needs, different training methods could be used. The training organisation should ensure that new instructors from the NPP have the correct technical qualifications prior to providing instructor training.

The following typical duties of a classroom instructor may be considered but are not limited to:

- Preparing for a training session, including:
  – Participating in training needs analysis.
  – Analyzing job or task performance.
  – Defining KSAs for a particular job position.
  – Developing classroom training materials.
- Conducting a classroom training session, including:
  – Managing the classroom trainees.
  – Applying adult learning principles.
  – Applying different training styles.
- Performance monitoring of trainees, including:
  – Observing trainees' performances.
  – Evaluating the overall training process.
- Improving training, based on feedback from trainees, training managers, and NPP management.

5.2.2. Simulator instructor

Simulator instructors are individuals who usually provide training mainly in a simulator setting. A simulator setting requires an instructor to have wider competence than that needed for classroom training. For example, a simulator instructor must be able to provide both classroom (pre-simulator) training and on the job (hands-on) training.

Briefing of a control room team is typically conducted prior to demonstration, practice, or evaluation scenarios. These briefings may be conducted in the classroom or at the simulator. In most cases the instructor uses a simulator exercise guide as the lesson plan. These briefings usually cover team member assignments, plant initial conditions, and immediately prior to the exercise, a shift turnover and control panel walk downs by the trainees. For demonstration or training scenarios the training also includes all information about the specific scenario and any refresher theoretical, systems, or components training needed to support the exercise.

Hands-on training is then provided on the simulator. The instructor may use the following methods of training:

- Demonstration.
- Practice.
- Evaluation.

The attitude and professional demeanour of trainees and instructors should reflect the professionalism expected in the main control room. To provide support in learning these areas, simulator instructors should have an appropriate qualification.

The number of instructors needed to conduct simulator scenarios also needs to be considered. Typically, one instructor is assigned to the simulator instruction station and one or more instructors to the simulator control room. For assessment scenarios, more instructors or assessors may be used to ensure an effective observation and critique of each control room job position.

After completion of the session on the simulator, a de-briefing session (or post-simulator critique) is provided in order to review the trainees' performance. Post-exercise critiques and de-briefings on trainee performance represent an important form of instructor-trainee interaction at the end of the exercise.

Simulator instructors should have experience in both an operating control room and other relevant operations and in the operation of the simulator console. Equivalent training should be applied to include both operation of the simulator and the use of the simulator as a training and evaluation tool. The instructor must learn to operate the simulator (initialize, freeze, snapshot, etc.), to inject malfunctions, to understand the boundaries of validity of the simulator and to operate facilities used in support of the training session, such as video cameras and recording equipment.

Simulator instructors should have wider experience and qualifications than those needed by classroom instructors.

Unique aspects associated with simulator training which need to be included in the instructor training programme are those that are relevant to:

- Development of diagnostic skills.
- Teamwork within the shift.
- Introduction and management of stress by the trainee(s).

Considering lessons learned by IAEA Member States, the following typical duties of simulator instructors may be considered but are not limited to:

- Preparing for simulator sessions, including:
  - Developing simulator exercise guides.
  - Reviewing existing training materials for pre-simulator sessions.
  - Preparing the full-scope simulator for training sessions.
  - Conducting pre-simulator sessions, including:
  - Applying different training styles in a class.
  - Preparing training materials.
  - Reviewing industrial or NPP experience.
- Conducting full scope simulator training sessions, including:
  - Controlling the full scope simulator.
  - Controlling a training session.
  - Applying different methods of training on the full scope simulator.
  - Developing and conducting part-task training for trainees.
- Conducting examination sessions on the full scope simulator.
- Performance monitoring of trainees, including:
  - Observing trainees' performances and FSS performance during a training session.
  - Evaluating trainees during a simulator session.
  - Preparing and conducting a post-simulator critique.
  - Evaluating FSS performance.
- Implementing the FSS Configuration Management Procedure.
- Participating in special operations and control of the main control room under direction from NPP management and the Training Manager.

Additional information on simulator instructor training is contained in the IAEA TECDOC on Use of Control Room Simulators for Training of NPP Personnel, which is currently under preparation [9].

5.2.3. On the job (hands-on) training instructor

On the job or hands-on training instructors are individuals who provide training mainly in a working environment. This kind of training may be conducted in a laboratory or workshop, on training equipment, or at the actual working place of the trainee. On the job training settings require specific instructor competences compared with those needed for classroom and simulator training. For example, before a hands-on session, the instructor may provide the briefing session in a classroom or in the work place. Then, the instructor conducts the hands-on exercise. The following is a typical sequence of hands-on training:

- Explanation, or formal training in a classroom.
- Demonstration.
- Practice.
- Evaluation.

After completion of the training sessions, a trainee performance critique is provided. Finally, after accomplishing all the hands-on training sessions, or the course, a formal examination is conducted.

Considering good practice gained from IAEA Member States, typical duties of on the job training instructors may include but not be limited to:

- Preparing for hands-on sessions, including:
  – Developing and reviewing training and evaluation materials.
  – Preparing training tools (or equipment) needed for sessions.
- Conducting demonstration sessions, including:
  – Applying different demonstration techniques.
  – Applying the procedure and technical specification while demonstrating the operations or maintenance activity.
- Conducting practice sessions, including:
  – Applying different training techniques.
  – Managing training tools or equipment used.
  – Controlling the training session.
- Performance monitoring of trainees, including:
  – Conducting evaluation sessions.
  – Observing trainees' performances and the performance of the training tools or equipment.
  – Evaluating trainees during an evaluation session.

5.2.4. Other specializations

Some training organisations have special staff who undertake training material development, simulator configuration management or maintenance, training needs analysis, etc. In many cases these duties are integrated into an instructor's day-to-day job. Lessons learned have shown that it is important to use real feedback from the NPP in order to continue to improve the delivery and effectiveness of training. Instructor participation in this continuing process is essential.

Instructor training needs should be identified through a formal SAT-based approach. All the duties required for effective training of NPP personnel should be in place when establishing a training organisation. Relevant training programmes should be developed and implemented, and instructors, including occasional instructors, should be trained accordingly. Methods of identification of the necessary competences are described in Section 6.1.

Based on lessons learned, the following typical duties of instructors specializing in training material development may be considered but are not limited to:

- Providing job analysis.
- Providing task analysis (or competency analysis) techniques for NPP job positions.
- Developing training objectives according to task analysis data.
- Developing instructor lesson plans or guides for particular training sessions.
- Developing or participating in the development of slides, films, computer based training and other training aids and tools for specific training sessions.
- Developing evaluation formats or procedures for use in different training settings.

Based on lessons learned, the following typical duties of instructors specializing in simulator configuration management may be considered but are not limited to:

- Managing training material configuration.
- Managing simulator technical documentation configuration.
- Managing instructor competence.
- Managing simulator design data.
- Managing simulator modifications.
- Co-ordinating simulator configuration management with the NPP and training functions.

Based on lessons learned, the following typical competencies of instructors specializing in training needs analysis may be considered but are not limited to:

- Analyzing actual training needs.
- Analyzing existing training materials.
- Providing interviews with NPP managers, training management, and job incumbents.
- Analyzing interview results.
- Preparing training requests.

Based on previously defined instructor competences and prescribed instructor duties, for each category and speciality of instructors, appropriate training and retraining (continuing) programmes should be developed and implemented; instructors in each category should undertake formal training as defined in their training programmes. New instructor competences required for the training process should be derived from actual training needs.

6. DEVELOPING INSTRUCTOR COMPETENCE

The operating organisation should establish a formal programme for selecting, training and authorising instructors. All full time instructors and most occasional or part time instructors need to acquire instructional competences by completing a training programme designed for this purpose. Both initial and continuing training are needed to establish and maintain an instructor's competence. It is important to define precisely the instructor competence needed by the training organisation for its short and long term needs. SAT should be applied to this activity.

The following important criteria for instructor qualification should be considered but not limited to:

- A high level of technical knowledge and skills.
- Good preparation for all lessons.
- The quality of the training materials being developed or reviewed by the instructor.
- The quality of lessons being delivered.
- The quality of post simulator critiques being prepared and delivered.
- Mastery of interpersonal communication skills.
- Mastery of observation skills.
- Acceptance of self-development.
- Professionalism.

6.1. AN APPROACH TO SELECTION AND RECRUITMENT OF INSTRUCTORS

There are several different approaches used when selecting and recruiting instructors, as exemplified in the US Department of Energy publication 'Guide to Good Practices for Training and Qualification of Instructors [10] and in the National Academy for Nuclear Training publication 'Guidelines for Instructor Training and Qualification' [11]. The most common practice is to select and recruit instructors from candidates who have relevant technical and pedagogical competences. In practice there are sometimes limitations in recruiting candidates with a suitable qualification. Because of national and social situations, in some cases, full time instructors are selected from non-nuclear organizations such as universities or colleges. In such cases additional technical training will need to be provided for candidates in order to meet the qualification requirements.

Nevertheless, wherever possible it is good practice to recruit instructors directly from NPP departments or other nuclear facilities.

Based on lessons learned, the following requirements should be considered when selecting and recruiting instructors for an NPP personnel training organisation:

- high level of technical competence corresponding to the relevant NPP job positions to be trained.
- extended experience in NPP operations, maintenance or another NPP specialization being referenced to a particular category of NPP personnel.
- training qualification related to adult training, training process organisation, etc.

In many cases, for the most appropriate qualification of instructors, an instructor training programme should involve both technical and instructional training.

Occasional instructors should be selected based on specific requirements that may be different to those needed for full time instructors. Occasional instructors are typically highly technical professionals with a narrow specialization, so that they may need only instructional training in order to be able to provide training sessions in relevant training setting environments.

Each training organisation should establish its own requirements for the selection and recruitment of instructors. Such requirements should be included in the training administrative procedures or guides.

6.2. TRAINING OF INSTRUCTORS

As for all NPP personnel, instructors should pass through a formal initial and continuing training programme. Initial training programmes should be derived from the job description process and task or competency analysis. Continuing training programmes should be derived from training needs analysis, feedback from NPPs and training performance, and other inputs as defined in the following sections. Examples are provided on the accompanying CD-ROM of instructor training as used in France, Russia, Ukraine, the United Kingdom and the United States.

6.2.1. Training needs

Based on training needs, and also on training policy, the training organisation structure, job descriptions and other inputs, a comprehensive instructor competence list should be derived. In some training organisations, a complete list of competences needed for an instructor's job position is used for deriving the required KSAs.

Some training organisations use contractors to define instructor competences. In any case, a systematic approach to defining instructor competences should be used.

An example of instructor needs analysis list is given in Appendix G. Additional examples of instructor needs analysis are provided on the accompanying CD-ROM.

6.2.2. Instructor training

6.2.2.1. General approach

In general, each training organisation has its own approach to instructor training. A common approach is to develop and implement an instructor training programme based on first implementing a "pilot" programme. The results of the pilot programme are then used to provide feedback to refine and finalize the programme to be used for each category of instructor and for each training setting.

Following the best international practice, the aims of instructor training are as follows:

- Provide initial technical training appropriate for the training programmes and subjects that are to be taught. This aim must be achieved prior to entering an instructor training programme. (Usually, requirements for technical competences are identified when a training department is established and instructor job descriptions have been finalised.) A variety of approaches and a combination of methods can be employed to satisfy the requirements for technical competences.
- Provide the necessary training on SAT.
- Provide basic instructor training to meet the expectations regarding fundamental instructional competences for all instructors. This aim, dealing with the basics of instruction, can be achieved during a pilot training programme.
- Provide training relevant to the specific training modes and training settings. This aim is to be partially covered within the instructor initial training and then fully achieved within the instructor continuing training programme.

The following main principles may be employed for the development of instructor training programmes:

(a) Sequential principle.
  (i) A training programme should be based on training needs and job descriptions developed using, as appropriate, job and task analysis (JTA) and job competency analysis (JCA) for instructor job positions. As references, task (competency)-to-training matrices may be used.
  (ii) Training programme modules should be logically structured and sequenced.
  (iii) Necessary technical competences (built from appropriate education, training and experience) shall be acquired prior to the conducting of training on instructional competences.
  (iv) Specific instructor training should be delivered only after basic instructor training.

(b) *Principle of 'chains'.*
Each theoretical part of training should be continued by practical on the job training and even independent work under close supervision by experienced instructors.

(c) *Principle of sufficiency.*
An individual training programme for each particular candidate for an instructor's job should be sufficient to qualify that candidate for the instructor job after completion of the entire training programme.

(d) *Principle of modularity.*
A training programme should incorporate logical and distinct parts or modules of the training. A modular structure of the training programme will allow to time to obtain reliable feedback from the training and to adequately control the training process. The modular structure should also allow a flexible training programme to be established in order to customize the training programme to meet specific and individual needs.

(e) *Principle of personality.*
A training programme should meet the expectations of the training department, the NPP and the candidate for an instructor's job position.

(f) *Principle of Continuing Professional Development (CPD).*
Individual programmes of CPD for the instructors should be established and implemented.

When developing and implementing instructor training, and based on the principles mentioned above, the following may be considered:

- An example of generalized scheme of instructor training programme is provided in Appendix H. This example covers only the instructional part of an instructor training programme; the technical part of instructor training should be implemented in accordance with selected approached and methods as described above. The final instructional training programme should consist of both initial training and continuing training.
- The initial training programme may include basic training modules and specific training modules.
- A description of initial training is provided in Section 6.2.2.4.
- After successful completion of initial training, including all the necessary tests and examinations, a candidate is regarded as successfully passing formal training. However, before formal acceptance by an instructor qualification panel, or similar board, a candidate should receive formal on the job training, working as an ordinary instructor but under close supervision of training supervisors or experienced instructors. This OJT may take some time; in some Member States it takes approximately from 4 to 20 weeks depending the abilities of the candidate and national requirements.
- In the event, each instructor should receive formal instructional training and additional technical training as described in Sections 6.2.2.2. and 6.2.2.3.

6.2.2.2. Technical training

In practice, instructors are usually selected from NPP departments. Nevertheless, in some cases, candidates may be selected from other NPPs, universities, or other organizations. These cases require extended technical training programmes to be provided for the instructors. Such instructor training should meet all the qualification requirements established for a particular NPP job position (for example, the instructors who provide training for reactor operators should either have a reactor operator qualification or successfully undertake a formal reactor operator training programme).

All instructors should participate in continuing training programmes, which includes the annual maintaining of technical competency in relevant areas; in some Member States the latter is subject to national or local regulations for instructor competence.

6.2.2.3. Instructional training

Based on defined instructor competence, a training programme on the fundamentals of training techniques would typically address the following:

- understanding the role of an instructor.
- arranging the classroom (or other training setting) to match the training sessions.
- applying adult learning theory.
- using appropriate training techniques.
- using lesson plans and training materials.
- conducting lectures.
- conducting discussions.
- conducting practical demonstrations.
- assisting trainees in solving problems associated with learning.
- assessing trainees.
- maintaining and using individual trainee records and training programme records.

To qualify for more advanced assignments, an instructor should demonstrate competence to carry out classroom training and should complete additional training, which may include:

- Designing training programmes.
- Planning and developing lessons.
- Developing lesson plans.
- Selecting, developing and modifying training materials.
- Developing training measurement methods.
- Presenting laboratory instruction.
- Managing individualized instruction.
- Conducting walkthroughs and plant tours.
- Conducting simulator training.
- Supervising on the job training.
- Identifying trainee stress.

An example of training competences is provided in Appendix I. Additional examples of instructor competences and tasks are provided on the accompanying CD-ROM.

6.2.2.4. Initial training

Typically, the scope of initial training depends on the speciality of the instructor. In many Member States, initial training includes training only on classroom specific activities. The following topics may be considered for an initial training programme:

- Role of the instructor.
- Training process.
- Communication process during training sessions.

- Working in a group.
- Adult training: generic and specific aspects.
- Conflict resolutions.
- Learning objectives.
- Preparation for a training session.
- Introductory part of a training session.
- Organisation of tests or quizzes.
- Trainee performance assessment.
- Use of training handouts and training tools.
- Managing the training process.
- Pedagogical techniques in providing training.
- Methods of training.
- Development of a training lesson plan.
- Evaluation of trainee performance.
- Preparation for practical lessons.
- Providing practical lessons.
- Evaluation of a course.

Based on a specific request from a training organisation, specific training may be provided and employed as a part of an initial training programme.

(a) Specific courses are oriented to acquire knowledge and skills in narrow fields of specialization of the instructor duties associated with simulator, OJT, laboratory and workshop training. This training is also a part of instructor initial training and provided accordantly to instructor specialization.

(b) A number of specific courses, depending on the types of training being conducted or planned at the training centre or the NPP. Based on the speciality of the instructors, the following specific courses should be made available:

  − A specific course on 'Classroom Instructor Training'. This course may be limited to the particular instructional techniques used for classroom training. The duration of this course should be at least one week although experience has shown that a sensible length is two weeks.

  − A specific course on 'Simulator Instructor Training'. Usually, the duration of such a course is two weeks. The main expectations are to provide specific knowledge and skills in simulator training process management. The course includes instructor workstation control, monitoring, observation and evaluation of trainee performance, development of simulator exercise guides, and reinforcement of shift team performance. The course incorporates theoretical and hands-on training.

  − A specific course on 'OJT instructor Training'. Usually, the duration of such a course is one week. The main expectations are to provide specific knowledge and skills in the field of OJT training process management. The course covers the principles of OJT delivery, monitoring, observation and evaluation of trainee performance, examining the trainees, and development of OJT training materials, including qualification cards or OJT checklists. The course includes theoretical and hands-on training. The course is typically provided to in-plant personnel who are designated and responsible for conducting on the job training.

  − A specific course on 'Laboratory/Workshop Instructor Training'. This course is similar to the one above but deals specifically with laboratory and workshop training. The course duration is usually of one week.

An example of an initial training programme for an instructor is given in Appendix J, while an example of the OJT part of an initial training programme for instructors is given in Appendix K. Additional examples are provided on the accompanying CD-ROM.

6.2.2.4.1. *Approval of instructor competence*

The NPP training manager, or manager of the relevant training organisation, in conjunction with other appropriate individuals, should receive evidence that an instructor is technically qualified to present the material and has instructional skills to perform training tasks as needed for a specific job position. Approval of such technical competence should be based on a demonstration of the appropriate technical KSAs in the subject area(s) to be taught by the instructor.

Approval of KSAs in instructional techniques should be based on a demonstrated performance of training tasks for the specific instructor position. The final evaluation of all instructors should be based on evaluating their performances by observing a number of training sessions.

Examples of instructor qualification forms used for instructor evaluation are given in Appendix L. Additional examples providing instructor certification criteria are on the accompanying CD-ROM.

6.2.2.5. Continuing training

Continuing training programmes should be established to maintain, improve and advance both the technical and training competences of qualified instructors. The continuing training programme for instructors should consist of two elements: technical training and instructional skills training as outlined below:

6.2.2.5.1. Continuing technical training

The purpose of this training is to maintain technical qualification and familiarity with job requirements, NPP changes, operational experience, NPP documents, etc.

Instructors should maintain their job qualification by fully participating in continuing training programmes in the area of expertise for which they are providing instruction.

All instructors should periodically work or receive "shadow" training at the NPP in the discipline in which they are qualified and for which they prepare trainees. Some NPPs use opportunities available during scheduled plant outages for this purpose. In the case of simulator instructors, in-plant training should be undertaken during normal NPP operation to enable them to monitor and refresh their knowledge of plant activities, such as shutdown and startup associated with refuelling outages. Some NPPs require simulator instructors to maintain a current operator licence.

Many operating organisations periodically rotate technical instructors between the training function and the NPP or assign plant personnel to the training staff for periods from one to two years.

6.2.2.5.2. Continuing training for maintaining instructional competence

An aim of continuing training for maintaining instructional KSAs is to improve and advance an instructor's training competence. Such training consists of reviewing selected initial training topics, in-depth instruction on selected topics, information on new training methods and aids, information on changes to training related regulations or procedures, and observing and evaluating other instructors. The training content should also be based on feedback from assessments of instructors and evaluation of training programmes.

An example of continuing training programme for maintaining instructional competence is given in Appendix M. Additional examples demonstrating continuing training programmes are given on the accompanying CD-ROM.

6.2.2.6. Remedial training

- Following a request from the training function, remedial training must be provided for instructors. The following may be included in this training but not be limited to:
- Applying new training methods.
- Using new training equipment or tools.
- Updating skills in training development (i.e. task analysis, OHP use, etc.).
- Updating skills to monitor or evaluate trainees' performance.

6.3. ASSESSMENT AND PERFORMANCE MONITORING

To monitor and assess instructor performance, appropriate assessment and performance monitoring procedures should be implemented. These procedures should concentrate on the following:

- Formal assessment of instructors (including. if relevant, assessment by a Regulatory Body, the NPP, Human Resources Management, etc.).
- Periodic evaluation and coaching, feedback from other instructors, the NPP, etc.
- Instructor's evaluation made by trainees, usually provided at the conclusion of a training course.
- Instructor's evaluation made by training management, normally undertaken regularly and in accordance with a formal procedure.

In addition to individual instructor assessment, instructor training programmes should also be monitored and evaluated.

An example of instructor assessment criteria is given in Appendix N. Additional examples of checklists; formats etc., used for instructor assessment are given on the accompanying CD-ROM.

6.4. IMPLEMENTATION OF INSTRUCTOR TRAINING PROGRAMME

An instructor training programme may be implemented in different ways. It may be fully implemented by the NPP's training organisation. Alternatively, a central training organisation or centre may be responsible for the training of all categories of instructors and

in all training settings. It is sometimes more cost effective to use a contractor or university to provide training for some categories of speciality instructors.

In any case, an instructor training programme should be developed using a SAT-based approach and should be derived from training needs analysis.

The following approach may be applied when an instructor training system is to be implemented within the NPP training organisation:

- select the instructors to be trained.
- conduct a training needs analysis.
- conduct an instructor job or task or competence analysis.
- develop an instructor training programme based on a task or competency list.
- train the selected instructors, and provide training materials.
- monitor the implementation of the instructor training programme.
- evaluate the trainee instructors and their training programme.

For other approaches, cultural and other human-related aspects should be considered when developing an instructor training programme.

7. CAREER DEVELOPMENT

7.1. LIFE INSTRUCTORS VS. INSTRUCTORS ROTATED WITH NPP

There are typically two types of assignments (or contracts) between instructors and training organisations: short term assignments/contracts of between 6 months and 5 years and long term assignments/contracts.

On the one hand, short term assignments may be offered to instructors who rotate between the training function and an NPP or, in some cases, short term assignments are offered to experienced personnel who are used only occasionally as instructors but keep their job positions at the plant. On the other hand, long term assignments may be provided to instructors who are appointed for much of their working life on a permanent basis (sometimes termed "life instructors" or "permanent instructors").

7.1.1. Advantages and disadvantages

For each type of assignment or contract for instructors there are advantages and disadvantages.

For short term assignments advantages include:
- Opportunities to retain up to date KSAs regarding the NPP organisation and policies and to impart these to the trainees.
- For experienced people, a higher level of technical skills may be retained and imparted to the trainees.

Disadvantages include:
- For young graduates there is a high pedagogical investment for a relatively low return in the training gained.
- The technical investment needed from the NPP and the training function is high.

For long term assignments advantages include:
- A high return on the investment especially for the organization (and the instructor).
- A high level of competence is gained in training expertise.

Disadvantages include:
- A risk of having a large discrepancy between the knowledge demanded and the practicalities of instruction.
- Less opportunity to maintain knowledge of NPP technical activities.
- Lack of opportunity to raise questions on NPP policies and organisational matters.

7.2. PROMOTION OF INSTRUCTORS

NPPs and training organisations frequently face difficulties in recruiting instructors especially from an Operations Department where individuals have enhanced pay from shift-related salaries. As a consequence, training organisations have to seek solutions if they want an Operator or Shift Supervisor to become an instructor.

Possible solutions include:

- Keeping the same pay or gradually decreasing it.
- Compensating lower pay by offering interesting opportunities, such as involvement in international training projects.
- Similarly offering opportunities to participate in international exchanges (IAEA meetings or working groups, WANO meetings or peer-reviews).
- Offering opportunities to participate in national or international projects.
- Providing the instructors with additional (e.g. Human Resources) competences.

Another difficulty is an individual's concern about the job position that will be offered by the NPP to the instructor on returning to the NPP. In many cases individuals will have a greater interest in keeping their job positions at the NPP than to have new job positions as instructors.

Some solutions can be offered in order to facilitate the re-integration of instructors at the NPP after spending time within a training organisation:

- Negotiating national or local conventions between the NPP(s) and training organisation or centre(s) in order to formally recognize the added value of being an instructor and to identify what could be the level of responsibilities of a future job position.
- Arranging observation periods at the NPP and meeting with plant managers in order to identify more precisely what could be the future job position of the instructor.
- Providing instructors with job positions in which they can take advantage of their training background (management or expert job positions).
- Providing instructors with a job position having a level of responsibility that will be the same as if they had kept their job position at the NPP.

7.3. INVOLVEMENT OF INSTRUCTORS IN NPP ACTIVITIES

Whenever possible, instructors should be involved in NPP activities while they perform their tasks in the training organisation or centre. The frequency and the duration of these activities may be different from one Member State to another. For example, the frequency or duration may be:

– A specific number of days per month.
– A specific number of weeks per years.
– According to the needs of personnel.
– According to the specific job position at the NPP.

The amount of involvement in plant activities also depends on the duration of the assignment. In the case of long term assignments, it is important for the instructor to have regular involvement in NPP activities so that he/she is able to maintain and update his/her plant competences. In the case of a short term assignments, the involvement could consist in preparing for the future job position.

Some NPP activities are as follows:

– Participating event analysis in order to identify any training needs.
– Identifying and responding to NPP training needs or training requests.
– Performing their job position at the NPP.
– Replacing unavailable personnel at the NPP if needed.
– Participating in operation activities during a refueling at the NPP.
– Participating in working groups at the NPP (advices, councils, analysis of job activities)
– Contributing to the design of NPP job frame of reference and NPP job frame of activities.

7.4. METHODS OF UPGRADING PROFESSIONAL CABABILITIES

Instructors can be involved in the following types of activities in order to upgrade their training and technical capabilities.

7.4.1. Coaching

This activity consists in helping new instructors during their learning phases by providing advice, exchanging pedagogical or technical information and routinely mentoring the new instructors.

7.4.2. Introduction of new training techniques, methods etc.

The training environment may need to be adapted to new training equipment, new plant systems or equipment, or revised organisations or job positions at the NPPs. For these reasons some improvements have to be regularly made in terms of training methods or training programme content.

Some examples are:

– New mocks-up with or without detailed job environment devices.
– Training games to point out the interfaces between different services (maintenance, operation, safety departments, etc).
– Emergency exercises organised by the NPP in relation with the training organisation or centre.
– Validation/testing and promotion of new plant procedures (used for normal or for emergency operation) or new methods.
– Analysis of work practices owing to changes in plant equipment or job duties.
– New part task or full scope simulators.

7.4.3. Support of self-study

The training environment may also need to be adapted to the availability of NPP personnel. For this reason, self-study solutions utilizing advanced training tools may be an alternative method in order to improve the knowledge of personnel.

An efficient self-study will also need to be augmented by a "hot line" technical support, continuing monitoring of trainee progress during self study and an on-site one-to-one assistance.

Some examples are as follows:

Distance learning
The trainee receives materials to study and learns the content and does assigned exercises. After completing the exercises, they are sent to an instructor for evaluation. At different steps of the training, an assessment should be done in order to reinforce the efficiency of the training.

Web-based, computer-based
The principle is the same as in the previous example. The difference consists in taking advantage of the web or the computer technology to improve the exchange of information and the interactivity of training (update of documents).

Virtual technology
This technology consists in designing virtual equipments or plant systems that will be operated from a computer.

It should be used especially for parts of the plant which are not available during normal operating conditions (high level of radioactivity, identified dangers, etc.).

It also should be used to train field operators in normal or emergency operating conditions owing to a virtual modelisation of the plant taking into account the time to go from one point to another one.

8. CONCLUSIONS AND RECOMMENDATIONS

8.1. CONCLUSIONS

The following general conclusions are based on the content of this report, the responses to the questionnaire, and the examples provided by Member States.

Role of management: The ultimate responsibility for training of personnel is widely recognized to be the line organisations (i.e. operations, maintenance, engineering, and other departments). Most NPPs have a training policy and administrative procedures that assign responsibility and delineate requirements for the selection, qualification, and training of instructors. Line managers typically approve the overall training programmes for their organisations and routinely observe the conducting of training, particularly training conducted on a simulator. Training review committees, with representatives from the line and training organisations, are also used by some Member States to assure the relevance and technical

content of training programmes. Where central training organisations are used, good communications with the NPPs are established, as well as methods to maintain the instructors' current technical knowledge of plant conditions.

Selection of instructors: Instructors must have both technical and training skills. Consequently, almost all Member States, as a first choice, recruit their instructors from an NPP and train them to be instructors. In cases where university or other personnel are hired as instructors, technical as well as instructor training must be provided. In order to select good instructors, some Member States also have formal administrative procedures and use a selection review committee.

Role of instructors: In addition to training, full time instructors are generally involved in the implementation of all phases of the SAT processes. The use of subject matter experts (SME's) from a NPP in the development and delivery of training is a common practice and helps improve the quality and relevance of training. Instructors are also involved in other plant activities such as event analysis, refuelling outages, and are increasingly being used in knowledge management activities. Many instructors, particularly those involved in operator training, maintain their technical qualifications in the plant by participating in the continuing training programmes for their discipline, periodic work assignments in the plant, or in some cases by maintaining their operator licence/authorization from the regulatory body. This practice helps maintain an instructor's credibility with plant personnel.

Categories of instructors: Most NPPs use a combination of full time, occasional (part time), and contracted instructors. The full time instructors are generally qualified to provide training in all training settings, while the occasional or contracted instructors are typically only used in one training setting (i.e., classroom, laboratory, etc.). Plant personnel are typically used to conduct on the job training and they receive appropriate training on how to conduct this type of training.

Developing instructor competency: Member States have established initial and continuing training programmes for instructors. The training programmes for instructors use the SAT process and are typically based on a job or competency analysis. Most Member States have training courses for classroom instructors, simulator instructors, laboratory instructors, and on the job training instructors. These courses are typically one to two weeks in duration. The courses are usually developed and delivered by the training organisation (central or NPP training organisation) and in some cases are provided by contractors.

Career development: Member States either recruit and assign instructors as permanent instructors or provide for shorter term assignments (six months to several years). In either case, opportunities for continuing professional development are usually provided. A number of Member States indicate that they require or encourage assignment or rotation of NPP personnel to the training organisation as a prerequisite to further advancement. This is considered to be a good practice because it provides the training organisation with subject matter expertise and at the same time greatly improves the individual's plant knowledge and skills. Many Member States also note that such personnel are more likely to be promoted due to their improved communication and interpersonal skills gained as a result of their experience in the training organisation.

8.2. RECOMMENDATIONS

Line management ownership of training: In many Member States line managers have some degree of involvement in training. Since the training of personnel is one of the best ways to ensure management's expectations for technical knowledge and positive attitudes of plant workers as well as a means to promote and improve safety culture, NPPs should consider establishing standards or practices for periodic and planned review, approval, and observation of training. Line managers should also routinely be involved in the selection and assignment of instructors to the training organisation.

Recruitment and retention of instructors: The quality of NPP personnel training is highly dependent on the availability of competent instructors. However, in most Member States, an assignment to the training organisation results in lower pay then a job at the plant. It is important that training staff are not disadvantaged by an assignment to training. Plant management should consider methods to remove this disincentive. For example, incentives such as providing comparable compensation or bonuses, more professional development opportunities, or making training assignments a career path for promotions may be possible to implement, depending on individual country employment requirements or practices.

Knowledge management: Increasing emphasis is being place on knowledge management. Since the training organisation has systematically developed detailed training materials based on plant design and job duties, and these materials are maintained current, NPP management should involve the training organisation instructors in ongoing and new activities in the field of knowledge management. In particular, the instructors are uniquely qualified to gather "undocumented" worker knowledge and skills from workers before they retire.

E-Learning: The methods and settings for training are rapidly changing and advancing. Increasingly, computer-based training, web-based training and other forms of e-learning are being developed. In order to take cost effective advantage of these new methods, NPP management will need to provide resources for the continuing training of instructors and professional development by attendance at national and international workshops on the use of these new methods.

Appendix A

**EXAMPLE OF FACTORS TO CONSIDER IN FORMULATING A
TRAINING POLICY**

Qualified personnel are vital to NPP safety and reliability. To develop qualified personnel, the training staff should emphasize analysis, design, development, implementation, evaluation, and revision of training and qualification activities for facility personnel. Facilities should periodically evaluate and revise training programmes due to changes in standards, technology, procedures, requirements, job assignments, and qualifications of new personnel.

Training mission, goals, and objectives

The training organization should have a mission with clearly written goals and supporting objectives that establish the required elements of the training system. The training mission and philosophy should be consistent with facility commitments and policies and should apply to all organizations that share responsibility for training. Long term goals, objectives, and policies necessary to accomplish the training mission should be clearly defined, published, and distributed to all organizations that contribute to their accomplishment. The training mission, goals, objectives, and policies should be reviewed periodically and updated as necessary to reflect changing needs.

Overall training objectives or goals should be developed by the training organization with input from the appropriate line managers. The objectives should be specific, clearly stated, and results-oriented such that their accomplishment can be measured. The number of developed objectives should be a manageable amount. Training objectives should be reviewed in a periodic self-assessment and any weaknesses in the methods should be revised.

The following is a partial listing of training objectives that might be used for a training programme:

– Develop and provide quality performance-based initial and continuing training to prepare personnel to perform duties in a safe and reliable manner.
– Develop and provide initial and continuing training to subcontract personnel who support facility operation and outside agencies used to assist during site emergencies.
– Assist line management in ensuring that subcontract personnel are qualified and their use does not result in degraded facility safety or reliability.
– Establish and maintain a training organization staffed with qualified personnel who are capable of accomplishing their assigned tasks.
– Provide the settings, equipment, and materials necessary for effective support of training activities.
– Assist the line organization in the training and qualification of facility personnel.
– Provide training that meets the needs of facility personnel.
– Encourage line managers to take responsibility for training programme content and oversight with assistance from the training organization.
– Develop and provide a mechanism to identify and analyze performance problems. Review facility and industry operating experience and training trends (e.g., continued team performance weaknesses during facility walkthroughs) to identify the need for training programme changes or improvements.
– Routinely evaluate training effectiveness and correct identified weaknesses.

The objectives that support training goals should be used to establish plans, priorities, and budgets and should be reviewed and revised as periodic self-assessments identify weaknesses.

Training policies and procedures

Training policies and procedures should support the accomplishment of the training mission, goals, and objectives by providing general guidance and detailed directions. Policies typically describe the conditions that guide the decision making process (i.e., thoroughness, prudence, openness, and responsiveness). Procedures describe how specific tasks will be accomplished. Policy statements and procedures should be developed on topics such as the following:

−   Analyzing tasks, designing and developing training materials, implementing and evaluating the effectiveness of training activities
−   Identifying personnel qualification and training needs according to position descriptions, job assignments, previous education, training, and experience
−   Assessing the level of expertise of subcontract personnel and temporary employees performing work at the facility
−   Pursuing job related education activities
−   Handling of individuals whose performance is marginal or unsatisfactory during training (i.e., remedial training)
−   Describing training department and line organization responsibilities for the training and qualification of facility employees
−   Incorporating into training lessons learned from facility and industry operating experiences
−   Conducting consistent training and evaluation in the classroom, laboratory, simulator, and on the job training
−   Communicating between training and line managers (e.g., curriculum committees, peer review groups)
−   Maintaining training records of personnel training and performance
−   Controlling and administering tests to maintain evaluation integrity
−   Training and qualifying instructors
−   Scheduling of training activities and determining makeup requirements
−   Maintaining control of training equipment
−   Exceptions
−   Facility evaluation criteria
−   Vendor short courses or use of vendors for training.

Training procedures should describe the types of training and training programmes to be conducted, training programme prerequisites, and the training audience. The procedures should clearly indicate the training needed for each job position and the sequence in which it is to be completed. The procedures also may reflect the facility's division of labour policies, position descriptions, and work assignment practices.

Appendix B

EXAMPLE OF MANAGER AND SUPERVISOR RESPONSIBILITIES

Manager - Nuclear Training

- Ensures the overall effectiveness of NTG Personnel.
- Approves Instructor Certification.
- Evaluates Instructors in accordance with this procedure.
- Approves the training curriculum for each position in the Nuclear Training Group.
- Serves as the Instructor Curriculum Committee Chairperson and approves the meeting minutes.

Manager – Accreditation and Support

- Manages the effectiveness of the Instructor Qualification and Certification Program.
- Maintains a training matrix for the Nuclear Training Group, which identifies the curriculum for Nuclear Training as required by NDAP-QA-0010.

Supervisor - Nuclear Instruction/Supervisor – Operations and Technical Instruction

- Task qualifies Instructors in accordance with this procedure.
- Recommends Instructors for professional instructor certification.
- Evaluates Instructors in accordance with this procedure.
- Reviews and concurs with the curriculum for Nuclear Training Group personnel.
- Serves as the Instructor Curriculum Committee Vice-Chairperson and assigns competent personnel from each instruction group to the committee. The Supervisor - Nuclear Instruction/Supervisor - Operations Instruction shares the responsibility with the Manager – Accreditation and Support for developing training curriculum for each Nuclear Training Group position. This includes maintaining the curriculum current by performing periodic reviews to ensure completeness.
- Approves Instructor development training material.
- Reviews the technical content of training courses for instructional personnel or assigns a competent employee to perform the review.
- Supports the development of instructor training courses.
- Evaluates and reviews the effectiveness of the curriculum.
- Approves instructor technical qualifications.

Nuclear Training Supervisors

- Implement this procedure.
- Assign completion dates to Instructors for their professional and specialty qualifications.
- Ensure Instructors in their group complete Instructor Certification within one year of NTG start date.
- Ensure training is attended as required to enable the Instructors to achieve qualification.
- Ensure all instructors attend continuing training.
- Recommend Instructors for professional certification.
- Task qualifies Instructors in accordance with this procedure.

- At least annually, evaluates the Instructor competencies to conduct training in all applicable settings.
- Develops the personnel in their group to ensure an effective and safe work force.
- Requests training for their personnel in a timely manner.
- Identifies training for each discipline and position, to include the Emergency Plan training and the needs of the individual.
- Completes the Instructor Certification and Specialty Qualifications within the required timeframes.

Instructor

- Take responsibility for their own professional development.
- Ensure they are qualified to independently perform assigned tasks.
- Complete the Instructor Certification within the required timeframe.
- To conduct OJT, must complete ID213 qual sheet.
- Request evaluations, at least annually, in each instructional setting that they will be teaching.

Evaluators

- Evaluators must complete MA040, Evaluator Training, and be qualified in the task that they are evaluating.

Sign the qualification sheet after instructor has satisfactorily met the specified evaluation criteria.

Appendix C

EXAMPLE OF AN INSTRUCTOR OBSERVATION FORM

Instructor Performance Evaluation

LESSON TITLE: _____   DATE:

INSTRUCTOR: _____   LENGTH OF OBSERVATION:

OBSERVED BY: _____   DATE:

REVIEWED BY: _____   DATE:

Instructions: Below is a list of competency statements that instructors should use to contribute to the learning process. Read each statement and evaluate the instructor's performance by circling the appropriate rating next to the statement. Written comments for all ratings are encouraged. Comments are required for "unsatisfactory" and "needs improvement" ratings. Space is available to the right of each rating.

EXPLANATION OF RATINGS

0	Not Observed	Activity not observed by the evaluator
1	Unsatisfactory	Failed to perform the required activity
2	Needs Improvement	Performed most essential activities properly
3	Satisfactory	Performed all essential activities properly
4	Above Average	Performed all requirements and exceeds on several
5	Outstanding	Consistently exceeded requirements

MATERIALS   **COMMENTS**

1. The student handout is organized in
    a logical manner conforming with
    lesson presentation.   0 1 2 3 4 5

2. The training material is current and
    technically accurate.   0 1 2 3 4 5

MATERIALS (Continued)   **COMMENTS**

3. The training material relates to the
    learning objectives.   0 1 2 3 4 5

4. When used, the industry event
    examples are appropriate.   0 1 2 3 4 5

CONDUCT OF CLASS

Preparation

1. Classroom physical layout enhanced
    the learning climate.   0 1 2 3 4 5

2. The instructor appeared adequately
    prepared.   0 1 2 3 4 5

Introduction

1. Started class on time.   0 1 2 3 4 5

2. Provided student handouts.   0 1 2 3 4 5

3. Stated the purpose of lecture.   0 1 2 3 4 5

4. Reviewed the objectives for
    the class session.   0 1 2 3 4 5

5. Stated a problem to be solved or
    discussed during the class.   0 1 2 3 4 5

CONDUCT OF CLASS (Continued)   **COMMENTS**

6. Made explicit the relationship between
    current subject matter and previous
    classes.   0 1 2 3 4 5

Presentation

1. Followed the lesson plan.   0 1 2 3 4 5

2. Taught the content in a systematic
    and organized fashion.   0 1 2 3 4 5

3. Defined new terms, concepts, and
    principles.   0 1 2 3 4 5

4. Used clear, simple, and relevant
    examples to explain major ideas.   0 1 2 3 4 5

5. Related new ideas to familiar ones.   0 1 2 3 4 5

6. Presented information at an
    appropriate level of detail.   0 1 2 3 4 5

7. Used alternate explanations when
    necessary.   0 1 2 3 4 5

8. Stated the relationship among
    various ideas in the presentation.   0 1 2 3 4 5

CONDUCT OF CLASS (Continued)   **COMMENTS**

9. Asked questions to determine if
    information was presented at a
    proper rate.   0 1 2 3 4 5

10. Periodically summarized the
    important ideas.   0 1 2 3 4 5

11. Reiterated definitions of new terms
    to help students become accustomed
    to them.   0 1 2 3 4 5

12. Exhibited a level of knowledge
    adequate to teach the material.   0 1 2 3 4 5

13. Displayed a positive attitude.   0 1 2 3 4 5

14. Demonstrated confidence during
    the class presentation.   0 1 2 3 4 5

15. Developed a positive rapport
    with the students.   0 1 2 3 4 5

16. Requested student participation.   0 1 2 3 4 5

COMMUNICATION SKILLS

<u>Verbal</u>

1. Voice could be easily heard.   0 1 2 3 4 5

COMMUNICATION SKILLS (Continued)   **COMMENTS**

2.   Voice was raised or lowered for
     variety and emphasis.   0 1 2 3 4 5

3.   Speech was neither too formal
     nor too casual.   0 1 2 3 4 5

4.   Rate of speech was neither too
     fast nor too slow.   0 1 2 3 4 5

5.   Varied the pace of the presentation
     to keep the students alert.   0 1 2 3 4 5

6.   Spoke at a rate that allowed
     students time to take notes.   0 1 2 3 4 5

7.   Facilitated discussions effectively.   0 1 2 3 4 5

Non-Verbal

1.   Established and maintained eye
     contact with the entire class.   0 1 2 3 4 5

2.   Listened carefully to student
     comments and questions.   0 1 2 3 4 5

3.   Appearance was proper.   0 1 2 3 4 5

4.   Instructor was enthusiastic
     about the material presented.   0 1 2 3 4 5

COMMUNICATION SKILLS (Continued)   **COMMENTS**

5.   Noted and responded to signs of
     puzzlement, boredom, and
     curiosity of the student.   0 1 2 3 4 5

QUESTIONING ABILITY

Asking Questions

1.   Asked questions to determine what
     the students know about the lecture
     topic.   0 1 2 3 4 5

2.   Asked questions that allowed the
     instructor to gauge student progress.   0 1 2 3 4 5

3.   Addressed questions to individual
     students as well as to the group at
     large.   0 1 2 3 4 5

4.   Encouraged students to answer
     difficult questions by providing
     clues or rephrasing.   0 1 2 3 4 5

5.   Involved as many students as
     possible in the classroom discussion.   0 1 2 3 4 5

6.   When necessary, asked students
     to clarify their questions.   0 1 2 3 4 5

QUESTIONING ABILITY (Continued)   **COMMENTS**

7. Asked probing questions if a student's
    answer was incomplete or superficial.   0 1 2 3 4 5

8. Repeated answers when necessary
    so the entire class could hear.   0 1 2 3 4 5

Answering Questions

1. Encouraged student questions.   0 1 2 3 4 5

2. Received student questions politely
    and, when possible, enthusiastically.   0 1 2 3 4 5

3. Answered student's questions
    satisfactorily.   0 1 2 3 4 5

4. Repeated student's question when
    necessary.   0 1 2 3 4 5

AUDIO/VISUAL AIDS

1. Used audio/visual aids to enhance
    the learning objectives.   0 1 2 3 4 5

2. Transparencies/slides were clear
    and easy to read.   0 1 2 3 4 5

3. Board work appeared organized
    and legible.   0 1 2 3 4 5

AUDIO/VISUAL AIDS (Continued)   **COMMENTS**

4. Demonstration performed
    could be seen by all students.   0 1 2 3 4 5

5. Student handout was used effectively
    by the instructor.   0 1 2 3 4 5

SUMMARY

1. The instructor properly summarized
    the key points of the presentation.   0 1 2 3 4 5

Instructor Performance Evaluation

STRONG POINTS	SUGGESTIONS FOR IMPROVEMENT

Overall Evaluation Score

1	2	3	4	5
Needs Improvement		Minimum Requirement		Exceeded Requirement

_____
_____

Signature of Trainee   Date

_____
_____

Signature of Evaluator   Date

Appendix D

**EXAMPLE OF A TRAINING REVIEW COMMITTEE
ADMINISTRATIVE PROCEDURE**

A. Purposes

Curriculum Review Committee (CRC) shall be established at Browns Ferry, Sequoyah, and Watts Bar Nuclear Plants to facilitate involvement by line management in training, to advise on training program content, to supplement the formal post-training feedback process, and to evaluate training effectiveness. As a minimum, CRCs shall be established at each site for the following training program areas:

1. Operations Training (nonlicensed, reactor operator, senior reactor operator, continuing training for licensed personnel, shift technical advisor, shift manager)
2. Instrument and Control Technician
3. Electrical Maintenance Personnel
4. Mechanical Maintenance Personnel
5. Maintenance Supervisor
6. Radiochemical Laboratory Analyst
7. Radiological Protection Technician
8. Engineering Personnel

B. Authority

The authority of the operations, maintenance, and technical programs' CRCs will be the delegated authority of the respective plant managers. The authority of the engineering CRCs will be the delegated authority of the respective site vice presidents. The plant managers and the site vice presidents (for engineering support personnel training) appoint chairpersons for each CRC. Typically, the senior manager in a given program area is selected since that person has the primary responsibility for ensuring proper training and qualification of personnel.

C. Responsibilities

A given CRC is responsible for ensuring that:

1. Training programs are implemented in accordance with pertinent Training Procedures (TRNs), utilizing the SAT process;

2. Cognizant line managers meet the expectations outlined in Section 3.2 of this Procedure;

3. Training content is determined, developed, delivered, and evaluated consistent with plant needs and industry guidance;

4. Appropriate evaluation of training effectiveness is accomplished in a timely manner.

D. Membership

1. As noted above, the chairperson is appointed by either the plant manager or the site vice president. That person will be responsible for convening and presiding over meetings

(or for designating an alternate chairperson); for assigning CRC action items; and, for dispositioning all issues brought to the CRC.

2. The site training manager appoints an appropriate manager from the Training Department to serve as training representative and secretary of the CRC. That person shall be responsible for providing agenda coordination and other support necessary for effective administration of the CRC including following up on action items.

3. The minimum quorum for a CRC meeting shall consist of the chairperson, training program manager (or designee) and three members from among the following categories: job incumbents, first line supervisors, instructors, training process specialists, and cognizant managers. The CRC meeting should include at least one job incumbent.

4. Corporate program managers are ex officio members of CRCs in their respective disciplines.

The following is the definition for our TRB (in Operations) from our administrative procedure for reactor operator training program, which is the same for all of the operator training programs;

Training Review Board - A board (committee) which is composed of the plant operations manager, the operations superintendent, the site training manager, and the site operations training manager, or as otherwise defined in the site specific FSAR. The TRB approves removals from initial and continuing license training. The TRB also recommends individuals to sit for license examinations. This Board may override decisions of the CRC or act in lieu of the CRC.

Appendix E

EXAMPLE OF CRITERIA FOR RECRUITING INSTRUCTORS

The Training Centre Manager shall identify the optimal number and composition of personnel needed to discharge the assigned instructional duties in an effective and efficient manner. To be able to support efficient training, qualified replacement individuals for key positions shall be developed in a Succession Plan.

1. The minimum qualification requirements for instructors include:

    a. A university degree or equivalent acceptable to the KAEC in an appropriate discipline.
    b. A job-related educational background or an appropriate technical area of study for a minimum of two (2) years.
    c. Successful performance in related job positions at nuclear facilities or other appropriate experience for a period of not less than one (1) year.
    d. Successful completion of an approved Instructor Training Programme, and participation in continuing training to maintain and enhance their technical and instructional skills.

2. The number of personnel on the training staff and their qualification requirements will vary depending on the nuclear facilities it is intended to support. If contractor personnel are used, either to meet short term temporary needs or for long term staff augmentation, the Training Centre shall establish proper monitoring and control to ensure these external personnel perform to the expected standards. The tasks, responsibilities, authorities, and interfaces with the training staff and others shall be clearly defined and understood by all. Contractor personnel shall be trained and qualified for the tasks to be performed and held to the same performance standards as training personnel performing similar tasks. Contractor personnel shall be indoctrinated in appropriate facility policies and procedures and shall adhere to the policies and procedures to the same degree as facility personnel.

3. Training staff members shall possess the knowledge, skills, and attitudes required to fulfill their assigned duties, especially with regard to their technical knowledge and skills whether employees of the NPP, contractor employees, or employees at a Training Centre.

4. Instructors shall demonstrate and continuously improve their instructional capabilities in all applicable training settings. Specific attention shall be paid to androgogical skills.

5. Subject matter experts may be used to conduct instruction as adjunct or temporary instructors on an occasional basis. In these cases, qualified training personnel shall ensure that training quality is maintained through appropriate assistance and monitoring.

6. Personnel who conduct on the job training and evaluations shall be cognizant of facility policies, procedures, methods, and standards for conducting effective on the job training and task performance evaluations.

7. Instructional skills and technical competences of instructors shall be evaluated regularly in applicable training settings.

8. Continuing instructor development maintains and improves needed technical and instructional knowledge and skills, and addresses weaknesses resulting from evaluations of instructor performance.

EXAMPLE OF AN INSTRUCTOR JOB DESCRIPTION FOR NPP INSTRUCTORS[1]

GENERAL MISSION

Within the framework of the strategic plan of the EDF Training and Development Division (SFP), and within the management contract of the Thermal Operation Training Department (PCT), design and adapt educational files, prepare and lead training in the field of nuclear operation, or of conventional thermal operation, so as to contribute to the preservation and development of the skills of EDF Industrial Division personnel.

1. OBSERVATION

The role of an instructor is included in EDF training policy. An instructor has responsibilities which are defined in three official HR files. These responsibilities depend on the level of instructor: The first level is called simply "Instructor", the second level is called "Instructor – responsible for the conception of a training session" and the third level is called "Instructor – Training Project Manager". Each level of instructor is involved in the EDF Training Process which is very similar to SAT. The first level of instructor is involved only in the implementation of training sessions. The third level of instructor is involved in the complete EDF Training Process (SAT).

2. HIERARCHICAL RESPONSIBILITY

NPP instructors report to the Training Centre Manager.

3. RELATIONSHIPS

3.1. Relational network internal to PCT

An instructor's job relates to:

–	Its hierarchical position within the day to day management framework.
–	The Production Manager asking for codifications of an action and sending follow-up action sheets.
–	Its training counterparts exchanging practices on training activities.
–	The trainer/project leader ensuring, as "leader coordinator" of the team, a functional responsibility within the framework of following-up team activities.
–	The national action manager within the framework of the quality follow-up of training activities.

3.2. Relational network internal to the SFP

Within the SFP, the job is related to:

–	consultants and trainers of other SFP Training.

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[1] The information provided in the Appendix F is taken from job description files of the EDF Training and Development Division –SFP- but cannot substitute them. Updated information is in the original documents. Moreover, the content of the job description could be modified by SFP because of the experience feedback or because of new requirements in the future.

3.3. Relational network internal to EDF and to Gaz de France

Within EDF and Gaz de France, the job is related to:

- The trainees, mainly from the EDF Industrial Division and especially the Nuclear Production Division –DPN- during the training actions it undertakes.

3.4. Relational network external to EDF and Gaz de France

Outside EDF and Gaz de France, the job is related to:

- Simulator manufacturers, according to technical monitoring and development of training simulators.

4. ROOM FOR MANOEUVRE

An instructor's job extends from the planning proposed to the dedicated team and is validated by management through the EDF hierarchical system. This planning incorporates the demands of clients and the contribution expected from the job to the Department's qualitative and quantitative objectives.

An instructor manages the organisation, leading, follow-up and assessment of the training sessions that are delivered.

An instructor is responsible for the general area of PWR training in assessing trainees as regards training objectives, and signs the assessment sheets used to accredit the NPPs.

Depending on the needs of the PCT, an instructor is allocated activities concerning one or several specific roles within the dedicated team or department, such as classroom planning manager, documentation manager, or operation simulator manager.

5. CONTEXT OF THE INSTRUCTOR'S JOB

5.1. Sphere of intervention

An instructor performs activities within a team dedicated to a client (such as a local NPP unit or national division). This team carries out general training and/or preservation and development training of skills in the areas of nuclear operation and safety or conventional thermal activities. To undertake this, an instructor uses training tools such as compact simulators (particularly important) and training mock-ups.

An instructor intervenes in training management (compiling training files) and in leading (using the resources available, such as training tools, training files and documents) to undertake group or individualised training activities.

An instructor leads general training in classrooms and on simulators. This training is related to NPP operation and nuclear safety or to conventional thermal areas.
An instructor participates in training design.

The duties of an instructor are linked to nuclear operation (safety, quality and normal operation of a NPP).

5.2. The available resources

To create and preserve training documents, an instructor uses normal up to date office facilities (word processing, spreadsheets, and drawing software).

In seeking data, an instructor calls upon personnel within the department or project, or upon external experts (tutors, management, trainers and consultants). An instructor uses existing documentation systems, such as policy statements, national procedures, reference documents, etc.

With regard to requests and invoicing of training, an instructor relies on the Management Section of the Production Department and or on a local section.

For training conducted at other NPP sites, an instructor has access to the logistic training organisation, and to SFP management.

An instructor relies on the project organisation, and particularly on support in professional engineering, for advice on training and engineering.

An instructor utilises training tools such as NPP simulators.

5.3. The administrative and technical constraints

An instructor undertakes activities within the framework of regulations governing trainers' activities within EDF-GDF.

An instructor's job is referred to in the DPN/SFP recruitment convention of 1999, in industrial policy, in DPN's strategic orientations, and in the training policy of EDF and Gaz de France.

An instructor has to comply with the insurance quality plan of the PCT and the training conducted must comply with nuclear or conventional thermal operation rules.

An instructor must also comply with the rules of the UTE C 18-510 publication and the rules laid down in the personnel security instruction document.

5.4. Particular conditions required for the job of instructor

Preferentially, instructors are recruited from the Industrial Division. In that case, the "instructor/training designer" in PCT is one possible promotion path for "operator" personnel in the Industrial Division.

Recruitment within SFP as an "instructor/training designer" is achieved through an interview with line management.

A contract is signed between three parties: the instructor, a representative from PCT and a representative from the original operational unit (NPP). The contract stipulates the conditions (hiring, progress within the job, duration of the job, return to DPN, etc.) under which an instructor will work while performing training activities.

This contract represents the respective commitments of all three parties, although it may evolve with the agreement of the three parties, so allowing progression within DPN in partnership with SFP.

5.5. The exercising conditions

Within the framework of a periodical return to operation, an instructor receives accreditation from the DATR category B (e.g. medical agreement about radioprotection).

An instructor is subjected to a confidentiality agreement with trainees' managers and other personnel in the team regarding the nominative assessments of the trainees.

An instructor is bound to report to the department manager or the mission manager information on trainees such as any lack of pre-conditions or particular difficulties.

In a particular area of expertise (nuclear or conventional thermal), an instructor is polyvalent as regards other trainers and PCT jobs.

An instructor can be assigned to travel within France and, in particular, to other PCT sites to conduct training.

6. ACTIVITIES OF AN INSTRUCTOR

6.1. Implementation of a training file

–   From a schedule of conditions of a training action, an instructor draws up, participates in the drawing up, or updates training files of the trainees (standard training undertaken, or customised training for a specific group or individuals) and, in collaboration with other trainers in the training team, participates in:
  - Being responsible for all aspects of the training.
  - Drawing up or adapting the strategy for training to be able to meet the general training objectives defined in the schedule of requirements.
  - Writing and updating documents related to training developed (documents distributed to trainees, individualised resources, training aids, etc.).
  - Designing or implementing training tools to accompany the training.
  - Designing or participating in the design of an assessment and ensuring its quality (positioning grid, assessment grid, questionnaires etc.).
  - Implementing corrective actions.

6.2. Preparation and follow-up of training actions

–   An instructor prepares the training file (including the contracts with trainers who have presented the training).
–   An instructor prepares training sessions (writing sheets, choosing training tools, preparing the room or the workshop and personnel details).
–   An instructor checks the pre-conditions of trainees or carries out the status of a trainee.

6.3. Face to face activities and assessment of trainees (standard and customised procedures)

–   An instructor welcomes the trainees at the beginning of the training programme (statement of expectations, introduction of objectives, safety instructions, etc.).
–   An instructor uses training tools adapted to the learning situations:
  - implementing the training strategy defined in the training file,

- adapting the strategy according to the progress of the group,
- using training simulators,
- implementing a means of formative assessment to determine what has been learned.
– An instructor assesses the trainees and signs the assessment sheet at the end of the training period.

6.4. Results of Training

– An instructor prepares and leads the preparation and analysis of results of training.
– An instructor writes reports on training.
– An instructor delivers the information related to following-up the results with national managers.

6.5. Other activities

– Instructors participate in working in a team, a department or mission, or for the duration of a specific project:
- Participating in project management weekly, drawing up reports of training activities.
- Participating in working groups within the project department.

The attached survey contains eleven duty areas with supporting task statements. The initial duty areas and task statements were obtained from a generic task listing for nuclear instructors developed by the Mid-Atlantic Nuclear Training Group (MANTG) after they had surveyed 179 instructors at 14 commercial reactor utility sites concerning instructor job requirements. The list was then reviewed by five instructors and revised to reflect the perceived job requirements for instructors. The results of this survey may be used to verify and/or modify existing initial and continuing instructor training program.

Before filling out the attached survey forms, please answer the following questions. These answers will be used to establish a local data base for the survey.

1. Number of years of practical experience related to your field of training _____.

2. Number of years as an instructor in this organization _____.

3. List the positions you have held (e.g., SRO, SS, maintenance foreman, etc.) and your educational background.

_____

_____

_____
_____

_____

Appendix G

DEFINITIONS OF SURVEY CRITERIA SCALES

DIFFICULTY OF PERFORMANCE

First, decide if the task performance requires a high, medium, or low degree of mental activity. A high mental activity rating will use either "5" or "4," medium, a "3"; and low, a "2" or "1." The amount of motor coordination required will resolve using "5" or "4" and "2" or "1" (a medium mental activity uses a rating of "3" irrespective of motor coordination).

Min.	1.	"Low" mental activity and "low" motor coordination are required.
	2.	"Low" mental activity and "high" motor coordination are required.
	3.	"Medium" mental activity is required (irrespective of the degree of motor coordination needed).
	4.	"High mental activity and "low" motor coordination are required.
Max.	5.	"High" mental activity and "high" motor coordination are required.

TASK IMPORTANCE

Min.	1.	Consequences of improper performance are "negligible" (for example, improper performance could affect personnel training, but with no significant consequence).
	2.	Consequences of improper performance are "undesirable" (for example, improper training may result).
	3.	Consequences of improper performance are "serious" (for example, improper training may result in generation of an occurrence report).
	4.	Consequences of improper performance are "severe" (for example, improper training may result in an alert event).
Max.	5.	Consequences of improper performance are "extremely severe" (for example, improper training may result in a site or general emergency event).

FREQUENCY

Min.	1.	"Less than once per year."
	2.	"Annually/semiannually (6–12 months)."
	3.	"Monthly/quarterly (4 weeks–3 months)."
	5.	Weekly/bi-weekly (1–2 weeks)."
	6.	
Max.	5.	"Daily (or more frequently than once per week)."

JOB ANALYSIS
INSTRUCTOR

Key - Arabic Numeral, i.e., 3 = Duty area
- Arabic Numeral W/Decimal, i.e., 3.8 = Tasks relating to duty area

1 - ANALYZE TRAINING NEEDS	Difficulty	Importance	Frequency
1.1 Conduct a needs analysis	____	____	____
1.2 Conduct job analysis	____	____	____
1.3 Interpret job analysis data	____	____	____
1.4 Revise/modify existing job analysis	____	____	____
1.5 Conduct a task analysis	____	____	____
1.6 Interpret task analysis data	____	____	____
1.7 Revise/modify existing task analysis	____	____	____
1.8 Evaluate requests for training	____	____	____
1.9 Develop questionnaires to determine student and management needs	____	____	____
1.10 Analyze student and management questionnaires	____	____	____

2 - CONDUCTING TRAINING			
2.1 Prepare instructional setting	____	____	____
2.2 Review lesson plan	____	____	____
2.3 Schedule resources and facilities	____	____	____
2.4 Verify training schedule	____	____	____
2.5 Verify training equipment is operable	____	____	____
2.6 Administer diagnostic test	____	____	____
2.7 Evaluate diagnostic test results	____	____	____
2.8 Use instructor guide	____	____	____
2.9 Conduct plant walk-throughs and field trips	____	____	____
2.10 Perform demonstrations	____	____	____
2.11 Conduct lab sessions	____	____	____
2.12 Conduct lecture	____	____	____
2.13 Conduct discussion	____	____	____
2.14 Conduct seminars	____	____	____
2.15 Conduct role-playing exercises	____	____	____
2.16 Conduct hands-on exercises	____	____	____
2.17 Apply case studies	____	____	____
2.18 Use a flip chart	____	____	____
2.19 Use a videotape	____	____	____
2.20 Use a black (white) board	____	____	____
2.21 Use slides	____	____	____
2.22 Use transparencies	____	____	____
2.23 Question trainees orally during lesson to determine their progress	____	____	____
2.24 Respond to trainee questions	____	____	____

2 - CONDUCTING TRAINING (cont)	Difficulty	Importance	Frequency
2.25 Monitor computer based training	____	____	____
2.26 Team teach with other instructors	____	____	____

2.27 Monitor/facilitate independent study activities _____ _____ _____
2.28 Monitor/facilitate individualized instruction _____ _____ _____
2.29 Conduct training for on the job training evaluator _____ _____ _____
2.30 Supervise on the job training _____ _____ _____
2.31 Administer quizzes periodically to determine
trainee progress _____ _____ _____
2.32 Administer written exam _____ _____ _____
2.33 Administer oral exam _____ _____ _____
2.34 Administer performance test _____ _____ _____
2.35 Proctor written exam _____ _____ _____
2.36 Gather feedback from trainees on effectiveness
of training _____ _____ _____
2.37 Assess your own training session _____ _____ _____
2.38 Tutor trainees _____ _____ _____
2.39 Conduct training programs for outside agencies _____ _____ _____
2.40 Recognize and respond to disruptive trainee
behavior _____ _____ _____

3 - DESIGNING TRAINING

3.1 Plan/organize a training documentation tracking
system _____ _____ _____
3.2 Develop a work plan for training program
development _____ _____ _____
3.3 Function as a program/curriculum development
team member _____ _____ _____
3.4 Function as a program/curriculum development
project coordinator _____ _____ _____
3.5 Coordinate a training program _____ _____ _____
3.6 Apply adult learning theory and instructional
principles to develop mentor training program _____ _____ _____
3.7 Construct learning objectives _____ _____ _____
3.8 Modify existing learning objectives _____ _____ _____
3.9 Sequence learning objectives _____ _____ _____
3.10 Choose training method _____ _____ _____
3.11 Determine instructional setting _____ _____ _____
3.12 Modify existing training methods _____ _____ _____
3.13 Modify existing training materials _____ _____ _____
3.14 Modify existing lesson plans _____ _____ _____
3.15 Modify existing exam questions _____ _____ _____
3.16 Choose type of media and supplies to be used _____ _____ _____
3.17 Review existing (packaged) training programs
for applicability _____ _____ _____

4 - DEVELOPING TRAINING

	Difficulty	Importance	Frequency
4.1 Develop course content outline	_____	_____	_____
4.2 Develop study activities	_____	_____	_____
4.3 Develop OJT checklist or qual card	_____	_____	_____
4.4 Modify existing trainee text	_____	_____	_____
4.5 Write trainee text	_____	_____	_____

	Difficulty	Importance	Frequency
4.6 Modify existing trainee workbook/exercise guides	____	____	____
4.7 Develop trainee/exercise guides	____	____	____
4.8 Modify existing trainee handouts	____	____	____
4.9 Develop trainee handouts	____	____	____
4.10 Modify existing A-V materials	____	____	____
4.11 Develop flipcharts	____	____	____
4.12 Develop transparencies	____	____	____
4.13 Develop slides	____	____	____
4.14 Develop diagnostic tests	____	____	____
4.15 Develop an evaluation plan for training programs	____	____	____
4.16 Develop hands-on/practical exercises	____	____	____
4.17 Develop standards for performance tests	____	____	____
4.18 Write performance test items	____	____	____
4.19 Write multiple choice test items	____	____	____
4.20 Write matching test items	____	____	____
4.21 Write completion test items	____	____	____
4.22 Write essay test items	____	____	____
4.23 Write oral test items	____	____	____
4.24 Write test instructions	____	____	____
4.25 Develop test answer keys	____	____	____
4.26 Develop a test specification matrix	____	____	____
4.27 Develop a training standard document	____	____	____
4.28 Develop a training matrix	____	____	____
4.29 Perform pilot session using draft training materials	____	____	____
4.30 Revise draft training materials based on pilot session feedback	____	____	____
4.31 Write lesson plans for classroom setting	____	____	____
4.32 Write OJT guides for OJT setting	____	____	____
4.33 Develop computer based training	____	____	____
4.34 Write a program description	____	____	____
4.35 Coordinate vendor training	____	____	____
4.36 Produce video tape presentations	____	____	____

5 - EVALUATING TRAINING	Difficulty	Importance	Frequency
5.1 Grade trainee quizzes/exams	____	____	____
5.2 Review exam results with trainees	____	____	____
5.3 Analyze trainee exam results	____	____	____
5.4 Analyze post-training feedback from program graduates	____	____	____
5.5 Analyze post-training feedback from program instructors	____	____	____
5.6 Analyze post-training feedback from supervisors/managers	____	____	____
5.7 Evaluate effectiveness of training equipment	____	____	____
5.8 Evaluate effectiveness of training materials	____	____	____
5.9 Revise training materials based on evaluation results	____	____	____
5.10 Evaluate effectiveness of training methods	____	____	____
5.11 Revise training methods based on evaluation results	____	____	____
5.12 Evaluate other instructors	____	____	____

5.13 Evaluate vendor training   ____   ____   ____

5.14 Evaluate incoming plant modifications to determine potential effect on training programs   ____   ____   ____

5.15 Participate in writing an accreditation self evaluation report   ____   ____   ____

5.16 Conduct a course evaluation   ____   ____   ____

5.17 Conduct a program evaluation   ____   ____   ____

5.18 Analyze personnel performance problems in-plant   ____   ____   ____

5.19 Analyze procedural problems in-plant   ____   ____   ____

5.20 Analyze equipment problems in-plant   ____   ____   ____

5.21 Conduct item analysis/test analysis on exam questions   ____   ____   ____

6 - MAINTAINING INSTRUCTOR PROFICIENCY AND CERTIFICATION

6.1 Attend internal and external seminars and conferences for personal/professional development   ____   ____   ____

6.2 Maintain current knowledge of technical instructional development   ____   ____   ____

6.3 Review changes in training related administrative procedures   ____   ____   ____

6.4 Participate in periodic in-plant observation sessions   ____   ____   ____

6.5 Read/review training articles   ____   ____   ____

6.6 Communicate effectively through speech   ____   ____   ____

6.7 Communicate effectively through writing   ____   ____   ____

6.8 Communicate effectively by listening   ____   ____   ____

6.9 Maintain current knowledge of plant modifications   ____   ____   ____

6.10 Interpret bargaining unit agreements   ____   ____   ____

6.11 Maintain/update instructor qualification records   ____   ____   ____

6.12 Maintain membership in professional organizations   ____   ____   ____

7 - OPERATING THE SIMULATOR

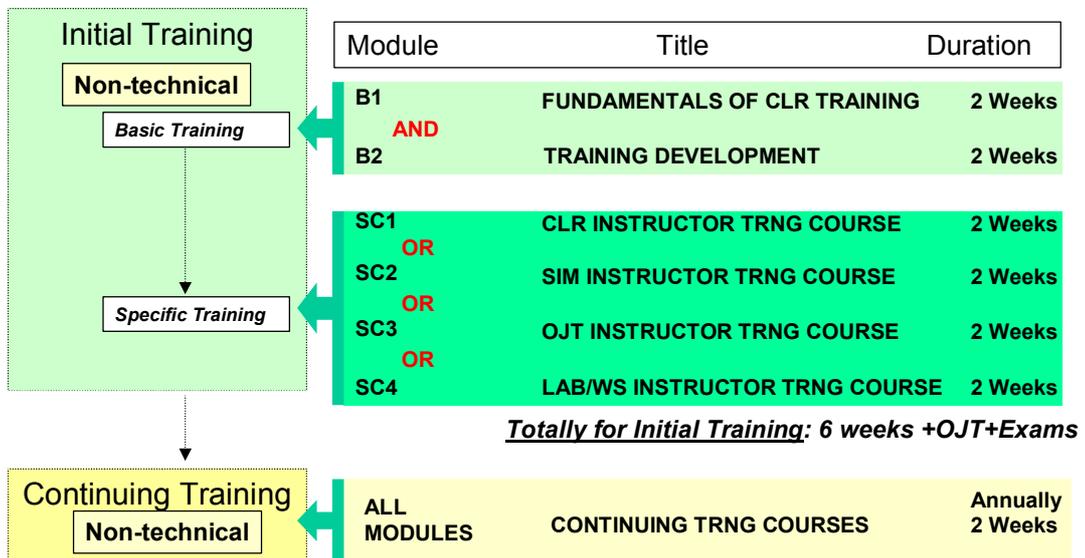|	Difficulty	Importance	Frequency
7.1 Develop team-oriented learning objectives	____	____	____
7.2 Select simulator scenarios for training from an existing inventory	____	____	____
7.3 Determine plant/simulator differences	____	____	____
7.4 Determine simulator limitations	____	____	____
7.5 Construct a scenario content outline	____	____	____
7.6 Develop scenarios	____	____	____
7.7 Test or dry-run scenarios	____	____	____
7.8 Test simulator modifications	____	____	____
7.9 Validate procedures on the simulator	____	____	____
7.10 Perform daily operations readiness procedures	____	____	____
7.11 Power-up the simulator complex	____	____	____
7.12 Initialize the simulator for training	____	____	____
7.13 Brief trainees prior to a simulator session	____	____	____
7.14 Conduct exercise preview	____	____	____
7.15 Direct and guide drill exercise	____	____	____
7.16 Operate the instructor control console	____	____	____
7.17 Operate remote instructor controls	____	____	____

7.18 Perform restart/recover procedure   ____   ____   ____
7.19 Perform shutdown procedure   ____   ____   ____
7.20 Secure the simulator complex   ____   ____   ____
7.21 Collect data for evaluation/critique   ____   ____   ____
7.22 Evaluate trainees visual awareness while
     operating simulator   ____   ____   ____
7.23 Evaluate individual crew member performance ____   ____   ____
7.24 Evaluate crew/team performance   ____   ____   ____
7.25 Evaluate individuals/crews integrated plant
     operations knowledge level   ____   ____   ____
7.26 Evaluate scenario effectiveness   ____   ____   ____
7.27 Facilitate trainee critique of drill exercise ____ ____   ____
7.28 Conduct and reinforce team skill training   ____   ____   ____
7.29 Maintain individual reactivity manipulation
     completion cards   ____   ____   ____
7.30 Maintain operations requalification records ____   ____   ____
7.31 Maintain simulator records   ____   ____   ____
7.32 Write up a simulator problem report   ____   ____   ____
7.33 Provide procedure/design feedback to engineering ____ ____ ____
7.34 Evaluate simulator vs plant fidelity   ____   ____   ____

8 - OPERATING TRAINING SUPPORT EQUIPMENT	Difficulty	Importance	Frequency
8.1 Operate a video camera	____	____	____
8.2 Operate a video recorder	____	____	____
8.3 Operate a movie projector	____	____	____
8.4 Operate a slide projector	____	____	____
8.5 Operate a lettering machine	____	____	____
8.6 Operate computer terminal and employ necessary software	____	____	____

9 - PERFORMING ADMINISTRATIVE TASKS

9.1 Maintain/update trainee attendance records	____	____	____
9.2 Maintain/update trainee grades and exam scores	____	____	____
9.3 Maintain/update program development files	____	____	____
9.4 Maintain/update training documentation tracking system	____	____	____
9.5 Prepare a budget	____	____	____
9.6 Requisition materials and supplies and review upon receipt	____	____	____
9.7 Attend training meetings	____	____	____
9.8 Interpret training procedures	____	____	____
9.9 Maintain knowledge of appropriate company/plant policies and procedures	____	____	____
9.10 Interpret regulations or rules promulgated by Federal or state agencies for training requirements	____	____	____
9.11 Schedule classes	____	____	____
9.12 Appraise managers and supervisors of training concerns	____	____	____
9.13 Notify instructors and supervisors of new training programs	____	____	____

	Difficulty	Importance	Frequency
9.14 Utilize reference library resources	___	___	___
9.15 Write memos/letters/reports	___	___	___
9.16 Maintain/update task-to-training matrix	___	___	___
9.17 Prepare and submit company required documentation	___	___	___
9.18 Initiate waivers for training	___	___	___
9.19 Review company/plant procedures for changes	___	___	___
9.20 Review industry information from regulatory sources	___	___	___
9.21 Review industry information from other facilities	___	___	___

10 - PROVIDING COUNSELING	Difficulty	Importance	Frequency
10.1 Counsel trainees concerning training related problems	___	___	___
10.2 Counsel trainees in career planning	___	___	___
10.3 Discuss trainee performance with trainee	___	___	___
10.4 Provide remedial training materials to trainees	___	___	___

11 - UNDERSTANDING ORGANIZATIONAL RELATIONSHIP

11.1 Establish and maintain positive working relationships with line supervision	___	___	___
11.2 Establish and maintain a positive working relationship with instructional staff	___	___	___
11.3 Facilitate changing policies and procedures	___	___	___
11.4 Make formal presentations to management of plans for training and development of programs and projects	___	___	___
11.5 Write memos and announcements about training activities	___	___	___
11.6 Establish rapport and credibility with key personnel in the organization	___	___	___
11.7 Use knowledge of company/plant organizational structure	___	___	___
11.8 Understand how training relates to other company/plant functions	___	___	___

EXAMPLE OF GENERAL INSTRUCTOR TRAINING PROGRAMME

Instructor Training

	Module	Title	Duration
Initial Training			
Non-technical	B1	FUNDAMENTALS OF CLR TRAINING	2 Weeks
Basic Training	AND		
	B2	TRAINING DEVELOPMENT	2 Weeks
	SC1	CLR INSTRUCTOR TRNG COURSE	2 Weeks
	OR		
	SC2	SIM INSTRUCTOR TRNG COURSE	2 Weeks
	OR		
Specific Training	SC3	OJT INSTRUCTOR TRNG COURSE	2 Weeks
	OR		
	SC4	LAB/WS INSTRUCTOR TRNG COURSE	2 Weeks

Totally for Initial Training: 6 weeks +OJT+Exams

	Module	Title	Duration
Continuing Training	ALL MODULES	CONTINUING TRNG COURSES	Annually 2 Weeks
Non-technical			

Appendix I

EXAMPLE OF INSTRUCTOR COMPETENCES

Number of duty area: 10	Duty Area: Instructional Materials, Media and Settings
10-01	List the types of instructional materials and media utilized in the plant.
10-02	Explain the role of instructional materials and media in the instructional process.
10-03	Describe the relationship of materials and media to the instructional situation.
10-04	Describe the characteristics of effective instructional materials and media.
10-05	Review and discuss examples of instructional materials and media.
10-06	Define procedures/controlled documents for plant training materials/aids.
10-07	Discuss the methods used to select appropriate instructional materials and media to support a classroom lesson.
10-08	Practice in selecting appropriate audio/visual/instructional aids.
10-09	Select appropriate audio/visual/instructional aids.
10-10	Explain how to obtain and maintain training equipment, mockups, models, and training aids.
10-11	Demonstrate the correct use of instructional materials and media.
10-12	Discuss the importance of working closely with subject matter experts to identify content, resources, and constraints for proposed training.
10-13	Develop instructional materials and media (trainee workbook, exercise guide, handouts, study guides, OJT qualification cards, OJT guides, classroom lesson plans, transparencies, video tapes, etc.).
10-14	Discuss needs of the procedures for plant training materials and media in respect of different training settings
10-15	Describe the specifics of use of following training settings: – Classroom – Simulator – Laboratory/Workshop – On the job training – Self-paced instruction – CBT
10-16	Describe the advantages/disadvantages of each setting.

Note: A full list of instructor competences is provided on the accompanying CD-ROM (comp_list.doc).

Appendix J

EXAMPLE OF AN INITIAL INSTRUCTOR TRAINING COURSE OUTLINE

1.   Course Introduction
2.   Systematic Approach to Training
3.   Analyzing Instructor Qualifications and Professionalism
4.   Applying Adult Learning Principles
5.   Selecting Training Settings and Methods
6.   Introduction to Writing Learning Objectives
7.   Introduction to Preparing Lesson Plans
8.   Developing and Using Training Aids
9.   Using Effective Classroom Presentation Skills
10.   Using Effective Questioning Techniques
11.   Handling Challenging Classroom Situations
12.   Overview of Developing and Administering Tests
13.   Introduction to Program Evaluation
14.   Using the Classroom Demonstration Method
15.   Course Summary

Note: *A complete example of a Basic/Initial Instructor Training Course is included on the accompanying CD-ROM*

Appendix K

EXAMPLE OF OJT CURRICULA

The following list of representative competencies should be reviewed for applicability to a facility's OJT instructor training program. Competencies that are omitted should be evaluated for inclusion in other instructor training programs. Those competencies that apply should be converted to facility-specific terminal and enabling learning objectives. Once in the learning objective format, training and evaluation tools may be designed. An OJT instructor training course should develop the following representative competencies:

- On the job Training

   General
   – define "on the job training"
   – explain how OJT differs from "job experience"
   – discuss the relationship of OJT to other instructional methods or training settings
   – discuss the advantages and disadvantages of OJT
   – discuss methods by which disadvantages may be minimized or eliminated
   – discuss the planning of a performance-based OJT program
   – discuss the need for monitoring a student's progress during enrollment in an OJT program

   Training Portion of OJT
   – describe the "training portion" of the OJT process
   – discuss the reasons for and the process by which the OJT instructor may "tailor" an OJT lesson to an individual trainee based on the trainee's knowledge and skills at the start of the lesson (trainees that can perform some/all of the learning objective don't need to be "taught" what they already know)
   – review trainee records to determine completion of prerequisite training
   – conduct on the job training using approved materials
   – demonstrate use of the summary process for reinforcing trainee understanding
   – conduct an evaluation of another instructor's OJT lesson delivery

   Evaluation Portion of OJT
   – define "performance test" (may also be referred to as a "practical factor")
   – describe the purpose of a performance test
   – explain why and how knowledge and skill(s) are assessed during a performance test
   – discuss the performance test levels of accomplishment (Perform, Simulate, Observe, and Discuss)
   – explain how the content of a performance test is determined and subsequently controlled
   – develop a training standard to control the content of a performance test
   – discuss the contents of an OJT Checklist (also called Qualification Card), including the guidance that should be provided for the trainee and the OJT instructor
   – discuss the development of an OJT checklist
   – discuss how performance tests are conducted when several levels of accomplishment are specified on the OJT checklist, i.e., perform/simulate
   – describe the OJT performance test process including requirements to document level of accomplishment

- discuss the techniques utilized to assess knowledge during a performance test
- discuss techniques utilized by the OJT instructor to critique trainee performance
- conduct a performance test using an approved evaluation standard
- evaluate an OJT instructor administering a performance test

- **Records Management**
    - discuss the importance of maintaining adequate OJT program records
    - describe the OJT instructor's responsibilities with regard to the documentation of training and evaluation of employees
    - discuss the process used to document on the job training and performance testing processes

- **The OJT Instructor**
    - describe the attributes of a competent OJT instructor
    - discuss the entry-level technical qualifications for OJT instructors
    - explain the need for OJT instructors to develop and demonstrate professional skills/attitudes at all times when dealing with trainees
    - discuss the importance of the OJT instructor working closely with instructional technologists to identify required content, resources, and constraints for proposed training
    - discuss the importance of advising a trainee's supervisor or manager of training concerns
    - explain why resourcefulness and creativity on the part of an OJT instructor are necessary
    - explain the OJT instructor's role in the total training effort

- **Learning Objectives**
    - discuss how the sequencing of learning objectives may affect student learning
    - explain how learning objectives are utilized in OJT programs
    - develop a learning objective containing the three component parts

- **Principles of Adult Learning and Motivation**
    - discuss the factors which are under an instructors control that affect learning and motivation during OJT
    - demonstrate techniques that promote learning and motivation of learners

- **OJT Guides**
    - define "OJT guide"
    - explain how OJT guides differ from classroom lesson plans
    - describe the reasons for utilizing an OJT guide to conduct OJT
    - develop an OJT guide that is based on a terminal objective using the concepts of adult learning and motivation
    - explain why it is not usually possible to assign fixed time allotments to OJT topics
- **Qualification of Trainees**
    - describe the evaluation processes which may be utilized to qualify a trainee at the completion of a training program (comprehensive written examinations, operational evaluation with a first-line supervisor, oral board, etc.).

Appendix L

EXAMPLE OF INSTRUCTION EVALUATION FORMS[2]

INSTRUCTOR EVALUATION - CLASSROOM

Instructor: _____   Date: _____

Evaluator: _____   Lesson Length: _____

Lesson Title: _____   Evaluation Length: _____

Training Program: _____   Number of Trainees: _____

Directions: Check Yes, No, N/O (Not Observed), or N/A (Not Applicable)

I.   Advance Preparation - Determine if the instructor demonstrated adequate preparation for the training session.

		YES	NO	N/O	N/A
a.	Training area was set up for effective instruction prior to training (e.g., lighting, seating, supplies)?	❑	❑	❑	❑
b.	Training materials were gathered and checked for accuracy, completeness, and legibility?	❑	❑	❑	❑
c.	Administrative materials (e.g., attendance sheets) were available?	❑	❑	❑	❑
d.	Training aids and materials (e.g., tests, handouts, transparencies) were organized for effective and efficient use?	❑	❑	❑	❑
e.	Audio/visual equipment was set up and operational?	❑	❑	❑	❑

2.   Format of the Training Material - Determine if the instructor demonstrated ability to follow the lesson:

		YES	NO	N/O	N/A
a.	An overview of the session was presented as part of the introduction?	❑	❑	❑	❑
b.	Training content was presented according to the lesson plan?	❑	❑	❑	❑
c.	Instructor/trainee activities were implemented according to the plan?	❑	❑	❑	❑
d.	The instructor demonstrated the ability to make the instruction meaningful for the trainees?	❑	❑	❑	❑
e.	Training objectives were presented at the beginning of the class?	❑	❑	❑	❑
f.	Objectives were reinforced during the training?	❑	❑	❑	❑
g.	Examples and analogies were used to apply the content to practical situations?	❑	❑	❑	❑

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[2] **Kursk NPP (Russian Federation)**

Determine if the instructor demonstrated the ability to focus trainee attention on the training content:

	YES	NO	N/O	N/A
h. The trainees were provided with an appropriate purpose for the training?	❑	❑	❑	❑
i. Interest in the topic was increased through the use of reinforcement?	❑	❑	❑	❑
j. The relationship of the present session to previous training was identified?	❑	❑	❑	❑
k. The on the job significance of the training was emphasized?	❑	❑	❑	❑

Determine if the instructor demonstrated the ability to present the content and instructor/trainee activities in an organized, logical sequence:

	YES	NO	N/O	N/A
l. One teaching point/objective flowed to the next?	❑	❑	❑	❑
m. Trainees could follow the presentation without confusion?	❑	❑	❑	❑
n. "Nice to know" information was minimized?	❑	❑	❑	❑
o. Meaningful relationships between concepts and skills were clear?	❑	❑	❑	❑
p. Topics had natural beginning and ending points?	❑	❑	❑	❑

3. **Technical Material Review** (for use when evaluation is performed by a SME) - Determine if the instructor demonstrated appropriate technical competence to present the subject matter:

	YES	NO	N/O	N/A
a. Content knowledge was accurate and current?	❑	❑	❑	❑
b. Knowledge was of appropriate depth?	❑	❑	❑	❑
c. Knowledge could be applied to the job as appropriate?	❑	❑	❑	❑

4. **Applied Instructional Theory** - Determine if the instructor demonstrated the ability to involve trainees actively in the learning process (as opposed to constant lecture or watching a demonstration):

	YES	NO	N/O	N/A
a. Active trainee participation was encouraged?	❑	❑	❑	❑
b. Checks for understanding were made through questioning, performance, review quizzes, etc?	❑	❑	❑	❑
c. Training was monitored/adjusted to trainee needs?	❑	❑	❑	❑
d. Allowances were made for "slower" and "faster" learners?	❑	❑	❑	❑

		YES	NO	N/O	N/A
e.	Behavior and trainee responses were elicited?	❑	❑	❑	❑
f:	Frequent and appropriate trainee responses were elicited?	❑	❑	❑	❑
g.	Opportunity to ask subject-matter questions was encouraged?	❑	❑	❑	❑
h.	Trainees were given an opportunity to practice more than once (if needed)?	❑	❑	❑	❑
i.	"Hands-on" practice was provided where possible?	❑	❑	❑	❑
j.	"Hands-on" practice emphasized critical steps and skills?	❑	❑	❑	❑

Determine if the instructor summarized key points, information, and task steps before progressing to the next objective:

		YES	NO	N/O	N/A
k.	The amount of information presented was appropriate for the trainees?	❑	❑	❑	❑
l.	Instructor summarized objective and ensured understanding before moving to next point?	❑	❑	❑	❑

Additional Comments: _____

_____

_____

_____

Strengths: _____

_____

_____

_____

Areas for Improvement: _____

_____

_____

_____

Evaluator Signature: _____Date _____

    Review the results of this evaluation within two working days of the session with the instructor:

    9. INSTRUCTOR SIGNATURE: _____ DATE _____

Route original to the instructor's personnel file; Copy to the Training Manager.

INSTRUCTOR EVALUATION - LABORATORY

Instructor: _____ Date: _____

Evaluator: _____ Lesson Length: _____

Lesson Title: _____ Evaluation Length: _____

Training Program: _____ Number of Trainees: _____

Directions: Check Yes, No, N/O (Not Observed), or N/A (Not Applicable)

I. General Instructional Techniques.

		YES	NO	N/O	N/A
a.	Objectives for the laboratory were discussed prior to performance?	❑	❑	❑	❑
b.	Instructor followed the lab guide (content and time)?	❑	❑	❑	❑
c.	Instructor activity assisted trainees during the lab session?	❑	❑	❑	❑
d.	Instructor identified and corrected trainee knowledge and skill weaknesses?	❑	❑	❑	❑
e.	Instructor used trainee responses and other situations as opportunities to teach and reinforce concepts?	❑	❑	❑	❑
f.	Instructor exhibited interest and enthusiasm for the session?	❑	❑	❑	❑
g.	Instructor listened to trainees and responded to their questions and needs?	❑	❑	❑	❑
h.	Instructor adjusted the pace to the level of trainee's knowledge and ability?	❑	❑	❑	❑
i.	Instructor movements and gestures were appropriate (not distracting)?	❑	❑	❑	❑
j.	Instructor maintained vocal variety (not monotone)?	❑	❑	❑	❑
k.	Instructor avoided using distracting vocal mannerisms ("and-uh", "you know", "OK?")?	❑	❑	❑	❑
l.	The instructor summarized activities at the end of the session?	❑	❑	❑	❑
m.	Instructor solicited and answered unresolved trainee questions at the end of the session?	❑	❑	❑	❑

2. Knowledge of Subject Matter (only to be answered by an SME).

		YES	NO	N/O	N/A
a.	Instructor explained technical information clearly and concisely?	❑	❑	❑	❑
b.	Instructor pointed out differences that may exist between the lab and actual facility procedures and equipment?	❑	❑	❑	❑
c.	Instructor asked questions that required the trainees to:				
	(1) Think through causes and effects of steps?	❑	❑	❑	❑
	(2) Think through plant conditions, activities, causes, and responses?	❑	❑	❑	❑
	(3) Integrate knowledge (theory, systems, procedures, tech specs, etc.)?	❑	❑	❑	❑
d.	Instructor's feedback to trainees (timing, frequency, nature) was appropriate for the stage of the session?	❑	❑	❑	❑

e. The instructor effectively incorporated the theory of facility operations and industry operating experiences into the laboratory training? ❑ ❑ ❑ ❑

f. Enough time was spent on the exercises? ❑ ❑ ❑ ❑

3. Technical Material Review (for use when evaluation is performed by a SME) - Determine if the instructor demonstrated appropriate technical competence to present the subject matter:

	YES	**NO**	**N/O**	**N/A**
a. Content knowledge was accurate and current?	❑	❑	❑	❑
b. Knowledge was of appropriate depth?	❑	❑	❑	❑
c. Knowledge could be applied to the job as appropriate?	❑	❑	❑	❑

Additional Comments: _____

_____

Strengths: _____

_____

Areas for Improvement: _____

_____

Evaluator Signature: _____ Date _____

Review the results of this evaluation within two working days of the session with the instructor:

10. INSTRUCTOR SIGNATURE: _____ DATE _____

Route original to the instructor's personnel file; Copy to the Training Manager.

INSTRUCTOR EVALUATION - SIMULATOR

Instructor: _____ Date: _____

Evaluator: _____ Lesson Length: _____

Lesson Title: _____ Evaluation Length: _____

Training Program: _____ Number of Trainees: _____

Directions: Check Yes, No, N/O (Not Observed), or N/A (Not Applicable)

I. Introduction

	YES	NO	N/O	N/A
a. Instructor maintains a professional demeanor?	❑	❑	❑	❑
b. Organized and prepared simulator and materials?	❑	❑	❑	❑
c. A briefing was held on initial conditions, status of the plant, and special instructions?	❑	❑	❑	❑
d. Gave overview of simulator exercise and objectives?	❑	❑	❑	❑
e. Provided time for board walkdown and questions?	❑	❑	❑	❑
f. Participant roles were assigned?	❑	❑	❑	❑

2. Lesson

	YES	NO	N/O	N/A
a. Ideas were put in context and tied to previously learned skills?	❑	❑	❑	❑
b. Instructor used effective questioning skills?	❑	❑	❑	❑
c. Instructor recognized and encouraged participant questions?	❑	❑	❑	❑
d. Instructor posed valid follow-up questions?	❑	❑	❑	❑
e. Training activities promoted control room realism?	❑	❑	❑	❑
f. Instructor clarified standards of performance and addressed deviations?	❑	❑	❑	❑
g. Required participants to use procedures?	❑	❑	❑	❑
h. Instructor recognized and encouraged correct performance?	❑	❑	❑	❑

3. Use of Simulator (To be evaluated by Supervision of License Training Only)

	YES	NO	N/O	N/A
a. Instructor initiated malfunctions properly?	❑	❑	❑	❑
b. Instructor operated the console correctly?	❑	❑	❑	❑
c. Simulator training time was used effectively?	❑	❑	❑	❑
d. Instructor utilized the simulator's capabilities effectively to ensure training realism?	❑	❑	❑	❑

4. Summary/Post Exercise Critique

	YES	NO	N/O	N/A
a. Instructor conducted critique of performance?	❑	❑	❑	❑
b. Instructor summarized performance and key points?	❑	❑	❑	❑
c. Instructor reviewed objectives and clarified questions?	❑	❑	❑	❑
d. Instructor discussed problems encountered and recommended solutions?	❑	❑	❑	❑
e. Instructor discussed teamwork skills and communication?	❑	❑	❑	❑

f. Instructor discussed safety functions and emergency classifications?	❏	❏	❏	❏
g. Instructor addressed conflict resolution problems?	❏	❏	❏	❏
h. Instructor discussed the importance of leadership?	❏	❏	❏	❏
i. Instructor addressed role and responsibility problems?	❏	❏	❏	❏
j. Instructor discussed attitudes and attitude problems?	❏	❏	❏	❏
k. Summary included a tie to corresponding lessons, courses or other training?	❏	❏	❏	❏
l. Instructor completed documentation of simulator exercise?	❏	❏	❏	❏

Additional Comments: _____

_____

Strengths: _____

_____

Areas for Improvement: _____

_____

Evaluator Signature: _____Date _____

Review the results of this evaluation within two working days of the session with the instructor:

11. INSTRUCTOR SIGNATURE: _____   DATE _____

Route original to the instructor's personnel file; Copy to the Training Manager.

Appendix M

EXAMPLE OF A CONTINUING INSTRUCTOR TRAINING COURSE OUTLINE

1. Team Dynamics/Team Skills

2. Learning Style Inventory

3. Self-Introduction

4. Content Topic Selection By Students
   – Instruction and Training
   – Group Involvement and Group Management
   – Advanced Presentation Skills
   – Implementing Creative Methods ad Materials
   – Starting Things Off (i.e., icebreakers, opening session)
   – Handling Problem Situations and Disruptive Classes
   – Overcoming the Transfer Problem (e.g., use job aids, effective summaries)

5. Review of Basis Instructor Training

Note: *A complete example of an Advanced/Continuing Instructor Training Course is included on the CD-ROM*

Appendix N

SELF-ASSESSMENT OF INSTRUCTOR QUALITIES

Take your time and think about each of the statements listed below. Then determine how your actions compare with those described. Indicate your score for each of the statements by selecting the number that most closely corresponds with you. Be honest with yourself. No one else will have to see your answers and very often no two answers are the same for each statement. This exercise is meant to give you an idea of how your toolboxes of instructor skills compare with others who have been successful as instructors. Compare your total score to those in the box at the bottom.

		Always		Sometimes		Never	
1.	I am fair, consistent and non-judgmental in my dealings with trainees.	5	4	3	2	1	0
2.	I believe in my trainees and encourage them whenever possible.	5	4	3	2	1	0
3.	I display enthusiasm for the subject matter and show that I am pleased when the trainees learn the material.	5	4	3	2	1	0
4.	I am knowledgable in my subject matter and remain current with modifications, industry experience, and changes in the job requirements.	5	4	3	2	1	0
5.	I am prepared and organized whenever I present material to the trainees.	5	4	3	2	1	0
6.	I allow the trainees to get involved in the planning and choosing of activities whenever it is possible.	5	4	3	2	1	0
7.	I look for ways to improve my ability to prepare and present instructional material that is clear, organized, and important to job performance.	5	4	3	2	1	0
8.	I make my instruction relevant to the real life needs of my trainees and the company.	5	4	3	2	1	0
9.	My classroom is a comfortable and challenging experience, but free from unnecessary pressure.	5	4	3	2	1	0
10.	I always maintain and model a professional appearance and attitude.	5	4	3	2	1	0
11.	I strive to remain current with the latest techniques for effective training.	5	4	3	2	1	0
12.	I continuously try to improve my speaking and presentation skills.	5	4	3	2	1	0
13.	I have patience when dealing with trainee's problems and display empathy for the trainee point of view.	5	4	3	2	1	0
14.	I strive to make my training meaningful, relevant and enjoyable.	5	4	3	2	1	0
15.	I make myself available to answer questions and address concerns of the trainees without making them feel as if they are infringing on my time.	5	4	3	2	1	0

Column Totals: _____

Total Score _____

65–75	You possess many of the qualities that help you to be a successful instructor. Build on your qualities and continue to work on improving your skills.
55–64	You should identify the areas where you need to improve your qualities. Any effort will quickly help you improve as an instructor.
45–54	You should formulate a specific action plan to develop your weak areas. You need to develop a broad base of qualities to help you succeed.
< 45	You should recognize the need to develop these qualities. Begin now by identifying several areas you will concentrate on right away. Even though these qualities don't guarantee your success, they can help you in your training efforts.

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ABBREVIATIONS

CBT	-	Computer based training
FSS	-	Full scope simulator
HRM	-	Human resource management
JCA	-	Job competency analysis
JTA	-	Job and task analysis
KSA	-	Knowledge, skills, and attitudes
NPP	-	Nuclear power plant
OJT	-	On the job training
SAT	-	Systematic approach to training
TC	-	Training centre
QA	-	Quality assurance

CODE ELEMENTS FOR COUNTRY NAMES

Abstracted from ISO-3166 Part 1 (1997)

AM	-	Armenia
BR	-	Brazil
CA	-	Canada
CH	-	Switzerland
CZ	-	Czech Republic
ES	-	Spain
FR	-	France
GB	-	United Kingdom
IN	-	India
RO	-	Romania
RU	-	Russian Federation
SK	-	Slovakia
UA	-	Ukraine
US	-	United States of America

IAEA QUESTIONNAIRE ON THE DEVELOPMENT OF INSTRUCTORS FOR NPP PERSONNEL TRAINING

A TECDOC on 'The Development of Instructors for NPP Personnel Training' is currently being developed by IAEA and is to rely heavily on examples provided by member countries. Selected examples from each country will be included in the Appendices of this report. If appropriate, other examples will be included in annexes on a CD-ROM included with the publication. This publicaiton will be available to view, via the Internet, on the IAEA's website.

Purpose

The purpose of the report is to provide practical guidance on various aspects of instructor selection, development and utilisation, by use of actual examples from different countries. It highlights the importance of having an appropriate training policy, especially considering the various organisational arrangements in different Utilities/countries.

Scope

The report will consider instructors with different roles and responsibilities according to the operating organisation's training arrangements and is therefore applicable to Operating Organisations, NPPs, and internal and external organisations with responsibilities for the training of NPP personnel.

To assist with the development of the publication, please provide answers to the questions in the attached Questionnaire and provide documents/examples as appropriate:

LIST OF EXAMPLES DESIRED

One example may address more than one of the items in the questionnaire. As an alternative, a 1–2 paragraph description of a method or application that addresses one or more items from the below list would also be acceptable. An electronic copy is preferred. Excerpts from larger documents such as laws, standards, norms, procedures etc., which are self-explanatory, may also be provided.

Where a document is considered useful, but is not available in English, please provide a short summary in English, which may be included in the main report, and a full copy in the national language, for inclusion on the CD.

STRUCTURE OF THE QUESTIONNAIRE
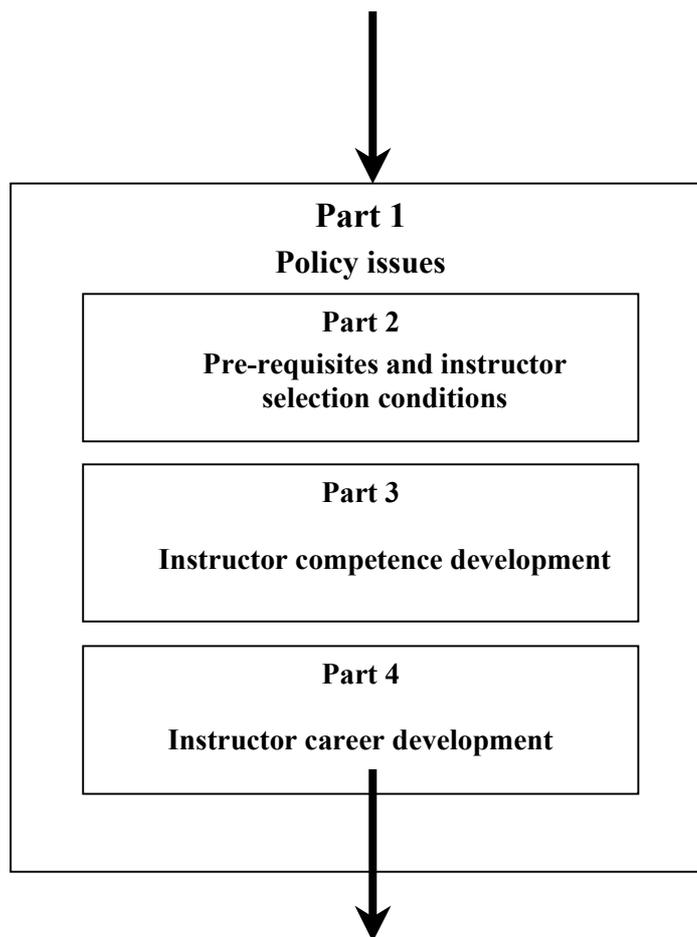
Policy issues:

–   Who is responsible for training activities in your Utility/Country?
–   How is training organised? (e.g. NPP-based, local/central Training Centre, Contract)
–   Is the role of instructor included in your training policy? What responsibilities are defined?
–   Are there national standards or norms regarding identification, selection and training of instructors?
–   Who is responsible for, and who co-ordinates, instructor training? Please explain the interfaces?
–   Do you make use of "occasional" (part time) instructors e.g. NPP specialists, contractors, equipment suppliers? *(If so, please, describe any specific arrangements for occasional instructors in the following sections, if different from full time instructors.)*
    o   Please, define the categories of instructors used (full time, occasional, contracted, classroom, simulator). Please include any 'hierarchical' categories.
–   Does the training organisation have a direct relationship with the regulatory body or is this achieved through the NPP / Operating Organisation?
    o   Please describe any direct relationship between the training organisation and the regulatory body.

Pre-requisites and instructor selection conditions :

–   Do you have a policy of rotating/seconding instructors from NPP's?

- o If yes, please describe your policy/arrangements.
– Where are your instructors recruited from? (NPP, Central, External?)
  - o If you use different sources, what are the approximate percentages (%)?
– Please describe your recruitment process. (Provide any existing procedures)
  - o What, if any are the roles of training and/or NPP managers in the process?
– What formal entry-level requirements exist (e.g. qualifications, experience in job positions, age, pedagogical background, etc)?
– How many instructors per year do you recruit?
– Do you have difficulties in recruiting instructors?
  - o If so, please describe difficulties and any solutions you have developed.
  - o Please describe any specific incentives to recruit instructors e.g. financial, promotion.
  - o Please provide a summary comparison of salaries/grades for differences between instructors and between instructor – NPP staff.

Instructor competence development?

– Do you have instructor task / job competence lists?
  - o If so, please, provide copies.
– Describe process for integration of a new instructor into the training organisation?
  - o Please, provide any formal programme/procedure.
– What are the roles/typical duties of an instructor in:
  - o the training process ?
  - o the preservation of knowledge
  - o other roles.
– Please provide examples of different categories
– Do you have formal training programmes for instructors?
  - o If so, please describe stages in programme for initial, continuing, On the job Training. Please, provide programme summaries / curriculum.
  - o Please, provide details of frequency, duration, scope (technical, instructional) of continuing training (including any NPP based requirements).
  - o If not formal, please, describe your process/arrangements?
– Do you have requirements for any organisation or individuals who provide instructor training ?
  - o If so, provide details.
– What are your arrangements or process for initial authorization/certification of instructors?
  - o Please, provide samples of any procedure or checklist used.
  - o Please, provide details of any continuing certification.
– What is the process of defining any new competences needed by instructors e.g. new simulator, new training tools, techniques, instructor broadening?
– How do you evaluate the performance of instructors? How often? Please, provide details of any procedure or proformas used?
– Do you monitor/set targets for any instructor performance parameters? e.g. % time providing training, no. of lessons developed/year, % time self development.
  - o If so, please describe/provide examples.
  - o If not, how do you ensure instructor competence, quality of training, training organisation effectiveness?
– What are the key responsibilities of each category of instructor in the SAT process as used in your organisation (e.g. in each of the 5 phases)?

Instructor career development:

- Do instructors typically return or transfer to NPP's after a period of time in training?
- If rotated/seconded instructors (full time) used, what is typical period of rotation?
  - What are the arrangements for their NPP job related training?
    - during secondment.
    - prior to resuming NPP duties.
  - What job positions are typically proposed for return to NPP.
- Please provide details of any procedures, re-training programmes, etc.
- Is experience in the role of instructor identified as desirable, or a prerequisite, for other roles in organisation?
  - If so, please, give details.
- Please describe any specific training strategy or projects regarding:
  - First type of NPP in an organisation or a country.
  - New type of NPP.

  Including any special roles of instructors:
  - Overseas assignments (NPP / Training Centres).
  - Recruitment or contracting of instructors from other Utilities/Countries.
  - Adaptation of training practices/methods from other Utilities/Countries.

Annex 2

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7   Romania
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39	UA	Training Plan of Initial Instructor Training	Identification of hours involved, training settings and methods used and methods to assess instructors [Zaporizhzhya NPP]	6
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Part 5. IAEA PUBLICATIONS RELATING TO TRAINING & QUALIFICATION

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