

***Assuring the competence of
nuclear power plant
contractor personnel***



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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 on the development, implementation and evaluation of training programmes for all nuclear power plant personnel, including maintenance contractor personnel. The IAEA International Working Group on Training and Qualification of Nuclear Power Plant Personnel recommended that an additional publication be prepared to provide further details concerning the competence of nuclear power plant contractor personnel.

Contractor personnel provide essential services to nuclear power plants, particularly during plant outages or for projects involving major upgrades to plants. In providing these services contractor personnel encounter similar problems to those that challenge nuclear power plant personnel. Accordingly, contractor personnel must be similarly competent and effectively interface with NPP personnel when performing their assigned duties. It is in this context that this publication offers a framework for assuring the competence of contractor personnel.

This report was initially drafted by the IAEA Secretariat working with a team of consultants. Data were later gathered from Member States and reviewed by the consultants with further contributions received from an Advisory Group meeting. The results are presented here to reflect actual practices of the involvement of contractor personnel at NPPs and the means currently used to assure the competence of these personnel.

This publication will prove useful for, and is addressed to, nuclear power operating organizations and others to ensure that NPP contractor personnel are competent to undertake their assigned tasks.

Appreciation is expressed to all Member States for their valuable contributions and to individuals who provided data on the subject, especially J.-C. Behr, R.J. Bruno, C.R. Chapman, A.Yu. Kazennov and F. Sanchez, all of whom also assisted in reviewing the data. Particular thanks are due to C.R. Chapman who compiled this publication. The IAEA officer responsible for this publication was A.N. Kossilov from the Division of Nuclear Power.

EDITORIAL NOTE

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1. INTRODUCTION

1.1. BACKGROUND

This report was prepared in response to a recommendation by the IAEA International Working Group on Training and Qualification of NPP Personnel (IWG-T&Q) and supported by a number of IAEA meetings on NPP personnel training. IAEA publications on NPP training are the only international documents available to all Member States with nuclear programmes.

This report complements the following IAEA publications on NPP personnel training: Technical Reports Series No. 380, *Nuclear Power Plant Personnel Training and its Evaluation, A Guidebook* [1], IAEA-TECDOC-1057, *Experience in the Use of Systematic Approach to Training (SAT) for Nuclear Power Plant Personnel* [2], and IAEA-TECDOC-1063, *IAEA World Survey on Nuclear Power Plant Personnel Training* [3]. This TECDOC also supplements the IAEA Safety Guide 50-SG-O1 (Rev. 1), *Staffing of Nuclear Power Plants and the Recruitment, Training and Authorization of Operating Personnel* [4] and Safety Standards Series No. NS-R-2, *Safety of Nuclear Power Plants: Operation* [5].

Within the context of this report NPP contractors are defined as any personnel working for a nuclear power plant who are not directly employed by the nuclear power plant. Competence is the ability to perform to identified standards; it comprises skills, knowledge and attitudes and may be developed through education, experience and training. Qualification is a formal statement of achievement, resulting from an auditable assessment; if competence is assessed, the qualification becomes a formal statement of competence and may be shown on a certificate, diploma, etc.

1.2. OBJECTIVE

It is recognized that personnel are used to perform tasks that are of a specialised or temporary nature where it is not feasible to hire or maintain a full-time NPP employee. Accordingly, contractors may be used in a variety of situations to support NPPs. Typical situations include:

- Supplies and services being delivered by the contractors that are subject to different quality standards based on a graded approach to assuring quality.
- The contractors performing work on-site or off-site (see Section 3).
- Contractors involved on a short-term or long-term basis.
- Contractors involved in plant routine activities or performing unique/specific activities.
- Contractor activities dealing with plant safety systems or systems important for safety, which may make more demands on contractor personnel competence.

Contractor personnel provide essential services to nuclear power plants and other nuclear facilities, particularly during plant outages or for projects involving major upgrading of plant. Typical services are:

- Unique services offered by specialised contractors.
- Augmentation of NPP personnel for particular tasks.
- General services provided on a permanent basis.

These services are provided by both small and large contractor organisations and require a broad range of competences.

In providing these services contractor personnel encounter similar problems to those that challenge NPP personnel. Typical examples are assessment of risk, quality assurance, compliance with procedures, communications, teamwork, work in hazardous environments and concerns about nuclear safety.

Accordingly, contractor personnel must be competent and effectively interface with NPP personnel when performing assigned duties. Assurance is required that contractor personnel meet the qualification criteria before undertaking any activities at a NPP site, as the NPP has a responsibility for establishing qualification criteria for its own personnel and for contractor personnel.

The objective of this TECDOC is to assist NPPs and other organisations to ensure that NPP contractor personnel are competent to undertake their assigned tasks.

1.3. SCOPE

This TECDOC addresses the competence of contractor personnel for an operating nuclear power plant or for a nuclear power plant under decommissioning.

This TECDOC deals specifically with contractor personnel working on-site at a nuclear power plant; however, the principles addressed here have similar applicability to off-site work undertaken by contractors.

1.4. STRUCTURE

This publication comprises 11 sections and 17 annexes containing examples of typical means by which competence may be assured by Member States.

- Section 2 outlines some considerations for selecting a contractor organisation;
- Section 3 identifies categories of contractors and their duties;
- Section 4 deals with assuring competence;
- Section 5 discusses the specification of qualification requirements;
- Section 6 explains the principles of gap analysis and consequent compensatory actions;
- Section 7 explains the significance of site access requirements;
- Section 8 outlines the need for radiological protection qualification requirements;
- Section 9 considers specific qualification requirements;
- Section 10 discusses the maintenance of contractor personnel competence;
- Section 11 provides an analysis of a survey of Member States' involvement in assuring contractor personnel competence.

The diagram presented in Section 4 gives an overview of the process in assuring contractors personnel competence. Different sections developed in the present document are referenced in this diagram.

2. CONSIDERATIONS FOR CONTRACTOR SELECTION

2.1. INTRODUCTION

Nuclear power plants (NPPs) are usually more complex and require a greater deal of regulatory oversight than conventional thermal plants. Nuclear plants around the world are of various technologies, e.g. pressurised water reactors (PWRs), pressurised heavy water reactors (PHWRs), boiling light water reactors (BWRs) and advanced gas cooled reactors (AGRs); these are constructed by a variety of organisations and suppliers and at a variety of times, yet the licensing requirements of all these plants are remarkably similar.

The requirements for high availability, safety and reliability are paramount for such plants. The current deregulation in the electricity supply industry in the United States of America, Canada and many parts of Europe is a driving force for improving the reliability of most of these plants, and thus improving the return on investment from these plants. This driving force has prompted many NPPs to resort to hiring contract personnel, instead of retaining full time employees. The trend is anticipated to continue or even intensify in the future.

This section is addressed primarily to line and plant managers training managers.

2.2. ESTABLISHING THE NEED FOR CONTRACTOR PERSONNEL

When the requirement or need for contractor personnel is established by a particular NPP department, key items that typically need to be identified are:

- description of the task,
- description of duties and deliverables,
- specification of QA level or requirements of the completed task or deliverable,
- rationale for the need,
- qualification / certification required by contractor personnel,
- work space requirements / location,
- required or available tools,
- estimated cost/budget,
- estimated task duration,
- recommended source(s) of service.

2.3. CONTRACTOR QUALIFICATION CRITERIA

The selection of prospective service providers (contractors) should be based on an assessment of their capability to provide the required services.

Listed below are some typical criteria for selecting prospective contractors for the Invitation to Bid (ITB):

- purchasing department approved suppliers list,
- technical or service capability of contractor,
- relative experience to requisitioning task,
- work history and feed back,
- health and safety performance on previous jobs,

- availability of resources or current work load,
- ability to comply with safety and regulatory requirements,
- reputation or references background checks,
- cost competitiveness,
- individual employee records.

2.4. REQUEST FOR INFORMATION ON POTENTIAL CONTRACTORS

It may be helpful to issue a “Request for Information” invitation, in a public advertisement if necessary, as a basis for encouraging potential bidders that should be considered for the Invitation To Bid submission, even if there is information about the availability of potential contractors to meet an NPP identified need. The evaluation criteria that will be used in assessing the Request for Information submissions and selecting potential contractors must be agreed to and documented prior to issuing the advertisement.

An example of a Request for Information from Iberdrola (Spain) is included in Annex A.

2.5. RESPONSIBILITIES EXPECTED OF NPP LINE MANAGEMENT AND CONTRACTORS

The respective roles and responsibilities of contractors and of NPP personnel should be clearly defined, understood and documented.

Contractor personnel should have no direct authority over NPP personnel unless this is specifically granted. NPP personnel are responsible, through their line management to the NPP manager, for making decisions after careful consideration of any specialist advice from a contractor and of other factors.

The NPP, utility or operating organisation should have adequate personnel possessing the knowledge, skills and attitudes necessary to supervise and evaluate the work of contractor personnel. Personnel required to supervise contractors should be clearly identified.

Regulatory requirements in almost all Member States assign to plant management the responsibility for ensuring the competence of personnel (NPP and contract personnel) working at an NPP site and for acquiring appropriate qualifications and authorisation when required.

Based on the nature of work to be contracted out, the NPP may assign a project manager or project supervisor, whose responsibility is to assist in:

- supervising, managing the contract within the stipulated terms and conditions,
- assessing the work to the performance criteria established by the contract,
- communicating with the requesting department about non-performance,
- reviewing and authorising invoices for payment,
- completing contractor’s performance evaluation and determining if the contractor’s personnel has provided the deliverables identified in the contract.

3. CATEGORIES OF CONTRACTORS

The qualifications needed for a contractor and the approach to assure competence will vary according to the duties, assigned tasks, the degree of responsibility and autonomy.

In this respect utilities, with the involvement of plant line managers responsible for the contractor's work, must define the contractor's duties and the framework within which to complete the required work. These specifications must form part of the contract and include details such as location, radiological conditions, safety considerations, equipment to be used, responsibility and autonomy, supervision and quality assurance involvement.

Contractors are defined as any personnel working for a nuclear power plant who are not directly employed by the nuclear power plant.

A useful categorisation of contractors is:

Off-site contractor

Contractor personnel who perform work off-site.

Usually the result of the work is a deliverable product. In such a case, the approach to assure competence is indirectly through QA as described in the previous section.

(Such as services engineers, instructors, etc.).

On-site contractors

Contractor personnel who perform work at the NPP.

(Such as maintenance technicians, in-service inspectors, etc.).

Long-term contractor

Contractor personnel who work on a continuing basis at the NPP (i.e. for more than a year), usually supporting certain job positions at the plant.

(Such as maintenance technicians, security, canteen and housekeeping personnel).

Short-term contractor

Contractor personnel who work at the NPP for a short period of time and are likely to be unescorted, usually, but not exclusively, during outages

(Such as refuelling staff, health physics technicians, modifications engineering, etc.).

Contractor visitor

Contractor personnel who perform tasks short in time, without significant risk implications and under direct supervision.

(Such as external auditors, administrative personnel, etc.).

Certified contractor

Contractor personnel who require an official recognition of competence to be able to perform the job, usually from local authorities or other official agencies

(Such as welders, NDT inspectors, etc.).

Radiation exposed contractor

Contractor personnel who are under a risk of exposure to ionising radiations.

(Such as health physics technicians, steam generator and primary loop inspectors, etc.).

Nuclear safety related contractor

Contractor personnel whose work affects structures, systems or components important to safety.

(Such as working on the primary loop, safety systems, safeguards, etc.).

4. ASSURING CONTRACTOR PERSONNEL COMPETENCE

4.1. PRINCIPLES

The principles of assuring competence of NPP contractor personnel are derived from the overall policies of NPP quality and safety and from regulatory requirements. A key principle to assure the competence of contractor personnel is that they must be suitably qualified before performing the work. Accordingly, contractor personnel competence should be formally assessed and documented. See Section 1 for definitions of qualification and competence as used in this publication.

The final responsibility for assuring quality of all the work performed at the NPP rests with the utility.

Assessment of contractor personnel formal qualification should be performed to assure that any particular worker has the necessary capabilities to perform his tasks. In this concern, necessary QA procedures or guides should be developed, either by NPP or contractor QA organization, to establish the proper technical profiles to cope with plant needs.

4.2. FUNDAMENTALS OF ASSURING COMPETENCE

NPP quality assurance programme

The NPP quality assurance programme should include formal procedures and rules to determine qualification requirements for any job that can potentially influence the quality of the work to be performed by contractors or plant safety at the NPP. These requirements include the needed competences (through education, experience, initial and continuing training programmes) and the qualification records.

As a key point into the QA programme, contractors personnel competence should be assessed through verification of existing or requested documentation and records such as: certificates, diplomas, task reports, curricula vitae, evaluations results, reports of similar works performed in other NPPs, etc.

Specific training of contractor personnel could be considered within the provisions of the training system in use at the NPP and contractor personnel can be assessed, by the utility, in order to verify and guarantee their competence.

Performance assessment and supervision such as inspections, audits, performance evaluations during or after the work can be included in the quality plan.

The NPP quality assurance programme should allow a graded approach for those activities carried out by contractors which do not affect plant safety, simplifying the procedure using some of the elements described in the next paragraph.

Contractor quality assurance programme

A quality assurance programme cites requirements for contractor personnel qualification, including initial and continuing training programmes. Both the contractor and NPP should audit the qualification of contractor personnel as stated in the quality assurance programme or in the quality plans developed for specific activities.

Records of contractor personnel qualification shall be available anytime to be compared with NPP requirements.

Selection criteria should also be elaborated following QA Manual in order to guide personnel recruitment processes.

Feedback – Lessons learned

The lessons learned determine challenges and good practices to improve contractor's personnel performance and feedback to both QA programmes, taking them into consideration in the NPP requirements as well as in the contractor training programmes.

Annex B describes the experience of a contractor (Tecnatom, Spain) in assuring the competence of its personnel.

4.3. ELEMENTS OF ASSURING COMPETENCE

Figure 1 depicts a general approach and key elements to assure NPP contractor personnel competence.

In general, it is expected that there are responsibilities for both the contractor and the NPP regarding competence and qualification of NPP contractor personnel. These responsibilities should be considered carefully when contractor personnel are employed.

The most suitable ways of assuring competence of contractor personnel change from country to country due to specific regulatory requirements and other particular aspects. Nevertheless the assessment of formal qualification together with specific training and evaluation, in a systematic manner, is the most useful approach regarding this.

It is important to consider not only the technical competence related to each particular task to be performed on site. The final results of contractor personnel activities are also related to a proper fulfilment of site access requirements which includes information about plant layout, emergency planning, basic health physics information, fire protection, waste treatment, quality assurance and plant organisation procedures. Annex C resumes the current practice of Dukovany NPP (Czech Republic) related to access requirements for contractor personnel.

If there is a gap between a needed qualification and the current qualification of a technician, it remains on the plant organisation the responsibility for establishing formal ways to fulfil the requirements. This can be solved through training programmes developed by contractors and formally accepted by plant organisation or other applicable training and management tools. Annex D shows the actual practice developed by Electricité de France (EDF) to assess contractor personnel qualification.

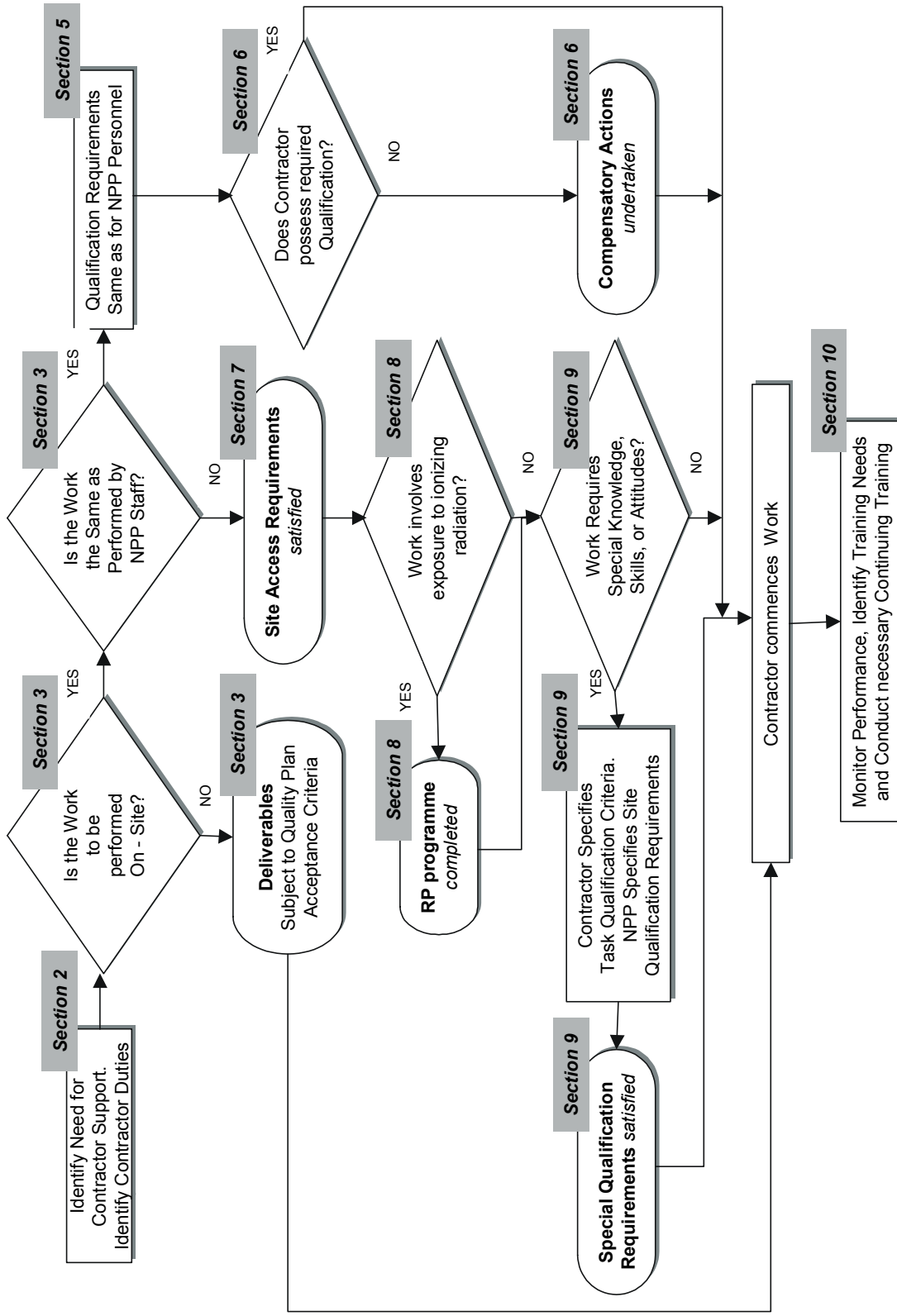


FIG.1. Assuring competence of NPP contractors - overview

Annex E provides information on how a NPP vendor (AECL, Canada) being an NPP contractor itself, implements the measures to particularly assure its subcontractor personnel competence.

An example of company practice of assuring the personnel competence of a typical contractor in the field of NPP instrumentation and measurement services is provided in Annex F.

5. THE SPECIFICATION OF QUALIFICATION REQUIREMENTS

The requirements for qualification of contractor personnel are typically defined in terms of education, experience and training. Additional requirements, such as medical fitness and other special requirements, including licences issued by regulators and special certifications from other authorities, may be applied.

The determination of qualification requirements depends on the nature of services requested by the contractor. The following situations may occur in NPPs.

- For contractors performing usual duties (not the same as permanent NPP staff), the qualification requirements should be defined by the NPP according to the duties and tasks being performed.
- For contractors performing complex or new tasks, the NPP may not have sufficient expertise in stating all the requirements regarding contractor personnel abilities to perform these tasks. In such a case the NPP specifies the site qualification requirements, and the contractor specifies task qualification criteria and make these available to the NPP for review (or approval).
- For contractor personnel hired to perform the duties assigned to specific NPP job positions, the qualification requirements based on those required for NPP staff. In particular, these contractor personnel shall successfully pass prescribed training programmes.

In all cases it is typical for contractor personnel to receive site access, radiological control and other kinds of training when applicable. The contractor shall demonstrate that its personnel are qualified to all defined standards and criteria of the specified work. The NPP should periodically assess contractor personnel qualification, and, possibly, the training process of contractor personnel at all locations where this training is conducted.

An approach and examples from a Regulator's point of view, including legal and regulatory bases, requirements for contractor personnel qualification, training and qualification processes, in assuring NPP contractor personnel are included in Annex Q.

6. GAP ANALYSIS AND COMPENSATORY ACTIONS

6.1. OVERVIEW OF GAP ANALYSIS

After identification of all qualification requirements, as described in Sections 3 and 4, it is necessary to determine whether an individual contractor possesses the desired qualification, or if deficiencies exist. This analysis of the actual qualification as compared with the desired qualification is called “gap analysis”. Use of the word “gap” is intended to imply that very limited shortfalls are anticipated, and it would be expected that any deficiencies identified would not be difficult to remedy. Qualification records should be verified using all available means, including the gathering of additional information on contractors’ past activities.

Clearly, if gaps do not exist, the contractor is qualified, and is ready to perform work at the NPP. However, if gaps do exist, it is necessary to make arrangements for compensatory actions to close the gaps before the contractor is allowed to work on site. At some NPPs and utilities assessment of knowledge and skills of contractor personnel are required.

If deficiencies exist, the gap analysis becomes a “needs analysis” and is the expected starting point of a systematic determination of compensatory actions.

6.2. OVERVIEW OF COMPENSATORY ACTIONS

It is not uncommon for gaps to be identified in the actual qualifications of contractor personnel as compared with the desired qualifications required by the NPP. If gaps are identified, it is necessary to take compensatory actions before contractor personnel are allowed to work on site. The main characteristics of each particular situation should be taken into consideration in order to define the most appropriate compensatory action.

For training-related compensatory actions, the following should be considered:

- If training is needed, it should be delivered before the contractor personnel commence work on site.
- Interfaces between the NPP and the contractor organization should be established to close identified gaps. In particular, any necessary training may be conducted at the contractor’s premises (e.g. radiological control training), or at the NPP (e.g. plant walk-throughs, on-job training), or at plant or external training centres.

Other management initiatives may also be implemented as compensatory measures, to establish a complete qualification record for the contractor; for example:

- Direct supervision,
- Replacement of certain contractor personnel,
- Documentation of additional experience, training or education,
- Waivers.

Examples of Gap Analysis and Compensatory Actions can be found on Annexes C, D and G from Dukovany NPP (Czech Republic), EDF (France) and British Energy (UK).

7. SITE ACCESS REQUIREMENTS

7.1. APPLICABILITY

Any contractor intending to work at a NPP has to satisfy the site access requirements.

Site access depends on the category of contractor (see Section 3) custom company requiring and local regulations requiring, for example:

- Medical and psychological fitness reports.
- Exposure records (for radiological workers).
- Security clearance reports.
- Site access training programmes.

Exemptions could be made for those contractors categorised as *contractor visitors*.

7.2. TRAINING OBJECTIVES

To provide contractors with an understanding of the general fundamentals of the operation of an NPP, relevant site policies and safety considerations regarding work at an NPP, a training programme may be made available.

A site access training programme has similar objectives to general employee training (GET) but is usually shorter in scope and length.

For long-term contractors, the site access training programme may be replaced by the GET. Training objectives for a typical GET course are given in Annex H.

7.3. TYPICAL TRAINING PROGRAMME CONTENT

A typical site access training programme may include topics such as:

Site introduction

- Fundamental principles of NPP operation
- Systems and main equipment
- Main buildings and site layout

NPP policies

- Relevant plant policies regarding safety, quality assurance and housekeeping
- Behaviour in a nuclear environment
- Self-checking
- Principles of quality assurance and quality plan

Security

- Plant access, restricted areas, use of access cards

Emergency plan

- On-site emergency plan objective
- Classification of emergencies
- Initiation
- Assembly points

Fire protection

- Fire prevention and detection
- Means of fire fighting
- Control of flammable substances
- Actions to be taken in the event of fire

Industrial safety

- Risk identification
- Preventative measures
- Safety equipment
- Incident notification
- First aid

In the implementation of the Access Training Programme distributed training strategies such as CBT, multimedia applications, teletraining through INTERNET should be considered in terms of time and cost saving, although training assessment must be directed or at least supervised by utilities.

Annex I includes the Access Training Programmes at Balakovo NPP (Russian Federation) and Dukovany NPP (Czech Republic).

An example of a handout for contractors providing instructions on site access and expected behaviour is included in Annex J.

8. RADIOLOGICAL PROTECTION QUALIFICATION REQUIREMENTS

8.1. APPLICABILITY

Radiation exposed contractor personnel (see Section 3) have to meet at least the same requirements that are mentioned in paragraph 7.1. In addition they should have completed a Radiological Protection Training Programme before working in radiation-controlled areas.

8.2. TRAINING OBJECTIVES

The objective of a Radiological Protection Training Programme is to inform personnel about radiological risks and their consequences, and to provide them with the necessary skills to conduct work in radiation controlled areas in a safe manner.

8.3. TYPICAL TRAINING PROGRAMME CONTENT

A typical radiological protection training programme may include topics such as:

Fundamentals of radiological protection

- Radioactivity
- Risk and protection measures
- Contamination
- Activity, contamination and exposure units
- Biological effects.

Plant specific radiological protection

- ALARA
- Radiological protection procedures and rules in controlled area
- Dosimetry
- Waste management and contamination control
- Radiation work permit
- Individual protection tools.

Regulatory requirements

The length, frequency and content of radiological protection programmes are subject to national regulations and have to be in accordance with international standards.

An example of training materials for Radiological Protection for contractor personnel is given in Annex K.

9. SPECIFIC QUALIFICATION REQUIREMENTS

9.1. APPLICABILITY

In addition to the requirements identified in Sections 7 and 8, some complementary competences must be considered if contractor personnel are to perform activities that could require specific knowledge, skills and/or attitudes. Examples are:

- Tasks that require frequent practice to maintain proficiency.
- Tasks critical to safety.
- Infrequent tasks or new tasks.
- Tasks performed under extreme hazardous conditions.
- Tasks that require special tools or equipment.

Specific qualification requirements may need to be established, in co-operation with the contractor organisation, due to the special expertise of the contractor. These requirements have to be consistent with the NPP safety policies and quality standards.

Special attention should be paid to work performed by *nuclear safety related contractors* (see Section 3).

9.2. TRAINING OBJECTIVES

The main objective is to provide contractor personnel with the specific knowledge and skills to accomplish tasks, as described above, taking into consideration NPP safety and quality assurance requirements.

9.3. TYPICAL TRAINING PROGRAMME CONTENT

Typical topics to be considered for specific training programmes related to safety, quality assurance and good practices, are:

- Particular radiological protection and industrial safety considerations.
- Safety culture concepts.

- Risk assessment.
- Classification of safety related system and equipment.
- Safety during operation.
- Specific quality assurance.
- Verification techniques.
- Self-checking.
- Foreign material exclusions.
- Operating experience – lessons learned.
- Communications.
- Line manager's expectations.

The technical training programme content may have to be developed taking into consideration the specific aspects of the tasks.

Examples of specific training programmes are presented in Annex L (Pre-Outages Training Programme, Mochovce NPP, Slovak Republic), Annex M (Quality Safety Programme, EDF, France), Annex N (Safety Culture, Tecnomat, Spain), Annex O (Self-checking, Tecnomat, Spain) and Annex P (Foreign Materials Exclusion Supervisor, Balakovo NPP Russian Federation).

10. MAINTAINING CONTRACTOR PERSONNEL COMPETENCE

Once qualifications are achieved, contractor personnel are expected to perform work competently. However, contractor personnel must not only initially achieve the necessary qualifications, they must also maintain those qualifications over a period of time. Retraining requirements should be satisfied. The following topics should be monitored for any changes that may affect the ability of the contractor to perform competently:

- The work environment.
- Procedures.
- Systems modifications.
- Tools and equipments.
- Access requirements.
- Radiation conditions or regulations.
- Communications pathways.
- Industrial and on-site operating experience , etc.

The performance of the contractor should be monitored. Lessons learned, such as encountered problems and good practices, may lead to further consideration of the required qualifications.

It is expected that the continuing training needs resulting from these considerations would be systematically addressed to maintain the competence of contractor personnel. Experience within Member States has shown that the systematic approach to training (SAT) is the most effective method available for preparing and producing training programmes. Through its five interrelated phases of analysis, design, development, evaluation and implementation, SAT offers significant advantages of maintaining the competence of contractor and NPP personnel.

11. ANALYSIS OF MEMBER STATES PRACTICES REGARDING CONTRACTOR PERSONNEL COMPETENCE

Eleven Member States were invited to respond to a questionnaire in an attempt to gain an overview of the involvement of contractor personnel at NPPs and the means currently used to assure the competence of these personnel. These results of the analysis of the responses received should not be interpreted as providing a comprehensive international survey of practices within all IAEA Member States, nor of representing the practices of all NPPs within those Member States that did respond. The questionnaire covered three broad topics regarding contractor personnel undertaking work for the NPPs within each Member State:

- Activities and duties performed by contractors.
- Means of assuring contractor competence.
- Contractor personnel training programmes/courses.

Summaries of an analysis of the questionnaire responses received are given in the following three sub-sections. Further details on practices within participating Member States may be found in the Annexes to this document.

11.1. ACTIVITIES AND DUTIES PERFORMED BY CONTRACTORS

The responses received indicate that contractor personnel are employed in all Member States for planned outage work, which often includes refuelling, and for specialised maintenance activities. Several Member States use contractors for NDT and associated work, while others use NPP or utility personnel for this work. In only a few Member States is health physics and radiological protection support provided by contractors and a similar situation exists with regard to quality assurance support.

Training activities are supported by contractor personnel in very few Member States, the NPPs or utilities preferring, in most Member States, to employ their own instructors and training support personnel.

The majority of Member States use contractors on a long-term basis for routine maintenance and for facilities management and building services, which mostly includes some administrative support, catering, cleaning and garden maintenance. Most Member States also employ long-term contractors for security, although in a few Member States the security is specifically undertaken by NPP or utility personnel and is not entrusted to contractors.

11.2. MEANS OF ASSURING CONTRACTOR COMPETENCE

According to the survey, the means of assuring contractor competence varies considerably from Member State to Member State.

In some cases the contract for work drawn up and agreed between the NPP and the contractor includes a requirement that all relevant contractor personnel are competent for the work identified in that contract. In some cases the quality of the previous work of a potential contracting organisation is examined by the NPP as a guide to the competence of its personnel.

In many cases the NPP requires a contractor to provide evidence of formal qualifications of its personnel by showing relevant certificates or diplomas of individuals; in other cases the NPP requires written assurances from a contractor that named employees are competent to undertake a specific task or job, or are competent to work on a particular item of equipment or plant at that NPP.

In a few cases the contractor activities are audited during the period of the contract by qualified NPP auditors, while in some Member States reliance is placed on national legislative requirements for contractors to provide only competent persons to work at NPPs.

Where training is provided by the NPP for contractor personnel for site access, radiological protection and other needs, most Member States demand that contractor personnel are individually assessed to determine the capability of each person before being permitted to undertake work for that NPP.

Subsequent analysis of NPP component integrity or failure is used formally in some Member States to identify contractors whose work is deemed acceptable and whose personnel are, therefore, likely to be competent, although such analysis is supported by other means to determine if the personnel of that contractor are currently competent.

11.3. CONTRACTOR PERSONNEL TRAINING PROGRAMMES/COURSES

The NPPs in the majority of Member States provide some form of training for contractor personnel who are nominated to undertake work for those NPPs. The length and intensity of the training programmes or courses varies from Member State to Member State, and depends, in some cases, on the familiarity of individuals with current legislation, regulations and with particular plant/equipment. Only in one case is a training course provided specifically on the national legal implications of contractor activities at an NPP.

In all cases training is provided in site and plant familiarisation to permit contractor personnel to have access to a particular site. In many cases those contractor personnel who are expected to work on a long-term basis at a particular NPP undertake the same General Employee Training as undertaken by the NPP permanent employees. Where contractor personnel have to work in areas where there is a possibility of exposure to ionising radiations, those personnel are given training in radiological protection.

In most Member States the NPPs provide training programmes and courses on specific items of plant and equipment on which contractor personnel are contracted to work. Completion of a suitable training programme or course for contractor personnel is a mandatory requirement in most Member States before those personnel are permitted to undertake work for an NPP.

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- [1] INTERNATIONAL ATOMIC ENERGY AGENCY, Nuclear Power Plant Personnel Training and its Evaluation: A Guidebook, Technical Reports Series No. 380, IAEA, Vienna (1996).
- [2] INTERNATIONAL ATOMIC ENERGY AGENCY, Experience in the Use of Systematic Approach to Training (SAT) for Nuclear Power Plant Personnel, IAEA-TECDOC-1057, Vienna (1998).
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- [4] INTERNATIONAL ATOMIC ENERGY AGENCY, Staffing of Nuclear Power Plants and the Recruitment, Training and Authorization of Operating Personnel, Safety Series No. 50-SG-O1 (Rev. 1), IAEA, Vienna (1991).
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Annex A

BASIC REQUIREMENTS TO BE CONSIDERED IN THE TENDER, IBERDROLA, SPAIN

At Iberdrola, contractor personnel qualification is particularly considered at the time of contractor selection. Information on contractor personnel qualification is requested within an Invitation to Bid. Such information may be requested in a structured manner. This annex presents a possible way to obtain various data on a contractor, dealing specifically with personnel competence and qualification, at the tender stage of the contractor's involvement. This annex relates to Section 2.4.

1. Purpose

To describe the basic requirements those have been taken into consideration by awarded Contractor's tenders, which will be included in the Quality Plan.

2. Scope

It is applicable to every Contractor's tender to perform services in Cofrentes NPP.

3. Development

3.1. The annex of the present document will be filled in for each tender, in order to check that Contractor has taken into consideration the most relevant technical, financial and quality aspects of the service.

3.2. The answers to the questions will be developed in the specific Quality Plan, once the tender is awarded.

3.3. The annex, once filled in and signed by Contractor, will be sent together with the tender.

3.4. The annex is a supplement of the "Iberdrola general conditions to contract works and services in the Production area", N.I. 00.13.15 edition 1, March 1995, and that does not substitute it.

3.5. The proper filled in of said document will be an absolutely necessary requirement for the assessment of the tender; in other case the tender could be **rejected**.

4. Annex

Document: "Basic requirements to be considered in the tender".

Basic Requirements to be considered in the tender

GENERAL DATA

Contractor					
Call for tender N°:		Date:			
Description of Offered Services					
Foreseen Personnel	Total		Direct M.P.		Indirect M.P.

TYPE OF CONTRACT

Mark the correct option

	Mark the correct option	Yes	No	N/A	Remarks
By Administration		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Fixed Price		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

ASPECTS TO BE CONSIDERED

Mark the correct option

	Mark the correct option	Yes	No	N/A	Remarks
There is a framework contract with Iberdrola		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

1.- General

	Mark the correct option	Yes	No	N/A	Remarks
1.1 Has your company been assessed by CNPP (Cofrentes NPP)?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Have the agreed actions from the assessing audit been answered?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Have you considered the CNPP assessment requirements to perform the services?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.2 If your company has not been assessed by CNPP: Do you have available a documented Quality System (e.g. according to ISO 9000) ?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do you have available Quality Manual and Quality System procedures?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.3 Is your company registered in the National Nuclear Regulatory Body?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.4 Do you know if the offered service affects to components of nuclear class and/or is it related to nuclear safety?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

	Mark the correct option	Yes	No	N/A	Remarks
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Has this same service been performed in previous works/outages?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you know deeply in detail the scope of the work?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have you consider some exceptions / variations of the offered scope?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Indicate exceptions / variations of the scope			

2.- Organisation

		Mark the correct option										Remarks
		Yes	No	N/A								
2.1	In the organisation considered in the tender. Do you have available the organisation in CNPP with enough autonomy and independence from headquarter, to solve incidents during the service?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
2.2	Have specific organisational charts been foreseen for the offered service?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
2.3	The Contractor responsible (Works Supervisor) knows the organisation of CNPP.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
2.4	Indicate the persons responsible for each area and the percentage of dedication considered in the tender:	Responsible		100%	75%	50%	25%	10%	0%	Others (indicate)		
	Radiological Protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	Logistic and Administrative Management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	Quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	Industrial Safety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	Housekeeping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Indicate if there are any shared functions												

Indicate personnel participating in the tender and their experience	N° of Persons	N° of persons that have worked in CNPP	Average (years) experience in the offered service
<i>Works Supervisor</i>			
<i>Foremen</i>			
<i>Skilled Workers</i>			
<i>Labourers</i>			

2.5	Has it been considered in the tender?	Yes	No	N/A	Remarks
	The required Access Training by CNPP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Specific Training about the work to be performed: Technical, Industrial Safety, Radiological Protection y Quality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	It is necessary to justify the list of trained personnel in the different areas
	The continuing training, in case of services for more than one (1) year	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Certification of Welders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Cadwell Weld	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Non Destructive Tests (NDT's)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Connectors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Rawl Plugs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Others (Indicate)				

2.6	The persons responsible/s for quality:	Yes	No	N/A	Remarks
	Are they trained in quality assurance?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The training will be justify through proper documentation
	Do they meet the Safety Guideline (G.S.N. 10.5) from the National Nuclear Regulatory Body	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Do they meet the norm UNE 73405?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Are they certified by the Certification Centre for Quality Personnel -CERPER-?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

3.-Planning of the Works

	Mark the correct option	Yes	No	N/A	Remarks
3.1	The duration of the work, is into the (initial and final) planning designed by Iberdrola?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	In case of work on shift. are the organisation and proper controls foreseen for a suitable work tracking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Are there deviations from the specified delivery dates for works?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	If yes indicate them.				
	Have you foreseen the usage of eventual huts?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Is the incorporation of personnel to CNPP foreseen before the beginning of the activity?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.2	Is it foreseen to verify the implementation of the Quality System in the works? (e.g. through inspections and internal audits)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.3	It is foreseen the tracking of service indicators	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.4	Is the delivering of the final dossier at the end of the service considered?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

4.-Supplies and Subcontracting

4.1	In case of materials purchasing, is the development of technical specifications foreseen?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
4.2	Does the service implementation require Subcontracting? (if yes, indicate it in the observations)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
		100%	75%	50%	25%	10%	0%	Other (Indicate)
4.3	Indicate percentage of Subcontracting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.4	Indicate percentage of supervision over subcontracted works.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5.-Documents of Work

5.1	Are the development and approval of the following documents foreseen before the beginning of the works?	Yes	No	N/A	Remarks			
	Specific Quality Plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
	Specific Industrial Safety Plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
	Document about personnel Training and qualification in the technical, industrial safety, quality and radiological protection aspects according to the contracted activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
5.2	Is it foreseen in the works:?	Yes	No	N/A	Remarks			
	Inspections Points Programmes (IPP's) and/or Route Sheets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
5.3	The procedures to be used in the work: Do they belong to Iberdrola?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
5.4	If it is not the case, has the writing of the necessary procedures been considered?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
5.5	Indicate activities and percentage of inspection by quality personnel in the different works to control:	100%	75%	50%	25%	10%	0%	Other (Indicate)
	Activities							
1.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.6	The tools and measure equipment to be used in the work belong to?	Yes	No	N/A	Remarks			
	Iberdrola	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
	Contractor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
5.7	It is foreseen that the measure equipment to be used are in force and effect about calibration, with its certificates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				

Name	Signature	Date
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Annex B

THE CONTRACTOR POINT OF VIEW IN ASSURING THE COMPETENCE OF ITS PERSONNEL. THE EXPERIENCE OF TECNATOM, SPAIN

This annex describes the approach, in assuring contractor personnel competence, used at Tecnatom, from the point of view of the contractor. The different sources of qualification requirements are introduced and the quality assurance programme of the company, including the training manual, is presented as the main strategy to assure the competence of its personnel. Some examples of training programmes are included. Finally, this annex describes the typical process of competence assessment and how lessons learned are used to improve personnel competence. This annex relates to Section 4.2.

1. INTRODUCTION

Tecnatom is a service company involved, since 1957, in the supplying of qualified services during outages and normal operation at NPPs worldwide such as:

- In-service inspection of main components (reactor pressure vessel, steam generator, turbine, etc.) using non-destructive tests (NDTs).
- Tests of supports and snubbers, local leak rate test of valves (LLRT), integrated leak rate tests (ILRT).
- Inspection of fuel assemblies.
- Support during outages (radiological protection and quality assurance).
- Engineering support for operation and in-service inspection.
- Training of operation and maintenance personnel.

To supply this type of services related to quality and safety in an NPP it is crucial to count with high qualified personnel which constitute the most important value of Tecnatom.

2. QUALIFICATION REQUIREMENTS

At Tecnatom the personnel are qualified according to the following requirements:

National regulations

In radiological protection: *“Sanitary Protection against Ionising Radiation”* (RD-53/92. Art.:18); *“Operational Protection of the External Workers with Risk of Exposure to Ionising Radiation for intervention into Controlled Zone”* (RD-413/97) and in particular *“Operation Protection of External Workers with Risk of Exposure to Ionising Radiation for intervention into Controlled Zone”* (RD-413/97)

In industrial safety: *“Low about Hazards Prevention at Work”* (Low-31/95. Art.: 9).

NPP normative of reference: ASME section XI “NDT Inspector Requirements”; ANSI-ASME NQA 1 “QA Auditors Requirements” or ANSI-ANS 3.1 “QA Instructors Requirements”

Recommendations from national authorities and international organizations: “QA for essays tests and inspections for NPP” (CSN Safety Guides 10.5); “QA for NPP safety” (IAEA Safety Guide 50-C-QA); “QA personnel Training and Qualification” (UNE – 73/405-94) just to mention same examples.

NPP procedures: “QA Manual”, “Radiological Protection Manual”, “Plant Access Procedure” and “General Requirements for External Workers”, among others.

Contractual documents such as:

- “General Conditions for Contracting and Technical”. This document typically request among other the following information:
 - Organization structure, functions and responsibilities
 - Contractor personnel qualification Requirements (education, experience, training and certification when needed)
 - QA Programme and Quality Plan (for those works subjected to Quality requirements)
- “QA Specifications for Tenders”. Annex A includes an example of one of these documents from Cofrentes NPP.

The qualification requirements of the Tecnatom personnel are defined by a combination of:

- Education: minimum academic degree for specific job position (at the present situation 64% of the staff of Tecnatom have university studies).
- Experience: for some qualification levels it is necessary a number of years of experience.
- Training: the initial and continuing training programmes for the different job positions are designed and included as a part of the QA programme.
- Certification: for special job positions (NDT inspectors, QA technicians) is needed a certification by National Authorities.

3. QUALITY ASSURANCE PROGRAMME. THE TRAINING MANUAL

Tecnatom quality assurance (QA) programme is considered a strategic management tool for the supply of its services in the nuclear sector. As a part of the QA programme is integrated the training manual; this is a document that describes the general process for training and qualification, training programmes and define the levels of competence for the different specialists.

TRAINING PROGRAMMES

The training programmes for a company like Tecnatom, that supplies safety related services, needs to meet more requirements than for conventional business. This is the reason why Training Programmes should deal not only with technical knowledge and skills, but also with quality and safety culture. The Training Programmes are divided in the following areas:

Technical training

Technical training has been designed following Systematic Approach to Training methodology specifically for each job position.

QA training programme

QA Programme is considered a management tool. In this respect each employee is introduced about QA Programme at Tecnatom and their responsibilities.

Line managers, project managers and team leaders are more intensively training in QA including: QA objectives, administrative and QA procedures, particular QA requirements and the development of quality plans.

Radiological protection

Tecnatom as a contractor organization is responsible for the training and qualification of their personnel, who possibly may be exposed to ionising radiations, in radiological protection including: fundamentals of radioactivity, risks and protection measures, regulation and limits, rules in controlled zone.

NPPs are responsible to assure that Contractor personnel have received the general training (this information is included in the “Radiological Card”) and usually complement with plant specific topics such as: ALARA programme, radiological protection services, dosimetry, reduction of radioactive waste, radiological work permits and contamination control.

Industrial safety

In combination with QA and Radiological Protection, the Tecnatom personnel must have a good understanding of safety. Training programme includes theoretical and practical courses on: hazards and protective equipment, work in height, work in confined areas, electrical safety, hazardous chemical and nuclear safety.

For managers, responsible for the safety of their personnel, this training is reinforced with the details of the regulation requirements and the methodology for risk assessment.

Plant specific training (see Section 4)

Continuing training

To maintain and update competence, line managers and training managers at Tecnatom cooperate in the preparation of an annual continuing training programme, taking into consideration at least:

- Mandatory refreshing and re-certification,
- Lessons learned for previous works,
- New procedures,
- New technologies and equipment, and
- New regulations.

CERTIFICATION

The certification is the recognition of the personnel qualification by competent organizations or authorities.

In case of Tecnatom typical certifications are:

- NDT inspectors: certificate delivered by Tecnatom (according to ASME Code) and by CERTIAEND (according UNE-EN-473)
- QA technicians: certificate delivered by Tecnatom (according to ANSI-ASME-NQA1) and by CERPER (according to EOQ schema)

4. COMPETENCE ASSESSMENT

The competence assessment varies from one utility to other and from country to country, this is why an international contractor, such as Tecnatom, has to manage assurance of the competence of its personnel through an assessment of its Quality Assurance Programme.

Very often the first step that Tecnatom has to take, is to become a “Qualified Contractor Company” (member of the approved list of contractors for a specific utility). This contractor qualification process includes an assessment of the company organization, its financial status, QA system, recruitment process, personnel training programmes and its qualification, technical procedures, documentation and records. This accreditation, as a “Qualified Contractor Company”, has to be periodically renewed (usually every 3 years).

In addition to the accreditation as a “Qualified Contractor Company”, the assessment of the Tecnatom personnel competence, for specific works (i.e. outages), usually follows the process described in the scheme below.



Tecnatom personnel are trained in accordance with the Training Manual included in the QA programme (as described in paragraph 3), taking into consideration the qualification requirements (enumerated in paragraph 2).

Special requirements can be made by a NPP for specific tasks, usually through the contractual documents (technical and QA specifications). Such additional requirements must be analysed and if any qualification gap is identified, compensatory actions are taken such as:

- Experience, i.e. some NPPs ask for certain years of experience of similar work for team managers;
- Additional training, i.e. Quality and Safety Programme (QSP) for work at EDF NPPs;
- The level and number of personnel certified, i.e. the number of in-service inspectors of level I, II and III in certain NDT techniques.

One of the most important principles of personnel qualification is that the qualification must be *Traceable*. This means that when somebody is qualified, a certificate submitted by a competent organization must exist, and the results of the examinations and the duration, location and training programme must be available. All qualification records, including official certificates, are stored in a database. Those which are requested for a specific activity are submitted to the NPP for formal assessment.

Very often the NPP provides additional training before the commencement of the work. This training is the plant-specific part of the Radiological Protection course, On-site Emergency Plan, Fire Protection and specific QA and Safety considerations. At the end of this training there is an examination that the trainees have to pass.

In summary before undertaking work the assessment of competence is performed through:

- Contractor company qualification,
- Contractor documentation assessment,
- Contractor personnel evaluation (optional).

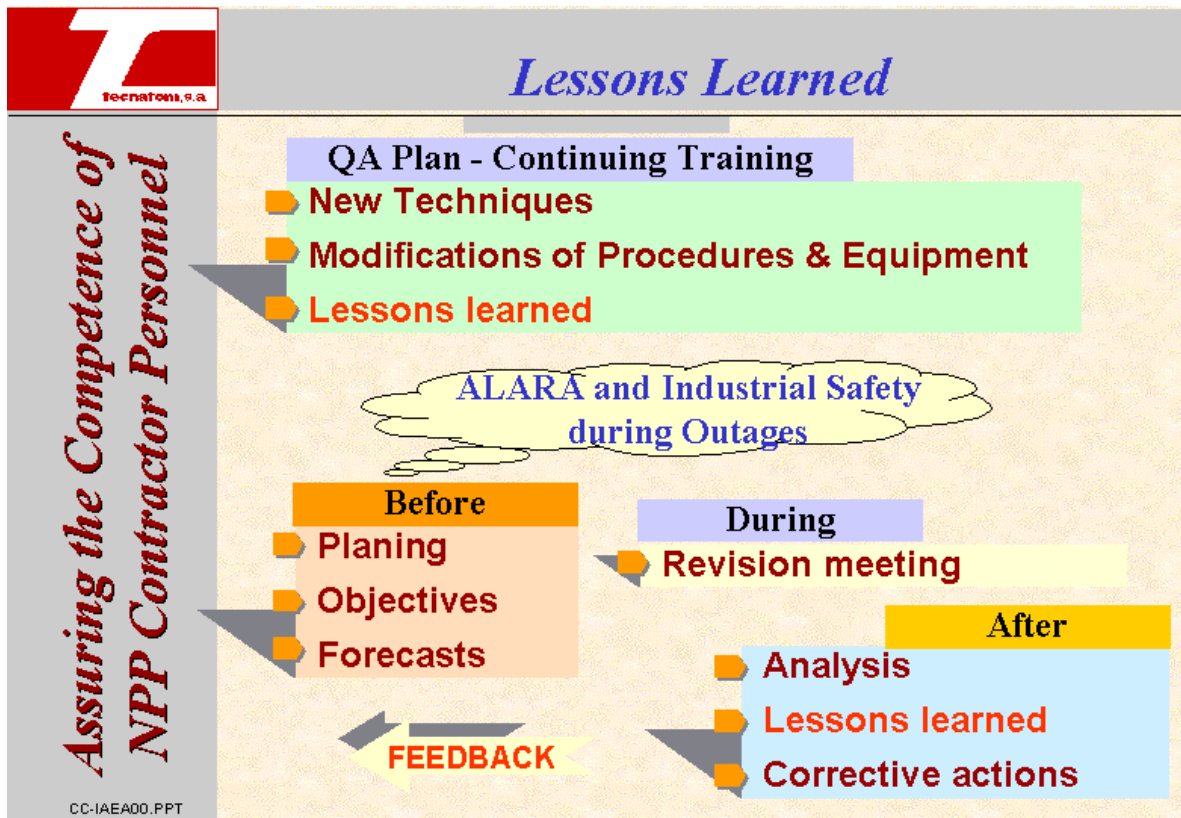
Also during the work the qualification assessment indirectly continues through the NPP QA programme and the Tecnatom quality plans, that include:

- Programme of inspections points, that means milestones in the work, checked by NPP and Tecnatom inspectors that the tasks are performed according to the NPP QA Programme and the submitted Quality Plan,
- Audits during the work by NPP and Tecnatom QA auditors.

5. LESSONS LEARNED

The previous scheme shows how lessons learned are taken into consideration in the feedback of the qualification process.

First of all, as was described in paragraph 3, the continuing training programme includes those lessons learned from previous work and that have been considered important for training purposes.



In addition to this, and specifically related to the NPPs ALARA programme and Industrial Safety during outages, a kick-off meeting, between NPP and Tecnatom managers, is held to plan the tasks and communicate the NPP objectives in terms of dose and work incidents.

During the outage there is a daily meeting to review the planning and objectives; and at the conclusion there is a closure meeting to analyse deviations and their root causes, lessons learned and corrective measures.

Often corrective measures are related to training and feedback into the qualification process.

6. CONCLUSIONS

Tecnatom, after its wide experience as a worldwide contractor in the nuclear field, has felt the necessity to develop a comprehensive QA programme in order to assure the competence of its personnel. A sound relationship between the Tecnatom QA programme and the assessment of competences made by the NPP, in accordance with its own QA programme, is the cornerstone to assure meeting the NPP qualification requirements.

Finally, the implementation, in cooperation with the NPP, of lessons learned from previous work, offers continuing challenges for improvement.

Annex C

CONTRACTOR TRAINING AT DUKOVANY NPP, CZECH REPUBLIC

Besides considering the specific technical competence of contractor personnel related to each particular task (such as non-destructive testing or equipment maintenance) to be performed on site, the technical competence requirements that all personnel working on site have to meet are also important. Such requirements and related training dealing with site access are presented in this annex. Also, this annex provides information on how Dukovany NPP assures contractor personnel competence by means of evaluation of the requirements for contractor personnel qualification, and evaluation of contractor personnel training programmes. This annex refers to Sections 4.3, 6.2 and 7.3.

A. EVALUATION, TEST, EDUCATION GROUPS IN SITE ACCESS TRAINING

Site access training

All contractor personnel allocated to Dukovany NPP site for the first time, or contractor personnel who have not worked in the NPP restricted area in the past year, are obliged to complete the site access training.

They are permitted to take the site access training only after submitting the completed **printed forms No. 1, 2, 3, 4** within the required time and confirmation of passing the required psychological test.

Purpose of the training

The purpose of the site access training is to enable contractor personnel to acquire basic information about the principles of generation of electrical energy in a nuclear power plant, and an appreciation of the plant layout and organisation, that they know how to react properly in case of abnormal or unusual events, that they are familiar with the principles of safe work, fire protection and waste treatment, and from where they may obtain the necessary information.

Organisation of the training

The training, inclusive of tests, takes place one to four times a month at dates fixed in advance, or by arrangement. It is the duty of the contractors of all **implementation groups** to organise the training of their personnel at **Department 7204 – Employees’ Special Preparation and Contractors’ Training** at least three weeks in advance, and to submit legibly completed **printed forms No. 1, 2, 3, 4** at the same time.

According to the character of the work that contractor personnel will undertake in the restricted area of NPP Dukovany, they are divided into two groups.

For each group, defined educational objectives in each module are prescribed, with an associated assessment.

An employee of **Department 7204 – Employees’ Special Preparation and Contractors’ Training** will ensure classification of contractor personnel into groups on the basis of the completed printed forms No. 1, 2, 3, 4.

Classification of groups

Group I: contractor personnel included in **implementation groups:** 1A1, 1A2, 1A3, 1B1, 1B2, 2A1, 2A2, 2A3, 2B1, 2B2

Group II: contractor employees included in **implementation groups:** 1B3, 1B4, 2B3, 2B4.

Materials for study

The basic text for self-study regarding the power plant is “**The Manual of General Training of personnel of NPP Dukovany and External Contractors**” (“The Manual”). The contractor will receive “The Manual” for his personnel at **Department 7204 – Employees’ Special Preparation and Contractors’ Training**.

It is the duty of the contractor to give “The Manual” to his personnel at a date that enables sufficient time for study.

It is assumed that each contractor employee has studied “The Manual” before commencing site access training.

Training content

The training content is broken down into three parts specified in the training programme: theoretical instruction, teaching by using models in the Information Centre and a visit to the power plant.

Test for verification of general qualification

After undertaking all three parts of the training, contractor personnel have to pass the tests to verify their knowledge according to the classification identified in Groups I and II. The tests are performed on personal computers in the format of pre-set multiple-choice questions. There are five possible answers to each question out of which only one is correct.

Successful personnel will receive confirmation “that they have completed the site access training and passed the test”.

Length of site access training

The training, inclusive of the tests, lasts one and a half working days. Assessment of knowledge is undertaken on the second day.

Other provisions

If a contractor employee does not pass the test to verify his knowledge at the first attempt, the contractor has to pay a charge for repeating the tests. Repeated tests cannot be taken within a week of the first tests or second, repeated, tests. The tests can be taken only three times. If a contractor employee has not worked in the restricted area of NPP Dukovany during the past year, it is the contractor’s duty to ensure that his employee will complete the site access training again and pass the tests.

B. AUDITS AND EVALUATION OF QUALIFICATION AND CONTRACTORS' TRAINING PROGRAMMES. CHECK LIST FOR CONTRACTORS TRAINING AND QUALIFICATIONS INSPECTION

1. Contractor personnel qualification

1.1. In addition to general qualification requirements, have specific qualification requirements connected with QA and safety, been determined?

Before contractor personnel begin to perform their tasks, have the employee categories been determined?

Before contractor personnel begin to fulfil their tasks, have the qualification requirements been determined?

Are these qualification requirements periodically reviewed, evaluated and revised, if need be?

1.2. Does familiarisation with the quality system and quality assurance elements comprise part of the acquaintance of a contractor employee with his work?

2. Training of contractor personnel

2.1. Have documented procedures, for establishing the requirements for training contractor personnel who perform activities influencing the quality of items relating to nuclear safety and radiation protection, been developed and maintained?

Do these procedures contain:

- Determining qualification criteria for relevant personnel?
- Methods of taking and maintaining the records of training, qualification acquired, and special preparations?
- Methods of documenting training of appropriately qualified personnel to enable them to execute the assigned work and to understand the importance of the work they do with regard to quality?

2.2. Is a special training plan, setting the final targets of the training and qualification criteria of a trained contractor employee for the given work activity, developed on the basis of the analysis of training requirements; and is it used?

2.3. Is an annual (or other periodic) training plan developed and used?

2.4. Is the training performed in accordance with the developed training plan?

2.4.1. Have the responsibilities for keeping the training plan to time been assigned?

2.4.2. Are contractor personnel trained consistently with regard to quality?

2.4.3. Is the training performed consistently and is it specific for each group of contractor personnel?

2.4.4. Is the training assured for all levels of contractor personnel whose activities influence the quality of the supplied items?

2.4.5. Are the personnel who ensure operations important with regard to quality trained in practical skills?

2.5. Is the analysis of evaluation of the effectiveness of contractor personnel training, based on selected criteria, performed continuously?

2.6. Are the remedial measures for detected shortcomings taken in such a way that the required improvements really happen?

3. Questions regarding meeting the NPP guideline - Training of contractors employee (contract basis)

3.1. Does the required training follow the NPP organised guidelines?

- Document by attendance lists
- Instructor's records
- Content
- Period of archiving
- Verification of knowledge
- Records
- Evaluation

3.1.1. Are all the certificates and appropriate licences issued?

3.1.2. Are the documented licences valid?

3.1.3. Are the documents, for obligatory archiving by the customer, submitted for special processes?

3.2. Documentation of the system of acquiring and maintaining the special qualification of contractor personnel in the form of a written document – QA programme

3.2.1. Have job descriptions been developed for the posts that are to be filled by contractor personnel?

3.2.2. Has a standard of special training, which must be in accordance with the contractor personnel qualification sheet, been developed for every post (job)?

3.2.3. Have lists been developed of required documentation for jobs?

3.3. Has authorisation for performing the job been issued to personnel by the employing contractor?

3.4. What method is used to prove that contractor personnel have acquired the required theoretical and practical knowledge or skills to be able to work according to the technological procedures on actual equipment on their own, under supervision or to manage the work?

3.5. Have the system and rules for selection and development of personnel been developed in accordance with the requirements of their qualification and preparation system?

3.6. How is it ensured that contractor personnel for NPP Dukovany have the medical, psychological and technical qualifications for performing actual activities or jobs?

3.7. Have the instructors who will be responsible for contractor personnel training been assigned in writing?

3.7.1. Do the instructors have the required qualifications?

3.7.2. Do the instructors have practical experience with the activity for which a new employee is being trained?

3.7.3. How is it ensured that the instructors possess instructional abilities?

3.8. Are the individual training programmes for contractor personnel developed to enable them to commence their work?

3.9. Have the training programmes been developed to meet all requirements?

3.9.1. Is the training organised according to these training programmes?

3.9.10. Have the training programmes for individual work on equipment been developed in co-operation with the customer?

C. GENERAL ACCESS TRAINING PROGRAMME

I. Principles of generating electricity in PWR

- Principles of electricity generation
- Atom composition
- Fission reaction, heat generation, heat transformation, steam generator

II. Layout of Dukovany NPP

- NPP facilities
- Facilities equipment

III. Organisation of Dukovany NPP

- Organisation chart
- Organisation of Nuclear Safety Department
- Shift diagram

IV. NPP security

- Security targets
- Security barriers (restricted, protected area)
- Identification card
- Prohibited activities
- Turnstiles, security incidents

V. Industrial safety

- Objectives and conditions
- Health protection
- General duties
- Prohibited activities
- Safety posters and schedule instructions
- Work permits (S,B,R)
- Personal protective equipment

VI. Fire protection

- Preventive and suppressive fire protection
- Fire Protection Equipment
- Fire posters and schedule instructions
- General Duties, Fire Safety Rules

VII. Radiation protection

- Basic terms, radiation sources, effects
- Principles of radiation protection

- Controlled zone, access to controlled zone
- Personal protective fundamentals

VIII. Emergency plan

- Internal emergency plan for Dukovany NPP
- Situation classification
- Employee general duties
- Shelters, muster points, evacuation

IX. External emergency plan

X. Waste handling

- General waste management
- Oil, metal, paper, other hazardous materials – waste handling
- Solid waste, radioactive waste processing
- Radioactive waste depository

XI. Quality assurance

- Quality assurance principles
- Quality assurance management
- Quality assurance supervision

Annex D

ASSURING AND MAINTAINING CONTRACTOR PERSONNEL COMPETENCE AT EDF, FRANCE

This annex presents the overall process for contractor qualification and maintaining this qualification. The items presented in this annex deal especially with contractor personnel competence. Attachments 1 and 2 are the most representative documents used. This annex relates to Sections 4.3 and 6.2.

For EDF nuclear generating facilities, contractor personnel competence is examined during following stages:

- At the time that the contractor (company) requests qualification.
- When contractor personnel arrive at a NPP site.
- While the contractor is working.
- Throughout the period of validity of qualification.

1. At the time that the contractor (company) requests qualification

For a contractor to become qualified, various fields are examined by EDF's qualification authority through the "Ability Review Report". One field deals directly with the competence of contractor personnel.

The following topics are examined:

Improvement of personnel professionalism

- Existence of a contractor's training plan and calculation of the rate of training undertaken.
- Examination of different **technical training courses** given to own personnel and to temporary personnel used by the company, dealing with the requested qualification field (examples of qualification fields for EDF's NPPs are: nuclear logistics, valves, rotating machines, boiler-making/piping, steam generator maintenance and inspection, electricity /instrumentation, non-destructive testing, insulation/scaffolding, regulatory inspections /measurement).
- Other means used by the contractor to develop and maintain personnel competences (example: companion training).
- Verification that the contractor sets up an internal assessment of the competence level of personnel, throughout their professional life.
- Verification that contractor personnel have followed some specific training courses dealing with the operating of relevant equipment.
- Examination of contractor evaluation reports regarding personnel competence (if the contractor is already qualified for another field).

Quality of management

- Verification for specific site management training
- Examination of criteria to select team leaders

Existence and strength of a risk prevention and radiological protection culture

- Training in risk prevention
- Training in radiological protection.

2. When contractor personnel arrive at a NPP site

Reminder: in relation to the previous point, contractor personnel are not permitted on site if the company does not have the necessary qualification for the relevant field.

Two controls are followed at this stage:

- The first one takes place **before the beginning of the work**, during a “release of prerequisites meeting” between EDF and the contractor company. During this meeting the contractor gives the list of personnel who will be involved in the work and clarifies for each individual, their competence/qualification level for the specified job which has to be done.
- When contractor personnel arrive at a NPP, site access personnel verify, in the individual’s access book, the validity of the different certificates which have been issued after compulsory training courses (quality and safety, radiological protection and licensing and other specific requirements).

3. While the contractor is working

Reminder: if a contractor has a qualification for a specific field, any French NPP may enter into a contract with this company. However, as specified by the French Quality Decree of August 10th 1984, *" the operator of a Basic Nuclear Facility (i.e. a NPP) has to ensure that a level of quality, pertaining to the importance of safety, is maintained upon equipment and operating conditions "*.

To satisfy the requirement specifically for maintenance activities, the Safety Quality Department of the NPP conducts site audits, most of them being conducted during outages. The programme of these audits depends on:

- Results of **annual national evaluation of contractor** (*see attachment D 2*) which have clearly shown some gaps and, therefore, require the contractor to set up progress main lines.
- List of contractors to be audited is drawn up by the requesting departments of the NPP.
- List of contractors to be audited is drawn up by the Safety Quality Department regarding the results of previous audits.

Among different topics to be audited, auditors can directly review contractor personnel knowledge and skills in safety, risk prevention, radiological protection and technical fields.

Important: If, during these site audits, important gaps regarding the personnel competence, are identified, **their removal is always the contractor's responsibility.**

However, the NPP can provide some additional training or documentation, or particular assistance from an operational department of the NPP.

4. Throughout the period of validity of qualification

Feedback is conducted at two levels, locally and nationally throughout the period of validity of qualification.

4.1. At the local level: each service is carried out by a contractor at an NPP

At the end of each service, a **Service Evaluation Report** (*see attachment D 1*) has to be filled out to estimate the appropriateness of the service carried out by the contractor in relation to the NPP requirements.

For contractor personnel competence, an assessment of following three fields is conducted:

Technical quality of the work

- Compliance with technical specification of the work
- Compliance with schedule
- Identification and treatment of deviations
- Quality and relevance of the technical inspection (article 8 of French Quality Decree)

Professionalism, competences and jobs

- Knowledge of levels of certifications
- Motivation and personnel involvement
- Ability to inform and communicate effectively
- Sense of innovation and a critical eye
- Scope of supervision (for foreman)

Appropriation of safety culture

- Behaviour, a questioning attitude to nuclear safety
- Consideration of nuclear safety (risks and preventative measures)
- Compliance with temporary management restrictive devices (“DMP”)
- Knowledge of work places and systems (circuits)

Comment: if a site audit has already been conducted by the Safety Quality Department of the NPP, an analysis of their results can also be added to the Service Evaluation Report.

Annually, each NPP writes a summary of evaluation of services carried out using the document "Periodic Contractor Evaluation Report".

4.2. At the national level of the contractor's qualification

All the Periodic Contractor Evaluation Reports are sent by the NPPs to the National Qualification Authority, which sets up a general evaluation for each contractor.

Remarks are grouped into eight sections that cover the majority of subjects treated in the “Ability Review Report”:

- Quality of the operation
- **Safety and safety culture (for individuals)**
- **Professionalism and qualifications (for individuals)**
- Organisation
- Identification of activities / documents
- **Security, radiological protection (for individuals)**
- Logistics/site/environment
- Cost control

Based on the collected data, the Qualification Authority may decide to include a contractor in the National Action Plan and define main paths that the contractor has to follow if desiring to keep the qualification.

Important: If a Service Evaluation Report has shown important gaps (i.e. a fault that places the installation's safety or availability at risk, or which represents a deliberate act by the contractor to defraud, or to avoid fulfilling obligations or the specified requirements), the NPP immediately informs the Qualification Authority which can require reinforced scrutiny of the contractor.

Attachment D1

SERVICE EVALUATION REPORT

SESSION CODE OR DATE: B9920N				
	TEAM 1	TEAM 2	TEAM 3	TEAM 4
	Foreman:	Foreman:	Foreman:	Foreman:
	Worker(s):	Worker(s):	Worker(s):	Worker(s):
	Technical inspection:	Technical inspection:	Technical inspection:	Technical inspection:
	Work:	Work:	Work:	Work:
	Equipment:	Equipment:	Equipment:	Equipment:
	POSITIVE POINTS AND MAIN DIRECTIONS OF IMPROVEMENT			
	TEAM 1:	TEAM 2:	TEAM 3:	TEAM 4:
	POSITIVE POINTS AND MAIN DIRECTIONS OF IMPROVEMENT			
	TEAM 1:	TEAM 2:	TEAM 3:	TEAM 4:
HEADING				
TECHNICAL QUALITY OF THE 'WORK				
global mark: A=very well, B=well, C=medium, D=bad ⁽¹⁾				
Compliance with work tech.spec.(procedures, CCTP)				
Compliance with schedule				
Identification, deviations treatment				
Quality & pertinence of tech.inspec(art.8 Q.Decree.84)				
APPROPRIATION OF THE SAFETY CULTURE				
global mark: A - B - C - D				
Behaviours, questioning attitude / nuclear safety				
Consideration of nuclear safety risks (parries)				
Compliance with management related to "DMP"				
Knowledge of places of work and systems (circuits)				

	POSITIVE POINTS AND MAIN DIRECTIONS OF IMPROVEMENT			
	TEAM 1:	TEAM 2:	TEAM 3:	TEAM 4:
PROFESSIONALISM, SCOPES, JOBS				
global mark: A - B - C - D				
Knowledge of levels of certifications				
<i>Quality of professional gesture, competences (information)</i>				
Motivation, involvement of workers				
Ability to inform, communicate effectively				
Sense of innovation and critical eye				
Scope of supervision (foreman)				
ORGANISATION				
global mark: A - B - C - D				
Compliance with suggested organization(organiz.chart,..)				
Reactions of workers (failings of schedule)				
FOLLOW-UP OF ACTIVITIES, DOCUMENTS				
global mark: A - B - C - D				
Appropriation and Compliance with the Quality Plan				
Quality of documents, reports				
Conformity documents / List of Applicable Doc. (case 1)				

INDUSTRIAL SAFETY, RADIOPROTECTION global mark: A - B - C - D	POSITIVE POINTS AND MAIN DIRECTIONS OF IMPROVEMENT			
	TEAM 1:	TEAM 2:	TEAM 3:	TEAM 4:
Behaviours, attitude regarding industrial safety				
Appropriation and Compliance with Prevention Plan				
Wearing individual protection				
Application of collective protection				
Compliance with industrial safety regulations				
Control of operating conditions, certific., authoriz.				
Compliance with labour regulations				
LOGISTICS, SITE, ENVIRONMENT global mark: A - B - C - D	POSITIVE POINTS AND MAIN DIRECTIONS OF IMPROVEMENT			
	TEAM 1:	TEAM 2:	TEAM 3:	TEAM 4:
Choice and conformity of products used ("PMUC")				
Compliance with EDF specified equipment				
Tidy and clean site				
Control of wastes (collect, select, reduce)				
COST CONTROL	POSITIVE POINTS AND MAIN DIRECTIONS OF IMPROVEMENT			
Effectiveness of work under controlled expenditure				
Appropriate means / requirements (contract)				

⁽¹⁾ Instructions for determining an appropriate mark

The “ B ” mark is to be assigned to contractor companies who meet the NPP’s requirements.

- Case of a company given “ A ” mark: the company exceeds the NPP’s requirements. It is essential that the reasons be indicated (strong points)
- Case of a company given “ C ” mark: the company does not meet all the requirements but the difference is relatively small; it is essential that the reasons be indicated. Significant changes do not need to be made to bring the company in line with requirements.
- The “ C ” mark in the Quality domain requires a report to be sent immediately to the National Qualification Authority.
- Case of a company given “ D ” mark: the company does not meet the NPP’s requirements and the difference is significant; the company does not comply with the quality required for the operation; it is essential that the reasons be given. Significant changes must be made to bring the company in line with requirements. This mark requires that a report be sent immediately to the entity which granted the qualification of the company. The company could be immediately placed under reinforced scrutiny.

Attachment D2

This attachment is an extract of the national experience feedback from 1999 related to all contractors of EDF's NPPs. For reasons of confidentiality, some information has been deleted. These examples deal with a contractor that had been referred to the National Action Plan because of bad results related to the competences of personnel.

COMPANY NAME		SIREN:	QUAD SIPRES:
Acronym			
Address			
ACTION PLAN 2000: YES		ACTION PLAN 1999: NO	
QUALIFICATION AUTHORITY: UTO / SAF		IN CHARGE OF QUALIFICATION:	
QUALIFICATION SYSTEM	ACTIVITIES	ACCEPTATION	EXPIRY DATE
Middle Voltage	<ul style="list-style-type: none"> Travelling crane (polar crane) Handling gantries 	Unreserved accepted in "Case 1"	
NUMBER OF FEPP ⁽¹⁾ / SITE	REPORTS CONCLUSIONS	ACTIONS	
BELLEVILLE: 2 FEP ⁽²⁾ (B-B)	☺ Technical quality – Safety ☹ No reports in SIGMA software	The company is referred to the National Action Plan 2000 ➤ <u>Against the company:</u> <ul style="list-style-type: none"> Notification of concerns about the company's quality organisation: "control failings of personnel qualification". Verification of the following points, during the audit for quality acceptance renewal, planned at the beginning of 2000: <ul style="list-style-type: none"> – Training and technical licensing process of new hired personnel – Real implementation of VTG ⁽⁴⁾ Results of this audit will allow, by means of remarks and/or concerns, to extend actions required from the company. ➤ <u>Internal EDF:</u> <ul style="list-style-type: none"> No particular actions expected from NPPs other than taking into account the concerns about the company Note: File transferred to DIS ⁽³⁾ (CCQP ⁽⁵⁾ from January 2000).	
DAMPIERRE: 3FEPP (B-B-B)	☺ Reactions – Good communication ☹ To ensure the technical competence of the company's new hired staff		
GRAVELINES: 1FEPP (B)	☹ To declare subcontracting – To improve integration of the company's new hired staff		
PALUEL: 1FEPP (B)	☺ Reactions – Good communication ☹ Better supervision of competences – Poor reports		
TRICASTIN: 1FEPP (B)	☺ Technical supervising – Reactions		
DIS ⁽³⁾ / SQR: 1FEPP (C)	☺ Availability – Reactions ☹ To respect the quality organisation – To implement the VTG ⁽⁴⁾ – documents management		

⁽¹⁾ FEPP: Periodic Contractor's Evaluation Report

⁽²⁾ FEP: Service Evaluation Report

⁽³⁾ DIS: National Engineering Department

⁽⁴⁾ VTG: General Technical Verification

⁽⁵⁾ CCQP: Coordination Committee for Contractor Qualification

COMPANY NAME		SIREN:	QUAD SIPRES:
Acronym			
Address			
ACTION PLAN 2000: NO		ACTION PLAN 1999: NO	
QUALIFICATION AUTHORITY: CAUX MANCHE		IN CHARGE OF QUALIFICATION:	
QUALIFICATION SYSTEM	ACTIVITIES	ACCEPTATION	EXPIRY DATE
Rotating machines	<ul style="list-style-type: none"> Other rotating machines, Diesel engines and auxiliary equipment, Lifting tackle 	Unreserved accepted in "Case 2"	October 2000
I&C/Electricity	<ul style="list-style-type: none"> General wiring of production and supplying, Other wiring and low currents, Instrumentation and control systems, Electromechanical engineering 		

NUMBER OF FEPP ⁽¹⁾ / SITE	REPORTS CONCLUSIONS	ACTIONS
PENLY	<u>I & C / Electricity: GLOBAL MARK: B</u> Good competence Good knowledge of equipment Adhering to objectives and rules	* Positive results in 1999, except CATTENOM.
Flamanville "AEI"	<u>I & C / Electricity: GLOBAL MARK: B</u> Good professionalism Good competence	* No particular action started. Improvement issues expected from NPPs will be treated during evaluation of 2000
PALUEL	I&C/Electricity: GLOBAL MARK: B	
Flamanville "TX"	Rotating machines: GLOBAL MARK: B Very good reactions to unforeseen changes in schedules. To ensure better writing of technical control.	
Flamanville "STE"	Thermal equipment maintenance of boiler room: GLOBAL MARK: B - Competent and receptive contractor - Taking account of concerns expressed during the first evaluation - To improve information feedback to the customer during deviation treatment	
CATTENOM	Rotating machines: GLOBAL MARK: C Efforts have to been made in all fields of the evaluation.	This FEPP is based on a " Diesel maintenance" service carried out in Feb. 1999 which demonstrated bad results. A meeting of Contractor / CATTENOM NPP allowed the implementation of a local action plan. The second service in Dec. 1999 confirmed the good responses of the company.

(1) FEPP: Periodic Contractor's Evaluation Report

Annex E

SPONSORING OF EXTERNAL CONTRACTORS, AECL, CANADA

Rather big variety of measures may be implemented to ensure the contractor's competence and qualification. Persons from the customer's side participating in involvement of the contractors and assuring their competence should also possess necessary competences. One of the mechanisms, so called "sponsoring of external contractors", developed to contribute to the contractor's competence assurance and to monitor and supervise their performance is described in the annex provided below. This annex relates to Section 4.3.

1. PURPOSE

This document describes the Occupational Safety and Health (OS&H) related role and responsibilities of those designated as Sponsors at AECL's Chalk River Laboratories (CRL), including the J.L. Gray Engineering Centre in Deep River, Ontario. This document was developed in order to help clarify the role and responsibilities of the Sponsor, to assist in establishing a consistent approach for all CRL Sponsors, and to assist both new and experienced Sponsors in effectively carrying out their duties.

2. SCOPE

This document applies to all CRL/J.L. Gray Building Line Managers, Project Managers, Technical Procurement/Purchasing Agents, Supervisors, and any employees/attached staff who are named as Sponsors. Sponsors are required for **all** non-CRL personnel coming onto the site. This includes Students, Visitors, Attached Staff, AECL Employees from other sites, and Contractors. Sponsors act as liaisons between AECL and Contractors and, while they can be given responsibility for many matters relating to the performance of work under a contract, Technical Procurement/General Purchasing retains responsibility for all contractual/commercial matters. This document focuses on those matters related to the protection of personnel, property and the environment.

Although these guidelines deal primarily with the sponsoring of external Contractors, the majority of the requirements (e.g.. Sponsor assignment, security clearances, safety orientation, pre-job meetings, monitoring activities) **are applicable to the sponsoring of others such as Attached Staff, Visitors and Students. Therefore, wherever reference is made to Contractors in this document, the term is meant to encompass Attached Staff, Visitors and/or Students *where appropriate*** (e.g.. Visitors and Students do not normally enter into contractual relationships with AECL, so references to contract requirements may not apply).

3. RESPONSIBILITIES

3.1. Line management

Once AECL Line Management has requested work to be done by an AECL service provider (e.g., design engineering, skilled trades, etc.), and has clearly defined the work requirements, the service provider will decide whether the work will be best accomplished by internal or external forces. If it is decided that the work will be best completed by an external Contractor, AECL Line Management is responsible for assigning a Sponsor to the job/project.

Sponsors can be assigned by either the customer or the service provider, and different Sponsors may be assigned to different parts of the job/project (e.g., technical representative during the design phase, construction representative during the construction phase, etc.). When assigning a Sponsor, Line Management shall ensure that the selected person meets the criteria specified in this document.

3.2. CRL sponsors

The Sponsor can play an important role in all phases of a contract, from development of the scope of work, to Contractor selection, to monitoring of the Contractor's work performance to ensure compliance with the terms of the contract. The Sponsor's role is primarily one of liaison between AECL and the Contractor on many matters relating to the contract/work (**NOTE:** Technical Procurement/General Purchasing retain responsibility for all contractual/commercial matters.). This document focuses on only those matters relating to the protection of personnel, property and the environment (although Line Management may assign a Sponsor additional responsibilities in areas such as quality assurance, schedule, cost, etc.).

Although a Sponsor is not usually responsible for directing or controlling the work of Contractors (an exception could be in cases where CRL site-specific radiological hazards dictate that strict adherence to the AECL Work Permit System and radiation protection requirements is required to ensure the safe conduct of the work), he/she is responsible for taking steps to protect the safety and health of AECL employees and property in the vicinity of the work site, and for monitoring the Contractor's compliance with the terms of the contract. A checklist designed to assist the Sponsor in fulfilling his/her responsibilities is included as Appendix 1 of this document.

3.3. Technical procurement/general purchasing

Technical Procurement/General Purchasing have responsibility for all contractual/commercial matters related to a contract. They are responsible for the preparation of contract packages and Requests For Quotation (RFQ), and for the coordination and management of the contractor selection process.

3.4. AECL support groups

A number of AECL support groups are available to assist the Sponsor in carrying out his/her role and responsibilities. These support groups include Occupational Safety and Health (OS&H), Radiation Protection (RP), Emergency Preparedness (EP), Waste Management (WM), Organizational Development and Training (OD&T), Security, and Fire Protection. Contact names and numbers for each of these groups are included in Appendix 2.

These groups, as requested, are responsible for:

- assisting with the preparation of contract packages,
- delivering presentations on site requirements at pre-bid meetings,
- reviewing Contractors' bid submissions,
- providing input to the development and/or delivery of the Contractor and General Safety Orientation sessions,

- providing guidance to Sponsors on the requirements of their particular support programs, and
- assisting with the monitoring of the Contractors' work performance.

4. RELATED DOCUMENTS

- Radiation and Industrial Safety Manual, Part II - Industrial Health and Safety (CRNL 356).
- AECL Research Radiation Protection Requirements (RC-2000-63 3 -0).
- AECL Work Permit System (RC-2000-101-01-0810).
- Canada Labour Code Part II and the Canada Occupational Safety and Health Regulations.
- Occupational Health and Safety Act of Ontario and Regulations For Construction Projects.
- AECL Personnel Security Procedure (00-3 42.1).
- Lock Out/Hold Tag portion of CRL SPP 3.B.3, Work Permits and Lock Outs/Hold Tags.
- CRL Emergency Response Handbook (RC-2000-060-110).
- Management of Radioactive Waste at AECL Facilities and Sites (RC-2000-021-2.5).
- Management of Non-Radioactive Waste at AECL Facilities and Sites (RC-2000-021-2.6).

5. PROCEDURE

5.1. Sponsor selection/assignment

When selecting/assigning a Sponsor, Line Management shall ensure that the selected person is an AECL employee, or suitably qualified Attached Staff, who is familiar with his/her role and responsibilities as outlined in this document (preferably through completion of the CRL Sponsor training session), and has technical/practical expertise/knowledge in the work to be performed under the contract/arrangement with AECL. Attendance at the CRL Sponsor's training course is **mandatory** for all Sponsors of construction and/or maintenance contracts. Line managers who select/assign such Sponsors should also attend the training course in order to become familiar with the Sponsor selection criteria. Line Management shall provide assigned persons with the necessary training, and allow them sufficient time to effectively fulfill their role and responsibilities as Sponsors Commensurate with the project involved. Sponsors shall also:

- be somewhat familiar with contract documentation,
- be trained in the AECL Work Permit System and Lock Out/Tag Out procedures,
- have received Group 4 Radiation Protection training as a minimum, and have successfully completed Group 3 Radiation Protection training before sponsoring contracts involving work with radioactive materials or radiation emitting devices,
- have a working knowledge of the requirements of the Canada Labour Code Part II and the
- Canada Occupational Safety and Health Regulations, and the Occupational Health and Safety Act of Ontario and the Regulations For Construction Projects, where required,

- have a working knowledge of the requirements of the AECL Occupational Safety and Health, Radiation Protection, Emergency Preparedness, Waste Management, Security and Fire Protection Programs, and
- be familiar with the content of the CRL General and Contractor Safety Orientation sessions.

5.2. Contract package/RFQ preparation

Technical Procurement normally prepares contract packages for projects that require the use of Contractors with highly specialized technical expertise, and involve substantial OS&H, RP, EP, WM, Security, Fire Protection and/or regulatory requirements. Technical Procurement will often act as a job coordinator, and work with Sponsors, and construction, design or technical specialists to define a project. General Purchasing normally handles projects that do not require the use of Contractors with highly specialized technical expertise, or do not involve substantial safety and/or regulatory requirements. General Purchasing administers contracts that involve common services and materials such as roof repairs, landscaping, paving, temporary personnel services, etc., but also work with Sponsors to prepare contract packages where required.

After the contract package is developed, the contract requirements (e.g., scope of work, duration, location, power availability, waste disposal arrangements, hours of work, OS&H requirements, whether or not the Contractor has to designate his/her employees as Atomic Radiation Workers, etc.) are defined in the Request For Quotation (RFQ) by Technical Procurement or General Purchasing. Depending on the scope of the work, the Sponsor and other specialists may also assist in the preparation of the RFQ. Once the RFQ is completed and forwarded to selected Contractors, a site visit may be required before an informed bid can be prepared. If a site visit/pre-bid meeting is required, the Sponsor may be asked to assist Technical Procurement/General Purchasing in arranging/coordinating the visit (e.g., completing Visitors Pass Requests for Contractor representatives, escorting Contractor representatives while on site, etc.).

Pre-bid meetings generally include provision of information on site-specific hazards, as well as an overview of the OS&H, **RP**, EP, WM, Security and Fire Protection requirements that the Contractors will need to know in order to prepare an informed bid. At this point, it should be made clear to the Contractors that they are expected to provide, maintain and use their own conventional personal protective equipment and/or clothing as required by law, and that AECL will provide any site-specific radiological protective equipment, clothing, and/or training that may be required. If the contract will involve physical changes to the CRL site, the Sponsor may be asked by the Project Manager/CRL Site Landlord to assist with the preparation and submission of a CRL Site Development Notification

5.3. Contractor selection

The process to determine the successful Contractor is coordinated and managed by Technical Procurement or General Purchasing. Upon receipt of bids, all involved parties (e.g., Sponsor, Technical Procurement/General Purchasing, and other specialists, as applicable) have input into the selection of the Contractor. The successful Contractor is the organization that offers the lowest cost while meeting all of AECL's technical, quality assurance, safety and health, commercial and schedule requirements.

5.4. Security requirements

5.4.1. CRL

Although AECL security requirements are communicated to Contractors via the RFQ, the pre-bid meeting and the Contractor Safety Orientation session, the Sponsor also has a responsibility to ensure that Contractors are aware of and comply with these requirements. As far in advance of the Contractor's arrival as possible, the Sponsor is responsible for preparing **Visitors Pass Requests -CRL-180-2** (see Appendix 3) for all Contractor personnel and forwarding them to CRL Security at the outer gate, as well as contacting Security staff in Bldg. 401, so that they can be prepared to process the Contractor personnel upon their arrival (see Appendix 2 for contact names and phone numbers). All Contractors are required to provide a **Criminal Records Name Check** (available from their local Police Department) on the first day that they arrive at CRL. Contractors requiring unescorted access to Controlled Area 2 during normal working hours, are required to submit to an **Identification Report**. Contractors who are required to be on site for more than 90 days, to view protected/classified documents, or to work off-shift hours will be required to undergo an **Enhanced Reliability Check**. The information/documents that Contractors are required to provide for these security clearances (e.g., birth certificates/passports, school transcripts, letters of reference, etc.) are outlined in the pre-bid meeting and in the Special Conditions attachment to the RFQ.

Contractors are to park their vehicles in the general employee parking lots (not the visitor's parking areas) unless they have received the necessary approvals to bring their vehicles into Controlled Area 1 or 2 (e.g. Contractor Drive-in Permit). Sponsors are to contact CRL Protective Services for such approvals should it be necessary for Contractors to bring their vehicles to their work location. If Contractors are required to bring tools or equipment into Controlled Area 1 or 2, they will be required to complete a **Material and Equipment Pass - CRL-136** (see Appendix 4) itemizing such tools and equipment. If Contractors want to remove materials, equipment or tools owned by AECL (or not listed on a CRL-136 form) from the site, a **Material and Equipment Permit -CRL-135** (see Appendix 5) approved by an AECL Branch Manager is required. Guidance in the use of these forms can be acquired from CRL Security. For moving equipment or materials out of Controlled Area 2 a **Request To Transfer Equipment or Materials From The Active Area Off The CRL Site - CRL-1406-2** (see Appendix 6) is required. Guidance in the use of this form can be acquired from the CRL Radiation Protection Branch. Sponsors must direct any special security-related requests (e.g., work outside of normal working hours such as evenings and weekends, escort privileges for Contractor personnel, siting of Contractor trailers and/or temporary buildings, camera permits, explosives permits, etc.) to CRL Security for approval.

5.4.2. J.L. Gray Engineering Centre

Sponsors must ensure that Contractors sign in and out of the J.L. Gray log book , and acquire a visitor's badge, *every day* they enter the building. The log book and badges are located at the reception desk on the main floor. Since Contractors who will be working *only* at the J.L. Gray building, and *not* on the CRL site, are *not* required to attend the CRL site Contractor Safety Orientation session, it is the responsibility of the Sponsor to ensure that the Contractor is aware of and understands all AECL requirements for work in the building. Provision of this information by the Sponsor will be deemed to be the J.L. Gray equivalent of the CRL Contractor Safety orientation session. For that reason, records should be kept of the meeting, its attendees, and the information covered.

Security requirements are similar to those for the CRL site (see Appendix 7), except that the completion of Visitor's Pass Requests is not required. There are no EP or RP training requirements for work in the building, and OS&H, WM, and Fire Protection requirements are likely to be job-specific and spelled out in the contract documents (e.g., use of AECL Work Permit System, use of fall protection for roof work, waste disposal requirements, fire response procedure, etc.). The J.L. Gray Building Contractor Fire Response requirements are spelled out in Appendix 8 of this document. The Sponsor has to be aware of all applicable requirements, and review them with the Contractor before work starts (e.g., pre-job meeting). The Pre-Job Meeting, Monitoring and Work Completion activities described for CRL work also apply to the J.L. Gray building.

5.5. CRL safety orientation

Contractors requiring *unescorted access* to any part of the CRL site require safety orientation training. Sponsors are required to contact the Organizational Development and Training group to arrange for safety orientation training (providing information such as Sponsor's name and phone/pager numbers, contract company's name, number of workers and their names, and work location). The *Vi* day Contractor Safety Orientation session (normally delivered on Monday mornings beginning at 9:30) provides an overview of the site OS&H, EP, Security and Fire Protection requirements, as well as delivering the AECL Group 4 Radiation Protection training. If the project/job is to be carried out in Controlled Area 2, or it involves work with radioactive materials or radiation emitting devices. Sponsors must contact the Radiation Protection Branch and inform them of the work location, and the type of work to be carried out, so that they can determine if any additional Radiation Protection training/protective measures will be required. Returning Contractors who have been away from the site for more than 6 months will be required to repeat the appropriate safety orientation session. There may be cases where exceptions to the above training requirements will be granted (e.g., full time AECL escort of personnel in place of training, computer-based training in place of instructor-led session, etc.), but such exceptions will require the approval of CRL Security, the CRL Radiation Protection Branch, and the Occupational Safety and Health and Emergency Preparedness Programs.

5.6. Pre-job meeting

Prior to the arrival of the Contractor on the CRL site, the Sponsor shall contact the CRL Fire Department and outline the scope of the work, paying particular attention to any "hot" work (e.g., welding, flame cutting, grinding, etc.). Based on the information received, the CRL Fire Department will decide whether or not they need to participate in the pre-job meeting. If they wish to be involved, it is the responsibility of the Sponsor to ensure that they are invited to the pre-job meeting, so that they may discuss fire safety issues with the Contractor prior to the start of work.

Following the receipt of safety orientation training, and prior to the beginning of work, the Sponsor shall conduct a pre-job meeting with Contractor personnel for the purpose of reviewing the contract/site requirements (including OS&H, RP, EP, WM, Security and Fire Protection requirements). The Sponsor should keep a written record of what he/she covers at the meeting. As part of this meeting, the Sponsor shall ensure that:

- Contractor personnel are made aware of all known and/or foreseeable **site-specific** safety and/or health hazards associated with the work area, and that they are provided

with the personal protective equipment/clothing required for protection from these site-specific hazards (**NOTE:** The Sponsor is **NOT** responsible for making sure that Contractors or their personnel are aware of safety and/or health hazards, or protective measures/equipment, inherent in their particular area(s) of expertise),

- all AECL employees working in or near the contract work area are made aware of all known and/or foreseeable safety and/or health hazards associated with the work/work area, and that every AECL employee granted access to the contract work area is familiar with and uses the required safety materials, equipment, devices and clothing,
- the Contractor is aware of his/her responsibility to report to their CRL Sponsor, in writing, all accidents/injuries that occur on the job/project, and to submit completed Contractor's Statistical Data Reports (see Appendix 9) to their Sponsor on a monthly basis,
- where required, the Contractor has provided their own distinctive hold tags for use when isolating equipment/systems in compliance with the CRL Lock Out/Tag Out procedures,
- where required, the AECL Work Permit procedure is reviewed with the Contractor prior to the initiation and/or authorization of a Work Permit for the work,
- where required, the appropriate CRL Work Permit Authorizer has been consulted regarding Work Permit requirements, and that Work Permits are initiated for the contract work in accordance with the requirements of the AECL Work Permit System procedure,
- a signed copy of the Work Permit for the work is posted in a visible location at the contract work site indicating the Sponsor's name, phone number, and pager number (if applicable), so that work hazards and requirements can be readily viewed by all, and so that the Sponsor can be readily identified and contacted by anyone having a concern about the work site,
- where required, he/she receives and reviews the Contractor's list of controlled/hazardous products /materials to be brought on site, along with their accompanying Material Safety Data Sheets (MSDSs) where there is a potential for exposure to AECL employees or interaction with AECL materials. (**NOTE:** MSDSs must be readily available to AECL employees who may be exposed. Guidance in the interpretation of MSDS information is available from the AECL Industrial Hygienist),
- that Contractor personnel are aware of the different CRL emergency signals, the required protective actions for each, and their designated sheltering locations (identified in consultation with the Emergency Preparedness Program, especially for work on the off shifts, company holidays and weekends),
- the Contractor is aware of his/her responsibility to cease work if the work environment and/or hazard conditions change during the course of the work, and that they are to contact their Sponsor for guidance regarding the reassessment of the working conditions (e.g., revision or reissue of the Work Permit), and any additional protective/corrective measures to be taken before continuing with the work,
- the Contractor is aware of the process to be followed when entering and exiting Controlled Area 2 while either on foot or in a vehicle (e.g., have tools and equipment surveyed in last building they do work in, showing badges to Security personnel as they enter the area, use of gate monitors,
- likelihood of delays if they attempt to exit the area after 4:15 p.m., etc.), and when leaving the site, where to sign out and drop off their badges, and
- the Contractor is aware that representatives of AECL support groups (e.g., OS&H, RP) will be assisting the Sponsor in periodically monitoring their work performance for compliance with the terms of their contract with AECL.

5.7. Monitoring activities

Once work commences, the Sponsor is responsible for periodically monitoring the Contractors' work performance for compliance with the terms of the contract (with the assistance of the applicable AECL Support Groups where requested), and for promptly bringing any deficiencies to the attention of the contractor for resolution. In order to ensure that the monitoring role is fulfilled, the Sponsor should develop a monitoring plan (e.g., frequency and type of monitoring activities) appropriate for the type of work and hazard levels involved, including a process for recording observed deficiencies for inclusion in the project file. The Sponsor's monitoring responsibilities also include:

- establishing a process for fulfilling the Sponsor's role and responsibilities during contract work conducted on off-shifts, company holidays and/or weekends that is acceptable to, and approved by, the Sponsor's Line Management,
- assigning a qualified/competent designate to fulfill the Sponsor's role when he/she is to be absent from work, and informing his/her Line Manager and the Contractor of the designate's name and phone/pager numbers,
- conducting a **daily** work hazard review with the Contractor, prior to the start of work for the day, in order to determine if there have been any changes in work/hazard conditions that may require changes in the work plan/schedule, revision or re-issue of the Work Permit, etc. (**NOTE:** The Work Permit form could be used as a checklist to help guide these reviews), and
- acquiring monthly Statistical Data Reports from the Contractor(s), and forwarding a copy to the Manager, Occupational Safety and Health.

5.8. Work completion

At the completion of the contract work, it is the Sponsor's responsibility to ensure that:

- the work has been completed in accordance with the terms of the contract (the Sponsor's Project/Line Manager should develop a checklist of close-out activities to aid the Sponsor in this task — e.g., statutory declarations, provision of WCB clearance certificate, return of AECL safety locks/equipment/documents, etc.),
- the job site has been returned to a clean, safe state,
- AECL equipment (including dosimeter badges) and protected documents have been returned,
- the Contractor has removed his materials, equipment and waste,
- AECL Waste Management is informed if a Contractor is to be leaving waste behind before the contractor leaves the site, and a close-out report has been submitted to Technical Procurement/General Purchasing (including a summary of the Contractor's work performance and any noted OS&H, RP, WM, EP, Security and/or Fire Protection deficiencies), since final payment to the Contractor may depend on the receipt of such a report.

6. RECORDS

- Contract Documents
- Visitors Pass Request forms
- Material and Equipment Pass forms
- Material and Equipment Permit forms

- Request To Transfer Equipment or Materials From The Active Area Off The CRL Site forms
- Minutes of Pre-Job Meeting
- OD&T Contractor Safety Orientation records
- Deficiency reports (OS&H, RP, EP, WM, Security, Fire Protection)
- Close-Out Report
- Contractor's Monthly Statistical Data Report

7. INQUIRIES

Inquiries regarding this procedure can be directed to the CRL Manager, Occupational Safety and Hygiene.

Appendix E1 CRL SPONSOR CHECKLIST

PROJECT/JOB: _____

CONTRACTOR(S): _____

SPONSOR: _____ DATE: _____

	Yes	No	N/A
1. Pre-Bid Meeting:			
• Visitor's Passes Completed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Sponsor Presentation Required?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Start of Work:			
• Visitor's Passes Completed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Criminal Records Name Check Completed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Identification Reports Completed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Enhanced Reliability Checks Completed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Vehicle Drive-In Permits Required?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Material and Equipment Passes/Permits Completed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Any Special Security Requests (e.g., extended work hours, camera permits, explosives permits, trailer siting, etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• RP Branch Consulted re Work/Training Requirements?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Contractor Orientation:			
• Arranged?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Completed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• EP program Consulted re Off-Hous Sheltering Requirements?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• WM Operations Consulted re Waste Disposal?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Pre-Job Meeting?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Fire Department Involvement Required?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Site-Specific Hazards Reviewed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• PPE/C Issued?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Hazardous Product List/MSDS Received?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Work Permits:			
• Required?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Initiated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Work Permit With Sponsor's Name/Contract Numbers Posted?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Monitoring Activities:			
• Monitoring Plan Developed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Sponsor Designate Arrangements Made For:			
• Days You Will Be Away?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Work Conducted Outside Normal Working Hours?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Arrangements Approved By Line Management?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Daily Work Hazard Reviews Scheduled?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• System Established To Record Observed Deficiencies?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Statistical Data Reports Received?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Work Completion:			
• Work Completed As Per Contract?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Work Site left In A Clean, Safe State?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Close Out Report Submitted?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix E2

CONTRACTOR SECURITY REQUIREMENTS — J.L. GRAY BUILDING

Every Contractor working at the J.L. Gray Engineering Centre must be sponsored by an authorized AECL employee. The Sponsor must ensure that the following Security requirements are in place before work commences:

1. All **contracts exceeding 90 days** in length, and/or involving access to **Protected/Classified documents/drawings** require that the Contractors undergo an **Enhanced Reliability Check**. These checks are normally completed within 24 hours if all documents and Criminal Records Name Checks have been produced (Consult AECL Security or contract documents for details of documentation required for security clearance purposes.). **Access may be denied if documents are not available to AECL Security upon arrival.** While awaiting clearance, no access to sensitive/protected/classified documents, drawings or materials, or access to strategic buildings, is allowed. Non-Canadian citizens should make every effort to obtain their Criminal Records Name Checks from their local or federal police agency as there will be at least a 4 to 6 month delay in obtaining the clearance if AECL has to send fingerprints to the country where the Contractor resides. U.S. Contractors **MUST** bring their Criminal Records Name Checks as AECL is unable to have a check conducted in the U.S. through the RCMP. If an American citizen is in possession of a valid U.S. Dept. of Energy security clearance that is equivalent to a Government of Canada Enhanced Reliability Check, then an Enhanced Reliability Check may be granted.
2. All **contracts of less than 90 days** duration require that the Contractor provide a Criminal Records Name Check the first day the Contractor arrives on site.
3. If a Sponsor wants a Contractor to have escort privileges for the J.L. Gray Building, he/she must contact AECL Security for approval. Canadian citizens can be granted escort privileges for the J.L. Gray Building **during normal working hours** (0800 to 1630 hours) provided they have produced an acceptable Criminal Records Name Check, and approval has been given by Security. There has to be a requirement, supported by the Sponsor, for escort privileges to be granted. Non-Canadian citizens must be in possession of an Enhanced Reliability Check before escort privileges will be considered. Escort privileges for **off-shift hours and weekends** are subject to the person (Canadian or Non-Canadian) being granted an Enhanced Reliability Check, and subject to the approval of AECL Security and the Sponsor.

Appendix E3

CONTRACTOR FIRE RESPONSE — J.L. GRAY BUILDING

All Contractors' personnel must sign in in the Visitor's Log Book located at the reception desk on the main floor. This registration list is used to account for Contractors and other visiting personnel in the event of a fire.

General fire orders

1. If you discover a **FIRE**, or see smoke, operate the nearest manual fire alarm pull station (coloured red and located near all exits) and warn any nearby persons in the affected area. When you have moved to a safe location, telephone the **Deep River Fire Department** immediately at 584-3500, giving the name and address of the building (J.L. Gray Engineering Centre, 3 Forest Avenue) and the floor of the fire.
2. Fight the fire using available portable extinguishers (located in main hallways) **ONLY** if the fire is small and not between you and an exit.
3. If you hear the **FIRE ALARM**, make sure all windows and doors (including external balcony doors) are closed, and leave the building using the nearest fire exit (indicated by directional arrows and red lights/signs). Elevators **SHALL NOT** be used during a fire emergency.

EXIT AND ASSEMBLY

Normal working hours

1. While exiting the building, move away from exterior doorways and along the sidewalks away from the building, in order to keep the exit routes clear for others exiting the building and for the Fire Department. Upon exiting the building, proceed to the assembly area in the rear (south) parking lot.
2. Contractors are required to collect in Assembly Area 1, located adjacent to the rear door of the building (next to the delivery vehicle ramp), and report to the Area 1 Fire Steward. The Fire Steward will check attendance of all Contractor personnel using the Visitors' Log Book.

Off-shift hours

1. Upon exiting the building, proceed to the area near the rear entrance and assist Firefighters by describing the location and extent of the fire. Remain at the rear of the building, and be prepared to provide assistance.
2. Do not re-enter the building unless asked to do so by Firefighters.

FIRE PREVENTION

Make a visual check of your work area daily, and report any faulty conditions immediately to the Area Fire Steward (as pointed out by your Sponsor) for action. Faulty conditions could include, but are not limited to, the following:

- fire doors wedged or blocked open,
- exit lights/signs not illuminated,
- first aid and/or fire fighting equipment inoperative or obstructed, and obvious fire hazards such as accumulations of combustible material, oily rags or other flammable substances/materials, defective electrical wiring, etc.

Appendix E4
CONTRACTOR'S MONTHLY STATISTICAL DATA REPORT

Submission of this report is required from ALL contractors performing work at AECL facilities. This also applies to each sub-contractor. The prime contractor will be required to submit one for each sub-contractor on the project.

Submit a separate report for each contract, by the end of the first week each month, regardless of whether or not any accidents/incidents/injuries occurred. Copies of inspection reports, minutes of safety meetings and incident/accident reports must be attached to this report.

Contractor's Name: _____ P.O.# _____

Type of Work or Service: _____

AECL Sponsor: _____

Month Ending: _____

	Current Month	Total to Date
Fires	_____	_____
Government Inspections	_____	_____
Spills or releases of hazardous materials	_____	_____
Near miss incidents	_____	_____
Total first aids	_____	_____
Total medical aid	_____	_____
Total lost workdays cases (LTA's)	_____	_____
Total lost workdays	_____	_____
Total personnel hours worked	_____	_____

Submitted by: _____

Date submitted: _____

RETURN TO Project Manager/Sponsor

cc: Manager, Occupational Safety and Health

Annex F

A COMPANY PRACTICE OF ASSURING THE COMPETENCE OF NPP CONTRACTOR PERSONNEL, AMS, USA

A view of typical NPP contractor (Analysis and Measurement Services Corporation, USA) on assuring competence of its personnel is presented in this annex. A comprehensive approach covering practically all aspects and measures of assuring contractor personnel competence is discussed. This annex relates to Section 4.3.

1. INTRODUCTION

Analysis and Measurement Services Corporation (AMS) is an engineering consulting firm, which has been serving the nuclear power industry since early 1977. The company specializes in testing of nuclear power plant instrumentation and control equipment, on-line testing of primary system components for predictive maintenance and aging management, and development of computer-based data acquisition and data analysis equipment to perform specific measurement and testing in nuclear power plants. The products of AMS are provided to nuclear power plants worldwide in terms of test equipment, training, and services.

Testing services in nuclear power plants constitutes a majority of AMS business. This work involves sending one or more crews of specially trained personnel to a nuclear power plant with test equipment and test procedures to make the necessary measurements, analyze the test data, and provide a report of the test results to the plant personnel. To prepare the AMS personnel for on-site work at nuclear power plants, rigorous training is provided to the personnel covering all aspects of work in a nuclear facility. This includes technical training, quality assurance training, health physics training, security training, safety training, fitness for duty training, public relations training, and project management training. The extent of this training depends on the responsibility of the trainee and the type of job that the trainee will be performing in a plant. Not all personnel and not all jobs require all of the above training. Only senior technical and management personnel are sometimes required to have adequate training on all or most of the above disciplines.

The present material describes typical requirements for contractor personnel to work in a nuclear power plant in the United States and how these requirements are met and maintained to ensure that the job is performed correctly, safely, and efficiently. It also provides recommendations for improvements on how contractor personnel may work together with the customer to produce the best results for all parties involved.

2. CONTRACTOR QUALIFICATION REQUIREMENTS

Contractor qualification requirements in the United States are included in the Quality Assurance (QA) rules for operating nuclear power plants. The QA rules for the nuclear power industry in the United States are defined under Title 10 of the US Codes of Federal Regulations (10CFR). More specifically, 10CFR50 Appendix B, is the designation of the US law on QA requirements for nuclear power plants. This law is supported by a number of standards that have been developed under the auspices of the American National Standards Institutes (ANSI). These ANSI Standards define how the intent of 10CFR50 Appendix B should be met and provide specific guidelines to the nuclear industry to help the industry to comply with the government requirements. For example, an ANSI standard that is referred to

as NQA-1 is one of the mother documents for complying with QA requirements of 10CRF50 Appendix B. NQA-1 refers to a number of sub-standards on specific aspects of nuclear power plant operations and maintenance. Among the standards that come under NQA-1, are specific standards on the qualification and training of nuclear power plant personnel, including contractor personnel. For example, qualification, experience, and training requirements are defined in these standards for Level I, Level II, and Level III technicians to work in nuclear power plants and the training that is required to attain these levels.

The American Nuclear Society (ANS) and others have also written standards and guidelines for training, qualifying, and certifying technical personnel for nuclear power plants. Furthermore, many companies such as AMS and industry organizations such as the Electric Power Research Institute (EPRI) have developed training programs and training courses to support the nuclear industry to train its personnel consistent with QA requirements, ANSI standards, and other government and industry requirements. This training is available through classroom presentation in nuclear power plants, offered in central locations for a group of nuclear power plants, and are also available by videotapes and distance learning means.

3. TRAINING OF CONTRACTOR PERSONNEL

A company which provides a product to the nuclear power industry must meet a number of requirements beyond the typical requirements for operating a business. The extent of the additional requirements that a company must meet depends on the type of product that the company supplies to the nuclear industry. In particular, if the company supplies nuclear safety-related products, the requirements are of course much more elaborate and stringent than if the company supplies non-safety-related products. In this chapter, we have summarized the training requirements for contractors working in nuclear power plants and the training that is provided to contractor personnel to qualify them to meet the industry requirements.

3.1. Quality assurance training

The first and foremost requirement for a company to provide safety-related products to the nuclear industry is to have a documented and auditable quality assurance (QA) program. The QA program defines the company's philosophy as to how it will meet the requirements of the nuclear power industry and describes the steps that the company will take to ensure that adequate quality is built into each and every aspect of a product. Typically, the ultimate responsibility for maintaining an acceptable QA program rests with senior company management such as the company's QA manager and ultimately the president of the company. Typically, the QA program applies to all the technical and management personnel in a company although administrative personnel and others are often expected to comply with the company's QA program.

QA training of AMS personnel is provided by documented procedures and typically involves a number of steps. First, each employee is given a copy of the company's QA manual and is briefed on the QA requirements of the company and the responsibilities of the personnel. Next, QA training of each person continues by a walk through of the QA cabinets containing QA documents such as calibration certificates, test procedures, etc. This step also includes a visit to the laboratory and a review of the test equipment used in the AMS laboratory or taken to nuclear power plants.

The QA manager usually conducts a training session with each new employee and trains them on the company's QA requirements and the requirements of the nuclear power industry. A package of QA material referred to as the AQA Notebook is handed to the trainee who is asked to review the material. An oral exam is then performed as needed to ensure that the new employee has adequately learned the fundamentals of the company's QA program and the requirements of the nuclear industry.

The senior QA personnel in the company are trained more vigorously, including attending training classes that are offered by QA experts and the leaders in the field. The senior QA personnel also attend seminars and meetings to keep up-to-date on the latest developments in the QA field.

3.2. Technical training

In spite of the above QA training, no one is allowed to perform formal tests or make formal measurements for nuclear power plants until after the new employee is specifically trained on how to perform the particular task and the training is documented. The people performing critical tasks are retrained as necessary and given oral, or written tests to verify that they understand the subjects well and can perform the job accurately.

At AMS, training of the company's technical personnel is mostly conducted by hands-on work under the supervision of an experienced person. The trainee is first asked to read about the subject and study the background, review all the previous work, and familiarize himself/herself with the theoretical aspect of the subject. The trainee is then allowed to perform hands-on work as practiced under the supervision of a trained expert until he/she is proficient enough to engage independently in formal testing or measurements. For example, a new AMS engineer or technician may have to work up to a year or more with an experienced person before he/she is allowed to make in-plant measurements or analysis. During this period, the trainee helps with the work while learning how to enter a plant, how to set up equipment, how to interact with plant personnel, etc. When a trainee has gained sufficient knowledge and experience, a supervisor documents the training and issues a training certificate in the name of the trainee. This training certificate is kept in the employee's qualification file in the AMS QA department. After this, the name of the trained person is added to the list of qualified personnel for the particular subject on which the person was trained.

3.3. Radiation training

If the company is involved in working in radiation environments of a nuclear power plant, handling radioactive material, or testing irradiated equipment, then radiation training is required for those who may be involved in radiation work. In the case of a company like AMS, however, most of the radiation training is provided by the customer. The health physics (HP) department at the plant is often responsible for verifying that the contractor personnel have adequate training to perform work in radiation areas of the plant. The plant HP personnel also monitor the contractor equipment to ensure that there is no contamination problem. In almost all cases, a written test is administered by the plant HP department to verify and document that the contractor personnel have adequate knowledge to work in the radiation areas of the plant.

Typically, radiation training involves a review of fundamentals of nuclear radiation, potential radiation hazards in a nuclear power plant, and how the contractor personnel are

expected to work. In recent years, video tape training has become popular in some nuclear power plants as a tool for radiation training. In addition, a pamphlet or booklet is usually provided by the plant to the contract personnel to describe the HP requirements of the plant and how to prepare for the HP tests, and what to do in case of a radiation release. In those situations when there is a group of contractor employees to be trained, a classroom presentation is organized by the customer at the plant to train the contractor personnel. Such cases normally focus on means to avoid radiation exposure, to keep radiation exposure to as low as reasonably possible, and the means by which to evacuate the area in case of a radiation release.

3.4. Safety and security training

In addition to QA and HP training, contractor personnel must have a good understanding of safety and security requirements in nuclear power plants. For example, each AMS personnel is given his/her own hard hat, safety glasses, hard toe shoes, and other protection to prevent against injury. Furthermore, the contractor company must take responsibility for the safety of its own personnel and make sure that all measures are taken to protect the personnel from injury.

As for security, the contractor is often required to guarantee that its personnel will not pose a security threat to the plant. As such, security background checks are often made as the first step in determining if a contractor employee may pose a risk to the plant. There are other security measures that are described later in this document.

The security training is often important if the contractor personnel is to have unescorted access to critical areas of the plant. In many instances, in lieu of security training and qualification testing, plants provide escorted access to contractor personnel to minimize the effort that is involved to allow a contractor to work in a plant.

The AMS safety program is described in a safety manual that is used as the training tool to qualify the personnel on proper safety rules and precautions that must be taken to ensure safety. Each employee working in a nuclear power plant is asked to read and understand the safety manual and agree to comply with its provisions. Furthermore, safe work practices are promoted at AMS at all times to encourage all employees to develop safe work habits and work cautiously to avoid accidents.

As for security training, it depends on the plant to which the personnel are dispatched. Usually, the plant provides their security requirements which are then given to the employees to study and to comply with. This effort is sometimes augmented by the security training that is provided by the customer at the plant before a contractor employee is allowed to have unescorted access to the plant. The training may be through classroom presentation or videotape presentation. There is often a written examination to ensure that the security training is adequately understood.

3.5. Fitness for duty

Fitness for duty has become an important consideration in the nuclear power industry in the last two decades. In the United States, an important aspect of fitness for duty is drug and alcohol screening. Aside from the fact that it is illegal in most states to use any illicit drugs, in the United States it is very critical for personnel working in a nuclear power plant to be

completely drug free. As such, contractor companies working for nuclear power plants are often required to have a formal fitness-for-duty program to meet the industry's requirement. The program is usually concerned not only with alcohol and drug use, but also with the psychological fitness of any person working in a nuclear power plant. To ensure psychological stability and good mental health, the personnel working in nuclear power plants may be tested occasionally using standard test packages that are designed by groups of experts. The tests are often followed by a discussion with a psychologist who evaluates the results of the written test and determines if the individual is psychologically fit to work in a critical area of a nuclear power plant.

There is no formal training program to ensure fitness for duty other than to encourage the employees to comply with the fitness for duty requirements. Any person found to have problems in this area is usually provided with counseling to break any unacceptable habit. If the problem persists, the employee is dismissed or kept from working in a nuclear facility.

3.6. Good guy letter

In the USA, contractors are often asked by nuclear power plants to provide a good guy letter for each contractor employee to work in the plant. A good guy letter shall state that the person is trustworthy, reliable, and has not exhibited any abnormal behavior. A senior contract or management person can write a good guy letter as long as he/she has objective evidence as to the fitness of the employee to work in the nuclear plant from drug, alcohol, mental health, and other stand points. In some cases, police records as well as the credit history of an employee are obtained (with their permission) as a part of a package of evidence that the employer must collect to demonstrate the employee's fitness for duty.

3.7. Educational requirements

Depending on their job function, contractor personnel are required to have the necessary education, experience, and training to perform the work they are assigned. For example, engineering work is done by those who have an engineering degree from a recognized institution and have additional work experience and training as necessary. As a part of the initial screening for employment in a contractor company, the credentials of technical personnel are checked and verified and this information is documented in the personnel employment file. This effort usually involves telephone conversations with the teachers/professors, previous employers, and other references provided by the candidate or identified by the contractor company.

At AMS, specific technical training is provided to all employees who perform important functions for nuclear power plants. This training includes formal classroom training, one-on-one training, and on-the-job training. Occasionally, the personnel are given oral, or written exams to ensure that their training is still valid and current. Both the training activities and the examinations are often conducted according to written procedures to ensure uniformity of the training and examination, and to document the steps that are taken to train and certify an employee to work in a nuclear power plant.

Senior technical personnel at AMS are encouraged to stay abreast of the latest developments in the field by reading the latest publications and joining professional societies that most closely match their field of expertise. Also, senior AMS employees are encouraged

and supported to participate in national and international conferences to exchange ideas with their peers as a part of their professional development and training.

3.8. Management training

Working in nuclear power plants involves a number of challenges especially delays and changes in schedules. AMS performs testing and measurement which require certain plant conditions. These conditions are not always available and frequent contact with reactor operators, plant engineers, and others is needed to perform the work. As such, good project management skills are essential for those who represent the contractor.

AMS trains its management personnel on an on-going basis and is known to have the most organized crews in the nuclear industry. This has come about by the special attention that AMS management pays to customer satisfaction. Prior to performing work in a plant, each AMS crew meets with senior company management to discuss the best strategy for a smooth operation at the plant. Each crew is then assigned a leader who is responsible for communication with the customer and the company. Any major problem is discussed by telephone and resolved involving the opinion of a number of experienced AMS personnel.

3.9. Public relations training

Since nuclear power is a sensitive issue, it is important for contractor personnel to avoid making statements that may be controversial. As such, AMS employees are trained on social, political, and economical aspects of nuclear power so that they can speak intelligently about the subject. Generally, AMS employees are advised to refrain from political discussions and never criticize a customer or engage in making comments that are contrary to a customer's policies or interest. Specific public relations training is given to each and every AMS employee. This training involves discussion as to how to interact with customer personnel at all levels, how the AMS employees must conduct themselves, and includes how to dress for the job, personal grooming, and how to speak with a customer. Great courtesy to all customer employees is always encouraged.

4. PROCEDURE FOR SELECTING, TRAINING, AND CERTIFYING CONTRACTOR PERSONNEL

The steps that are followed at AMS to certify an employee to work in a nuclear power plant are outlined below. These steps are drawn from the information provided in Chapter 3 above.

1. Review each candidate's resume to determine if the person is qualified for the job.
2. Conduct a telephone interview with the candidate to determine if a personal interview is warranted. The telephone interview is conducted using a written set of questions to help evaluate the candidate.
3. Ask for candidates credentials (copies of diplomas, list of grades, etc.).
4. Verify credentials.
5. Conduct a personal interview to determine if the candidate is qualified or can be trained to become qualified to work for the company in nuclear power plants. At AMS, two to four sets of personal interviews are performed by different AMS personnel who all vote on the qualifications of the candidate.
6. Check and verify candidate's references and identify areas of strength and weaknesses.

7. Check candidate's background for security, fitness for duty, etc.
8. Make a job offer to the candidate if qualified. At AMS job offers are almost always contingent on a 90-day trial period to ensure that the candidate is qualified to work for the company.
9. Begin training as soon as the candidate is employed. The training usually begins with several weeks of reading and studying to obtain specific knowledge about AMS work, the technologies used by the company, the company's QA program, its safety and security program, etc.
10. Identify the employees qualifications and the areas that may need specific training.
11. Provide the necessary training in the areas identified in the steps above. The nature of the training shall depend on the strength and weakness of the employee, the training subject, and the employee's background. The training shall include one-on-one discussions, hands-on work, examination, retraining, and other efforts as necessary to ensure that the person is qualified to perform the work.
12. Document the training of the employee and provide clearance for the employee to work in the areas that the employee is found to be qualified.
13. Retrain the employees as needed on a periodic basis to ensure that he/she has retained the material on which he/she was trained.
14. Encourage the employees to train themselves and train each other on a continuing basis and keep up-to-date on the latest technological developments.

The training of new and existing employees is performed on a continuing basis on a formal or informal basis as needed to ensure that the employee is qualified for his/her assignments.

5. STEPS IN CONTRACTOR INTERACTIONS WITH CUSTOMERS

A typical job to be performed by a contractor in a nuclear power plant begins with a call or a letter from a customer who typically asks for a specific test, measurement, or task to be performed by the contractor. After the customer and the contractor have determined that they can work together, a request for proposal, or a price quotation request is issued. In response, contractor submits a quotation or a proposal as requested by the customer.

After the contract is issued, a schedule for the work is negotiated between the contractor and the customer. If the work involves working in a nuclear plant, a tentative schedule is agreed upon. As it gets closer to the time to perform the work at the plant, the schedule is fine tuned. A day or two before the work shall begin at the plant, contractor personnel are sent to the plant to obtain plant access training as necessary and setup the test equipment for the work. The contractor is then put on a stand by to begin work at the direction of the customer when the plant is ready for testing.

Upon completion of the work, the contractor provides a preliminary report of the work to the customer and leaves the plant. The on-site report can be oral or written depending on the nature of the work. The work is normally concluded through submission of a final report of the work. The final report shall be written and include all the details of the work performed and the results obtained including steps taken to comply with the quality assurance requirements of the project and to comply with the customer specifications.

6. PROBLEMS IN WORKING AT NUCLEAR POWER PLANTS

Working at nuclear power plants involves a number of challenges. For example, delays are often involved in performing tests and measurements in nuclear power plants. These delays often result in cost overrun as contractor employees are normally compensated based on the number of hours that they spend waiting or working in a plant. Good project management, communication, and coordination between the customer employees and the contractor employees is essential in avoiding unnecessary delays and unreasonable cost overruns.

Another problem for contractors working in a nuclear power plant is the availability of essential plant personnel to provide direction for the work and to set priorities. Plant personnel are often busy and cannot spend much time with contractors. This problem often reduces the efficiency of contractor work. The problem can easily be resolved by good preplanning and setting aside time to interact with contractors. If the contractor job in a plant involves working with the plant operators, it is necessary for the operators to know the importance and priority of the contractor job. Usually, contractors do not have the authority to make requests of plant operators and a customer employee is needed to help as an interface between the contractor and the operators.

Obtaining approval to enter a nuclear power plant is also an area where contractors often experience difficulty. Site access approval requires paperwork that is sometimes not available or not complete. This can cause hours of delays as well as cost increases. These problems can easily be avoided if the customer can spend a few hours ahead of time to ensure that the contractor can enter the plant without undue difficulty.

Covering emergencies is an area that requires good communication between contractors and customers. Often, the customer calls on a contractor at the first sign of a potential emergency and asks the contractor to mobilize for work in a plant. However, if the emergency situation subsides, customers sometimes neglect to notify the contractor. This obviously causes difficulty for the contractor and undue cost to the plant as contractors charge for mobilization and demobilization.

7. RECOMMENDATIONS

7.1. Recommendations on training

Proper training, qualification, examination, and retraining of contractor personnel is one of the important keys to successful, safe, and efficient work in nuclear power plants. The area that shall be emphasized in today's world of continuous technological advances is the need for frequent retraining of contractor employees. The nuclear power industry is changing every day. These changes affect all aspects of nuclear power production and is thus important for the nuclear industry workers to be aware of the latest developments which affect their work. A number of resources are available to retrain the personnel and keep them up-to-date on the latest technical, economical, and political events, which affect their work. For example, the International Atomic Energy Agency (IAEA) offers training courses on a number of important aspects of nuclear power generation. These training courses are an asset to the international nuclear community for training and retraining of personnel working in nuclear power plants. In addition, others such as AMS, EPRI, and a number of professional societies provide regular training courses that are aimed at updating the training of nuclear power plant personnel.

Those working in the nuclear industry shall take advantages of the training courses to maintain familiarity with the latest developments in equipment, techniques, and procedures for operation and maintenance of nuclear power plants.

In addition to training courses, there are videotape training, distance learning, and many other new tools to keep up-to-date on the latest developments in most fields. The Internet is also becoming an important resource for training. The Internet not only is a convenient source of information and data, but also offers the possibility for distance training. For example, AMS is planning to conduct a training course from AMS location in the USA for nuclear power plant personnel in Europe. This course is scheduled for presentation in November 2000.

7.2. Other recommendation

The key to successful work with contractors is good communication between the customer and the contractor as well as good preplanning and good project management by both the customer and the contractor. Customers who assign a key person to work with contractors and give him/her the authority to direct the contractors often receive the best results at the most reasonable costs. Contrarily, if there is not a responsible person assigned to work with contractors, confusion can arise in many areas and lead to inefficiency and frustration.

Contractors are often trained to follow customer directions and it is therefore important for the customer to ensure that clear directions are given to contractors on a timely basis to ensure the efficiency of the contractor work. A list of tasks and expectations may be made by the customer and given to the contractor at the beginning of the project or on a daily basis to clarify the scope of the work and the completion schedule.

AMS has worked as a contractor in over one hundred nuclear power plants worldwide for over twenty-five years. The two most frequent problems encountered in this experience has been delays to enter the plant and delays in performing the in-plant work. These problems are inherent in most nuclear power plants and they are often due to the unavailability of key customer personnel to coordinate the work. Sometimes there is adequate plant personnel to assist the contractor, but these personnel do not have the authority that is needed to coordinate and approve all aspects of a contractor's work. As a result, delays are encountered in some aspects of contractor work in a plant.

Annex G

CONTRACTOR PERSONNEL TRAINING NEEDS ANALYSIS, BRITISH ENERGY, UK

Approaches and methods to measure and assure contractor personnel competence vary from country to country. The operating organizations or utilities may also have their own methods in this regard. An annex below provides an overview of methods employed by one of the utilities – British Energy (UK). Specifically, a co-operation of the customer and a contractor intended to effectively meet the requirements established for contractor personnel competence by means of identification and satisfaction of the contractor personnel training needs is discussed in the annex. This annex relates to Section 6.2.

Fundamental requirements

All contractors engaged by British Energy must fulfill all conditions of the specific contract being undertaken. Included in the conditions of all contracts defining the nature of the work and the costs, is a requirement that contractors' employees have the necessary competences to fulfill the terms of that specific contract. The methods by which a contractor organisation measures the competence of its employees are the contractor's choice but the methods are open to scrutiny by British Energy. British Energy may further require the contractor to demonstrate that each employee possesses the required competences or qualifications in terms of education, experience and training. Such demonstration may involve the contractor showing to British Energy the records of training or other records such as medical fitness, results of Trade Tests and formal qualifications or certificates of individuals.

Procedures for each contract

For each contract a Contract Manager is appointed and employed by British Energy to oversee the contract and ensure the agreed conditions are met by the contractor (contracting organisation). The Contract Manager liaises with a Contractor Manager who is appointed and employed by the contractor and who manages the contractor employees. The Contractor Manager conducts a Needs Analysis for the employees and decides what training is needed. The Contractor Manager has ready access to the aims and objectives and other details of a wide range of courses available from British Energy; and by compilation of a Needs Analysis/Training Request document negotiates and agrees with the Contract Manager which courses each employee should successfully undertake. A typical (double-sided) Needs Analysis/raining Request form is shown below.

On the form the following abbreviations are used:

BA	Breathing Apparatus.
C2	Contamination Controlled Area with surface contamination (levels specified).
C3	Contamination Controlled Area with airborne contamination (levels specified).
C4	Area with airborne contamination 100 times higher than in C3.
FME	Foreign Materials Exclusion (extremely clean conditions).
GS	Generation Standard (a British Energy standard document).
ISBN	International Standard Book Number.
RCA	Radiologically Controlled Areas (training includes contamination control).
RCD	Radiologically Controlled Documents.

Regs	Regulations.
RF	Request form.
STP	Surveillance Test Procedures.
SZB	Sizewell B.

PASSPORT is a work management system with database enabling the status of any item of work to be identified and controlled from the request for that work, the plant history to be recorded, the procedures for the work to be followed under specified conditions and standards, the equipment and tools to be nominated and requisitioned from stores, a risk assessment to be undertaken, the work authorised and the status of the work in progress to be determined.

SIZEWELL B POWER STATION
RF03
CONTRACTOR TRAINING NEEDS ANALYSIS / TRAINING REQUEST

COMPANY NAME		CONTRACT NO.					
EMPLOYEE NAME		N.I. NUMBER					
OCCUPATION		RESPONSIBLE ENG					
TO SITE DATE		WORK START DATE					
TRAINING AGREED	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 25%;">YES</td> <td style="width: 25%;"></td> <td style="width: 25%;">NO</td> <td style="width: 25%;"></td> </tr> </table>	YES		NO		R.E. SIGNATURE	
YES		NO					

COURSE TITLE		GUIDANCE	
GENERAL EMPLOYEE TRAINING	4hr	<i>unescorted access to site</i>	
RCA ACCESS & C2 DRESSOUT	3hr	<i>unescorted access to Radiological Control Area (RCA) & C2 areas</i>	
C3/C4 WORKING	2hr	<i>powered respirator work within RCA</i>	
COMPETENT PERSONS E&M*	4hr	<i>receive/transfer/clear E&M safety documents.</i>	
COMPETENT PERSONS NR*	3hr	<i>receive/transfer/clear Radiological Control Documents (RCDs)</i>	
NOMINATED SUPERVISOR*	2hr	<i>transfers documents to previous recipients</i>	
FME OVERVIEW	1hr	<i>Introduction to Foreign Material Exclusion (FME) & SZB's implementation</i>	
FME MONITOR	1hr	<i>required for monitors for option 1, 2 or 3</i>	
FME SPECIFIER	1hr	<i>enables specification FME precautions</i>	
CONFINED SPACE WORKING*	2hr	<i>Intro to Regulations & SZB implementation</i>	
BA ESCAPE (CAT 3)	1hr	<i>for escape use, category 2</i>	
BA NORMAL WORK (CAT 2)	6hr	<i>for normal work, category 1</i>	
STP (SURVEILLANCE TESTING)*	2hr	<i>for those who need to undertake Surveillance Test Procedures (STPs)</i>	
PASSPORT MODULE 1	4hr	<i>introduction to PASSPORT</i>	
PASSPORT MODULE 3	3hr	<i>raising work requests</i>	
PASSPORT MODULE 7	2hr	<i>getting things from stores</i>	

*AUTHORISATION REQUIRED

PLEASE INDICATE IF REQUIRED

SAFETY HARNESS WEARER	1hr	<i>how to wear safety harness for heights/water</i>	
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AIR LOCK OPERATOR	2hr	<i>for those who operate the personnel air lock</i>	
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FUELLING MACHINE OPERATOR*	2hr	<i>for qualified crane operators-a familiarisation</i>	
TURB/HALL CRANE (SINGLE)*	1hr	<i>familiarisation for qualified crane operators</i>	
TURB/HALL CRANE (TANDEM)*	2hr	<i>familiarisation for qualified crane operators</i>	
DIESEL HOUSE CRANE*	1hr	<i>familiarisation for qualified crane operators</i>	
FUEL BUILDING CRANE*	4hr	<i>familiarisation for qualified crane operators</i>	
POLAR CRANE*	6hr	<i>familiarisation for qualified crane operators</i>	
REACTOR BUILDING JIB CRANE*	1hr	<i>familiarisation for qualified crane operators</i>	
OTHER RCA (GROUP 2)*	1hr	<i>familiarisation for qualified crane operators</i>	
OTHER RCA (GROUP 2B)*	1hr	<i>familiarisation for qualified crane operators</i>	

EQUIPMENT ACCESS HOUSING	1hr	Specialist team for opening & closing	
EQUIPMENT HATCH HOIST	1hr	Specialist team for opening & closing	

PLEASE INDICATE IF REQUIRED

DO YOU HAVE ANY OTHER TRAINING NEED FOR THIS INDIVIDUAL? *(Please use the space below to indicate what further training is required)*

CRANE DRIVERS

To be selected and trained in accordance with parts 9-28 of GS39

SLINGERS/SIGNALLER (riggers & banksmen)

To be selected and trained in accordance with parts 31-37 of GS39

FORK LIFT TRUCK OPERATORS

To be selected and trained in accordance with "Rider Operated Lift Trucks - Operator Training"

FURTHER INFORMATION...

Health & Safety Commission - Approved Code of Practice and Supplementary Guidance (1992)

Rider Operated Lift Trucks - Operator Training 6th edition (ISBN 0118854593)

Guidance Note HS(G)6 from the Health & Safety Executive (1979)

Working with Lift Trucks (ISBN 0118832840)

Guidance Note GS39 from the Health & Safety Executive (1989)

Training of Crane Drivers and Slingers (ISBN 0118839322)

Guidance Note PM55 from the Health & Safety Executive (1985)

Safe Working with Overhead Travelling Cranes (ISBN 0118835246)

Annex H

GENERAL EMPLOYEE TRAINING OBJECTIVES, BNFL-MAGNOX GENERATION TRAINING CENTRE, UK

Training objectives for a General Employee Training (GET) course are shown in this annex. In this example from BNFL-Magnox Generation, Training Centre, England, the terminology of training aims and objectives is typically that used by government and private training facilities throughout the United Kingdom. It can be seen that the overall course aims are complemented by objectives that are all observable and measurable and so readily assessed. The topics on this course are similar to those found on GET courses in most IAEA Member States. This annex relates to Section 7.2.

AIMS

To reach the required standard in personal safety and other on-site safety procedures.

OBJECTIVES

By the end of this training course, the postholder should be able to:

- State the actions required of the postholder in the event of a fire, NPP site incident and site emergency, and recognise the alarm appropriate for each.
- Describe the NPP site layout, facilities, and access and security arrangements relevant to the duties of the postholder.
- Outline the NPP personnel and organisational structure.
- Identify the key persons on site to contact regarding personnel matters, payroll and security.
- Outline the history and design of the plant at this NPP.
- Describe the fundamentals of radiation and contamination protection.
- Describe in basic terms the industrial safety, chemical safety, fire fighting and first aid arrangements at this NPP.
- Outline the *BNFL-Magnox Generation* Safety Rules and their impact on the postholder.
- Describe the importance of Quality and good housekeeping, and the need to adopt a professional approach to all tasks and duties undertaken at this NPP.
- (For staff who will be required to work in Radiation and Contamination Controlled Areas).
- Demonstrate the correct barrier and dressout procedures adopted at this NPP, and the radiation and contamination protection procedures to be adopted whilst working in Controlled Areas.

Annex I

EXAMPLES OF SITE ACCESS TRAINING PROGRAMMES

It is important to consider not only specific technical competence related to each particular task to be performed on site by the contractor personnel. Fulfillment of the requirements similarly applied to all personnel working on site is also important. Such requirements particularly address the site access qualification requirements. The outlines of training programmes to develop the competencies associated with site access requirements are presented in the annex below. This annex relates to Section 7.3.

Balakovo Site Introductory Course Outline (Balakovo NPP, Russian Federation)

	Topic Title	Length, hours
1.	General Information on Balakovo NPP	2
2.	Two Major Incidents at Nuclear Power Stations	2
3.	Process Diagram and Major Equipment of the Primary Circuit	2
4.	Process Diagram and Major Equipment of the Balance-of Plant Systems	2
5.	Equipment Tagging Procedure	1
6.	Nuclear Power Plant Technical Documentation	1
7.	Communication Procedures and Policy	2
8.	Specific Industrial Safety Requirements for Nuclear Power Site	2
9.	Fundamentals of Radiation Protection	2
10.	Specific Fire Protection Requirements for Nuclear Power Site	2
11.	Written Test	2
	TOTAL	20

Dukovany Site Access Training Outline (Dukovany NPP, Czech Republic)

	Topic Title	Length, hours
1.	Electricity Generating Principles	0.5
2.	NPP Layout	0.5
3.	NPP Organisation	0.5
4.	NPP Security	1.0
5.	Industrial Safety	1.0
6.	Fire Protection	1.0
7.	Radiation Protection	1.5
8.	Emergency Plan	1.0
9.	Waste Handling and Housekeeping	1.0
10.	QA Programme	0.5
11.	Information Centre Visit	2.0
12.	Site tour	1.0
11.	Computer-Based Test	2.0
	TOTAL	13.5

Annex J

CONTRACTOR SAFETY AT AECL, CANADA

An example of a handout for the contractors which contains instructions on site access and expected behavior on site is provided in this annex. This annex relates to Section 7.3.

WORK PERMITS

In an effort to identify workplace hazards, and protect the health and safety of workers, AECL makes use of a Work Permit System for all work that may pose occupational safety and/or health hazards to workers on AECL sites, pose health hazards to the general public, or may affect the safe operation of AECL facilities and systems. Your AECL Sponsor, in conjunction with the appropriate Work Permit Authorizer, will determine if your work warrants the use of the Work Permit System. If you are required to work under a Work Permit, the main points that you need to remember include:

- **Do only the job that is defined on the Work Permit.**

Prior to the start of work the Work Permit Authorizer and/or your Sponsor must review the Work Permit with you, highlighting the scope of work, the hazards involved, and the protective measures to be taken prior to you signing accepting the work. If the work or work conditions change in any way, ask your Sponsor to review/revise the Work Permit.

- **Do the work only during the valid period of the Work Permit.**

The valid period is shown at the top of the Work Permit. At the end of your work day/shift, sign off on the Work Permit indicating the status of the job. A new permit will be issued the next day/shift if the work will need to continue.

- **Comply with all protective measures and other conditions specified on the Work Permit.**

Site-specific hazards other than those that are inherent in your particular area of expertise will be noted on the Work Permit, along with any protective measures to be taken to protect you from those hazards.

- **All approvals and the Work Permit Authorizer's signature must be in place before the work can begin.**

Work Permits are to be returned to the Authorizer at the end of each work shift/day.

- **If, for any reason, the work cannot be carried out without violating any of the conditions on the Work Permit, STOP THE WORK!**

Immediately notify your Sponsor and/or Work Permit Authorizer, since the Work Permit may have to be revised or re-issued.

LOCK/OUT HOLD TAG PROCEDURE

AECL uses a Lock Out/Hold Tag system for preventing unexpected release or transmission of equipment/process energy that could result in injury to personnel. The system uses three different tags - **White Tags** are applied by the equipment/process owner. **Red Tags** are applied by AECL electricians, and **Green Tags** are applied by all other AECL employees working on an isolated system. Tags are applied in conjunction with locks wherever practicable.

Contractors are responsible for isolating, locking and/or tagging equipment as instructed by their AECL Sponsor. Contractors are also responsible for supplying their own distinctive hold tags (preferably with their company name clearly indicated on them) for use on AECL sites, so that they can be readily distinguished from those of AECL employees. Contractors can provide their own safety locks, subject to the approval of their AECL Sponsor (eg: substantial, individually-keyed padlocks - NO combination locks allowed), or they can make use of AECL safety locks provided to them by their AECL Sponsor. Lock arrangements will vary depending on the contract/contractor involved. AECL locks are to be returned to the AECL Sponsor upon completion of the work requiring their use.

Before work begins, you must verify that proper equipment isolation has taken place. **Never assume** that a safe condition exists. Verification takes place through the Work Permit process with your supervisor, your AECL Sponsor, the equipment owner/operator and the Work Permit Authorizer.

If a contractor's lock/tag must be removed for pressing safety or operational reasons, and the contractor employee who applied the lock/tag is off site and unavailable, the contractor supervisor, in consultation with the AECL Sponsor, will remove the lock/tag after having taken steps to ensure that no one will be placed at risk by the removal of the lock/tag and re-energizing of the isolated equipment. **No other person may remove another person's lock and/or tag. Failure to comply with AECL's lock out/hold tag requirements is subject to corrective action, up to and including removal from the site.**

WHMIS – Workplace Hazardous Materials Information System

- The Contractor is responsible for supplying a list of any controlled substances brought on site; and is responsible for providing MSDS when any AECL worker is working as a co-worker.

PERSONAL PROTECTIVE EQUIPMENT AND CLOTHING

- It is the responsibility of the employee to wear the appropriate protective equipment to ensure their own safety and health and that of others entering the work area. Personal Protective Equipment/Clothing includes: Eye and Face Protection (spectacles, goggles, face-shields). Protective Footwear, Protective Headwear, Protective Clothing (lab coats, gloves, aprons etc.), Fall Protection, Hearing Protection, Respiratory Protection.
- It is the Contractor's responsibility to identify existing non-radiological occupational hazards and train employees in the proper use of Personal Protective Equipment/Clothing.

SECURITY

Site access

- At the end of this session you will proceed to the Building 401 Security Reception Area for processing and to be issued a dosimeter badge that must be worn at all times while on CRL property. If you should lose your badge, notify your Supervisor immediately, then after making reasonable attempts to recover the badge, report to the Security Reception Area at Building 401 to arrange an immediate replacement.
- Dosimeter badges will be picked up and dropped off according to the arrangements made in your Security Briefing Session.
- Contractor's personnel will be required to produce satisfactory identification (birth certificate, valid drivers licence or passport). Personnel not born in Canada must produce Canadian Citizenship card or valid work permit.
- All contractors will be required to provide a Criminal Records Name Check Report from a local Police Agency. (Deep River Police Service may assist those that do not have a completed copy).
- Contractors requiring unescorted access to Controlled Area 2 (Active Area) will be required to provide necessary personal information to complete an Identification Report.
- All contractors working on the site for ninety (90) days or more and/or those that require access to Protected information, drawings, documents will be required to be processed for an Enhanced Reliability Check.
- The Contract Sponsor must provide the Security Receptionist with the name and phone number of an on-site representative to contact in case any security related problems or other emergencies arise.
- The contractor is required to notify the CRL Security Outer Gate Receptionist DN 4401 immediately whenever any of their employees are dismissed or resign.
- **Firearms, ammunition, explosives, alcohol, narcotics and cameras are not allowed on CRL property.**
- Temporary construction trailers or buildings brought to the site for the Contractor's use must receive approval for their location by the owner. Fire Chief and Security.
- The Contractor's facilities may be subject to a mandatory fire patrol service as determined by the AECL Fire Chief. The contractor will submit access keys to these same facilities to the CRL Fire Chief. A set of access keys should also be submitted to Security for emergency access.

Vehicles

- The contractor and his employees shall park their vehicles at a designated parking area as directed in the Security Briefing. Vehicles cannot be parked in front of

access/egress/shipping doors or where they may obstruct regular road travel or snow removal.

- Drivers must hold a valid drivers licence recognized in the Province of Ontario.
- Contractors using other vehicles (all-terrain, snowmobiles etc.) must be licensed and issued as per the appropriate Province of Ontario regulations. These vehicles are to be used for contract work only, and not for personal "joyriding" or to access restricted areas.
- Vehicles entering or exiting the Controlled Areas 1 and 2 (Administrative and Active areas) will be inspected/searched.
- The speed limit inside Controlled Area 1 and 2 is 30 km/hour and contractors must at all times drive in a responsible and courteous manner. CRL Site has many pedestrians as well as support vehicles moving/walking around the site at any given time so care must be exercised in vehicle driving at all times.
- Contractors are also required to obey all posted traffic signs on CRL property, the same as on any Ontario roadway as per the Ontario Highway Traffic Act.

Material movement

- CRL Security will issue a Material and Equipment Pass to cover contractor material entering and leaving CRL site. To minimize delay, contractors should prepare written inventories in advance. Contractors are responsible for notifying the Outer Gate Receptionist of all their equipment/tools etc. upon arrival at CRL. Equipment or material remaining permanently at CRL does not have to be registered, only the equipment or material expected to leave the site later.
- The contractor shall maintain and have available satisfactory proof of ownership should there be a dispute over material and equipment leaving the CRL site.
- All material and equipment must be checked by Radiation Protection monitor before exiting the Active Area.
- Radiation Protection monitoring may be requested upon leaving CRL site.

Deliveries

Any contractor expecting a delivery, must notify the Outer Gate Receptionist in advance to ensure delivery instructions are available and required escorts have been arranged.

Communications

- Portable radios may be issued for communications while working in the remote parts of the Supervised (Outer) Area. Radios will be picked up and dropped off at the Outer Vehicle Gate. Radios must be manned at all times in case of emergency.
- Contractors will be expected to provide their own telephones (i.e. cellular, land lines etc.) while on site and provide the phone numbers to the Outer Gate Receptionist. Non emergency use of on-site telephones will require approval of CRL Sponsor. All long distance calls made by the contractor are paid by the contractor.

Smoking

- All CRL buildings and facilities are designated as Non-Smoking. Smoking is not allowed inside any buildings or facilities.

Breach of rules, regulations, policies, procedures

- Contractors who breach applicable rules, regulations, policies, or procedures pertaining to CRL site can have their CRL Site access privileges revoked and depending on the nature of the breach can be removed from the site immediately.

Annex K

EXAMPLE OF RADIOLOGICAL PROTECTION TRAINING PROGRAMME FOR CONTRACTOR PERSONNEL, ANGRA NPP, BRAZIL

Radiation-exposed workers, either plant employees or contractor personnel, should receive Radiological Protection training before working in radiation-controlled areas. Example of Brazil's experience may be found in this annex. (It may be taken into consideration that Radiological Protection training course at Angra NPP / Brazil is an integral part of its General Employee Training Programme.). This annex relates to Section 8.3.

1. RADIATION PROTECTION

1.1. Purposes and basic responsibilities

- Personnel and environmental protection,
- Basic responsibilities at NPP,
- Radiation Protection regulations,
- Related Technical Specifications,
- Radiation Protection group,
- Responsibilities of NPP staff and contractors.

1.2. Definitions, amounts and units in radiation protection

1.2.1. Ionizing radiation and contamination

- Type of radiation,
- Radioactive contamination,
- Types of contamination.

1.2.2. Dose and activity

- Values and dosimetric units,
- Activity units:
 - Ci (Curie),
 - Bq (Bequerel),
 - dpm (disintegrations per minute),
 - cpm (counts per minute).

1.3. Radiologic risks

1.3.1. Biologic effects

- Somatic effects,
- Genetic effects,
- Immediate effects,
- Delayed effects,
- Notes related to prenatal exposure.

1.4. Radiation protection principles

1.4.1. Optimization/ALARA

1.4.2. Limits of dose

- Occupational workers
 - Quarterly dose limit
 - Annual dose limit
- Non occupational workers and visitors
- Women

1.4.3. Radioactive waste

- Solid, liquid, and gaseous waste generated during normal operation of NPP,
- Main principles of the waste management,
- Cost of waste utilization.

1.5. Access to the restricted area

1.5.1. Requirements

- Training,
- Medical examination,
- Whole body counter,
- Dose credit.

1.5.2. Licença de Trabalho Radiológico (LTR) (radiologic work permit)

Types of LTR:

- Routine (90 days),
- Special (up to 30 days)

Definition of contaminated area

- Transferable contamination
 - Higher than $16.6 \text{ Bq}/100 \text{ cm}^2$ (or $1,000 \text{ dpm}/100 \text{ cm}^2$) for beta-gama sources.
 - Higher than $0.33 \text{ Bq}/100 \text{ cm}^2$ (or $20 \text{ dpm}/100 \text{ cm}^2$) for alpha sources.
- Fixed contamination + transferable (direct measure)
 - Higher than $83.3 \text{ Bq}/100 \text{ cm}^2$ (or $5,000 \text{ dpm}/100 \text{ cm}^2$) for beta-gama sources;
 - Higher than $1.66 \text{ Bq}/100 \text{ cm}^2$ (or $100 \text{ dpm}/100 \text{ cm}^2$) for alpha sources.

1.5.3. Electronic access

- How to proceed at the entrance,
- How to proceed at the exit.

1.5.4. Warnings

1.5.5. Behavior in the restricted area

1.6. Protection against contamination

1.6.1. Use of protective clothing

1.6.2. Breathing protection

1.6.3. Individual monitoring

Annex L

PRE-OUTAGE TRAINING PROGRAMME AT MOCHOVCE NPP, SLOVAK REPUBLIC

Contractor personnel involved in specific tasks (e.g., maintenance activities) should receive specific training in addition to the training provided for all contractor personnel (e.g., Site Access training, Radiological Protection training). This annex offers an example of such training for personnel, including contractors, involved in General Maintenance activities. This annex relates to Section 9.3.

INTRODUCTION

One of the basic requirements for employees undertaking work during general maintenance (GM) is to attend pre-outage training. This training is divided into two parts – general and specific. In the general part of the pre-outage training participants are familiarised with the organisation and management of GM, on health and safety protection during work, on fire protection, on nuclear and radiation safety in relation to work performed under specific conditions during GM (work on open primary circuit, with a potential risk of contamination and accidents, work performed using special protection, etc.). In the specific part of the training participants are provided with information focused on certain details (time schedule of GM, extent and content of the work, isolation of equipment from a security point of view, work on special orders, delivery and return of equipment for repair work, work with lifting machines, etc.). Contractor pre-outage training is based on procedure ME/0018 – Pre-outage training.

TRAINING EXTENT, CONTENT AND PERIODICITY

Pre-outage training is performed in one day (8 hours). The training consists of a general part, (3.5 hours) and a specific part (4.5 hours). The training is given in the NPP training area by NPP employees, who act as teachers.

Pre-outage training is executed once a year, always before the first annual planned GM. The training must be performed in the period of between 2 months and 2 weeks before the GM outage.

Typically, the content of the general part of the pre-outage training is as follows:

<i>Topic</i>	<i>Duration</i>
1. General maintenance schedule and basic activities within GM in general	20 minutes
2. Safe work at the NPP	25 minutes
3. Possible risks of accident arising during GM	20 minutes
Break	10 minutes
4. Work on open primary circuit	20 minutes
5. Radiation risks during GM and areas of personal decontamination	30 minutes
6. All kinds of waste liquidation and manipulation during GM	25 minutes
Break	10 minutes
7. Possible fire arising risks during GM and their elimination	10 minutes
8. Safety culture principles	20 minutes

Within the professionally specific training contractor personnel are presented with topics in following areas:

1. Maintenance technological procedures for activities provided by contractor
2. Decontamination and sanitary centre
3. Re-tightening of facilities
4. Work with lifting machines
5. Securing of places where work is to be undertaken
6. Cleanliness and tidiness of the work place
7. Emergency and crisis preparedness
8. Specific conditions in spaces where the contractor works
9. Taking over and giving back the workplaces for normal work

PRE-OUTAGE TRAINING RECORDS

The NPP must inform the Slovak Regulatory Authority in writing that contractor employees have attended pre-outage training. Participants' attendance lists are recorded during training and then sent to the human resources department responsible for maintaining these records. In addition, the relevant department maintains an updated database of its own and contractor personnel pre-outage training.

It is an essential that contractor personnel pass the pre-outage training before being permitted to work during Mochovce NPP units outage. This obligation to pass the training must be included to the commercial contract with a contractor who intends working during the unit outage.

Annex M

CONTRACTOR PERSONNEL TRAINING IN QUALITY AND SAFETY, EDF, FRANCE

This annex relates to Section 9 *Specific qualification requirements*. It presents an extract of the key points of the Quality and Safety Training course specification. The grid included at the end of this annex is an example of an end of course assessment. When this assessment is successfully performed, the certificate (or its renewal) is awarded to the contractor's individual employee.

EXPECTED CONTRIBUTIONS OF THE TRAINING PROGRAMME

This training programme enables contractor personnel to:

- master the organisation and stages of an unit outage in order to prepare themselves for an outage;
- understand in a practical manner:
 - The safety requirements and associated constraints,
 - The Quality Assurance approach related to maintenance activities and the associated documents used at nuclear power plants.

TERMINAL OBJECTIVES

Contractor personnel working at nuclear power plants must be able to:

- Undertake their duties and responsibilities regarding maintenance activities, particularly during a unit outage with the associated constraints in keeping with safety requirements;
- To conform to the safety and quality rules applicable at EDF NPPs, during operating or outages, when performing maintenance activities on safety related equipment or in its immediate vicinity.

CONCERNED PUBLIC

Compulsory course for all contractor personnel working at nuclear power plants on safety related equipment or in its immediate vicinity.

GENERAL LEARNING OBJECTIVES FOR THE COURSE

By the end of the course, the trainee should be able to:

- Explain the link between nuclear safety, containment barriers and safety functions;
- Explain the fundamentals of room and equipment identification in order to find his bearings at an NPP;

- Describe the main features of each type of unit outage and his role in the organisation of an outage compared with roles of other people involved in maintenance and operation;
- Distinguish the main stages of an outage preparation as well as the constraints of planning and intervention, related, particularly, to adhering to safety requirements (Technical Operating Specifications) ;
- Apply the "Quality" rules and Quality Assurance instructions in force at the Nuclear Production Department, during a practical exercise at a training location, (particularly those described in Technical Instruction NT 85/114);
- Explain the sense of the word "Quality" applied to an intervention at a nuclear power plant;
- Explain the purpose of safety risk analysis;
- Adapt his behaviour, during a practical exercise of an intervention for safety related equipment taking account of the environment and requirements defined in different documents;
- Distinguish causes which could lead to losing equipment integrity;
- Detect and report malfunctions and deviations which could affect the quality of a maintenance activity;
- Know his part regarding the nuclear facility experience feedback system (REX) ;
- Link the results of Service Evaluation (themes of the Service Evaluation Report and Contractor Evaluation Report) with the contractor's qualification;
- Know his part and responsibilities regarding the expectations of the Nuclear Facility.

CONTENTS

Attaining the general learning objectives presented in previous section, implies addressing the following themes:

- Buildings, main equipment and geographic and functional identification at nuclear power plants;
- Outage organisation and people involved in the maintenance activities;
- Nuclear safety during operation and particularly during outages (planning, Technical Operating Specifications, water levels and movements, operating domains, sensible stages);
- Regulatory Body ("Safety Authority");
- Equipment integrity under accident conditions and maintaining it during operation;
- "Quality" notions in the professional field and Quality Assurance instructions applicable to maintenance activities at NPPs: terms of reference and by contractors' applicable rules (Quality Decree 84 – Technical Instruction NT 85/114 – ISO 9000);

- Quality and Quality Assurance approach specific to maintenance activities at NPPs and categories of risks listed in NPP Safety Risk Analysis grids (common mode, single failure criteria, Temporary Specific Means and Devices, cleanness, procedures, tools, usable products at NPPs, spare parts...);
- Deviation treatment and experience feedback;
- Contractor qualification and evaluation;
- Nuclear facility expectations and contractor expectations, progress charter;
- Current developments of interest to contractors;

Practical exercises are implemented at an approved training location; they promote a **"Safety culture"** which enables each trainee to develop:

- an investigative attitude,
- a thorough and prudent approach,
- an ability to communicate.

The trainee can adapt the usefulness of a quality and quality assurance approach, based on:

- an intervention performed without any Quality Assurance rules and without any limitations identified;
- an intervention performed under a quality system with specific quality assurance instructions and documents applicable for maintenance activities.

NOTE: *specific knowledge related to the job, radiological protection or the company's quality system, is not included in this training course.*

Attachment M1
QSP 2000 AND POST-QSP TRAINING COURSE
END OF COURSE WRITTEN + ORAL ASSESSMENT

What is the logic of equipment identification?	/2
Why is reactor cooling necessary even when it is stopped?	/2
What is the use of Safety functions?	/2
How would you link the following Safety functions "Cooling and reactivity control" with the 3 containment barriers?	/2
What is the principal purpose of a unit outage?	/2
What is conditional maintenance?	/2
Why is it necessary to inform EDF's correspondent when it is foreseeable that the intervention will not end on time?	/2
After intervention file analysis and before starting the intervention, you notice that the use of specified tools is impossible, but a new tool recently developed by the NPP would suit your operation. What would you do? Why?	/2
EDF's correspondent has to be in possession of the follow-up document (or Quality plan) during the performance of a maintenance activity. True or false? Why?	/2
What are the risks associated with a working site that is not clean?	/2
The designated person in charge of removing a stopping point cannot do so at present. What would you do?	/2
Give examples of actions or situations that could lead to the loss of the equipment qualification (K1, K2, K3) during performance of a maintenance activity on this equipment or near this equipment.	/2
Why is it important to write down, in reports, consumable products and spare parts used during a maintenance activity?	/2
While performing a maintenance activity, one stage of the follow-up document (or Quality plan) requires you to ask the person in charge of "technical control" to make a measurement. This person is not free at the moment. You make this measurement yourself and it proves satisfactory. What would you do then?	/2
What are the differences between Contractors' Technical Control and Contractors' Monitoring?	/2
Why is it necessary to write down the tester references or the specified tools in the intervention report?	/2
Why is "technical control" necessary? Who is in charge of this "technical control"? Give an example.	/2
What is the use of the Service Evaluation Report filled out with EDF's correspondent at the conclusion of the service?	/2
Quality approach / Quality system and the Nuclear facility's objectives: what is the link between these two fundamentals?	/2
What are the main objectives of the nuclear facility?	/2

Annex N

SAFETY CULTURE TRAINING PROGRAMME, TECNATOM, SPAIN

Safety Culture is a course specially designed for *Long-Term Contractor* and those *Safety-Related Contractors* as well for NPP staff. Its main purpose is to transfer the principles of safety and safety culture in order to avoid incidents at a NPP. This annex relates to Section 9.3.

1 OBJECTIVE:

On completion of this course, the trainee will be awarded about the importance of the implementation of performance principles and the compromises acquired by the top and middle Management about Safety Culture.

2 CONTENTS:

- **Introduction**
- Training Objectives
- Training Programme
- **NPP Safety Principles**
- Defence in Depth
- Genesis
- Safety Culture
- **Safety Culture**
- Definition and Nature of Safety Culture
- Universal Features of Safety Culture
- Compromise at political level
- Compromise at managerial level
- Individual compromise
- Introduction to the Safety Culture Indicators
- **Safety Culture in the Site**
- **Debate**

3 DURATION:

Duration of the course: *Classroom hours: 4 hours*

4 DESIGNED FOR:

Designed for all the personnel which non-adequate performance can lead in an incident with or without consequences.

Annex O

SELF-CHECKING TRAINING PROGRAMME, TECNATOM, SPAIN

Self-checking is a course specially designed for *Safety-Related Contractors* as well for NPP staff. Its main purpose is to aware the trainees on the importance of human errors and to develop skills to prevent from them. This annex relates to Section 9.3.

5 OBJECTIVE:

On completion of this course, the trainee will have enough knowledge to apply with efficacy Self-checking, Independent and Double Verification techniques. The attendees will recognise when and where such verification techniques must be applied.

6 CONTENTS:

- **The Importance to prevent from human errors**
- The influence of human error in the industry
- Statistics of human error
- **Self-checking**
- Introduction
- Definition
- Needs for self-checking
- Techniques
- Steps
- Responsibilities
- Examples
- **Independent Verification and Double Verification**
- Introduction
- Definition
- Independent Verification and Double Verification: How? When? and Where?
- Techniques
- Limits
- Precautions
- Responsibilities
- **Susceptible activities for Self-checking**
- **Recommendations**
- To promote Self-checking. Methods
- To include the different Verification techniques in the Procedures
- **Task analysis test**
- **Exercises and practices** (Case Studies and operation on Panels layout simulated on PC)

7 DURATION:

Duration of the course: *Classroom hours: 6 hours*

8 DESIGNED FOR:

Designed for all the personnel which non-adequate performance can lead in an incident with or without consequences.

Annex P

EXAMPLES OF TASK SPECIFIC TRAINING PROGRAMMES

An outline of the training programme representing task-specific training provided for contractor personnel is included in this annex. This annex relates to Section 9.3.

Balakovo Foreign Material Exclusion Supervisor Training Program Outline (Balakovo NPP, Russian Federation)

	<i>Topic Title</i>	<i>Length, Hours</i>
1.	Interactions of Contractor, Maintenance, and Operations Personnel	3
2.	Maintenance Activities Organisation at Balakovo NPP	2
3.	Safety Culture Principles and Verification Techniques	2
4.	Foreign Material Exclusion Policy and Procedures for Work on Disassembled Equipment	5
5.	Tools Tagging Procedure	1
6.	Tools and Materials Control Procedure	3
7.	Written Test	2
	TOTAL	14

Annex Q

CONTRACTOR PERSONNEL COMPETENCE: SLOVAK PRACTICE, NUCLEAR REGULATORY AUTHORITY, SLOVAK REPUBLIC

An approach by the Slovak Regulatory Body to assure NPP contractor personnel competence is represented in this annex. The comprehensive approach and examples include such aspects as legal and regulatory issues, requirements for qualification of contractor personnel, training and qualification processes, and development and assessment of contractor personnel competence. This annex relates to Section 5.

1. Scope of Contractors' involvement in on-site activities

Typical activities performed by contractors are those for which nuclear-related competences are not required. These activities may be undertaken by small local contractors.

Examples are:

- general construction
- garden design, maintenance of site grounds and the NPP general area
- security services
- general cleaning
- catering.

Other specific activities at the NPP are also performed by contractors. Examples are tasks performed by experts requiring special training and experience or using special tools and equipment.

Examples are:

- activities during start-up
- research activities
- maintenance of the primary circuit main components (reactor, steam generators, control rod drives, etc.)
- leak detection from pressurised areas.

2. Contractor personnel competence

While performing their work each contractor must adhere to “The conditions for contractor’s activities” which form part of the contract. This contract document states the method of proving contractor personnel competence and what documentation is necessary.

It is specified to each contractor what documents are required when arranging access to the relevant area, what documents form part of the contract, how to prove that the NPP legal and internal regulations training has been undertaken, what competences and certificates are needed to be able to work in a controlled area and what penalties apply when the requirements are not met.

Contractors’ competences are defined in the organization’s internal directives, which are part of the whole quality assurance system of the NPP. The directives divide the

contractors into three groups according to the duration of their activities at the NPP and the type of area where these activities will be performed. The directives further define the type and the content of the training needed to acquire the necessary competences. The directives state the requirements for contractor personnel needing access to certain areas at the NPP to safely perform the contracted work.

It is necessary for contractors to acquire knowledge of the administrative organisation at the power plant; for example, the tasks of management and general maintenance working groups, maintenance procedures, various types of work orders, and the organisation of safe working at the NPP. Furthermore, it is necessary to be familiar with the quality assurance programme, the goals of the quality assurance system, and the structure of the quality assurance documentation. It is also necessary to be familiar with the radiation protection programme, concepts and methods for protection against ionising radiations, radiation protection principles, dosimetry control, and how to perform activities safely in the radiologically controlled areas at the NPP.

3. Regulatory requirements

In the Slovak Republic, the use of atomic energy is regulated by Act No. 130/1998 and related Regulations. One is the Regulation on NPP personnel professional competence. This regulation defines the qualification requirements for NPP personnel and for those contractors who assist the NPP start-up in the positions of Head of the Physical and Energetic Testing and the lead operators of the start-up process.

The Act does not cover activities during construction and start-up, and there is no legal standard which directly regulates and defines the competences and requirements for contractor training. Indirectly, however, this process is regulated through the licences issued to contractors. By the Act, every contractor who wants to run a business in the field of nuclear energy utilization, must have a licence issued by the Slovak Nuclear Regulatory Authority. Proof of contractor personnel professional competence and proof of financial, technical and organizational prerequisites, including quality assurance systems, are also conditions for issuing the licence.

Control of the contractor, when issuing the licence, is based on proof of professional knowledge, not on knowledge connected with the performance of the work of the contractor at the NPP.

The Slovak Nuclear Regulatory Authority approves the NPP quality system, which defines the requirements for contractors.

During an inspection, the Slovak Nuclear Regulatory Authority controls and examines the way the NPP establishes the requirements and competences of the contractors and how the NPP controls them.

4. Training and qualification process of the NPP contractor personnel

The contractor company bears the responsibility for training its personnel although the NPP examines a contractor's training programme and the competences of its personnel through assessments and audits. The NPP devises all contractor training programmes associated with access to the NPP, with work involving exposure to ionising radiations, with safe working during outages, and with compliance to nuclear safety principles and NPP

quality systems. The goals, content and extent of contractor training are described in Section 7.

5. Assessment of contractor competence

Audits are one method used to assess contractor competence. Such audits are undertaken by auditors trained by the NPP or by approved independent auditors from other organisations. Auditors from the NPP must attend special auditor training and they must hold a certificate for this activity issued by the NPP manager.

During an audit the qualification requirements and personnel training programmes of the contractor are examined. Systematic, high quality auditing by either NPP auditors or by independent auditors became an efficient tool in improving contractor performance in recent years at Slovak NPPs. In the future it is intended to audit the quality systems of certified contractors on a three-yearly basis, and to perform operational audits of quality plans related to a certain item of equipment or service supply.

A second method of assessing the competence of contractors is by gathering information on, and assessing, their previous work. Information and knowledge on a contractor's performance are acquired after general maintenance has been completed and the performance of a contractor is then assessed against an agreed scale. The NPPs maintain the list of contractors together with the assessment of their competences.

Another method of assessing a contractor's competence is by analysis of the causes of NPP component failures. Through the root cause analysis and identification of the contractor's contribution towards the failures, ways are considered to prevent these events in the future.

6. Development of contractor personnel competence based on lessons learned

As mentioned in the previous section, one of the methods used to assess contractor competence is by analysis of the causes of NPP component failures and analysis of the events. Knowledge and experience acquired during analysing these events are fed back into the contractors' training programme. The quick and accurate transfer of relevant data to the contractors' training is stimulated by involving professionals from various NPP departments in analysing the failures who also have expertise in this area.

7. Updated examples of contractors preparation programs

As mentioned above, the contractors are divided into three groups according to the duration of their activities at the NPP and the types of area in which they will undertake their work. Training programmes are devised for each group.

A five-day course is prepared for the first group of contractors. This course is organised by VÚJE, inc., Trnava (a private company) with instructors who are professionals from the NPPs.

The aim of the course is to explain the nature of the NPP, the importance of the NPP site rules and the care of property, recognition of the principles of measurements taken during various scenarios, to explain waste handling, waste management, radiation protection and to understand the site emergency plan.

The theoretical subjects on the five-day training course are:

- Power plant description
- Maintenance and technical safety of the NPP
- NPP protection and safety
- Nuclear and operational safety
- Radiation safety and radiation protection
- The NPP quality assurance system.

The contractor training is oriented towards the work undertaken at the NPP, its quality and towards personal safety.

Records are maintained of the training topics, course timetable and the names of trainees and their attendance at each session.

At the end of the five-day course an examination is undertaken, covering three topics:

- Organization of safe work at the NPP and co-ordination with contractors
- NPP quality assurance, nuclear, technical and fire safety
- Radiation safety.

After successfully passing the examination the contractor employee is awarded a certificate valid for three years. At the end of this period it is possible to extend the certificate validity if the employee participates in a two-day refresher training course and successfully passes the accompanying examination.

The content of the training for contractors included in the second group (a one-day course taken at the NPP site) is as follows:

- Basic information on the NPP
- Compliance with the safety principles and health protection during work
- NPP access and mobility principles
- Understanding of the Emergency Plan
- Quality assurance system
- Waste handling.

At the end of the one-day course an assessment is used to verify a contractor's comprehension of the topics. In case of successful results the contractor employee is awarded a certificate valid for two years.

All contractors entering a NPP site must supply "Proof of no criminal record" by presenting a statement from the criminal registry. If they want to work in certain areas at the NPP (for example, in a controlled area) they must present also "Proof of psychological competence".

Each contractor employee who requires access to a controlled area must attend a training course and take an examination according to the quality assurance decree — "The radiation safety rules". The examination consists of a "Set of questions and answers on radiation safety rules". Each employee must have a valid (issued within the past year) "Medical competence for work in a radiation environment" and must present a record of

“Absorbed dose rates during a previous period”. Each contractor employee is measured for internal contamination before starting work in the controlled area.

Contractor employees, who intend participating in work involving general maintenance of the NPP units, must attend training before the first outage of a year.

The training starts with a general section having the following basic topics:

- general maintenance schedule and main activities during general maintenance in general
- safe work at the NPP
- possible risks of injuries during general maintenance
- open primary circuit work
- radiation risks during general maintenance and methods of personal decontamination
- various methods of waste disposal during the outage
- co-operation between facilities administrators and maintenance preparation crews
- possible risks of fire and their elimination during general maintenance
- safety culture principles.

Training in specialised topics relating to a particular item follows after the general section. This training takes one day.

Participation in the above training is documented by the instructors who record the names of attendees and details of their training programmes.

This training and the associated documentation on personnel preparing for an outage is subject to inspection by the Slovak Nuclear Regulatory Authority. The documentation is submitted to the regulatory body by the NPP operating organisation.

The NPP personnel comprise the third group. The training for this group is undertaken when access to the NPP site is required. Training records are maintained.

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Consultants Meeting

Vienna, Austria, 9–13 August 1999, 16–20 October 2000

Advisory Group Meeting

Vienna, Austria, 7–11 February 2000

