

Towards Harmonized Qualifications for Radiation Exposed Personnel

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Abstract. The accelerated process of globalization affecting mankind doesn't exclude safety matters. Indeed, some transnational corporations are increasingly offering specialized engineering services such as industrial radiography or well logging. As well, a growing scientific exchange involves the mobility of nuclear researchers in different areas, for instance radiochemistry, nuclear medicine and radiotherapy. Such a breakdown in the technological frontiers must necessarily be reflected by the regulatory solutions. Particularly, diverse levels of theoretical-practical training for radiation exposed personnel coexist in the Latin-American Region, being an especially sensitive problem for radiation protection matters. The spectrum goes from post-graduate courses required for Radiation Protection Officers in some countries, while in others only basic recommendations are required for the Operating Personnel. Another scheme consists of medium level course for the Operating Personnel, while Radiation Protection Officers don't have special requirements! Many educational private institutions teach non standardized courses which only give broad concepts of Radiation Protection. On the other hand, usually nothing is said about the operational training, or else its certification is entrusted to the employer itself. In some countries multiple Regulatory Authorities apply dissimilar criteria to assess safety matters, including the evaluation of workers applications. The necessary regional integration makes indispensable to establish common standards for granting authorizations. Having similar or homogeneous requirements for the universe of radiation exposed personnel, i.e. source operators, Radiation Protection Officers, Qualified Experts and technical support people would be easier for the Regulatory Authorities to have common methodologies of evaluation for the applicants. An IAEA supported technical cooperation project related to this paper seeks to establish standardized requirements due to the universe of radiation exposed personnel diversifying their specialization by areas, i.e. medical, industrial and research, as much in normal operation as in emergency situations. It also seeks to allow common approaches to enable the educational institutions as well as to assess the qualifications of operator applicants.

KEYWORDS: *Qualifications; radiation exposed workers, Operating Personnel, Radiation Protection Officers, Qualified Experts*

1. Introduction

1.1. International Movement of Services and/or Practices

The globalization of human activities is reaching some aspects of nuclear and radiation safety related with some practices. Particularly, the economic expansion as well as the scientific and technological development of the Latin American region has prompted the incursion of some organizations far from their home countries. Indeed, some transnational corporations are increasingly offering specialized engineering services such as industrial radiography or well logging. As well, a growing scientific exchange involves the mobility of nuclear researchers in different areas, for instance radiochemistry, nuclear medicine and radiotherapy. Facilities, equipment and staff of these companies are generally licensed in their home countries, but not in the host country. The accreditation or authorization in the second country could be very time consuming, thus preventing or hampering the work contract. Such a breakdown in the technological frontiers must necessarily be reflected by the corresponding regulatory solutions.

1.2. Sources and Equipment

Thus, some of these practices have to move radiation sources as well as associated equipment or devices to perform their duties. Transport, import and export authorizations are generally well international established procedures. Moreover, the licensing requirements for sources are sufficiently standardized.

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1.3. Radiation Exposed Workers

On the other hand, the situation is especially complex for the exposed workers, since general and specific requirements, skills and abilities to be assessed, as well as the arrangements for their assessment, differ substantially from one State to another.

The universe of radiation exposed workers includes functions such as Operating Personnel, Radiation Protection Officers and Qualified Experts. Each of them has significant involvement in the safety field. For instance, the Qualified Expert designs systems and safety procedures, deals with the maintenance and calibration of equipment and generally performs functions that require a high degree of specialization. On the other hand, taking into account that the Operating Personnel have to deal directly with sources or devices emitting ionizing radiation, closely supported by the associated Radiation Protection Officers, we can state that the process radiation safety is a function of their reliability, i.e. they both constitute the first step of the operational radiation safety. Realizing that the qualifications for design and technical support people are of different level and scope, this paper aims to develop recommendations to homogenize the qualifications and evaluation of both Operating Personnel and Radiation Protection Officers.

2. Status Assessment/Issues

2.1. Present Approach Status

Particularly, diverse levels of theoretical-practical training for radiation exposed personnel coexist in the Latin-American Region, being an especially sensitive problem for radiation protection matters. The spectrum goes from post-graduate courses required for Radiation Protection Officers in some countries, while in others only basic recommendations are required for the Operating Personnel. Another scheme consists of medium level course for the Operating Personnel, while Radiation Protection Officers don't have special requirements! An intermediate situation is that both of them have the same training scheme. In fact, requirements to enable such people for working activities, as well as the approach to assess their capabilities differ substantially among the countries of the Region.

2.2. Training/Educational Institutions

Many educational private institutions teach non standardized courses which only give broad – non specific - concepts of Radiation Protection. On the other hand, usually nothing is said about the operational training, or else its certification is entrusted to the employer itself. Moreover, it remains unclear whether the training institutions should be subject to the Radiation Safety Authority, the Educational Authority, or both.

2.3. Regulatory Authority

The regulation of radiological applications is often shared by two or more organizations. For example, such activities have been segregated by:

- (a) Facilities type: nuclear, radioactive, X-ray
- (b) Application type: medical, industrial, research, teaching

In some States there is an overlap of the corresponding authorities in radiation safety matters and health matters. It is a fact that multiple Regulatory Authorities can apply dissimilar criteria to assess safety matters, including the radiation exposed workers applications.

2.4. Regulatory Approach

Last but not least, the model regulations adopted by the regional countries are often quite different. Some of them for example, follow the pattern of allowing only the Operator, also called Licensee, assigning to him the full responsibility for the practice and the involved staff. Other countries still require a general authorization for the Radiation Protection Officer, in terms of knowledge of safety

matters. Exceptionally, some countries are endeavoring to assess and license the fully involved exposed workers, which is the option taken by the author on the present paper.

3. Intended Solutions

3.1. Difficulties to Apply for Multiple Authorizations

The methods, practices and the organization for granting authorizations are quite different from State to State. The various authorization processes are usually based on formal examinations and/or on the testing of practical skills. Differences in the authorization processes also exist in the examination methodology, i.e. written or oral and in the scope of the practical examinations. These main differences, basically for requirements, methodology and timing, make very difficult to apply for authorization in each country.

3.1.1. Different Requirements

Requirements for individual applications are quite different from State to State, starting by the characterization of personal factors, i.e. bio-physical condition, educational level, work training, safety training. On a practical side, competences, skills and abilities are often required.

3.1.2. Different Evaluation Methodology

There is a wide diversity of authorizations policies as well as assessment methods. Some States have long established regulations and operating organization to lead the administrative procedures for authorization and periodic review of the authorizations. Changes continue to be made to improve the effectiveness of the process as well as to improve its cost-effectiveness ratio.

3.1.3. Timing

The accreditation or authorization in each duty country could be very time consuming, thus preventing or hampering the work contract. The total time going from the application to the eventual granting of the authorization must consider the documents presentation, often a personal – not mailed – requirement, the international validation of such documents, the examination – often fixed for periodic dates – procedures and finally the assessment of the full dossier.

3.2. Need to Homogenize

It is therefore highly desirable that the qualifications of exposed workers - as well as its assessment -be homogeneous. This means having individual characteristics, both biological and specialized knowledge, as well as enabling skills to perform the assigned duties. In other words, the requirements needed to obtain an authorization, as well as the evaluation of the supporting documentation, should be similar for the regional countries in a voluntary basis.

4. Performance Areas Description

As described earlier, the universe of radiation exposed workers includes functions such as:

- (a) Operating Personnel
- (b) Radiation Protection Officers
- (c) Qualified Experts

The performances of such functions correspond to three main application areas:

- (a) Medical applications, e.g. diagnose radiology, interventional radiology, radiotherapy, nuclear medicine
- (b) Industrial applications, e.g. mobile irradiators, fixed irradiators
- (c) R&D applications e.g. sealed sources, non-sealed sources, nuclear facilities

On the other hand, the workers would have to qualify in three different aspects:

- (a) Physical and psychological conditions
- (b) Job training, i.e. technical or operative training
- (c) Safety training, i.e. radiation protection matters knowledge

In such a way, crossing the previous items, it is generated a 3D matrix system of at least 81 elements whose characteristics would be necessary to determine. In other words, it would be necessary to assess and establish requirements for these 81 nodes.

As described, the present paper is focused to the two most relevant safety functions, i.e. Operating Personnel and Radiation Protection Officers focusing the analysis over radiation safety knowledge and job experience.

5. Conclusions

The necessary regional integration makes indispensable to establish common standards for granting authorizations. Having similar or homogeneous requirements for the universe of radiation exposed personnel would be easier for the Regulatory Authorities to have common methodologies of evaluation for the applicants.

Any changes to national standards and assessment procedures should be postponed until a second stage. It remains a priority, firstly, to reach consensus on the qualifications of exposed staff.

The following constitutes an extract of the identified ideal requirements for the whole universe of radiation exposed workers.

5.1. Physical and Psychological Conditions

From a medical point of view, ideal means the characteristics of a “perfect” individual, which is somebody practically inexistent. So, the ideal health requirements should be taken as reference levels and a grade of confidence should be adopted.

A medical examination should give the condition of the relevant bio-physical systems, i.e.: ophthalmic, otolaryngology, neurological, breathing, cardiovascular, haematopoietic, endocrine, immunologic, digestive, nutritional and metabolic, tegument, osteoarticular and muscular. The acceptability criteria should be stated according the general health criteria. As well, a psychological examination should give the condition of a well balanced personality, able to perform activities under normal as well as in emergency conditions.

5.2. Practical Training

The practical training should be specific according the practice. On the other hand, the Operating Personnel must require sound job training while the Radiation Protection Officer requires a lower instruction in the operating process.

5.3. Operational Radiation Protection

From a safety point of view, the focus of training must be inverted, that is the Radiation Protection Officer requires a very sound training in safety matters while the Operating Personnel require a strictly acceptance of safety rules. The scope and depth of the training must be according the type of radiation source and the associated risk.

6. Safety & Job Training Programs

Consistent with the above mentioned, this document is intended to standardize the training required for two selected functions from the universe of radiation exposed personnel, that is, Operating

Personnel and Radiation Protection Officers, focusing the analysis over radiation safety awareness and operational experience.

On the other hand, it identifies nine items as priorities to develop model training programs, reaching up to 36/81 of the global needs, i.e.: medical diagnose and interventional radiology, medical radiotherapy, nuclear medicine, industrial mobile and fixed irradiators, R&D sealed and non-sealed sources, R&D nuclear facilities,

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