PRACTICES AND PRIORITIES FOR RADIATION PROTECTION IN A FACILITY FOR TECHNICAL DEVELOPMENT OF THE PEACEFUL USE OF NUCLEAR ENERGY

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Abstract.

This paper intends to introduce as hierarchical criteria of priority in the radiation protection practices in an effort to make more effective the budget allocation. Initially the author classifies the radiation protection practices priority in a purely technical base. In a second part the author examines the possible changes if we consider other aspect as economical, social, ethical, political, etc. In the last part the author shows that the priority hierarchy cam by completely modified upon imposition of the superior organs to the technical radiation protection organ, without any technical back-up.

1. Introduction.

People who hold the power to decide over budgets are not ever experts in Health Physics and therefore have difficulty in allocating funds for the different branches of the organ responsible for radiation protection. This is more critic in developing contries, where there are few human and financial resources. This paper is directed to these officials who lead these process. However, at the same time, it could be useful as a guide to the proper radiation protection services. Hierarchical criteria for priorities for radiation protection activities are established to which the services could refer in an effort to make more effective use of their allocations, with the aim to maximize worker as well as public safety when doing radiation activities. This work is divided into three parts. The first part (item2 and 3) classifies, according to the author's viewpoint, radiation protection activities into hierarchial priorities based on a purely technical assessment. These priorities once defined can be presented by the technical scientific organs responsible for radiation protection to superior administrative and financial organs as an aid in the distribution of funds.

2. Hierarchical Priorities of the Radiation Protection Activities: Technical Point of View.

The radiological protection aim is to provide protection for the persons and its environment against the detrimental effects and the potencial hazards fo radiation and radioactive substances, while at the same time making it possible for the human race to enjoy all the benefits which may arise from the use of atomic energy(1).

The radiological protection considers that if we give sufficient protection to the man also his environment will be protected because there is an interaction between them(1).

The persons can be divides into two groups, the workers and the members of the public(2). The principal objective of the worker protection is the achievement and maintenance of acceptably safe and satisfactory working conditions while the principal objective of the member of public protection is to control the leakage radiation an the delivery of radioactive material in the environment, in a such manner to be sure that the risk in the critical group in minor or equal to risks regularly accepted by the population in his everyday life(3,4). In order to achieve and to maintain the working conditions acceptably safe and stisfactory for occupational exposure there is three resources that are: time from, distance from and shielding of the radioactive source. For members of the public to maintain the risks low is necessary the shielding, the containment or the confinement of the radioactive source. In both case worker and public for then protection need a sound Health Physics Engineering. In this case the facilities which are intended as nuclear or ionizing radiation installations need to be, when feasible self-shielded. The use of Individual Protection Equipment, IPE, should be understood only as a support procedure when and where it is not possible to make the facility completely self--shielded.

The packages for radioactive material are part of the protection for member of public, because they must be transported by members of the public as other hazardous material, following the same pathway then the other material not radioactive(5).

This health physics engineering is indubitably the first priority of the radiological protection service as for worker as for public. To decide for what group we need give more priority is sufficient to compare the dose received by the workers to theirs annual limits and the dose received by the critical group with the annual limits for members of public. The major priority will be given to the group that present the highest rate. In each case if the rate is lower than 0.1, this means that the complementation is not necessary. This do not means that needs to be eliminate but in any case will lost the necessity of to have the first priority.

Following we need to show that radiological protection system introduced in the first priority is adequate and continues to be so as time goes on(2). This goal is obtained using the monitoring technique.

There are two types of monitoring, as for workers (2) as for members of public (6), one has a prevention character because warns the person before to receive the dose and the other has a confirmatory character because inform the dose after to have been received. The first one is named workplace monitoring and the second are individual monitoring. Attached are three types of local worklace monitoring: external radiation, surface contamination and skin and clothing contamination. The relative priority between these monitoring types is obtained by the dose hoped and the annual limits as explained in the first priority and all the monitoring types whose doses are 0.1 of the biggest one are not necessary. Obviously the preventive monitoring type has priority over the confirmatory monitoring type. The relative priority between worker and member of public is obtained by the rate between the doses hoped and their annual limits as explained in the first priority and with the same exception for rates below 0.1.

For all this measurement used in the monitoring technique is necessary to hold radiation protection monitoring equipment calibrated within a reliability range national and internationally accepted. It is obvious that the calibration of the radiation protection monitoring instruments have the same priority than the type of monitoring for which they are used.

If the radioactive material do not satisfy the requirement for special form radioactive material(5) there is the possibility of contamination. The contamination can be understood in a more large sense including the contamination in the production process as 131I produced from elementar telurium irradiated in a nuclear reactor. More than 10 telurium radioisotopes are produced and from them the 131I is separated. Our four priority are the decontamination procedure and it occupies this priority because from the point of view of the radiation protection we need mantain this kind of service as small as practicable and give a major priority to radiation protection system that avoid contaminations. Now, if in facility arises contamination obviously we generate radioactive waste. The radioactive waste occupies this fifth priority because the preference for the radiation protection service is to invest in the contamination minimization then in a extensive programme of radioactive waste treatment. In second place, for radioactive waste, with small radioactive half-life, the best is to stock it for decay during a time sufficient to eliminate as normal waste, not radioactive.

As sixth priority we consider education and trainn-

ing for the workers(7) and also for the health physicist experts. The priority in the sixth place is justified because it is not an essencial activity to operate the installation because the direction can contract experts from other place but in the case of the country in development phase, many times it is difficult, from the point of view socio-economical, contract foreign experts and in the national market, that is incipient, there are not. In the case where the education and trainning is necessary to compensate fault in the different priorities already mentioned it can take the same priority of the practice that demand the education and trainning.

A facility that work with ionizing radiation many times have responsabilities that transcend the own one and go in direction to the community desire, for instance:

a) Legal and normative practices joined to City Hall, State or Country.
b) Emergency planning practices joined to civil defense.
c) Rendering services joined to the public.
d) Education practices to the community.

These practices occupy this position and this sequence in our priority scale because they are not related with the livelihood of the facility. The practice a) have priority over the other because the norm or law in preparation can affect the practices of the facility.

The practice b) is necessary only if there is in the neighborhood a nuclear facility that demand this type of practice.

The practice c) can receive a bigger priority if the facility has practices concerned with it but occupies this position if the facility do not has practices concerned with it.

About the practice d) we can mention that great alarm has been raised in people's minds during the past few years by incompetent discussion of the hazards of radioactivity and in some cases radioactivity levels a litlle over the natural background have caused a morbid anxiety without technical justification. The facility through their health physicist expert can deliver a lecture, seminary, conference, etc. to elucidate the community and to put the situation in the right extention. Finally remain to be examinated the practice research and development that can occupy all the priorities already mentioned principally if this practice belong to a research institution for the development of the peaceful uses of the nuclear energy. We can exmine three kind of research:

a) Scientific Research and development without any interest.
b) Scientific research and development related to a scanty practice between those already mentioned in the priority scale.
c) Scientific research and development to maintain the experts update and in the international competitively field consenting them an improving in their activities.

The first of them is without priority and must be refused. Better is to leave it to University that will give us an insaluable benefit preparing futures expert in radiological protection and then helping us in the practice with priority six. The second one will have to receive the priority number assigned to the scanty practice and the third one presents interest in short, medium or long term. The first two can be considered for execution and planning respectively and the third only mentioned in a relatory. In any case this third kind of research fits well in the practice with priority 6.

3. General Consideration.

Inside each priority, the job can be shared in sub-priority, obeying the criteria of priority already established, for instance, a trainning in preventive monitoring is a sub-priority more important than the same trainning is comfirmatory monitoring. A lot of practices mentioned in our priority scale can be performed by external institution under contract but this do not invalidates the position of our priorities.

The classification of priorities presented until now have an eminent technical character and for this reason can be directed from down to up i.e. from the technical competent organ to the major financial administrative organ to help it in the decision in highter jurisdiction.

4. Global Analysis of the Priorities Considering Others Criteria Besides the Technical Ones.

In this context can be considered other criteria as

economical, social, ethnical and political and the hierarchy previously established can be altered by the technical organs due to specific circunstances and can be justified to the superior administrative and financial organs. It is obvious that each situation can be examined case by case and for this reason we limit ourselves to an example. A nuclear institution that has a secondary laboratory for equipment calibration can extend its activity to calibrate clinical dosimeters that are not specific to it and in our scale occupies priority 9. Depending the demand and the interest can increase its importance and arrive until the priority three but never can adquire priority more important that established in the technical classification and in certain case of recession can be eliminated.

5. Global Analysis Done by Financial Organizations and Directed to the Technical Organ.

The priority scale established in the previous tittles can be completely changed. The priority depend of many criteria as economical, social, ethical, polithical etc. and in many instance assume more importance that the technical one. These criteria depends on the pression that the institution receive from others entities as the community, the population, the state, and so on. In this case the responsability of the priority scale remain with the autority that take this decision and not with the technical organ. Besides this, the radiological protection service, inside the institution, can assume others activities, do not mentioned in this paper, imposed by the superior competent organ(8) that not belong to the health physics field and can enter with a priority given by the supeior organs.

Finishing, we desire to mention that the priority scale is very fragile and depends of a series of institution interests.

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