

Industrial radiography and radiation protection

By:

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A working group bringing together sixty professionals of all disciplines, animated by the French Society of Radiation Protection (SFRP) and the COFREND (French Non Destructive Testing Confederation) worked during one year to help actors of industrial radiography to make safer this activity.

Nine subjects were examined, the French authority Body (ASN) and the French Labour Ministry were associated

The nine subjects were treated by nine working groups. The abstract of their work is:

1 APPLICABLE REGULATION

Industrial radiography is subjected to the “general” regulation (protection against radiation, risk prevention, coordination, detention and use of material containing radioactive sources, and to a certain number of specific rules (training with the Certificate of Aptitude To handle the Industrial Radiography and Fluoroscopes - CAMARI, design of the “gammagraphes”, conditions of use, etc). Some information on standards relating to the design of the gammagraphy apparatuses and the beaconing is also pointed out.

2 FEEDBACK EXPERIENCE FROM INCIDENTS AND ITS USE

This working group aimed at listing and, if possible, improving feedback experience from incidents in the field of gamma radiography. The documents produced by the group may be used to enrich the content of training courses addressed to operators or health physicists from gamma radiography firms. The participants analysed different

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bibliographical sources where incidents/accidents were presented: the incident databases named IRID and RELIR were particularly studied. It was then identified that the existing feedback experience was not representative from the events occurring today in France. New types of incidents (no mastery of the demarked area, source stuck due to foreign bodies in the guide tube) were thus identified from which new RELIR publications were established. In parallel, a synthesis of the lessons learned from the incidents listed during the work was elaborated.

See: <http://relir.cepn.asso.fr/>

3 TECHNICAL TRAINING

As for all the trades the formation begins with a training with a trainer or a companion to know the gestures, the postures and the actions which contribute to services of quality under optimum conditions for safety. For the handling of apparatuses of industrial radiography (X-ray or gamma), an additional specific knowledge must be acquired in the field of the risks related to the use of ionizing radiations.

In order to limit these risks for the operators and the public in general, a whole battery of regulatory texts was established in the French law. These texts relate to the detention of ionizing radiation sources, the transport of these sources, the control of the apparatuses, the training and the monitoring of the workers (see work of the workshop 1).

All these texts made it possible in France to enter little or not serious incidents during the two last decades, if one excludes the particular case of Forbach in 1991 whose accelerator of electrons was used for irradiations but which could have been used in radiography. However minor incidents always take place and the average of the personal doses of the operators of radiography, in particular in gammagraphy, remains one of the highest of the whole workers in France.

The best way of still limiting the exposure of this type of workers is to improve the formation in the field of radiation protection in general as well as in the diffusion of good professional practices, both being closely dependent.

The goal of this workshop was to give a progress report on the regulatory aspects of the training in radiation protection and to see how to make it evolve/move to limit the exposures of the workers in industrial radiography. The first part of this document presents the reflexions of the workshop starting from the end of the year 2006 and the second part presents the lawful sums of money texts of December 21, 2007 and details the principal provisions taken compared to the proposals of the workshop.

4: THE MATERIAL AND THE ASSOCIATED REQUIREMENTS

This workshop studied the material used in France for industrial radiography. The various types of material, the generators of x-rays and the apparatuses containing radioactive sources are described. Accessories and materials of delimitation and systems of collimation of the beam are also presented. For each type of material, axes of evolution and proposals of improvement are quoted.



*GAM @ 80 /
120*



Directional collimator



Luminous panels of warning (CARMELEC Cie)

5 DOSIMETRY

This publication attempts to examine the parameters influencing the dosimetry of the industrial interventions of radiography. These parameters are given in a description of the practice, the subject of field measurements as well as the models using the computer code MERCURAD are also described. This approach made it possible to estimate doses according to the various phases of the gamma-ray inspection under real conditions of the intervention and even during the phases of transport and handling of the irradiators. The conclusions insist on the need for an optimized organization for the reduction of individual dosimetry.

6 HELPS WITH THE EVALUATION OF THE RISKS AT THE WORK STATIONS OF THE INDUSTRIAL RADIOLOGISTS

The objective of this workshop was to propose an analysis of the risks for the future realization of studies of stations on Gamma Ray Non Destructive Testing (NDT). The principle selected was to carry out a phase division of a building site, by associating with each stage, the associated risks.

Gamma ray NDT are activities which require a vigilance of every moment:

To be sure of the quality of work;

To manage the various risks among which the risk of exposure to ionizing radiations;

To fight against falls of attention dependent on the forms of tiredness, the working conditions, the difficulties of access and in certain cases the night work, etc;

To manage the pressures temporal (audits, monitoring...);
To manage the coerciveness to avoid exposing other professionals,
To manage the dependent risk in the working place (INB, presence of hazardous substances.) The field of study of an analysis of risk covers the trades, the tasks and activities, the harmful effects, and the risks...

7 SELF ASSESSMENT

The program of self assessment based on the regulation makes it possible to study it, to better include/understand it, to make evolve/move the practices of the company and its tools. The method is based on the development of process integrating the determination of the necessary means.

The described criteria make it possible to evaluate the action.

The step is based on a reference frame MASE, associated with the standard ISO 9001.

Four processes are defined:

- ☞ a voluntary policy of the company
- ☞ the implication of the professionals concerned
- ☞ the association of the qualified professionals
- ☞ the program of monitoring

Last, nine criteria of evaluation are proposed to measure the effectiveness of the processes and their continuous improvement. Among these criteria appear the organization of radiation protection, human resources, the training and the follow-up of the personnel.

8 THE DISTRIBUTION OF THE RESPONSIBILITIES

This document is a guide for the companies using or performing for customers Non Destructive Testings. It takes again the whole of the stages of this type of services (on the basis of a work already completed at the level of the "Région PACA" in France") and identifies the distribution of responsibilities between:

- ☞ The Customer Cie (EU),
- ☞ The Project superintendent (MOE),
- ☞ The intervening company (I.E) in radiography.

It points out certain obligations and proposes "good practices" received from industrialists of this field. It is initially advisable to clarify the strong points which define this distribution of responsibilities. This one is based initially on a contractual relation between the 2 or 3 fascinating parts. The Company User thus entrusts to the ensemblier / Project superintendent and itself with the Intervening Company the responsibilities to make realize and/or to carry out the services in the respect of the lawful requirements and the conditions of optimum safety.

Each entity thus ensures its responsibilities, this should be the fundamental base and impossible to circumvent of their relevant implication in the behaviour of the operational objectives and of safety.

9 TRANSPORTATION

The work consisted to seek and explain the applicable rules as regards the transport of industrial irradiators. The radioactive sources included with these apparatuses being regarded as "dangerous goods" for the road transport, the code ADR is applicable.

Controls to carry out, whether they are visual, monitoring or administrative, are also described.

CONCLUSIONS

These good practices should not make forget that upstream it is quite important to raise the question of the justification of the use of gammagraphy (within the meaning of the first RP Principle). It appears difficult to replace gammagraphy by only one technique: NDT technique preserves an unquestionable interest because of its simplicity of implementation, of the very broad feedback experience available on a broad range thickness and very varied applications, with more than 1800 agents of control certified in activity in industry.

The COFREND recommended the experimentation of the proposals resulting from the working groups for a duration of one to two years

This work constituted a tool of the prevention, and a point stage of the practice of the industrial x-ray inspection.

For the evolution of radiation protection radiation, we tried to increase the integration of the Social, Organisational and Human aspects. For the future, it relies on each actor of the process to make this work sustainable to allow all, including the industrialists working in very diverse sectors, to have an identical level standard, in providing them the essential tools to exercise their responsibilities.