

DOSIMETRIC OPTIMISATION OF WORKSITE INVOLVING THE INSTALLATION OF VATS CONTAINING HIGHLY ACTIVE EFFLUENT

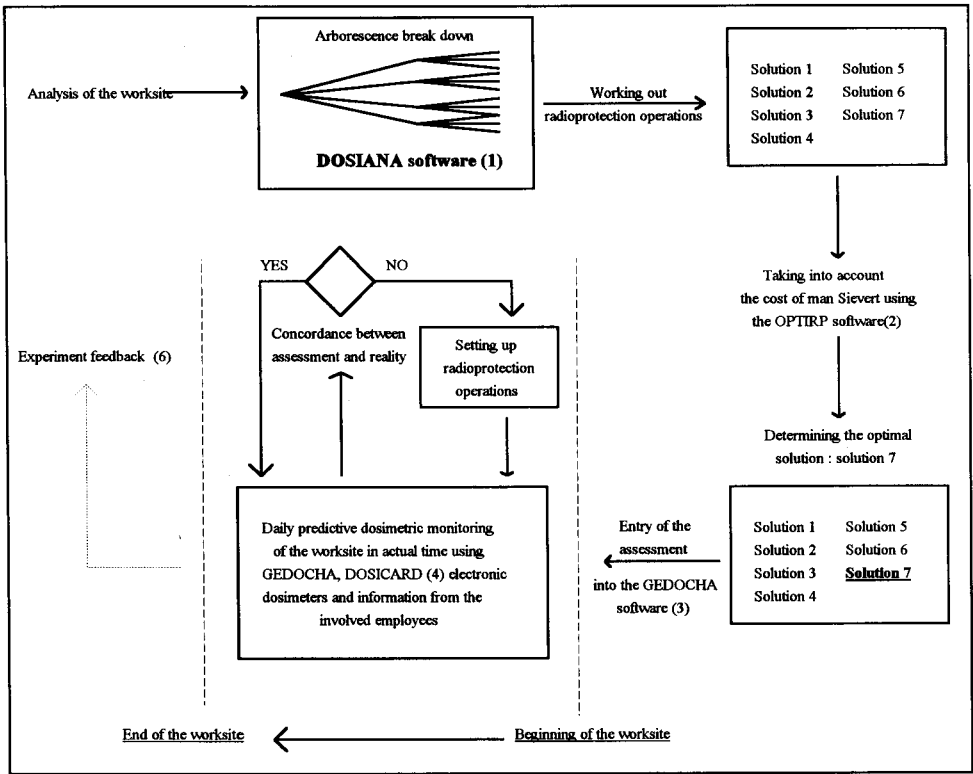
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Introduction

Within the framework of safety improvements at the CEA, CEA-FAR, concerned to formalize the ALARA initiative, has carried out for information and training purpose and to create awareness a dosimetric assessment of the worksite where new storage vats for highly active effluents are to be installed.

This study has led to the following organizational chart:



The numbers in brackets relate to the following informations

(1) DOSIANA software

This software developed by the Centre d'Etude sur l'Evaluation de la Protection dans le domaine Nucléaire (CEPN) (Center for the study of Safety assessment in the Nuclear Field), allows to create with the help of data collected on site, an arborescence specific to the worksite by capturing the values which constitute each elementary task, that is :

- lenght of time
- received dose
- number of employees involved in this task
- working outfit
- category of worker

The second stage was to study the radioprotection operations likely to reduce the doses received by the various employees.

After ruling out a number of financially unfeasable solutions such as robotization, seven propositions was retained.

(2) Cost of man.Sievert

Seven propositions, each modifying the initial arborescence, were made to compete with each other.

The optimization was carried out by considering the cost of man.Sievert according to the following criteria :

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- 100 \$ per man.Sievert for the employees having received doses between 1 and 5 mSv
- 1400 \$ per man.Sievert for the employees having received doses between 5 and 30 mSv

The OPTIRP software of the CEPN brought out the unquestionable superiority of the seventh solution. This arrangement involves the highest investment expenditure but reduces dramatically the operation cost due to faster and more effective work resulting in a 16,1 % saving in collective dose as well as financial saving.

(3) GEDOCHA software

The Service for the Protection against Radiation has developed the GEDOCHA software under Windows environment (GEstion DOSimétrique des Chantiers de Haute Activité : Dosimetric Management of Highly Active Worksites) allowing to establish from the capture of the received doses, of the hours'work and the identity of the employee a series of statistics and indicators in connection with the assessment.

The software indicates (in phasis, sub-phasis and elementary task) the received dose at time t with respect to the estimated overall dose, as well as the amount of hours's work with respect to the estimated overall length of time. A simple indicator is given :

$$\left(\frac{\text{Number of hours' work}}{\text{Estimated amount of hours}} - \frac{\text{Received dose}}{\text{Estimated dose}} \right) \times 100$$

This indicator is predictive. Indeed, it doesn't reflect an established fact, but an inadequation between assessment and reality in the event the worksite went on operating under the same conditions.

Positive, this indicator shows that the assessment over estimated the dose (or underestimated the amount of hours); negative, it shows the the assessment underestimated the dose (or overestimated the amount of hours). Therefore, these indicators allow to make radioprotection measurements while work is in progress in order to fulfil dosimetric objectives.

(4) DOSICARD electronic dosimeter

Each employee was given an electronic dosimeter (DOSICARD from NOMATEK) able to memorize the daily doses over a three month period and equipped with an alarm indicating trespassing of the limit. These wear-resistant devices, the size of a credit card, measure reliable doses at the microsievert level.

(5) Information of employees

Any radioprotection measurement involves providing information to all employees, with different skills and coming from various companies.

In order to do this a function for issuing daily "Computerized monitoring cards" was included in the GEDOCHA software. These cards tell the employee working in the frame of an elementary task the maximal dose to be received in order to fulfil the dosimetric objectives. Associated to the dosimetric measurement badge with digital reading and to trespass limit in the badge, reset each day for this objective, the computerized monitoring card increases each employee's awareness of the importance of radioprotection on such worksites.

(6) Experiment feedback

The experimental feedback highlighted various important points :

- the deep involvement of the Radiation Protection Department of CEA/FAR combined to computerized monitoring and a reliable measurement system allows detailed knowledge in actual time of the work in progress as well as an extremely accurate historical analysis.
- the most difficult parameter to assess remains the estimated amount of hour's work. Therefore improvement of the program consisted in adding a menu allowing easily such modification.

Conclusion

The approach used for this worksite is global. Technics used were all complementary, ensuring constant elaboration, expemriment follow-up and feedback of a worksite at a relatively low dosimetric cost (an estimated 36 men.mSv brought down to 30 men.mSv through implementation of the ALARA principle)

This type of global conception of radioprotection involving all the employees (head of project, project managers, companies, radioprotection employees...) which today proves its worth on a modest worksite must now be extended to worksites of a broader scope (several hundreds of men.mSv) where fulfilment of the dosimetric objectives is a major stake.