

# **NORM industrial plants with potential radiological impact on workers and local population: first lessons from the review of available risk assessment studies in France**

CAZALA C.<sup>(1)</sup>, LORiot G.<sup>(1)</sup>, PIRES N.<sup>(1)</sup>, DOURSOUT T.<sup>(1)</sup>, MATOUK F.<sup>(2)</sup>, RANNOU A.<sup>(1)</sup>, CESSAC B.<sup>(1)</sup>, DESPRES A.<sup>(1)</sup>

<sup>(1)</sup> *Institute for Radiological Protection and Nuclear Safety (IRSN), BP n°17, 92262 Fontenay-aux-Roses, France*

<sup>(2)</sup> *Nuclear Safety Authority (ASN), 6 place du Colonel Bourgoin, 75572 Paris Cedex 12, France*

## **INTRODUCTION**

Some industrial activities such as ceramic production, coal combustion in power plants or mining and ore processing for the production of metals (tin, aluminium, ...) involve the use of materials, usually regarded as non-radioactive but which contain naturally occurring radionuclides (NORM). Working with these raw materials or storing them can lead to a significant increase in the exposure of workers and members of the public. According to the council Directive 96/29 Euratom, this matter must be considered from the radiological protection point of view. The French approach and the first feedback are presented hereafter.

## **REGULATION**

The European Commission Directive concerning the handling of naturally radioactive materials was transposed in French regulations by two decrees (n°2002-460 of April 4, 2002 and n° 2003-296 of March 31, 2003) and by the Ministerial order of May 25, 2005. The latter sets a list of ten industries concerned by such a handling and imposes on the operators to assess the effective doses received by workers and populations. French authorities asked IRSN to evaluate the methods adopted by some operators for assessing these doses and to draw the first conclusions in terms of radiological protection. On the basis of this review, the list of the industries concerned may be reviewed either by addition or by deletion.

## **AN INTERPRETATIVE FRAMEWORK**

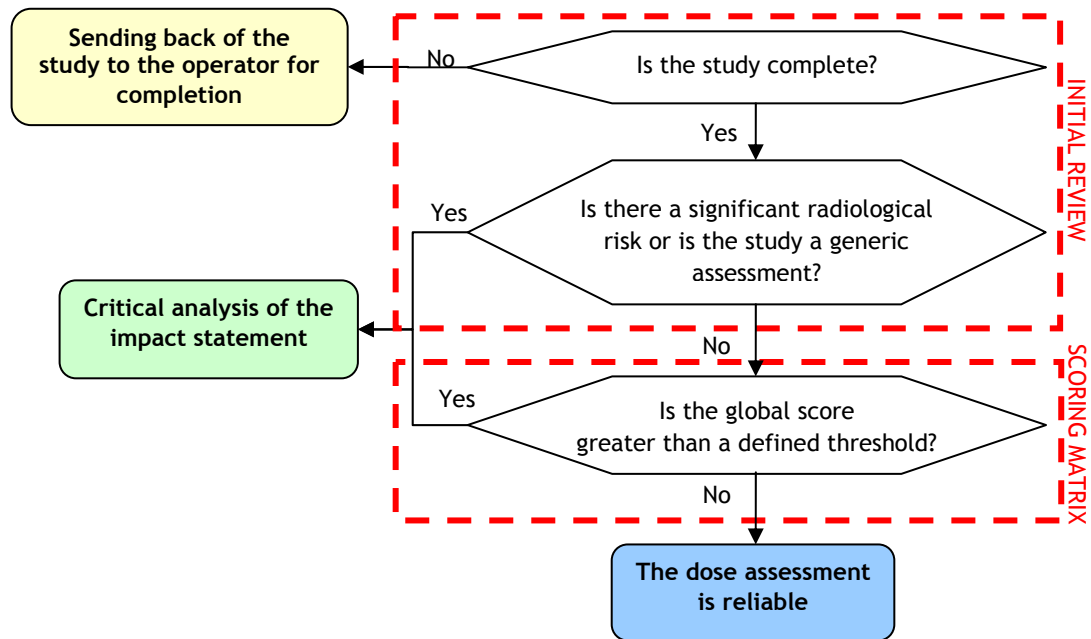
To help the regional representatives of French public authorities in their analyse of the studies carried out by the operators in application of the French Ministerial order of May 25, 2005, IRSN has set up an interpretative framework. This tool intends to evaluate the quality and the comprehensiveness of these studies and to highlight industrial activities where potential radiological protection concerns could be faced regarding occupational or public exposure.

This tool is designed in two steps as described in the figure 1:

- First step: it is an initial review of the study in order to determine either if it is complete, if effective doses calculated by the operator are significant or if the study is a generic assessment. At the end of this step, either the study will be sent back to the operator to be complemented, or a critical analysis of the study will be performed or the approach will be continued into the second step.
- Second step: a scoring matrix is applied in order to link exposure and hazards. The aim is to score :

- the quality of the dose assessments presented by operators (descriptions of the physical and chemical forms of materials, of the radiological characterizations, of the exposure pathways, ...),
- the effective dose levels.

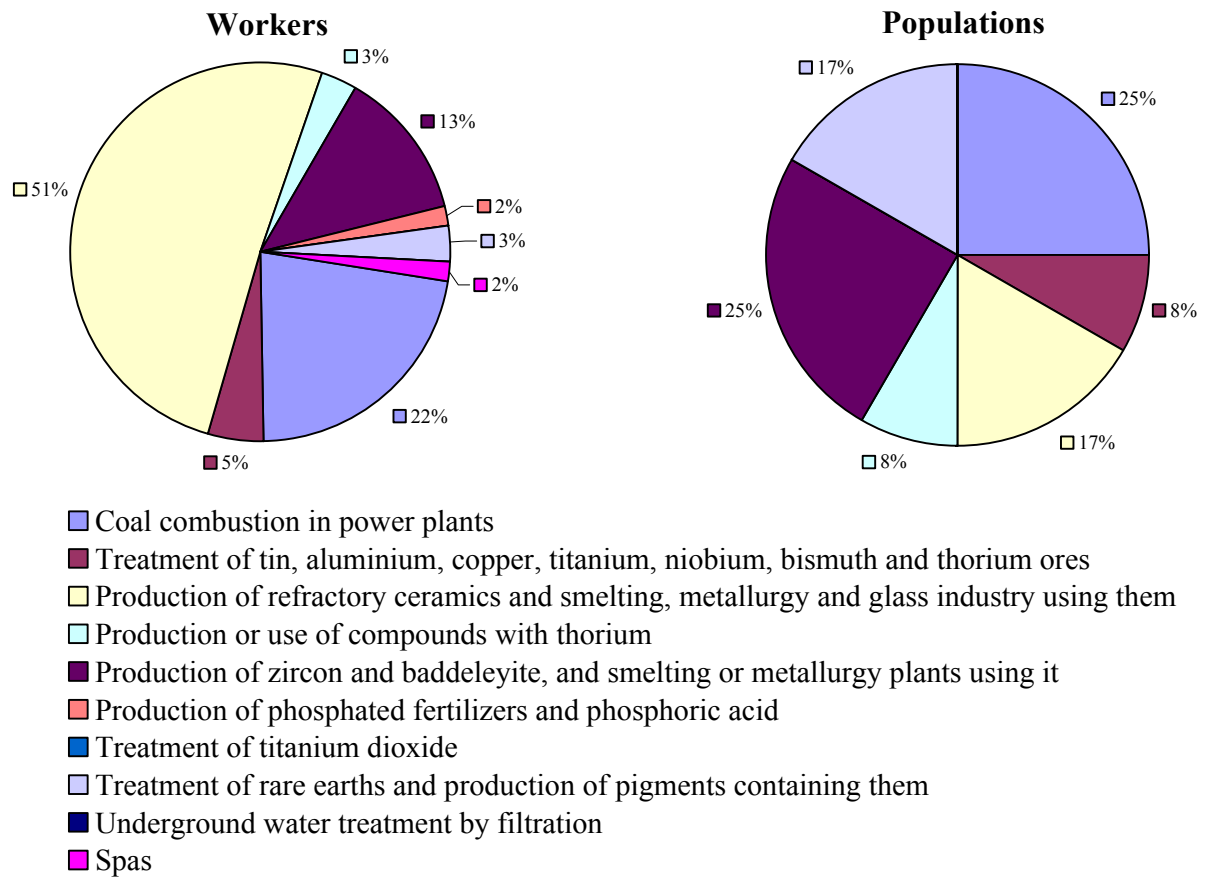
When the score is greater than a defined threshold, the study needs a careful examination and a critical analysis. Otherwise, the assessment is considered to show no significant radiological protection issue and to need no further examination within the general review process.



**Fig. 1:** Logical diagram of the interpretative framework

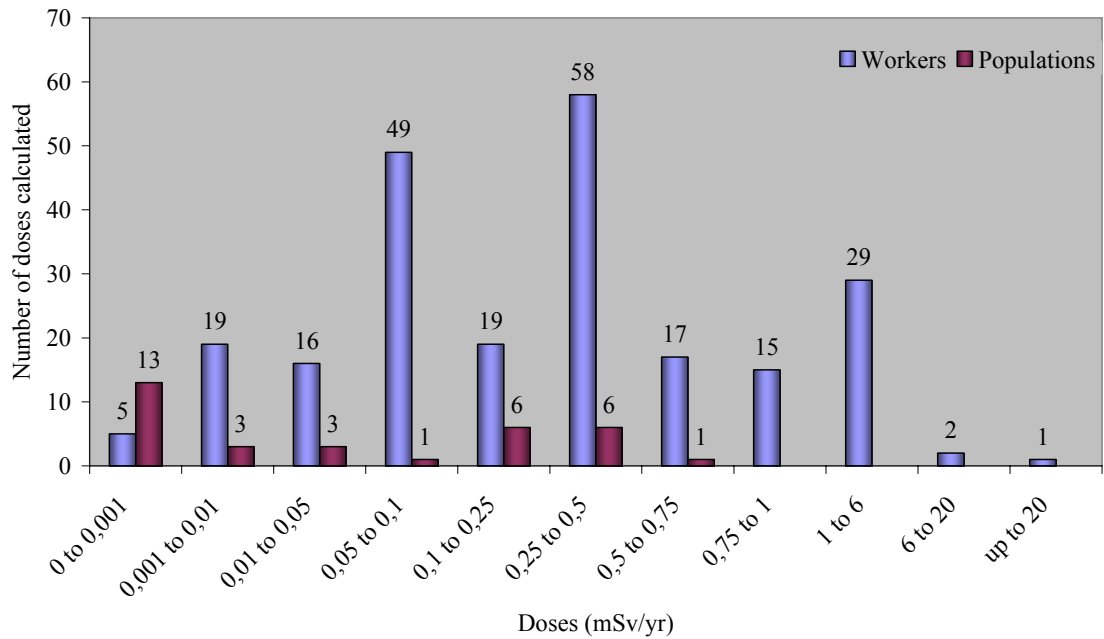
## FRENCH FEEDBACK

Since the publication of the French Ministerial order of May 25, 2005, IRSN has received sixty-six studies which deal with eight types of industrial facilities. The majority of the studies (sixty-three studies) deals with workers exposure and only twelve studies deal with populations exposure. Figure 2 shows the breakdown of studies by the different kinds of industrial facilities.



**Fig. 2:** Breakdown of studies by the different kinds of industry

Figure 3 shows the distribution of the doses calculated by the operators. For workers, half of the doses calculated is less than 0,25 mSv per year and 86% of the doses calculated is less than 1 mSv per year, the limit for non exposed workers. For populations, half of the doses calculated is less than 10  $\mu$ Sv per year and all of these are less than 1 mSv per year, the limit for populations exposure.



**Fig. 3:** Distribution of the effective doses calculated by the operators for workers and populations

## CONCLUSION

Based on the recent feedback gained by IRSN and French authorities on the studies conducted by operators, the following conclusions can be drawn:

- assessments are still expected for some industries concerned by the French Ministerial order of May 25, 2005;
- the assessments on populations are often unconsidered;
- about 15% of calculated doses for workers are greater than the limit of 1 mSv per year and need a further examination;

Nevertheless, even if the usefulness of the tool is demonstrated, users have to keep in mind that this interpretative framework is not devoted to replace a critical analysis of the studies but only to identify those which require a specific attention such as studies with a dose greater than 1 mSv per year.

## REFERENCES

Council Directive 96/29/Euratom of 13 may 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation

Decree n° 2002-460 of April 4, 2002 relative to the radiation protection of the population

Decree n° 2003-296 of March 31, 2003 relative to the radiation protection of workers

Ministerial order of May 25, 2005 about activities using NORM not used because of their radioactive properties