Report from a French incident

## Historical thorium contamination in a research facility

### Description of the incident

For several years, a research centre used thorium for the synthesis of new materials; this work ceased over 10 years ago. The room where the thorium was handled was adjacent to a site formerly intended for storage and recently renovated into an office.

A film dosimeter, present 24/7 in this office, twice registered a quarterly dose of 3.5 mSv. A survey requested by the regulatory authorities helped to determine the origin of this exposure. Thorium deposits had accumulated over the several years of operation in the laboratory's sewage disposal pipes (the laboratory had no specific radioactive effluent pipeline) – and this constituted the main radiation source responsible for the recorded doses. A more thorough search revealed significant contamination of workbenches, fume chambers, kilns and pipes.

The following actions were taken :

- The laboratory was closed and sealed immediately, with any remedial measures being subject to authorization.
- A decontamination operation was conducted by a specialized company.
- Information was distributed to laboratory personnel and to qualified persons in charge of radiation protection in the neighboring laboratories.
- The technical personnel working in the facilities received specific training regarding chemical and radiological risks.

### Radiological consequences

- The radiological consequences are mainly associated with the contamination of premises and pipes. The bioassay tests performed on several staff members that potentially could have been contaminated were revealed to be negative.
- During the decontamination, no airborne contamination was detected.
- The volume of waste produced by the decontamination work was twenty 200-litre drums.

It is reminded that there is no difference between an artificial or natural alpha particle nor between artificial or natural gamma radiation; in addition, natural radioelements may have long filiations, giving birth to radioelements of varying nature and period. On an average, people receive an annual dose of 2.4 mSv of natural exposure.

### Lessons to be learned from the incident

The use of natural radioactive materials such as thorium, even where this does not require particular authorization, can be as dangerous as that of artificial radioelements. The radiation protection precautions are the same, and it is appropriate to educate the users to the radiation risks.

Tight controls are required when working with dispersible radioactive materials, and in this case years of bad laboratory practice resulted in significant levels of radioactive contamination. Regular contamination monitoring is an essential control to avoid the accumulation of activity.
In addition there is a substantial financial cost; in this case, the costs of decontamination were estimated to be €200,000.

It is important to find and retain information on older facilities that may have changed use many years ago, but still have a legacy of radiation risks.

An initial survey of the radiological conditons should be carried out before starting any practice. Subsequent surveys would then have a better relevance.

A specific pipeline for contaminated liquid effluents should be used to collect all of this waste in a decay tank. This pipe should be checked regularly.