

## Cetama working group n°10 contributions on sampling and radiological characterisation

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Cetama working group n°10 is dedicated to sampling and characterisation. Through regular meetings (two or three by year), French feedback experience, good practices and innovations on these two topics are shared and discussed among all stakeholders, but the safety authority.

A resulting contribution from this collaborative work is the production of several reports, in French and in English, to synthesize and promote corresponding methodology for the radiological characterisation of soils and building structures.

In addition, side topics are also embedded, mainly thanks to presentations during meetings, for instance groundwater monitoring, radiological inventory of activated graphite and concrete, asbestos, background levels, scaling factors...

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### Introduction

CETAMA is a major contributor in France for the validation and promotion of laboratory techniques (reference samples, inter-laboratory comparison...) through dedicated working groups. On a regular basis the half of the 30 groups are active and slowly rotated.

Working group n°10 (WG10) is one of the transversal groups (not dedicated to a specific laboratory technique) and deals with sampling and characterisation issues. After several years of official dormancy, but not technical one as background work was still done in other groups (WG27 in particular), it has been re-activated in 2012 with a lot of projects around three main themes:

- Characterisation of contaminated soils and building structures
- Sampling in laboratory
- Process and in-line sampling

Indeed, the French regulatory framework focuses more on final radiological state (Guides 14 and 24 from ASN) while operators needs are concentrated on the proper determination of the initial radiological state as it has huge consequences on dismantling and remediation scenarios, planning, budget and waste management.

CETAMA WG10 benefits from a permanent secretariat and a presidency. It is then structured in 3 sub-groups to tackle more efficiently the 3 identified themes. Thematic and plenary meetings are organized two or three times a year. Generally, between 15 and 20 persons attend these meetings in Paris, Lyon and Marcoule. More than 100 persons have participated at least once and belongs to the diffusion list. The audience is interestingly constituted representatives from all major nuclear organizations in France, as well as industrial companies, consultants and experts.

### Contributions to sampling and characterisation

The sub-group dedicated to the characterisation of radiological contaminations initially started its work with soils by combining best measuring and sampling techniques with best data analysis tools. The proper use of geostatistical and statistical approaches is clearly specified, respectively for initial and final radiological states. A resulting guide has been produced in French and in English in 2014 (1).

As most of the needs are now for decommissioning and dismantling projects, the work has been extended to the characterisation of building structures (mainly concrete). One of the main outputs is the optimization of the sampling effort in accordance to the uncertainties of estimated waste volumes. This work has been summarized in a second guide dedicated to the characterisation of nuclear facility and

issued in 2016 (2).

Both documents are strongly based on real application cases as errors and difficulties from these past projects are generally the best inputs for the optimization of the overall methodology.

This sub-group has a strong link and serves as technical support for the ISO working group 13 (Committee TC 85, Nuclear energy, nuclear technologies, and radiological protection, Sub-committee SC 5, Nuclear fuel cycle). The result is an ISO standard 18 557 entitled “Characterisation principles for soils, buildings and infrastructures contaminated by radionuclides, for remediation purposes” that was published officially in October 2017

The sub-group dedicated to laboratory sampling discussed related topics according to sample nature (matrix (metal, concrete, liquid...), initial size, mass...), type of contaminant (radiological and/or chemical), homogeneity or spatial distribution of contamination (unfixed, surface, bulk) and global sampling objectives. Whatever the sample type, representativeness and adapted characterisation are the key issues in laboratory.

This CETAMA WG10 also was the basis for the organization of a 5-year frequency conference on sampling and characterisation in Montpellier (4). The last one was held in 2015, gathered 120 participants from France and abroad, and was very successful with 3 days of high level presentations, interactive workshop, industrial exhibition and innovation posters.

### **Difficulties and perspectives**

The major interest of this WG is to bring together experts from various fields to deal with common issues. This gives rise to fruitful discussions in which everyone has been involved. However, as these specialists are not fully available writing guidelines, standardization is a time-consuming task that requires adequate resources. It is therefore necessary to spread over times publication of documents.

“On-line sampling”, remains also a topic of concern of this WG focused mainly on process monitoring. Greater emphasis will be given in the near future depending on issue prioritizations and potential expert contributions.

As for perspectives, they cover a large range of aspects that have been once presented during a meeting or only identified for additional developments. In particular, indirect measurements such as autoradiography, gamma screening and so on are promising as quick, reactive and in situ techniques. Another point concerns sampling and management (transport and laboratory) of highly radioactive samples. A dedicated guide for high level sampling and characterisation may be required. In addition, the combination of samples and numerical models (activation, flow and transport...) is to be deeperly investigated to improve the radiological characterisation (graphite, activated concrete, groundwater monitoring) and optimize the sampling strategy.

### **Conclusion**

In addition to exchange meetings and technical report production, Cetama working group n°10 tries to identify and anticipate future needs and promote innovative techniques in the field of sampling and radiological characterisation. Indeed, remediation projects as well as decommissioning projects will significantly in the coming decades and industrial operators are lacking a sound methodological framework and good practice sharing, for the benefit of the whole nuclear industry (closing the loop).

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