

GUIDANCE TO RADIOACTIVE CONTAMINATION MEASUREMENTS IN HEALTH AND RESEARCH INSTALLATION

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1 INTRODUCTION

The detection of radioactive contamination is an important technologic task in the development of Radiation Protection. It is necessary to devise monitoring techniques that allow checking the contamination in the working areas and the exposure workers. These must establish the measurement types, the frequency, the reference levels and, furthermore, the applied procedures in case of finding contaminations. The legislation establish the necessity to carry out the radioactive contamination measurements to reduce these risks. Several technical documents proposing recommendations to apply procedures regarding the control of the contamination are available. However, a systematic in the measurement methods does not exist and, on the other hand, there are no Action and Register Values of common application. This fact motivated the Sociedad Española de Protección Radiológica (SEPR) to organize a course of Radioactive Contamination Measurements in Health and Research and Education installations. The technical knowledge and the practical issues shown in this course have been collected in a technical guide published by the SEPR[1]



2 OBJETIVE

To harmonize the different measurement procedures of the contamination in the radioactive installations which belong to the indicated fields, proposing common criteria that facilitate training and guidelines in relation with this practice to the Radiation Protection workers of these installations

3 DEVELOPMENT

PREVENTION

Situations that could increase the contamination probability have been identified. Prevention and protection criteria are suggested to avoid the radioactive material diffusion aiming to reduce the contamination incidence. The different stages of the operation installation, have been taken into account

MEASUREMENT PROCEDURES

This Guide shows the procedures that allow to verify in an experimental manner and, with the necessary frequency, that the contamination levels are within the established limits

The qualified expert writers of this Guide have reached a consensus regarding these procedures

Items developed:

- ✓ Monitoring equipment and procedures used to quantify surface contamination
- ✓ Leak test of sealed sources
- ✓ Airborne contamination measurements carried out in scenarios with volatile compounds
- ✓ Measurement procedures applied to internal and external personnel contamination

The necessary methods to estimate the derived dose of possible contaminations and perform the subsequent analysis of the obtained results are proposed

REFERENCE LEVELS

The reference levels proposed are based on the committed effective dose and this Guide has considered the following:

- ✓ Recording level: 1mSv/year
- ✓ Investigation level: 5 mSv/year

In order to suggest the reference level for surface contamination for the radiological work areas and body surface, this Guide has used the Derived Surface Contamination Limit (LDCS). It is defined as the maximum amount of surface activity to avoid exceeding the maximum annual occupational exposures limits. The LDCS proposed in table 1 are based on data recommended by IAEA and NRPB

RADIOLOGICAL AREA	RADIOISOTOPES CLASS A	RADIOISOTOPES CLASS B	RADIOISOTOPES CLASS C
Controlled	30 Bq/cm ²	300 Bq/cm ²	3000 Bq/cm ²
Body surface	3 Bq/cm ²	30 Bq/cm ²	300 Bq/cm ²
Supervised	3 Bq/cm ²	30 Bq/cm ²	300 Bq/cm ²

Table 1: Proposal LDCS for radioactive installations scientific and medical

Recording level of surface contamination:

In research radioactive installations 5% of LCDS for the corresponding radionuclide is applied. However, in medical installations 10% of LCDS is suggested taking into account that the probability of radioactive material dispersion is higher.

Investigation level of surface contamination:

The value corresponding to the 25% of LCDS of each radionuclide is applied.

RADIOLOGICAL AREA	RADIOISOTOPES CLASS A		RADIOISOTOPES CLASS B		RADIOISOTOPES CLASS C	
	Recording	Investigation	Recording	Investigation	Recording	Investigation
Controlled	1,5 Bq/cm ²	7,5 Bq/cm ²	15 Bq/cm ²	75 Bq/cm ²	150 Bq/cm ²	750 Bq/cm ²
Body surface	0,15 Bq/cm ²	0,75 Bq/cm ²	1,5 Bq/cm ²	7,5 Bq/cm ²	15 Bq/cm ²	75 Bq/cm ²
Supervised	0,15 Bq/cm ²	0,75 Bq/cm ²	1,5 Bq/cm ²	7,5 Bq/cm ²	15 Bq/cm ²	75 Bq/cm ²

Table 2: Proposal of Recording and Investigation level of surface contamination

4 CONCLUSIONS

- ✓ The measurement procedures shown in this Guide provide to the Radiological Protection professionals useful information advising of the most adequate procedure for each situation and the best manner to apply them
- ✓ This Guide suggests the common application of the Reference Levels proposed for the different contamination measurements.
- ✓ This fact may allow to assess the protection measurements and the radiological operational programme applied, and to optimize the Radiation Protection.
- ✓ The analysis of different Reference Levels proposed for the evaluated parameters in this Guide, demonstrates an important advance in achieving the harmonization of this practice

5 REFERENCES

1. Gilarranz R., Macías MT., Martínez A., Navarro T., Plaza R., Rueda C., Sánchez A., Usera F. 2010. Guía de medidas de contaminación radiactiva en instalaciones de centros de investigación y ámbito sanitario. SEPR Sociedad Española de protección Radiológica.