

# Radiation Dosimetry of Laboratory Practices based on Radiotracers Techniques

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## 1. Introduction

### 1.1: Background

Practices in which radiation is justified to be used require high safety and radiation protection principles implementations such as ALARA. This paper described radiation protection and safety principles implemented during radiotracer industrial applications laboratory experiments. The poster shows some monitoring results conducted.

### 1.2: Objective.

□ The main objective of this work is to optimize the level of radiation exposure in laboratory work related to radiotracer industrial applications by setting and implementing a suitable radiation protection program complying national regulations and international standards.

## 2. Materials and Methods

The following safety materials and equipments were used:

- Two Survey meter (RDS-30).
- Four direct reading personal dosimeter (RAD-60s).
- Syringe shields
- Lead block barrier.
- Shielded containers for liquid and aqueous radiotracers.

The laboratory area was divided into three regions, control, supervision and public area. The controlled area was totally covered with a plastic sheet to avoid possible floor contamination which might result in due to improper injection . Lead shielding was used during elution and injection of radiotracer to minimize radiation exposure figure 1.



Figure 1: Work place and lead shielding materials

Table 1: work place monitoring after radiotracer injection

Monitored area	Dose rates $\mu\text{Sv/h}$					Average dose rate $\mu\text{Sv/h}$
Controlled	4.57	4.44	4.00	3.93	3.52	4.09
Supervision	0.90	0.89	0.84	0.76	0.75	0.83
Public and surroundings	0.17	0.16	0.12	0.11	0.09	0.13

Table (2): Equivalent dose received by radiation workers and audience during radiotracer practices

Role of radiation worker	Effective dose received $\mu\text{Sv}$
Preparing radiotracer	4.0
Preparing and injecting radiotracer	7.0
Acquisition of data	3.0
RPO	3.0
Viewer (public)	0.0

## 4. Conclusion

All readings of dose rates for area monitoring (controlled, supervision and public area) 3.52, 0.75 and 0.09  $\mu\text{Sv/h}$ ) and the effective doses of personnel (4.0, 7.0 3.0 and 0.0  $\mu\text{Sv/h}$ ) were found to be within the permissible dose rate limit.

Radiation workers using Tc-99m 1mCi, can perform up to three practices per day for their effective dose to be within the permissible dose limits.

## 5. References

- 1) Safety Reports Series No. 423/ Radiotracer Application in Industry-A guidebook, IAEA, 2004.
- 2) SAEC act, 1996.
- 3) Radionuclide Safety Data Sheets, Occupational Safety & Environmental Health OSEH, [www.oseh.umich.edu/radiation/tc99m.shtml](http://www.oseh.umich.edu/radiation/tc99m.shtml).
- 4) SAEC-NDT| IIT Division, Radiation Safety Procedure in Industrial Radiotracer Applications

## 3. Results

The results of work place and radiation workers monitoring are shown in table 1 and 2.