SnT 2025 8 SEPTEMBER ONLINE DAY 9 TO 12 SEPTEMBER AT HOFBURG PALACE, VIENNA & ONLINE
CTBT: SCIENCE AND TECHNOLOGY CONFERENCE

Radiation protection in On-Site Inspections (OSI)

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CTBTO PREPARATORY COMMISSION | PUTTING AN END TO NUCLEAR EXPLOSIONS

INTRODUCTION AND MAIN RESULTS

A nuclear weapon explosion emitted radioactive contamination into the environment. The Comprehensive Nuclear-Test-Ban Treaty (CTBTO) in paragraph 69 of the protocol on “Inspection Activities and Techniques” refers to the tests that must be collected as evidence to prove the origin of the explosion. These samples are collected in a radiologically contaminated area with the risk to inspectors’ health. On-site inspectors have to know the risk for their health and how to avoid the radiation exposure. To develop procedures, to know tools in order to reduce the radiation, how to monitor personal radiation and to train help to reduce risks of dose.

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Introduction

A nuclear weapon explosion emitted radioactive contamination into the environment. The Comprehensive Nuclear-Test-Ban Treaty (CTBTO) in paragraph 69 of the protocol on "Inspection Activities and Techniques" refers to the tests that must be collected as evidence to prove the origin of the explosion. These samples are collected in a radiologically contaminated area with the risk to inspectors' health.

The inspection team must be aware of the risk of the exposure to radiation and the consequences to their health. To know how to act in preventive, protective and corrective scenarios to avoid of ionizing radiation exposure must be an objective in on site inspections.

Method

There are three principles of Radiation Protection based in ICRP and IAEA guidelines:

Justification: Any practice must be justified, The benefit must outweigh the potential harm.

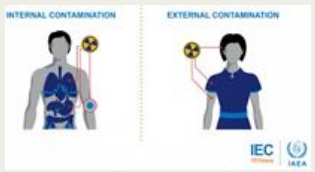
Optimization: Exposures should be kept at the lowest level feasible, As Low As Reasonably Achievable (ALARA principle).

Dose Limitation: Seek to avoid harmful health effects.

Ionizing radiation can be:

✓ **External irradiation** due to radioactive sources are outside the body.

✓ **Internal contamination** due to intake radioactive sources inside the body.



To work in radiologically contaminated areas needs to **radiological protection plan** and risk evaluation to reduce the inspectors' dose received due to ionizing radiation before the activity.

Personal dose must be control thought ionizing **radiation monitoring** of:

1. **External dose** is measured with effective dose (Sv) and can be measured through a **dosimeter**. There are two types:
   - *Passive* measures dose during a period of time.
   - *Active* measures dose rate and have alert signal when it is above the pre-assigned limit.

External irradiation can be reduce with ALARA tools:

- Reducing the **time** of irradiation
- Increasing **distance** with the source
- Using **shielding** for reduce the irradiation.

2. **Internal contamination** may be happened through inhalation, ingestion or wound. The magnitude is Effective Commitment Dose (Sv) and can be estimated from the scenario of intake and an individual monitoring of internal contamination. It is controlled **by in vivo measurements with body radioactivity counters** (γ and X rays) and **in vitro excreta analysis** in a radiochemical lab (α and β).

To avoid contamination is to use **Personal Protective Equipment (PPE),** to follow a right methodology in order to put on and take off to prevent intake contamination.

To develop ***procedures and methodologies to* reduce radiation exposure following ALARA** principle when the inspector is in the field, taking into account the dose rate and ***decontamination***. Consideration must be given to whether the exposure is external or internal, the dose rate, isotope, type of work, exposure time, distance to the source, and shielding.

For example: when the dose rate is above10 µSv/h, it needs to plan the activities in order to reduce the dose and number of inspectors, know the maximum time in the zone and if it is possible, to train the activity before, out of the contamination area.

Conclusions

CTBTO on-site inspectors have to know **how to protect of the radiation exposures** in the field in order to avoid the risk for their health:

- To develop **procedures to reduce the radiation exposure** and to **decontaminate** and follow them step by step.
- To **know tools in order to reduce the ionizing radiation exposure**
- To **monitor personal ionizing radiation**
- To **train these skills and tools** help to reduce risks of radiation dose.

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