



**HYGIENIC ASSESSMENT OF OCCUPATIONAL RADIATION
EXPOSURE OF INTEROSCOPE OPERATORS AT BORDER
CONTROL POINTS**

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Introduction

The use of X-ray interoscope systems has become an essential component of modern border security infrastructure. These devices are widely employed at airports, customs checkpoints, and postal terminals for the inspection of luggage, cargo, and vehicles. Although the radiation emitted by interoscope equipment is generally maintained within established safety standards, operators may be exposed to low-dose ionizing radiation for prolonged periods during their professional activities. Therefore, assessment of occupational exposure and hygienic evaluation of working conditions remain important aspects of radiation protection and occupational health [1,2].

Purpose of the Study

To evaluate radiation dose levels among personnel operating interoscope equipment at border control facilities and to assess occupational radiation safety conditions based on hygienic and dosimetric indicators.

Materials and Methods

The study was conducted at several border control facilities equipped with stationary X-ray interoscope systems. Radiation dose rate measurements



were performed using modern dosimetric instruments, including VeriFinder and Polimaster devices. Measurements were taken at operator workstations and surrounding areas of interoscope rooms. Occupational exposure indicators were analyzed and compared with current national radiation safety standards and hygienic regulations [3,4,5].

Results

The obtained results demonstrated that radiation dose rates in all investigated facilities ranged from 0.27 to 0.38 $\mu\text{Sv/h}$, which is significantly lower than the permissible occupational exposure limit. The highest value was recorded at the Urgench Airport Border Customs Post ($0.38 \pm 0.02 \mu\text{Sv/h}$), while the lowest value was observed at the Khorezm Regional Postal Terminal ($0.27 \pm 0.02 \mu\text{Sv/h}$).

Analysis of workplace conditions revealed that radiation exposure levels were highest in areas located closest to the interoscope operator console and scanning zone. Radiation intensity decreased substantially with increasing distance from the radiation source, confirming the effectiveness of distance as a protective factor. Annual occupational doses of personnel remained below regulatory limits, indicating a low level of radiation risk under existing working conditions.

At the same time, the study showed a gradual increase in the number of daily inspections during recent years, leading to increased workload and potentially higher cumulative occupational exposure. These findings emphasize the importance of continuous radiation monitoring and optimization of workplace organization.

Conclusion

The results of the study indicate that radiation conditions in interoscope rooms generally comply with current radiation safety requirements. Occupational exposure levels of interoscope operators remain within acceptable limits and do not pose a significant health risk. Nevertheless,





continuous dosimetric monitoring, improvement of workplace organization, optimization of working schedules, and implementation of preventive radiation protection measures are recommended to minimize long-term occupational exposure and maintain personnel health.

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