

IAEA Safety Report on Health Surveillance of Workers Exposed to Ionizing Radiation

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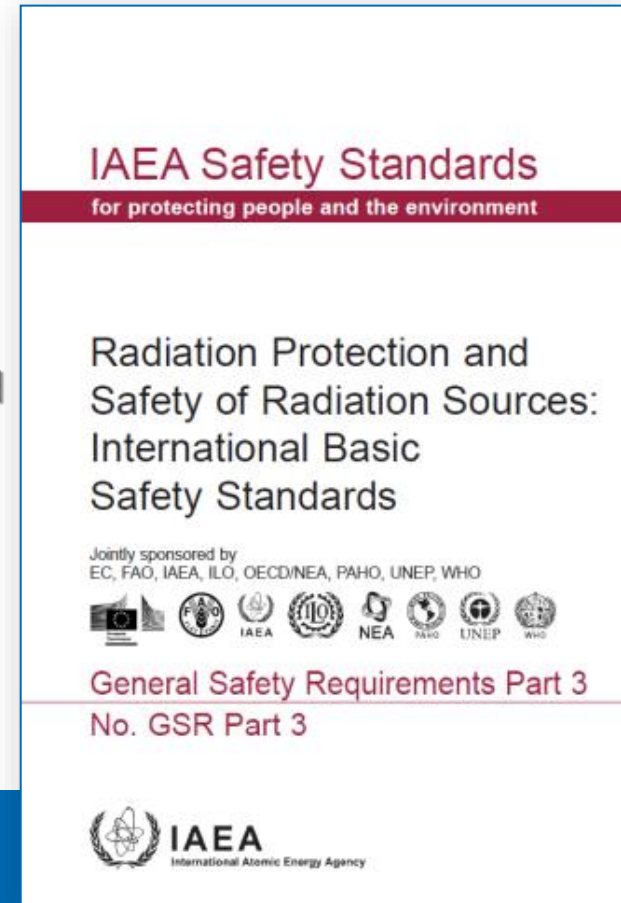


Outline

- ❑ Background, Objectives & Scope
- ❑ Structure of the report
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- ❑ Key Elements on Health Surveillance
- ❑ Summary & Key Actions

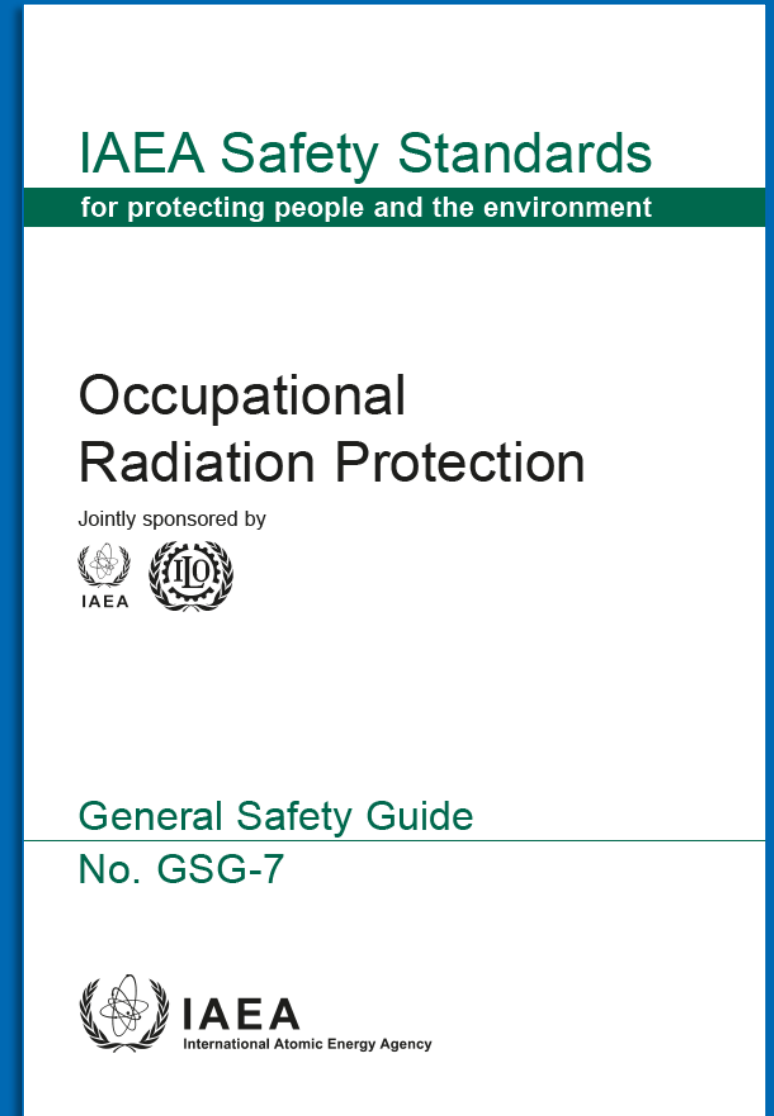
International Basic Safety Standards, GSR Part 3

- ❑ GSR Part 3 (BSS) follows ICRP 103 recommendations
- ❑ Protection and Safety requirements of the BSS apply to all facilities and activities
- ❑ Planned, existing and emergency exposure situations
- ❑ Occupational, public and medical exposure categories
- ❑ 52 overarching requirements – for governments, regulatory bodies, industry, health and safety professionals, workers, public and service providers such as technical support organizations
- ❑ 12 requirements for ORP; Control, monitoring and recording
- ❑ **Requirement 25: Assessment of occupational exposure and workers' health surveillance**



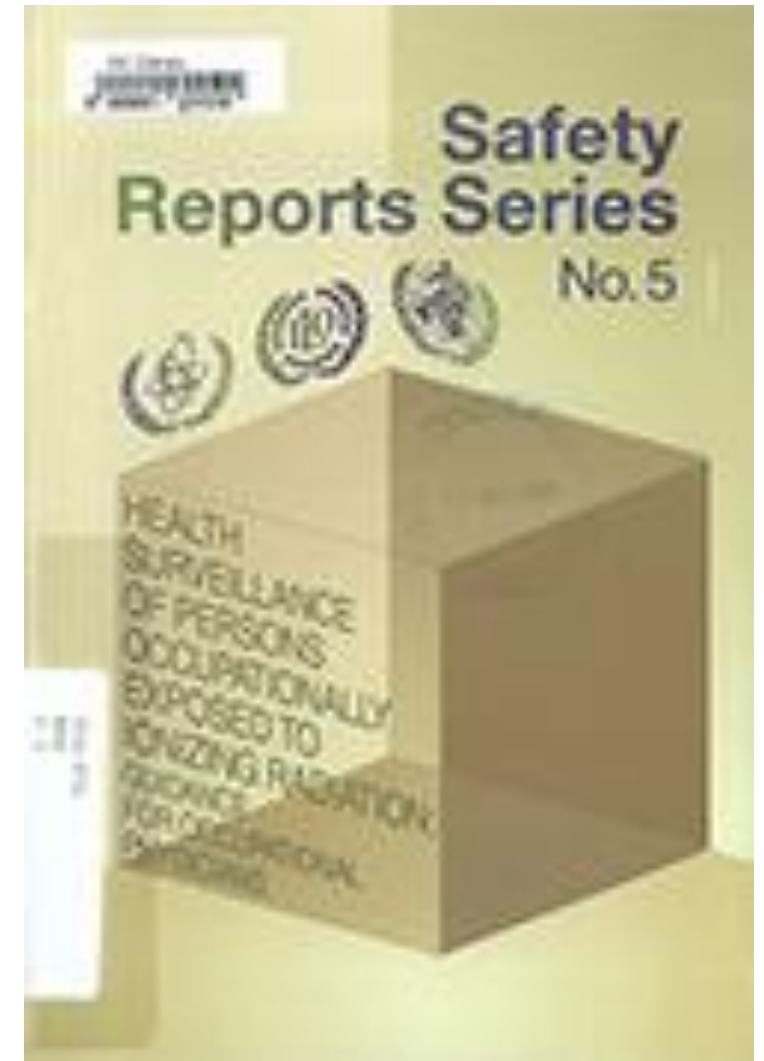
Safety Guide on ORP, GSG-7

- ❑ Supporting document to GSR Part 3
- ❑ Jointly developed by the IAEA and the ILO
- ❑ It is applicable to all areas concerning occupational exposure, including medicine, nuclear fuel cycle, industrial processes involving NORM, radiation application industries and scientific as well as educational facilities.
- ❑ **Chapter 10 WORKERS' HEALTH SURVEILLANCE**
 - Responsibilities
 - Programme for workers' health surveillance
 - Medical examination of workers
 - Notification of ailments and of overexposure



Limitations of the Existing Report on Health Surveillance

- ❑ The existing report from the IAEA:
 - Safety Reports Series, No. 5, Health Surveillance of Persons Occupationally Exposed to Ionizing Radiation: Guidance for Occupational Physicians
 - Published in 1998, jointly co-sponsored by the ILO and WHO
 - Multiple publications referred have been updated (UNSCEAR, ICRP, ILO)
 - The scope of the target audiences needs to be extended



Background & Drivers for Revision

❑ Updated Safety Standards :

- Alignment with IAEA GSR Part 3 and other supporting documents.

❑ Field Experience:

- ORPAS (Occupational Radiation Protection Appraisal Service) missions
- Highlighted the need for clearer guidance on program design

❑ Technological Advancements:

- Evolution of workplace practices and medical/industrial technologies.

Revision of the Safety Reports Series, No. 5, Health Surveillance

- ❑ Based on the updated Safety standards and international guidance
 - GSR Part 3, GSG-7 and other supporting documents.
 - Guidance from ILO and WHO
- ❑ Includes up-to-date scientific findings and experience
 - UNSCEAR reports
 - ICRP recommendations
 - Experience from Member states
- ❑ Expanded the scope of target audiences
 - Changed the title to “*Health Surveillance of Workers Exposed to Ionizing Radiation*”
 - Targets covering all stakeholders (employers, regulators, occupational physicians, RPOs, etc)
- ❑ Jointly co-sponsored by the ILO and WHO

Objectives & Scope

❑ Objectives:

- Provide guidance for employers, regulators, and occupational physicians to establish and implement health surveillance programs.

❑ Scope :

- Covers all workers occupationally exposed to ionizing radiation.
- Crucial Inclusion: Itinerant workers and subcontractors.
- Exclusion: Continuing medical care and follow-up during emergency exposure situations (covered by separate emergency response guidelines).

Structure of the Safety Report on Health Surveillance

1. Introduction
2. International safety standards and legal requirements
3. Background on radiation protection and health effects to be applied in workers' health surveillance
4. Radiation protection principles and concepts
5. Occupational exposure and radiation risk assessment
5. Radiation protection programme
7. Health surveillance programme and health records
8. Medical management of over exposed workers

References

Annex 1: Health effects of ionizing radiation

Annex 2: Examples of programmes on health surveillance of workers exposed to ionizing radiation and on management of over exposed workers

Key Information on Radiation Protection and Health Effects

- ❑ The roles of IAEA, ILO and WHO in Workers' health surveillance
- ❑ Principles of Radiation Protection
- ❑ Dose Limits, Constraints & Reference Levels
- ❑ Radiation Basics & Health Effects
 - Exposure Pathways
 - Deterministic (Tissue Reactions)
 - Stochastic
- ❑ Core elements of radiation protection programme

Global Occupational Exposure Status

- ❑ Global Scale: ~24 million workers exposed to natural or artificial radiation annually.
- ❑ Key Sector Levels (UNSCEAR 2020/21):
 - Natural Sources: Coal/Mineral mining (1.6 - 2.5 mSv/yr), Aircrew (2.7 mSv/yr)
 - Medical: Conventional radiology (0.4 mSv), Interventional radiology (0.6 mSv, high eye lens risk)
 - Industrial: Industrial radiography (1.1 mSv, highest accident risk)
 - Nuclear: Uranium mining (2.8 mSv), NPP operation (0.5 mSv)

Cancer & Non-Cancer Risk Assessment

❑ Epidemiological Evidence:

- INWORKS and atomic bomb survivor cohorts show a statistically significant positive correlation between cumulative dose and solid cancer mortality, even at low doses (0–100 mSv).

❑ Non-Cancer Effects:

- Moderate/high doses (>0.5 Gy) linked to cardiovascular diseases; low doses confirmed to cause lens opacities.

❑ Assigned Share (AS):

- Used to estimate the probability that a worker's cancer is attributable to occupational radiation exposure (crucial for compensation).

Health Surveillance: Purposes & Responsibilities

❑ Five Core Purposes:

1. Evaluate the effectiveness of workplace control measures.
2. Detect pre-clinical or clinical abnormalities early for timely intervention.
3. Prevent further deterioration of workers' health.
4. Promote and reinforce safe working practices.
5. Assess fitness for specific work tasks (Adapting work to the worker).

❑ Responsibilities

- Employers provide resources; Occupational Physicians provide independent medical assessments.

Implementation: Medical Examination Process

- ❑ Pre-employment / Pre-assignment: Establish baseline health data; identify contraindications.
- ❑ Periodic Examinations: Frequency depends on risk level (e.g., annually). Focus on:
 - Detailed occupational & exposure history.
 - Correlation of dosimetry data with clinical findings.
 - Targeted tests (e.g., CBC, eye lens, thyroid, pulmonary function).
- ❑ Exit / Post-assignment Examinations: Identify potential long-term health impairments.

Special Groups & Situations

- ❑ Pregnant & Breastfeeding Workers: Upon notification, adjust working conditions to ensure embryo/fetus dose does not exceed the public limit (1 mSv).
- ❑ Oncological Patients Returning to Work: No absolute contraindication. Requires case-by-case evaluation of tumor history, therapy, and job risks to avoid socioeconomic discrimination.
- ❑ Itinerant Workers & Subcontractors: Facility managers and contractors must clearly define responsibilities, ensuring equal protection standards and seamless dose record transfers.

Health Records & Confidentiality

- ❑ Record Content: Medical exams, dosimetry records, fitness conclusions, overexposure events.
- ❑ Retention Period: At least until the worker reaches age 75, and not less than 30 years after cessation of exposure.
- ❑ Confidentiality Principles:
 - Detailed medical data is strictly restricted to occupational health professionals.
 - Employers receive ONLY the "Fitness for Work" conclusion (Fit / Fit with restrictions / Unfit).

Medical Management of Overexposure (External)

❑ Initial Response:

- Verify dose (rule out dosimeter misuse); assess against thresholds.

❑ Above Limit but Below Deterministic Threshold:

- Medical counseling, biological dosimetry (e.g., chromosomal aberration analysis), discuss work adjustments.

❑ At or Above Deterministic Threshold:

- Immediate evacuation from the high-dose area.
- Record prodromal symptoms (nausea, vomiting, erythema) and exact onset times.
- Urgent referral to a designated radiation emergency hospital.

Contamination & Combined Injuries

❑ External Contamination:

- Prioritize life-threatening trauma. Once stable, remove clothing and decontaminate skin/wounds to prevent absorption.

❑ Internal Contamination:

- Collect and refrigerate excreta (urine/feces) for bioassay. Administer decorporation agents (e.g., chelators, stable iodine) early under expert guidance.

❑ Combined Injuries:

- Radiation injury + conventional trauma (burns, fractures).
- Rule: Life-saving conventional medical intervention ALWAYS takes priority over radiation decontamination.

Investigation, Communication & Return to Work

- ❑ Investigation: Physicians have to notify the employer and Radiation Protection Officer (RPO) to investigate root causes (e.g., protocol violations, equipment failure).
- ❑ Communication: Provide clear risk explanations and psychological counseling to the worker and family to eliminate unnecessary panic.
- ❑ Return to Work:
 - No return during the regulatory cooling-off period.
 - Requires full medical recovery and elimination of the root cause.
 - May involve reassignment or retraining.

Summary & Key Actions

- ❑ System Integration:
 - Health surveillance should be deeply integrated into the overall radiation protection program.
- ❑ Risk-Based Approach:
 - Medical exams should be tailored, personalized, and based on specific workplace risk assessments.
- ❑ Focus on High-Risk Areas:
 - Strengthen protection for interventional radiology, industrial radiography, itinerant workers, and pregnant staff.
- ❑ Emergency Preparedness:
 - Establish clear referral pathways to specialized hospitals and conduct regular drills for overexposure/contamination

Revision Process of the document

- ❑ Revision initiated in early of 2024
- ❑ Revision completed by the end of 2025, through
 - Two consultancy meetings (2024/2025)
 - External expert review (2025)
 - Review from ILO/WHO
- ❑ Publication process initiated in February 2026
 - Advanced Publication Advice (APA) completed, end of May 2026
 - To be sent to publication Committee for approval for publication
- ❑ Target date for publication:
 - Q4 2026 or Q1 2027
 - *Safety Report Series No. XX Health Surveillance of Workers Occupationally Exposed to Ionizing Radiation*



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THANK YOU

For further information, please contact to

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