



2600SEG270 RADIOLOGICAL PROTECTION MANUAL

1.0 PURPOSE

The purpose of this standard is to establish uniform hygiene and safety requirements to protect employees from ionizing radiation and preserve health at work sites where ionizing radiation constitutes a recognized hazard against human health by preventing events in which workers may be exposed to radiation levels above permissible limits, according to radiological protection standards.

2.0 BACKGROUND

N/A

3.0 SCOPE

This standard shall apply to all Panama Canal Authority (ACP) employees, contractors, and third parties who are in facilities, industrial shops, and areas under ACP responsibility.

4.0 LEGAL FOUNDATION

This standard is based on Resolutions No. 27 (October 24, 1995), No. 75 (October 28, 1997) “whereby Basic Radiological Protection Standard No. 110 is adopted,” and No. 76 “whereby regulations are approved for the planning, preparation, and response to radiological situations” of the Panama Ministry of Health (October 29, 1997), and IAEA, (International Atomic Energy Agency) Safety Series No. 115, and Agreement No. 12 of the Panama Canal Authority Hazard Control and Occupational Health Regulations, Chapter 1, Articles 8 and 17.

5.0 DEFINITIONS

5.1 Becquerel (Bq): Measurement unit of radioactive level decay or decline.

5.2 Curie (Ci): Basic measurement unit of radiation intensity.

5.3 Source: Radioactive substances and devices containing radioactive substances or substances that produce radiation, including consumer goods, sealed sources, uncovered sources, radiation generators, and mobile X-ray equipment.

5.4 Sievert (Sv): In the international unit system (SI), it is the new unit used to express exposure levels.

6.0 GENERAL

6.1 GENERAL REQUIREMENTS

6.1.1 The Panama Canal Authority, aware of the importance of preserving health at work sites and that ionizing radiation constitutes a recognized hazard against human health, shall not permit events that may expose its workers to radiation levels above those allowed under radiological protection standards.

6.1.2 At the current time, ACP does not maintain controlled areas or zones according to Decree No. 27 of October 10, 1995, of the Panama Ministry of Health whereby Standard No. 110 of the Basic Radiological Protection Standards is adopted. However, prior to procurement by ACP of any equipment with radioactive sources, it must be approved by the Industrial Hygiene Section, Safety Division, Safety and Environmental Department of the Panama Canal Authority, to ensure it has a sealed source that can be safely used. (see Appendix A).



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6.1.3 The Supervisor of the Safety and Industrial Hygiene Unit, is the Person in Charge of Radiological Protection (PICORP) in the ACP, and shall enforce compliance with the provisions of this document.

6.1.4 This document contains the radiation guidelines followed currently by ACP; however, it is subject to periodic revisions as necessary. All concerned parties shall be informed about any changes made to this document.

6.2 WORK PROCEDURES

6.2.1 Radiological Surveillance and Protection

6.2.1.1 The Safety and Industrial Hygiene Unit (RSHH) shall periodically evaluate the dose of annual maximum exposure allowed in accordance with International Commission on Radiological Protection (ICRP) standards.

6.2.1.2 Radiation exposure levels from the use of equipment with radioactive sources shall be below an effective dose of 20 mili Sievert per year over a period of five years, and may not exceed 50 mili Sievert in any given year, not including emergency cases. To this end, dosimeters or radiation level measuring equipment will be used to control exposure levels in accordance with Industrial Hygiene instructions (see Appendixes B and C).

6.2.1.3 Equipment with radioactive sources shall be checked annually by calibration and general evaluation. If for any reason surface levels from any radioactive source exceed 0.05 micro Curie (185 Bq/0.0111*10⁶ DPM), the equipment shall be immediately tagged and placed out of service. Damaged or out of service equipment shall be sent to the manufacturer (see Appendix D).

6.2.1.4 Surveillance of ACP operating areas shall be conducted by the Protection and Emergency Response Division (OPP), and access to these areas is prohibited to unauthorized personnel. Likewise, when justified, they shall not be allowed within a radius of less than 15 meters from instruments with sealed sources.

6.2.1.5 The Safety and Industrial Hygiene Unit shall approve the operating procedures of instruments with fixed sources, and enforce their compliance.

6.2.1.6 This manual also applies to any contractor using instruments containing radioactive sources, which should be registered with the Panama Ministry of Health. Registration and operation documents shall be kept available for the information of all personnel using such instruments.

6.2.2 Source Security

Radioactive sources and instruments containing such sources shall always be governed by security criteria, and the following shall apply to this effect:

6.2.2.1 Portable measurement instruments with sealed sources shall be kept under key, and access to them shall be controlled by the owner unit's responsible party. When in use, such instruments shall always be under the custody and surveillance of the operator.

6.2.2.2 Measurement instruments with sealed sources shall be under the custody of the party responsible for the equipment or for the facility where they are located.



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6.2.2.3 Removal from ACP facilities of any ACP equipment with a radioactive source shall be made taking into account equipment sensitivity; the required insurance policies against any loss shall be obtained, as well as the appropriate documentation regarding its change of custody.

6.2.2.4 Any missing or lost ACP radioactive source shall be reported to the Protection and Emergency Response Division (OPP) and the Safety and Industrial Hygiene Unit (RHS), in the manner established by each ACP owner of the radioactive source (see Appendix B).

6.3 ACTION IN CASE OF EMERGENCY

The Safety Control and Emergency Dispatch Center (CCSDE) of the Protection and Emergency Response Division (OPP) (119) shall be notified immediately in the event of any accident or incident involving a radioactive source. While such notification is being made, all areas shall be cordoned off in order to limit access to the essential personnel who will handle the emergency, and the unit emergency procedures shall be followed (see Appendixes E and F).

The staff of the Protection and Emergency Response Division (OPP/OPPD) shall take the pertinent action to control the situation.

6.4 MEDICAL EVALUATION

Employees who suffer excessive exposure according to the criteria of the Person In Charge of Radiological Protection shall be provided with annual medical observation during their entire employment with the ACP to detect any possible disorder due to radiation. Also, these employees shall undergo a final examination upon their separation from their employment with ACP.

6.5 DISPOSAL OF EQUIPMENT WITH RADIOACTIVE SOURCES

Equipment containing radioactive sources and is designated as "out of service" shall be returned to the manufacturer for its final disposal, as set forth in the Procurement Contract for said sources (see Appendix A), and the Industrial Hygiene Section shall be notified accordingly.

6.6 TRAINING

Employees exposed to radiation shall receive instruction on hazardous materials, the use of personal protection equipment, and the need for medical evaluation. This training shall be provided by Industrial Hygienists or other competent health staff. Supervisors may request this training by contacting the Manager, Industrial Hygiene Section.

6.7 RECORDKEEPING AND ACCESS TO DATA

6.7.1 The parties responsible for equipment with radioactive sources shall keep logs on the use of such equipment. The Safety and Industrial Hygiene Unit (RHS) shall keep radiation level monitoring records, including those on exposure levels during emergencies. It shall also keep a record of ACP equipment with radioactive sources, as well as logs for each instrument. In turn, the Occupational Health Division shall keep medical records on personnel occupationally exposed to radiation. Also, the Protection and Emergency Response Division (OPP/OPPD) shall keep records of responses to radiological emergencies.

6.7.2 All documentation shall be kept as specified in the ACP Records Retention Manual.



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- 6.7.2.1** The Occupational Health Division (HRH) shall keep records of examinations and analysis.
- 6.7.2.2** Units with radioactive sources shall keep records of the training provided to its employees.
- 6.7.2.3** RSHS shall keep the radiation monitoring records.
- 6.7.2.4** These records shall be made available to employees according to ACP regulations.

7.0 RESPONSIBILITIES

7.1 EMERGENCY AND CONTINGENCY MANAGEMENT DIVISION (MRE)

7.1.1 The Protection and Emergency Response Division (OPP/OPPD shall follow the provisions of the ACP Contingency Response Plan (Contingency Plan), and shall perform the pertinent rescue tasks and control the exposure levels of response personnel.

7.2 CANAL PROTECTION DIVISIÓN (ESC)

7.2.1. Once a call is received at the Safety and Emergency Dispatch Control Center (CCSDE), OPPD and RSHS shall be notified.

7.2.2 The isolation perimeter shall be cordoned off and persons or workers not involved in response tasks shall be kept away from the isolated perimeters according to the ACP Contingency Plan.

7.3 INDUSTRIAL HYGIENE SECTION (ESSI)

7.3.1 The Safety and Industrial Hygiene Unit (RSHS) shall evaluate radiation levels of sources that are not exempt, as well as their use or management. During emergency situations, ESSI shall evaluate the levels on the scene outside the initial isolation perimeter established by OPPD, to confirm that the rest of the workers or the public are not exposed to radiation levels above permissible limits.

7.3.2 In the event of an emergency involving a radioactive source, an instrument or cargo containing a radioactive source, or a missing or lost ACP radioactive source or waste, the Industrial Hygiene Section shall notify the National Disaster Management Department of (DENADE) of the Panama Social Security, and the *Salud Cero* unit of the Panama Ministry of Health.

7.3.3 The Supervisor of the Safety and Industrial Hygiene Unit (RSHS), shall be the Person in Charge of Radiological Protection within ACP, and shall enforce the provisions of this Manual.

7.4 CONTRACTING DIVISION (FAA)

FAA shall require that contractors using radioactive sources obtain all the certifications and permits required by the Panama Ministry of Health as well as the contractor Radiological Protection Manual for the source covered by the contract. The contractor manual shall be forwarded to the Safety and Industrial Hygiene Unit (RSHS) for its review.



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7.5 OPERATORS OF ACP EQUIPMENT WITH RADIOACTIVE SOURCES

7.5.1 Equipment operators shall inform the Safety and Industrial Hygiene Unit (RHSH) about any irregularity, loss, or circumstance that could have negative effects on the compliance with the provisions of this Manual (see MINDI Appendix).

7.5.2 Operators shall operate equipment with radioactive sources as specified in the manual for each instrument, and shall also keep a log on the use of each instrument.

7.6 Health, Wellness and Labor Welfare Unit (RHSS)

RHSS shall maintain the necessary medical controls on occupational exposure to ionizing radiation.

8.0 INQUIRIES

Any questions about the application of this procedure shall be referred to an Industrial Hygienist.

9.0 EXCEPTIONS

Any deviations or temporary exceptions to compliance with this standard may be requested in writing to RHSH.

10.0 TERM

This standard shall remain in force until revised or amended.

11.0 REFERENCES

11.1 Record Retention Tables, Records Management Section, ACP.

11.2 HAZARDOUS MATERIAL INFORMATION STANDARD 2600SEG201