

Protection and Safety Programme Advice – Diagnostic Radiology

A protection and safety programme tells how the licensee will protect people and the environment. This programme should include management arrangements, procedures and equipment.

After FANR has reviewed and accepted the programme, it will become a part of the licence. That is, licensees must meet the commitments they have made in these programmes.

A diagnostic radiology protection and safety programme should have the following:

1. Safety Assessment

This is the basis for the protection and safety programme. It should deal with each type of radiation source used by the licensee, and include the licensee's equipment, procedures and operations. It should estimate the doses due to routine operations and the potential doses due to accidents. Based on this information it should specify the radiation protection equipment and procedures that the licensee needs.

A licensee that is already in operation should conduct a safety assessment to check whether any additional safety measures are needed.

2. Information about the licensee

Include

- The number and types of X-ray equipment that the licensee uses.
- The number of staff who work with radiation and their areas of expertise
- A floor plan showing X-ray rooms and nearby areas including patient waiting areas
- Patient workload

3. Radiation safety policies

Provide a commitment to comply with FANR regulations and licence conditions. Include a commitment to support this protection and safety programme.

Include a procedure to notify FANR at least thirty days before any significant changes to equipment, responsible staff or radiation protection arrangements.

4. Management structure

Include an organization chart showing the reporting chain through clear lines of responsibilities and accountability. Include the duties and authorities for radiation safety of managers, supervisors and workers. Identify roles of radiation protection

officers (RPO) and their duties, authorities (supported by documented delegation) and access to managers. Include a requirement that staff must be qualified for their duties. Include a procedure for making sure that workers understand and acknowledge their duties including the maintenance staff.

5. Occupational Protection

Include what will be done to keep workers' doses within your dose constraints (an occupational dose constraint of 3 mSv/year is regarded as reasonable). Include a procedure to train workers about what they should do to protect themselves from radiation.

Include how pregnant workers are encouraged to notify management and how management will adapt their working conditions to protect the foetus without excluding the women from work.

Include how persons under 18 are protected from radiation

Specify any controlled areas or supervised areas, and say why they were established, including shielding calculations or direct measurements. Controlled areas usually include all X-ray rooms. Include how these areas are monitored, how access is restricted and what protective measures are used.

Personal protective measures should include

- All staff should be out of the room or at a shielded console
- For fluoroscopy cases, provide lead aprons, thyroid shields, lead goggles and lead flaps for staff
- Provide ceiling suspended shielding as appropriate

6. Individual monitoring

Provide written procedures for worker dose assessments. Include how workers who are monitored are identified. Include the type of dosimeters used, arrangements for using an approved dosimetry service and rules for returning and changing dosimeters. Include how the RPO will review doses and how accumulated doses will be recorded. Include procedures for dealing with worker overexposures and lost or damaged dosimeters. Include investigation levels. Provide procedures so that dose records contain the information FANR requires, are kept as long as FANR requires, and are made available to workers. Include a procedure for reporting worker doses to FANR every six months.

Health surveillance should include assessing workers' fitness for their tasks and detecting any occupational health issues they may have. Include preventing deterioration of workers' health, and evaluating how effective the licensee's radiation control measures are. Provide for asking whether the workplace needs to be changed to improve workers' health.

7. Patient Exposure Protection

Include assigning responsibility for patient protection to a medical practitioner such as the department head, radiologist or chief medical officer. Include assigning responsibility for

conducting or supervising calibration of beam and sources, clinical dosimetry and quality assurance (QA) to a specific qualified expert in diagnostic radiology physics.

Provide a procedure for justifying medical exposures, such as a doctor's referral. Include how patients' exposures will be kept to the minimum required for effective diagnosis. This procedure should take guidance levels and information from previous treatments into account to avoid unnecessary additional exposures.

Include how women who are pregnant will be protected. Provide for signs in appropriate languages and procedures for questioning female patients.

Include provisions for calibrating radiation beams.

For accidental patient exposures, include procedures to investigate and report:

- Any medical exposure given to the wrong patient or the wrong tissue, or causing a dose significantly different from what was planned;
- Any equipment failure, accident, mistake or other unusual event that might have made a patient get an exposure significantly different from what was planned.

For accidental medical exposures, include procedures to estimate the doses received, to decide on the corrections needed and to make those corrections.

Include how justification and optimization procedures will be reviewed. Include how records will be maintained for at least five years so that past doses can be assessed.

8. Public Protection

Provide the licensee's procedures for keeping doses to the public below an acceptable public dose constraint of 0.1 mSv/yr. (FANR will consider a dose constraint of up to 0.3 mSv/year if the Licensee provides a reason for why a Dose Constraint of 0.1 mSv/year is impractical¹.) Include how public exposures will be monitored and recorded to be sure these constraints are met. Include protecting family members and caregivers. Include shielding designs and use of controlled and supervised areas.

9. Safety of X-ray equipment

Discuss how the licensee will make sure that it buys the right equipment, including instruments, for its needs and how it will make sure they meet international quality standards.

Provide inspection, calibration & maintenance procedures. Discuss how equipment and instruments will be tested according to international standards. Include software.

Include provisions to ensure that measurements in X-ray beams are made with a calibrated instrument.

Describe any personal protective equipment that is used and the procedures for its use, inspection and maintenance.

Include how the licensee will keep X-ray equipment secure, including

¹ See FANR Regulatory Guide 007, 'Radiation Safety', page 11.
1 March 2013

- Keeping an inventory of all items of X-ray equipment, including their descriptions, where they are located and who is assigned to keep the inventory include criteria to submitted update inventory to FANR ;
- Keeping unauthorized persons from using them.

This section should also include procedures for controlling X-ray equipment, including

- Procedures to keep it from being transferred unless the receiver is authorized to have it;
- Procedures to notify FANR after receiving or transferring it;
- Procedures to send FANR the licensee's inventory of X-ray equipment twice each year.

10. Operating procedures

These should be written procedures for workers to follow. They should be clearly displayed or easy for workers to find and should be written in all of the languages that the workers may use.

11. Employee training

Provide the radiation safety training program for all staff who work directly with X-ray equipment. The training should emphasize the procedures the workers must follow. Include how worker attendance at training will be recorded and how the workers will be tested to make sure the training has been effective Include the frequency of refresher training.

12. Incident reporting and investigation

Provide procedures for reporting incidents and accidents to FANR and procedures for investigating them. Include procedures to meet the reporting requirements in of FANR-REG-24, Articles (19) and (41).

13. Quality Assurance

Provide the licensee's QA programme. Include a process for writing procedures; for changing them and for documenting the changes. Also include a process for confirming compliance with the procedures.

Include procedures or the use of a qualified contractor to make sure safety equipment and safety systems are checked regularly and that problems are corrected. Include quality assurance of instruments used for calibration and clinical dosimetry.

Include procedures for periodically reviewing and auditing the licensee's safety performance. Include the performance of this protection and safety programme. Include corrective action procedures.



Resource Information

A thorough description of a Diagnostic and Interventional Radiology protection and safety programme is provided in Appendix I of IAEA Safety Series Report No. 39, Applying Radiation Safety Standards in Diagnostic Radiology and Interventional Procedures Using X Rays, Pub1206, 2006