

Protection and Safety Programme Advice – Industrial Radiography

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.

An industrial radiography 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 radioactive sources and radiation generators that the licensee uses
- The number of staff who work directly in radiography
- A floor plan that shows any shielded enclosures used for doing radiography and where radiation generators and radioactive sources are stored

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 covers whole process (from import to return to supplier). Include the duties and authorities for radiation safety of managers, supervisors and workers.



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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. If work is done at more than one site, state who is responsible at each site. If work is done at a client's site, assign an employee to interact with the client. Include a procedure for making sure that workers understand and acknowledge their duties.

In medium to large sized radiography companies, include a radiation protection committee. Members usually should include a senior manager, the RPO, and a radiographer.

5. Occupational Protection

Include what will be done to keep workers' doses within your dose constraints (an occupational dose constraint of 6 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 are established. Controlled areas usually include shielded enclosures, source storage facilities and areas surrounding on-site radiography. Include how these areas are monitored, how access is restricted by devices such as mobile barriers, ropes, signs and surveillance, and what protective measures such as audible warnings are used.

6. Individual and workplace monitoring

This section should provide procedures for individual and workplace monitoring, and the systems for recording and reporting all relevant information related to the control of worker exposures.

- a) For individual monitoring, provide written procedures for worker dose assessments. Include how workers who are monitored are identified. Include 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.

Radiographers and any other workers who regularly enter controlled areas should use equipment that provides personal alarm monitoring when a preset dose or dose rate is exceeded and two kinds of dosimetry: occupational dosimetry and direct reading dosimetry.

- b) For workplace monitoring, include how controlled and supervised areas are monitored for radiation and how often they are checked.

- c) Monitoring devices should include a survey meter that can measure gamma radiation from 0.1 micro Sv per hour through 10 mSv per hour.
- d) 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 and contamination control measures are. Provide for asking whether the workplace needs to be changed to improve workers' health.

7. 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. These should include, for site radiography, written procedures for establishing, monitoring and managing controlled areas.

8. Safety of generators, radioactive sources and associated equipment, radiation protection instruments, and software

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

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

Include how the licensee will keep sources and generators secure, including

- Keeping an inventory of all sources and generators, including their descriptions, where they are located and who is assigned to keep the inventory include criteria to submitted update inventory to FANR.
- Keeping sources and generators from being stolen or damaged, and keeping unauthorized persons from using them either where they are used or where they are stored.

This section should also include procedures for controlling sources and generators, including

- Procedures to keep them from being transferred unless the receiver is authorized to have them;
- Procedures to notify FANR after receiving or transferring them;
- Procedures to notify FANR if a source or generator is stolen or damaged, as required by REG-24, Article (19); and

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



- Procedures to send FANR the licensee's inventory of sources and generators twice each year.

9. 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. Include routine operations, source exchanges and transport. As appropriate, include procedures for working in shielded radiography enclosures and on site.

10. Employee training

Provide the radiation safety training programme for all workers who work directly with sources or generators. 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, as well as the periodic of the retraining should be identified.

11. 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, Article (19).

12. Emergency Response Plan

Begin with a list of predictable incidents and accidents and the procedures that will be followed to deal with them. Include immediate actions to minimize doses to workers and the public. Include how the public will be kept away from affected areas until conditions have been returned to normal.

Describe the duties of each person who will respond to the emergency. Include radiographers, assistant radiographers, radiation protection officers and responsible supervisors and managers. Include the names and complete contact information for these persons. Provide for simple instructions to be clearly visible and for any equipment needed for emergency response. Include reporting procedures, along with the contact information needed to report accidents to all responsible authorities.

Provide for Emergency Response training that includes drills, exercises and refresher training.

13. Import/Export

Provide the procedure for getting permission from FANR to import and export radioactive sources and radiation generators. Licensees must ask FANR for a permit in advance of each shipment.

14. Transportation

Most industrial radiography licensees will be involved in transportation as shippers, carriers and receivers. They should provide.

- Procedures for classifying the sources that will be shipped and for choosing the package that will be used. Include procedures for labeling packages correctly, for preparing transportation documents and for notifying FANR and other authorities.
- Procedures for meeting vehicle requirements; for loading and stowing packages and for putting placards on the vehicle.
- Procedures for receiving packages. Include procedures for surveying them, confirming the shipping documents, and notifying FANR that the packages have been received.
- Procedures for training workers who do any of the above things

15. Waste management

Include procedures to manage, store, document and dispose of or return sources that are no longer used supported with financial/ administration security for safe disposal or return to supplier.

16. Quality Assurance

Provide the licensee's Quality Assurance (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 to make sure safety equipment and safety systems are checked regularly and that problems are corrected.

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 description of an Industrial Radiography radiation protection programme is provided in Section 4 of IAEA Safety Specific Guide SSG-11, Radiation Safety in Industrial Radiography, Pub1466, 2011.

A thorough description of an Industrial Radiography safety assessment is provided in Annex I of the above IAEA document.