

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

- 10.1 Introduction
- 10.2 Objectives
- 10.3 Scope
- 10.4 References
- 10.5 Definitions
- 10.6 The Regulatory Body
- 10.7 Regulatory Functions
- 10.8 Responsibilities of Employer (Authorized Operator/Clients /License Holders)
- 10.9 Cooperation between Employers
- 10.10 Administrative Requirements for Radioactive Sources
- 10.11 Risk Assessment & Permit to Work System
- 10.12 Permit to Work System
- 10.13 Personal Protective Equipment (PPE)
- 10.14 Dose Limitation
- 10.15 Radiation Protection Officer
- 10.16 Company Radiation Safety Procedure
- 10.17 Information, Instruction and Training
- 10.18 Arrangements for the Control Of Radioactive Substances, Articles And Equipment
  - a. Suitable Leak Tests
  - b. Accounting For Radioactive Substances
  - c. Movement Of Radioactive Substances
  - d. Suitable Receptacles For Moving Radioactive Substances
- 10.19 Designation of Controlled or Supervised Areas
- 10.20 Monitoring Of Designated Areas
- 10.21 Control of Access
- 10.22 Specific Measures to Prevent The Spread Of Contamination
- 10.23 Monitoring Equipment
- 10.24 Storage Requirements
- 10.25 Handling Precautions
- 10.26 Transportation of Radioactive Material
- 10.27 Record Keeping



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

- 10.28 Medical Examination
- 10.29 Disposal of Radioactive Substance
- 10.30 Emergency Plans
- 10.31 Enforcement, Offences and Penalties

### 10.1 Introduction

A well-developed Trakhees regulatory safety arrangement can ensure an effective safeguards system and the security of radioactive material. Sufficient ionizing radiation constitutes a significant health hazard unless adequately shielded and handled with proper care. This protocol has been drawn up in order to limit the risk of overexposure of workers and members of the public, and to keep radiation doses as low as is reasonably achievable. These systems can enhance security measures, such as the prevention of illicit trafficking or the deterrence and detection of unauthorized acts involving radioactive material. The management of radioactive material/activities shall be in accordance with Rules and Regulations of Federal Authority for Nuclear Regulations (FANR) always as amended.

### 10.2 Objectives

The objectives of this protocol are:

- 10.2.1 To provide for the adequate protection of people and the environment against the harmful effects of ionizing radiation and for the safety and security of radiation sources
- 10.2.2 To establish Trakhees with the functions and responsibilities set forth in FANR Regulations/Law for the purpose of exercising regulatory control over the safe and peaceful uses of ionizing radiation
- 10.2.3 To enable PCFC to meet its obligations under relevant international instruments entered into by FANR and any protocols thereto
- 10.2.4 Establish a regulatory framework for the control of movement of radioactive material into and outside the Jurisdiction of PCFC.

### 10.3 Scope

- 10.3.1 This protocol shall apply to all activities and practices involving the industrial uses of radioactive sources and ionizing radiation conducted under the jurisdiction or control of PCFC.
- 10.3.2 This protocol shall apply to the export, import, transit or transfer of nuclear or other radioactive material and related equipment, through the Jurisdiction of PCFC.
- 10.3.3 This protocol shall not apply to the regulation of sources of non-ionizing radiation.

### 10.4 References



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

- 10.4.1 Federal Law No. 1/2002 regarding Regulation and Control the Use of Radiation
- 10.4.2 Code of Practice for the Management of Dangerous Goods in the Emirate of Dubai ISSUED BY DUBAI MUNICIPALITY 1997
- 10.4.3 Regulations for the Safe Transport of Radioactive Material, IAEA Safety Series.
- 10.4.4 Ionizing Radiations Regulations –UK-1999- Work with ionizing radiation
- 10.4.5 IAEA Hand Book
- 10.4.6 Ministerial Decree (56/2004) Regarding the Regulations for Safe Transport of Radioactive Materials Sources and Protection Against their Hazards;
- 10.4.7 FNAR Regulations as amended
- 10.4.8 DM Technical Guideline Number 66
- 10.4.9 Code of Practice for the Management of Dangerous Goods in the Emirate of Dubai 1997

### 10.5 Definitions

- 10.5.1 **Activities:** means the production, use, import and export of radiation sources for industrial, research and medical purposes; the transport of radioactive material, radiography, construction, commissioning, operation and decommissioning of facilities; radioactive waste management activities and site rehabilitation.
- 10.5.2 **Authorization:** means the granting by a regulatory body or other governmental body of a written permission for an operator to perform a specified activity and may include — for example — a license or registration.
- 10.5.3 **Classified Persons:** All personnel assigned to work in an area where radiation level exceeds 7.5  $\mu\text{Sv/hr}$  (0.75 mrem /hr) shall be designated as classified persons. All classified persons must have adequate training and qualifications for their job. Furthermore, classified persons must perform their radiation work in accordance with established company procedures and other applicable regulations.
- 10.5.4 **Controlled Area:** Any work area where radiation exceeds 7.5  $\mu\text{Sv/hr}$ . shall be designated as controlled area.
- 10.5.5 **Clearance:** means the removal of radioactive material or radioactive objects within authorized practices from any further control by the regulatory body.
- 10.5.6 **Decommissioning:** means all steps leading to the release of a facility, other than a disposal facility, from regulatory control other than confirming the decommissioned status of a facility. These steps include the processes of decontamination and dismantling.



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

- 10.5.7 **Discharges:** means planned and controlled releases into the environment, as a legitimate practice, within limits authorized by the regulatory body, of liquid or gaseous radioactive material that originates from regulated nuclear facilities during normal operation.
- 10.5.8 **Disposal:** means the emplacement of spent fuel or radioactive waste in an appropriate facility without the intention of retrieval.
- 10.5.9 **Employer** means **Employer** who undertakes work with ionizing radiation e.g. in the form of a trade, transport of radioactive material, radiography etc.,
- 10.5.10 **Exclusion means** the deliberate exclusion of a particular category of exposure from the scope of the present FANR on the grounds that it is not considered amenable to regulatory control.
- 10.5.11 **Exemption** means the determination by the FANR that a source or practice need not be subject to some or all aspects of regulatory control on the basis that the exposure (including potential exposure) due to the source or practice is too small to warrant the application of those aspects or that this is the optimum option for protection irrespective of the actual level of the doses or risks.
- 10.5.12 **Export** means the physical transfer, originating from an exporting State, into an importing State, of nuclear or other radioactive material, including sources.
- 10.5.13 **Facilities** means and any other places where radioactive material is produced, processed, used, handled, stored or disposed of, on such a scale that consideration of protection and safety is required.
- 10.5.14 **Import** means the physical transfer, into an importing State or to a recipient in an importing State, originating from an exporting State, of nuclear or other radioactive material, including sources.
- 10.5.15 **Intervention** means any action intended to reduce or avert exposure or the likelihood of exposure to sources which are not part of a controlled practice or which are out of control as a consequence of an accident.
- 10.5.16 **Ionizing radiation** means the transfer of energy in the form of particles or electromagnetic waves of a wavelength of 100 nanometers or less or a frequency of  $3 \times 10^{15}$  hertz or more capable of producing ions directly or indirectly;
- 10.5.17 **License** means a legal document issued by the FANR granting authorization to perform specified activities related to a facility or activity. 'Licensee' means the holder of a current license granted for an activity or practice who has recognized rights and duties for the activity or practice, particularly in relation to safety and security.
- 10.5.18 **Notification** means a document submitted to the regulatory body by a legal person to notify an intention to carry out a practice or other use of a source.
- 10.5.19 **Local Authority** means Dubai Civil Defense and Trakhees



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

- 10.5.20 **Federal Authority** means the Federal Authority for Nuclear Regulations (FANR), UNITED ARAB EMIRATES.
- 10.5.21 **Enclosed exposure facility** means a permanent, shielded installation or structure designed for industrial radiography, which incorporates a fixed exposure device and in which such work is regularly performed.
- 10.5.22 **Gamma radiography** means industrial radiography performed with radioactive nuclides.
- 10.5.23 **Guide tube** means a flexible or rigid sheath or tube for guiding the source assembly from the source container to the working position.
- 10.5.24 **Industrial radiographer** means a person authorized by the approved company to perform industrial radiography.
- 10.5.25 **Industrial radiography** means work involving the examination of the structure of materials by non-destructive methods, utilizing ionizing radiation. Specifically included in the definition of industrial radiography work are all procedures which are significant from a radiation safety point of view, such as the detachment and attachment of winding cables to source assemblies, the winding in and out of radioactive sources, the monitoring of radiation levels, etc.
- 10.5.26 **Overexposure** means any exposure of a person to ionizing radiation to an extent that an annual dose limit is exceeded.
- 10.5.27 **Radioactive substance** means any substance which contains one or more radio nuclides whose activity cannot be disregarded for the purposes of radiation protection;
- 10.5.28 **Remote control system** means the device which enables gamma radiography apparatus to be operated at a safe distance, and which comprises a winding cable, winding cable sheath and winding control mechanism (e.g. reel with crank handle).
- 10.5.29 **Source container** means the shielding container in which a sealed radioactive nuclide is transported and stored.
- 10.5.30 **Source encapsulation** means the small outer metal sheath which surrounds a radioactive source and which connects it to the source assembly.
- 10.5.31 **Supervised Area:** Where the instantaneous dose rate of an area exceeds 2.5  $\mu\text{Sv/hr}$ , to 7.5  $\mu\text{Sv/hr}$  the area shall be designated as Supervised Area. All supervised area must be regularly monitored.

### 10.16 The Regulatory Body

Trakhees is an authority for the control of activities and practices identified in this Protocol. Trakhees shall monitor the compliances requirements stipulated in the FANR regulations within its jurisdictions.



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

### 10.7 Regulatory Functions

Trakhees executes the following regulatory functions, including but not limited to:

- 10.7.1 To inspect, monitor and assess activities and practices for the purpose of verifying compliance with this Protocol, applicable, local FANR regulations and the terms and conditions of authorizations /approvals.
- 10.7.2 To take enforcement measures in the event of non-compliance with (violation of) this Protocol, applicable, local FANR regulations and the terms and conditions of authorizations /approvals.
- 10.7.3 To define the obligations, including financial ones, of persons or entities authorized to conduct activities or practices
- 10.7.4 To ensure that corrective actions are taken if unsafe or potentially unsafe conditions are detected at any location where authorized activities are conducted
- 10.7.5 To confirm the competence of personnel responsible for the safe operation of a facility or activity or practice
- 10.7.6 To cooperate with the Local and Federal authorities, FANR, Dubai Civil Defense in the application of safeguards in accordance with the applicable regulations, protocols
- 10.7.7 To cooperate with other relevant agencies of Local and Federal authorities, FANR, Dubai Civil Defense in establishing and maintaining a plan for preparedness for and response to emergencies , involving nuclear or other radioactive material and ensuring health and safety, environmental protection, security and transportation of dangerous goods.
- 10.7.8 To communicate directly with other governmental bodies in all circumstances it considers necessary for the effective exercise of its functions
- 10.7.9 To establish appropriate mechanisms and procedures for informing and consulting the public and other stakeholders about the regulatory process
- 10.7.10 To conduct any other functions that are necessary in its judgment to protect people and the environment under PCFC Jurisdiction.

### 10.8 Responsibilities Of Employer (Authorized Operator/Clients /License Holders) For Radiation Protection

- 10.8.1 The authorized person (licensee) possesses an adequate understanding of the fundamental principles of radiation protection
- 10.8.2 The authorized person (licensee) will take all steps necessary for the protection and safety of workers and the public by keeping doses below the relevant threshold and ensuring that all



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

reasonable steps are taken to minimize adverse effects on the population, at present and in the future.

- 10.8.3 The authorized person (licensee) will plan and implement the technical and organizational measures necessary to ensure adequate safety, including effective defenses against radiological hazards.
- 10.8.4 The authorized person (licensee) will prepare and implement an appropriate emergency plan.
- 10.8.5 The authorized person (licensee) will ensure compliance with the dose limits established by the FNAR and will monitor the radiation exposure of workers.
- 10.8.6 The authorized person (licensee) possesses adequate human and financial resources to conduct the proposed activity or practice in a manner that ensures safety and security.
- 10.8.7 The authorized person (licensee) has made adequate financial arrangements for waste disposal, decommissioning and potential liability for radiological or nuclear damage
- 10.8.8 The authorized person (licensee) will provide access by inspectors of EHS-Trakhees, FANR and other relevant government agencies to locations necessary for the performance of their duties.
- 10.8.9 The authorized person (licensee) will not modify its conduct of any authorized activity or practice in a manner that could affect the protection of workers, the public or the environment without seeking the approval from FANR and EHS-Trakhees.
- 10.8.10 The authorized person (licensee) will provide, upon request or pursuant to the requirements in relevant regulations, all information considered to be necessary by the EHS-Trakhees, FANR and other relevant government agencies.

### **10.9 Cooperation Between Employers**

Where work with ionizing radiation undertaken by one employer is likely to give rise to the exposure to ionizing radiation of the employee of another employer, the employers concerned shall co-operate by the exchange of information.

### **10.10 Administrative Requirements for Radioactive Sources**

No person shall carry out an activity or practice unless specifically authorized (licensed) by the EHS-Trakhees, or unless the practice has been exempted from regulatory control. An authorization shall not be transferred. An authorization shall cease to be valid when any time limit established by regulation or condition of the authorization has expired.



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

For import/export, transshipment, storage and handling of any radioactive sources, prior authorization from FANR, shall be obtained.

For import of radioactive isotopes, Trakhees – Inspection Department S1 Form and for Export S2 Form should be filled and submitted for necessary approvals.

Radioactive/Radiography work permit (on S3 Form) from Trakhees – Inspection Department is required before carrying out radiography work involving radioactive material

Monthly Tracking Report comprising of all radioactive source movement details with inventory status on the prescribed form of Trakhees – Inspection Department with necessary supporting documents (wherever applicable) shall be submitted to Trakhees – Inspection Department on or before 5<sup>th</sup> of every month.

### **10.11 Risk Assessment & Permit to Work System**

Any person or entity authorized to conduct an activity or practice shall have the primary responsibility for the safe and secure conduct of that activity or practice and for ensuring compliance with this protocol, FANR regulations and all applicable regulatory requirements and conditions of the authorization related to that activity or practice.

Prior to commencing any new work practice involving a source of ionizing radiation it is important that a realistic assessment of the radiation risks is carried out. This assessment will identify areas where special protective measures should be implemented to reduce exposure to radiation. The risk assessment shall consider and address the possibility of exposures to workers and members of the public from foreseeable incidents involving the ionizing sources used in the practice.

The risk assessment requires regular review to ensure that controls are effective to perform activities safely. Furthermore the risk assessment records may be required at the time of license/authorization renewal or during EHS inspection.

A radiation risk assessment shall take into account all the risks, both real and potential, of exposures to workers and members of the public. The minimum steps listed below will assist this process.

Step 1: Identify all possible radiation hazards.



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

- Step 2: Identify all workers and any members of the public who may be exposed to the radiation hazards identified in step 1 and the instances by which these exposures may occur.
- Step 3: Evaluate the protective measures in place, such as safety procedures, local rules, protective materials and equipment. Identify areas where improvements may be made.
- Step 4: Document the findings from steps 1 to 3.
- Step 5: Review the assessment and amend if necessary.

Risks should be assessed in terms of the likelihood of the hazard occurring and the degree of harm that may result. The risks associated with sources of radiation are dependent on issues such as the type of activity being carried out, the nature of the sources (type and energy of radiation emitted), radiation dose rates, working environment, security and safety measures in place.

In order to identify the possible risks consideration should be given to:

- Hazards arising from the routine operation and maintenance of the practice.
- Hazards arising from potential radiation accidents involving the sources of radiation.

The following list includes the major issues that should be taken into account when carrying out or reviewing a risk assessment:

- The nature of the sources of ionizing radiation used, held or transported.
- Radiation dose rates to which anyone may be exposed.
- The likelihood of airborne and/or surface contamination in the work area and other locations.
- Access to working areas where dose rates or contamination levels are likely to be significant.
- The types and quantities of personal protective equipment required.
- Results of any previous personnel dosimetry or area monitoring relevant to the proposed work.
- Advice from the manufacturer or supplier of equipment about its safe use and maintenance.
- Engineered control measures and design features already in place or planned.
- Consequences of possible failures of control measures such as electrical, ventilation systems and warning devices.
- Consequences of failure to comply with work procedures or safety rules.
- Adequacy of inventory checks to confirm the presence of all sources of radiation.
- Adequacy of written work procedures and safety rules, including clear designation of responsibilities.
- Availability of advice on good practice from suitable qualified professionals.



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

The risk assessment should enable the employer/licensee to identify the actions to be taken to ensure that the radiation exposure of all persons is kept as low as reasonably achievable. Consideration should be given to:

- The use of engineering controls, design features, safety devices, warning devices and the undertaking of suitable tests.
- The availability of appropriate personal protective equipment.
- The designation of specific areas as controlled or supervised areas.
- The preparation of radiation safety procedures, permit to work system and safety rules.
- The working conditions of any female employee upon declaration of pregnant or who may be breast-feeding.
- The training needs of workers.
- A suitable program of dose monitoring for employees.
- The possible need to classify workers and provision of appropriate medical surveillance for them.
- The assigning of responsibilities for ensuring that all regulatory and licensing conditions are adhered to.
- A self-assessment program which may include internal auditing of work procedures and safety rules.

### 10.12 Permit to Work System

- 10.12.1 **Employer** who provides any system of work or personal protective equipment pursuant to this protocol shall take all reasonable steps to ensure that it is properly used or applied as the case may be.
- 10.12.2 Any person or entity authorized to conduct an activity or practice shall have a written permit to work system which provides formal written procedures and formal actions to ensure that potentially hazardous activities are carried out safely as possible.
- 10.12.3 The permit **to work system** is a written document which authorizes persons to carry out the work, warns of possible dangers and clearly states the precautions to be taken for the job to be carried out safely. The work permit ensures that full consideration is given to the hazards and risks, and that these are properly dealt with prior to the commencement of the work.



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

- 10.12.4 The work permit shall specify clearly the particular piece of equipment and the area involved, the extent of work allowed, the conditions to be observed and the duration of validity of the permit. The issuer and the performer shall ensure that it is safe for the work to begin.
- 10.12.5 If any condition required by the work permit cannot or is not met, the permit shall be withdrawn and the work must not be started. The work permit may be issued after remedial action has been taken.
- 10.12.6 Prior to issuing a work permit, the person responsible shall satisfy himself that the conditions at the work site, or the equipment, are safe for that work to be undertaken.
- 10.12.7 A work permit shall be authorized by competent persons involved in the activity authorized by the employer/ entity.
- 10.12.8 Generally, the issuing authority is a Supervisor or above level of person in the operations department and performing authority is a supervisor or above level of person in the maintenance department.
- 10.12.9 **“Issuing Authority”**- Supervisor/foreman or above level, who is a qualified, experienced, trained and competent person authorized to issue permits.
- 10.12.10 **“Performing Authority”**- Supervisor/ foreman or above level, who is a qualified, experienced, trained and competent person authorized to receive the work permit and undertake the safe execution of the job
- 10.12.11 **“COMPETENT AUTHORITY”**- EHS Officer/ EHS representative
- 10.12.12 The work permit shall be valid for one shift (maximum 12 hours only) or limited to/linked to the duty of performing authority. **The permit shall be extended by appending duly filled renewal sheet and adhering with the safety arrangement stipulated in the original work permit.**
- 10.12.12 Once the validity is over the work permit shall be closed by cancellation and maintained as record for minimum two months.

### 10.13 Personal Protective Equipment (PPE)

- 10.13.1 **Employer** shall ensure that **'adequate and suitable' personal protective equipment are correctly selected and used.** Personal protective equipment (PPE) includes respiratory protective 8(2) equipment (RPE), protective clothing, footwear and equipment to protect the eyes.
- 10.13.2 Types of PPE specific to protection against external ionizing radiation include lead aprons and gloves. Various types of respiratory protective equipment (including pressurized suits) provide protection specific to the risk of inhaling radioactive material.



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

10.13.3 The risk assessment should be used to decide on the choice of PPE. The purpose of the assessment, in this case, is to ensure that the **Employer** chooses PPE which is adequate and suitable, i.e. correct for the circumstances of use. For RPE this implies that it provides an adequate margin of safety and is matched to the job, the environment, the anticipated air concentration of radioactive material and to the wearer. Adequate controls shall be in place to ensure that PPE shall not render the wearer liable to other forms of risk greater than that arising from the ionizing radiation.

10.13.4 **Employer** shall ensure that all personal protective equipment are thoroughly examined at suitable intervals and is properly maintained and that, in the case of respiratory protective equipment, a suitable record of that examination is made and kept for at least two years from the date on which the examination was made and that the record includes a statement of the condition of the equipment at the time of the examination.

### 10.14 Dose limitation

**Authorized Person/Clients** shall ensure that his employees and other persons are not exposed to ionizing radiation to an extent that any dose limit specified by the FANR or other relevant government agencies. It shall be ensured that exposures arising from the work are kept as low as reasonably practicable and **Employer** must make sure that the cumulative exposure of their employees over the year does not exceed a relevant dose limit set by the authorities/FANR/MOH.

### 10.15 Radiation Protection Officer

Employer shall appoint/ delegate responsibility as **Radiation Protection Officer (RPO)**. His responsibility includes but not limited to assist the employer in ensuring that work with ionizing radiation is supervised to the extent necessary to meet the requirements of this protocol, Federal and local regulations, conducting emergency drills. The Radiation Protection Officer must ensure that all persons performing industrial radiography or who act as radiographic operators and assistants have the necessary training and are familiar with the correct operating and safety procedures. Employer must ensure that the RPO regularly observes the performance of all radiation workers during actual radiographic operations, in order to establish whether correct operating procedures and “Local Authority” all requirements are being adhered to.



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

RPO should know and understand the requirements of the Regulations and local rules relevant to the work with ionizing radiation, command sufficient authority from the people doing the work to allow them to supervise the radiation protection aspects of that work, understand the necessary precautions to be taken and the extent to which these precautions will restrict exposures and know what to do in an emergency.

### 10.16 Company Radiation Safety Procedure

- 10.16.1 Employer shall prepare written radiation safety procedures (local rules for radiation safety) for the purpose of ensuring that work with ionizing radiation is carried out safely and in compliance with these protocol and applicable local and federal regulations.
- 10.16.2 Radiation safety procedures shall identify the key working instructions intended to restrict any exposure in controlled or supervised area. The details given in these radiation safety procedures shall be appropriate to the nature and degree of the risk of exposure to ionizing radiations.
- 10.16.3 The procedure should cover work in normal circumstances and also the particular steps to be taken to control exposure in the event of a radiation accident, as set out in the emergency/contingency plan.
- 10.16.4 Employer shall ensure that the radiation safety procedures that he has prepared are brought to the attention of all employees and other persons who are affected by them.
- 10.16.5 Employer shall ensure that the radiation safety procedure includes but not limited to the following information:
  - a. Management and supervision of the work
  - b. The name of the employer and premises and a description of the work with ionizing radiations to which the rules apply.
  - c. Description of the persons to whom the rules apply.
  - d. Written system of work required for persons who enter any controlled area.
  - e. The name of the radiation protection supervisors appointed in accordance with this code.
  - f. The procedures to be followed in the event of unplanned incidents or emergencies involving ionizing radiations and the roles of key personnel involved in implementing these procedures.
  - g. Testing and maintenance of engineering controls and design features, safety features, the dose level and warning devices
  - h. Radiation and contamination monitoring



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

- i. When appropriate the special precautions to be taken to restrict the exposure of female employees, which are (or maybe) pregnant.
- j. Identification or summary of any contingency arrangements indicating the reasonably foreseeable accidents to which they relate

### 10.17 Information, Instruction and Training

- 10.17.1 Employer shall ensure that those of his employees who are engaged in work with ionizing radiation are given appropriate training in the field of radiation protection and receive such information and instruction as is suitable and sufficient for them to know:
  - a. The risks to health created by exposure to ionizing radiation
  - b. The precautions which should be taken and
  - c. The importance of complying with the medical, technical and administrative requirements of these Regulations
  - d. adequate information is given to other persons who are directly concerned with the work with ionizing radiation carried on by the employer to ensure their health and safety so far as is reasonably practicable
- 10.17.2 Employees including contract workers involved in work with ionizing radiation need to be made aware of the main risks, including the risk of accidental exposures, and the control measures provided to prevent or reduce those risks. RPO should have adequate information about hazards, risks, dose limit etc.
- 10.17.3 Training should be appropriate to the nature of the work and the needs of the individual. Periodic and refresher training shall be imparted to the employees where appropriate. Individuals should be aware of when they need to seek help and where they should find it.
- 10.17.4 Training records must be kept of all training conducted.

### 10.18 Arrangements for the Control of Radioactive Substances, Articles and Equipment

Where a radioactive substance is used as a source of ionizing radiation in work with ionizing radiation, the employer shall ensure that, whenever reasonably practicable, the substance is in the form of a sealed source. A sealed source is one that under normal conditions of use prevents any dispersion of radioactive substances into the environment

Employer shall establish whether the design and construction of the source or article is fully fit for its intended use and to take account of the actual work to be done.



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

Information from the manufacturers or suppliers of sources and articles about the mechanical protection used, including bonding materials, will allow the Authorized Person/Clients to assess whether the manufacturing specification suits the intended use of the source. The overriding objective needs always to be prevention of loss of containment. For example, if the source is to be used in wet or aggressive conditions, the possibility of corrosion should be taken into account.

Where a sealed source reaches the end of the working life for the source capsule recommended by the supplier or manufacturer, a review of its condition is advised, with a view to replacing the source or having it examined by the supplier or manufacturer. If the source is not to be replaced, it is advisable to set a time limit on its continued use after which a further review would normally be undertaken. Where the supplier or manufacturer does not specify a recommended working life, it may be advisable to seek advice from the FANR about a period.

### 10.18.1 Suitable Leak Tests

Where appropriate, the Employer shall ensure that suitable tests are carried out at suitable intervals to detect leakage of radioactive substances from any article and the Employer shall make a suitable record of each such test and shall retain that record for at least 2 years after the article is disposed of or until a further record is made following a subsequent test to that article. The manufacturer or supplier will normally advise about periodic leak testing and the methods to adopt to give the required level of assurance that radioactive material will not be allowed to disperse.

### 10.18.2 Accounting for Radioactive Substances

For the purpose of controlling radioactive substances which are involved in work with ionizing radiation which he undertakes, **Employer** shall take such steps as are appropriate to account for and keep records of the quantity and location of those substances and shall keep those records or a copy thereof for at least 2 years from the date on which they were made and, in addition, for at least 2 years from the date of disposal of that radioactive substance. The records for accounting for any particular radioactive substance will normally need to include:

- a. a means of identification, which for sealed sources should usually be unique;
- b. quantity & the date of receipt
- c. The activity at a specified date and amount of radioactivity used.
- d. the whereabouts of the substance, updated at appropriate intervals; and



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

- e. The date and manner of disposal (when appropriate) and amount of radioactivity disposed of.

### 10.18.3 Movement Of Radioactive Substances

Employer shall ensure, so far as is reasonably practicable, that any radioactive substance under his control which is not for the time being in use or being moved, transported or disposed of -

- a. is kept in a suitable receptacle; and
- b. Is kept in a suitable store.

A receptacle is suitable where it ensures effective restriction of exposure, prevention of dispersal and physical security.

### 10.18.4 Suitable Receptacles For Moving Radioactive Substances

Employer who causes or permits a radioactive substance to be moved (otherwise than by transporting it) shall ensure that, so far as is reasonably practicable, the substance is kept in a suitable receptacle, suitably labelled, while it is being moved. This requirement relates to suitable packaging and labelling of radioactive substances during movement other than transport. It therefore particularly applies during site movements of radioactive material.

## 10.19 Designation of Controlled and Supervised Areas

### 10.19.1 Designation of Controlled Areas

Employer shall designate as a controlled area any area under his control which has been identified by an assessment made by him. The risk assessment undertaken by the employer will indicate where special procedures are necessary to restrict exposure, in addition to the physical control measures required. The requirements shall be followed in controlled area as follows:

- a. it is necessary for any person who enters or works in the area to follow special procedures designed to restrict significant exposure to ionizing radiation in that area or prevent or limit the probability and magnitude of radiation accidents or their effects, or
- b. any person working in the area is likely to receive an effective dose greater than 6mSv a year or as stipulated by FANR/relevant government bodies.
- c. Employer shall always designate a controlled area, an area where an employee might in the course of a calendar year receive a radiation dose in excess of three tenths of any annual dose limit.
- d. In determining whether an area should be designated as a controlled area employers must take into account possible deviations from normal working practice including the possibility of minor accidents.



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

- e. Employer shall ensure that, wherever practicable controlled areas that he has designated are physically demarcated using radiation-warning signs and that appropriate instructions are displayed at points where employees or other persons may enter.
- f. Procedures for handling radioactive substances in controlled areas should be specified based on guidelines provided by FANR/ Ministry of Health/Other relevant government bodies.
- g. Employer shall ensure that those working in controlled areas are:
  - Subjected to individual monitoring and assessment procedures.
  - Subjected to medical check-up every six months.

### 10.19.2 Designation of Supervised Areas

An employer shall designate as a supervised area any area under his control, not being an area designated as a controlled area:

- where it is necessary to keep the conditions of the area under review to determine whether the area should be designated as a controlled area
- or
- in which any person is likely to receive an effective dose greater than 1 mSv a year or an equivalent dose greater than one-tenth of any relevant dose limit referred to in Schedule 4 in respect of an employee aged 18 years or above.

The decision to designate an area as a supervised area depends both on the assessment of likely doses in that area and the probability that conditions might change. For example, an area may need to be kept under review and therefore designated as a supervised area because of the possibility that radioactive contamination might spread. However, it will not be necessary to designate a supervised area outside every controlled area. For example, if a controlled area has been designated on the basis of external dose rate, and conditions in adjacent areas are unlikely to alter significantly, a supervised area will not be necessary unless a person is likely to receive a dose in excess of 1 millisievert a year in those adjacent areas.

### 10.20 Monitoring of Designated Areas

Authorized Person/Clients who designates an area as a controlled or supervised area shall take such steps as are necessary (otherwise than by use of assessed doses of individuals), having regard to the nature and extent of the risks resulting from exposure to ionizing radiation, to ensure that levels of



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

ionizing radiation are adequately monitored for each such area and that working conditions in those areas are kept under review.

- 10.20.1 For areas designated on the basis of external radiation, adequate monitoring should include measurement of dose rates (averaged over a suitable period if necessary). For areas designated on the basis of internal radiation, adequate monitoring should include measurements of air activity and surface contamination where appropriate, taking into account the physical and chemical states of the radioactive contamination. In either case, the monitoring should be sufficient to indicate whether levels of radiation and contamination are satisfactory for continuing work with ionizing radiation.
- 10.20.2 Monitoring should be designed to indicate breakdowns in controls or systems and to detect changes in radiation or contamination levels. In order to check the continued correct designation of areas, monitoring will be necessary both inside and outside the boundaries of controlled and supervised areas.
- 10.20.3 Employees carrying out the monitoring should be familiar with the proper use of the instruments and know how to interpret and record the results correctly.

### 10.21 Control of Access

The responsibility for controlling access to the area rests with the Employer. If the Employer in control of a site hands the control of a particular area to another employer, for example a contractor undertaking maintenance work in that area, the second employer will be responsible for controlling access. Different requirements apply to access by classified persons and non-classified persons. Any employee who enters a controlled area will require appropriate instruction.

In many cases, physical barriers and warning signs may be sufficient to restrict access to a controlled area when backed up by appropriate training and instruction. However, Employer in control need to arrange for supervision of access points into the area to ensure that appropriate checks can be made.

### 10.22 Specific Measures to Prevent the Spread Of Contamination

Employer shall ensure that:

- 10.22.1 the provision of suitable and sufficient washing and changing facilities for persons who enter or leave any controlled or supervised area are provided
- 10.22.2 the proper maintenance of such washing and changing facilities



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

- 10.22.3 the prohibition of eating, drinking or smoking or similar activity likely to result in the ingestion of a radioactive substance by any employee in a controlled area and
- 10.22.4 the means for monitoring for contamination any person, article or goods leaving a controlled area

### 10.23 Monitoring Equipment

- 10.23.1 Employer shall ensure that adequate number of suitable monitoring equipment available for monitoring and the person undertaking the monitoring had received adequate training
- 10.23.2 The suitability of monitoring equipment will depend on the type, nature, intensity and energy of the radiation that has to be monitored and the conditions and use of the equipment.
- 10.23.3 The functioning of instruments will need to be checked routinely as part of their maintenance.
- 10.23.4 Periodic examination and testing of the monitoring equipment shall be conducted to ensure that the monitoring equipment is not damaged, has not lost its calibration and is suitable for the expected duration of use until it is next thoroughly examined and tested.
- 10.23.5 All instruments should be individually calibrated before first use and as part of the annual examination and test
- 10.23.6 The qualified person takes responsibility for the accuracy of the information in the test certificate or other record of the test by signing it.

### 10.24 Storage Requirements

- 10.24.1 Storage areas shall be constructed of materials of sufficient durability, adequate shielding and containment of radioactive materials and strength to resist fire and unauthorized entry. Suitable store for radioactive substances shall have
  - a. protection from the effects of the weather
  - b. resistance to fire sufficient to minimize dispersal and loss of shielding, taking into account the combustibility of surrounding materials and the likely temperatures that would be reached in the event of a fire
  - c. Shielding to achieve outside the store the lowest dose rate that is reasonably practicable. Where non-classified persons may approach the outside of the store it is advisable that the dose rate does not normally exceed 2.5 microsieverts per hour and may need to be lower in special cases if the radiation employer wishes to avoid designating the area as a supervised area
- 10.24.2 The dose rate outside the store shall not exceed the limit set by the FANR/ other relevant authorities.



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

- 10.24.3 All storage areas and facilities for radioactive materials shall be suitably labelled to indicate that they contain radioactive material and shall if appropriate be designed as controlled or supervised areas.
- 10.24.4 Employer shall maintain records of the radioactive materials he holds including, in the case of sealed radiation sources, the following details:
- The radionuclide present.
  - The physical form of the radioactive source.
  - The radioactivity in Becquerel specified at a fixed date if necessary.
  - The serial number or other unique identifier.
  - The date that the source was received onto the premises.
  - The date and details of the receiving destination if it is removed from the premises.
- 10.24.5 Stores used to contain radioactive material in transit must be physically secure and weather proof and provide sufficient protection for packages from extreme of heat, cold and humidity.

### 10.25 Handling Precautions

- 10.25.1 Employer undertaking work with ionizing radiation sources shall ensure that the radiation exposures of his employees and all other persons are kept as low as reasonably achievable.
- 10.25.2 Employer shall, so far as is reasonably achievable, ensure that the restriction of exposure prescribed by FANR, federal regulations is achieved by means of engineering controls including where appropriate, shielding, ventilation, containment of radioactive substances and safety features including safety systems (interlocks) and warning signals.
- 10.25.3 In addition to meeting the general requirements above, **Employer** who has designated any controlled or supervised area which is entered by his employees or other persons shall provide safe systems of work and where appropriate, personal protective equipment, including respiratory protective equipment and protective clothing in order to further restrict the exposure of persons entering those areas.
- 10.25.4 Any employee engaged in work with ionizing radiation shall exercise reasonable care to not expose himself or any other person to any great degree of radiation than is necessary.
- 10.25.5 No company shall intentionally or recklessly misuse or interfere with any radioactive substances, sealed radiation source or radiation generator, or with any safety system (interlock) or warning signal provided to meet the requirement of these regulations.
- 10.25.6 Employer shall ensure that no radioactive sources are directly held by the hand unless the instantaneous dose rate to the skin of the hand is less than 75  $\mu$ Svh.



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

### 10.26 Transportation of Radioactive Material

- 10.26.1 Radioactive Material shall be packed, marked, labeled and transported as per **Code of Practice for the Management of Dangerous Goods (in the Emirate of Dubai.)**, IATA and IMDG, FANR regulations as applicable.
- 10.26.2 Before each package of radioactive material is offered for transportation, it shall not have a radiation level exceeding 2 mSv/h (200 mrem/h) at any point on the external surface of the package and 100 Sv/hr (10 mrem/hr) at one meter distance from the external surface of the package.
- 10.26.3 For exceptions to the above where prescribed level is exceeded, the package of the radioactive material shall be transported by exclusive use only and with approval from Competent Authority.
- 10.26.4 Permits for importation and re-exportation of radioactive material must be approved by relevant Authority namely, FANR, Dubai Civil Defense, DM. Radioactive Materials shall be transported as per Code of Practice for the Management of Dangerous Goods in the Emirate of Dubai.

### 10.27 Record Keeping

Employer shall be able to account for all radiation sources use, movement, disposal, monitoring equipment/ instruments etc., within his control at all times. A log shall be maintained to record the movement of radioactive sources within the premises of the entity/company and within PCFC jurisdictional areas, date, time, location etc. **Records of industrial radiography equipment** shall be maintained which show the information for all radioactive sources and source containers within his control.

### 10.28 Medical Examination

Employer shall ensure that adequate medical surveillance is conducted on their employees engaged in activities involving radioactive source. The medical surveillance should include:

- a. a medical examination before first being designated as a classified person in a post involving work with ionizing radiations
- b. periodic reviews of health at least once every year
- c. special medical surveillance of an employee when a relevant dose limit has been exceeded;
- d. determining whether specific conditions are necessary
- e. a review of health after cessation of work where this is necessary to safeguard the health of the individual.



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

For individuals who have received an overexposure, medical surveillance (including monitoring for possible biological effects) is mainly intended to assess fitness to continue the work with ionizing radiation.

### 10.29 Disposal of Radioactive Substance

Employer shall ensure that radioactive substances from authorized practices and sources are not discharged to the environment unless such discharge is within the limits specified in the license and is carried out in a controlled fashion using authorized methods.

Disposal of radioactive substances shall be in accordance with FANR, Civil Defense and DM requirements. Employer shall monitor and record the discharges of radionuclide with sufficient detail and accuracy. Requirements of any other laws or regulations shall be complied regarding non radiological hazards of the discharges to the environment.

### 10.30 Emergency Plans

- 10.30.1 Employer shall identify reasonably foreseeable radiation accident (having regard to the steps taken by them to prevent radiation accident), he shall prepare a contingency/ emergency plan designed to secure, so far as is reasonably practicable, the restriction of exposure to ionizing radiation and the health and safety of persons who may be affected by such accident. The plan shall be in line with the requirements stipulated in the PCFC Radiological Response Plan. The purpose of the plan is to restrict any exposure that arises from an accident both to the employees themselves and to others, including emergency services personnel, who may be affected by it.
- 10.30.2 No authorization (license) to conduct an activity or practice, operate a facility, or possess or use a source may be granted unless and until an appropriate emergency preparedness and response plan has been developed by the applicant/ user and approved by Trakhees.
- 10.30.3 Emergency plans shall include but not limited to the following:
- a. Responsible persons for putting the plan into effect.
  - b. A requirement that an authorized person (licensee) shall immediately notify Trakhees of any situation or incident that could pose a risk of radiological injury requiring an emergency intervention.
  - c. An allocation of responsibilities for notifying relevant emergency services/ intervention and response organizations and for initiating intervention.
  - d. An identification of conditions that could create a need for emergency intervention.



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

- e. Intervention levels for protective actions and the scope of their application, taking into account the possible severity of emergencies that could occur. What immediate mitigating actions need to be taken, for instance in clearing the accident area and establishing temporary means of preventing access to that area
- f. what personal dosimetry requirements there are for people involved in controlling the accident
- g. Procedures, including communications arrangements, for contacting and obtaining assistance from emergency intervention organizations;
- h. A description of the methodology and instrumentation for assessing an emergency situation and its consequences.
- i. Provisions for training of emergency responders and for conducting practical exercises, as appropriate, to test the adequacy of the plan and to ensure that all parties that may be involved in emergency interventions are adequately informed and prepared for possible emergencies.
- j. An assessment of the nature, likelihood and potential magnitude of resulting damage, including the population and sites at risk from an accident, malicious act or incident.
- k. The results of any accident analyses and any lessons learned from experience and/or incidents and accidents that have occurred in connection with similar activities or practices.
- l. Emergency plans shall be periodically reviewed, updated and tested.

### 10.31 Enforcement, Offences and Penalties

- 10.31.1 Any authorization issued by Trakhees may be suspended, modified or revoked by Trakhees in the event of a violation of its conditions, when the conditions under which it was issued are no longer met, or in any circumstance where the EHS-Trakhees determines that continued activity under the authorization would pose an unacceptable risk to people or the environment.
- 10.31.2 Any person who fails to comply with (violates) the terms of this protocol, FANR requirements and other applicable regulations is guilty of an offence and may be subject to the penalties as per Trakhees tariff.
- 10.31.3 Where an authorized person or entity is found to be in noncompliance with this protocol, FANR Regulations, all applicable regulations or the terms and conditions of the authorization, Trakhees shall take the necessary enforcement actions commensurate with the seriousness of the non-compliance (violation).



---

## Regulation IO – 10.0: Radioactive Source Monitoring Protocol

- 10.31.4 In all cases, the employer/ person or entity subject to enforcement action shall take the necessary measures to remedy the non-compliance (violation) as soon as possible, as required by Trakhees, and take the necessary measures to prevent a recurrence.