MANAGEMENT OF IONISING RADIATION PROCEDURE

TNCL-OHS-SOP-0025

TEMBO NICKEL CORPORATION LIMITED
29 JUN 2024
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1. INTRODUCTION

TNCL is dedicated to safeguarding the well-being of its employees by implementing a zero-harm policy. This policy aligns with TNCL's core values of safety, respect, honesty, and integrity, which are integral to the company culture.

In 2022, the International Labour Organisation added Safe and Health at Work as one of the fundamental principles and rights at work. Ionising radiation is one of the physical hazards that will be encountered in our workplace; therefore, a systematic approach is needed to preserve the health, safety, and livelihood of the employees.

This document provides a scientific, legislative, and management approach to managing ionising radiation as a physical hazard in the workplace.

2. DEFINITION AND ACRONYMS

Table 1: Definition and Acronyms

Terms	Definition
Absorbed Dose	Radiation has its effect by passing energy to its target. The energy deposited per unit mass of the target is, therefore, a useful measure. SI unit = gray (Gy) = 1 joule per Kg
Activity	The amount of radioactive material present in a sample change continuously, dependent on its half-life. It is defined as a number of atoms undergoing decay at the time. SI unit = becquerel (Bq) = 1 disintegration per second
Collective Dose	The sum of all effective doses to a population within a specified period or from a specific source is termed the collective Dose and provides a measure of population detriment. Collective Dose is expressed in Man-Sieverts.
Effective Dose	Effective dose in mixed exposure situations represents the sum of the weighted equivalent doses in all tissues and organs.

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Equivalent Dose	Unfortunately, the biological effects of radiation are more complicated than simple energy disposition calculations, and radiations vary in their Relative Biological Effectiveness (RBE). This is dealt with by multiplying the Absorbed Dose by a Radiation Weighting Factor (WR) for the specific type of radiation, as follows: Beta, X and gamma WR = 1 Fast neutrons WR = 10 Alpha particles WR = 20 **Absorbed Dose x WR = Equivalent Dose** **SI Unit = Sievert (Sv) = 1 joule per Kg**
Exposure	While radiations cannot be seen or sensed, they can be measured. This is usually done by collecting the charge which their ionisation has caused. The SI unit for this process is the Coulomb per Kg of air;
GM	General Manager
ICRP	International Commission on Radiological Protection
ILO	International Labour Organisation.
IRR	Ionising Radiation Regulation of UK
Man-Sv	man-sieverts give a measure of the extent to which a group of people or a population has been exposed
mSv	microsieverts (µSv)- 1 Sievert = 1,000,000 microsieverts (µSv)
OHS	Occupational Health and Safety
SOP	Standard Operating Procedure
Sv	The sievert (Sv) is the International System of Units (SI) derived unit of Dose equivalent radiation.
TNCL	Tembo Nickel Corporation Ltd
WHO	World Health Organisation.

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3. RESPONSIBILITIES

3.1 Site General Manager (GM)

a) The general manager's role is to ensure that the required funding is available to implement this program.

3.2 Occupational Health and Safety Manager (OHS)

a) The Occupational Health and Safety Manager will be the overall foresee of the program.
b) To support the SOP technically and administratively.

3.3 Occupational Health Lead

a) To ensure the SOP is operational and sustainable.
b) Conduct Hazard Identification and Risk Assessment (HIRA) onsite.
c) Develop, implement, and review the SOP.
d) To ensure there is a health register for radiation workers.
e) To ensure all Registered radiation workers or those who will be exposed are under medical surveillance.
f) Be available to answer the employer or employees' questions or concerns.

3.4 Environmental Manager

a) To ensure the Compliance process regarding:
    I. Transportation
    II. Storage
    III. Usage and
    IV. Disposal
b) Ensuring the company secures necessary permits regarding the use of radioactive materials or equipment emitting ionising radiation onsite.

3.5 Registered Radiation workers or those who will be exposed

a) To comply with the employer's instructions regarding the management of ionising radiation.
b) Wear a personal dosimeter to monitor ionising radiation.
c) To appear for medical surveillance when needed.

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d) Correctly use the PPE provided by their employer, even for jobs that will only take a couple of minutes.
e) Take care of PPE and store it correctly.
f) Tell their employer about any faults with PPE and report any damage.
g) Take care of their radiation passbook, and do not enter false information.
h) Cooperate with employers regarding dose measurements and assessments.
i) Report loss or damage of personal dosemeters to their employer immediately.
j) Cooperate with their employer and doctor to complete medical surveillance.
k) Tell their employer about actual or suspected incidents that the employer has a duty to investigate, such as apparent overexposure or loss of a source.

3.6 Registered Safety Officer

a) Advise TNCL on all matters pertaining to the protection of workers, patients, the public, and the environment from radiation.
b) Advise TNCL regarding formulation, observance, and enforcement of local rules for the protection of workers, patients, the public and the environment from ionising radiation.
c) Advise and liaise with the Commission regarding the implementation of radiation protection measures at the TNCL workplace.
d) Assist the Commission in the enforcement of the provisions of the Atomic Energy Act in relation to the undertaking in respect of which he/she is appointed.

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4. PROCEDURE

4.1 Scope

This procedure shall apply to all TNCL employees and contractors at Tembo Nickel.

4.2 Purpose

This document aims to guide how to manage ionising ration exposure at the workplace. This Guideline was conceptualized by the ***Health and Security Executive, L121, the code of good practice in working with Ionising Radiation.***

4.3 Legislative framework

Under the Constitution of the Republic of Tanzania (CAP2), section 14 states every person has the right to live and the protection of his life by society in accordance with the law. To further ensure every person has the right to live in the working environment, the Occupational Health and Safety Act, No. 5 of 2003, requires employers to ensure the workplace is safe and healthy for the employees. It is further a requirement that the employer is required to ensure that all workplace risks are prevented or, if not practicable, must be sufficiently controlled.

Therefore, as TNCL, we will ensure the employees' safety and health by managing ionising radiation in the workplace. This will be through using both local and internal laws and guidelines:

a) Atomic Energy Act, (CAP. 188) 2002
b) Atomic Energy Regulations 2023
c) International Commission of Radiation Protection (ICRP)
d) Ionising Radiation Regulation, HSE

Complying with the above legislation and international standards will ensure that TNCL lives its core values while ensuring business continuity.

4.4 Radiation as a Physical Hazard

4.4.1 Background

Radiation is energy that travels through space in the form of particles or electromagnetic waves.

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There are two forms of radiation: ionising radiation and non-ionising radiation. This document is focused on ionising radiation. Ionising radiation is the radiation with enough energy to split away an electron and cause ionisation. The results of ionisation are free electrons and positively charged ions, both of which can go on to take part in other reactions with biological effects.

Ionising radiation comes in many forms depending on the sources; these are:

a) Alpha rays
b) Beta rays
c) Positron
d) Gamma rays
e) X-rays

Alpha particles: ('α') particles. These are heavy, positively charged particles which do not travel very far, even in the air. Alpha particles are intensely ionising but cannot penetrate the skin, so they can be harmful only if emitted inside the body. Entry of alpha particles inside the body can occur through inhalation of radioactive dust or ingestion of alpha-emitting radioactive material. Alpha particles are easily stopped by a thin sheet of paper or by the skin covering your body.

Gamma rays ('γ'). These are waves of energy similar to light, but they have much higher energy and can travel great distances through air. They are very penetrating and require shielding in the workplace. Thick shields of concrete or metal (lead)

plating can stop them. Gamma rays pose a risk whether the radioactive material is within or outside the body.

Neutrons are mostly released by nuclear fission - the splitting of atoms in a nuclear reactor, and hence do not pose a risk outside nuclear plants. However, fast neutrons can be very destructive to human tissue.

X-rays are generated by electronic machines and not by radioactive material. X-rays pass through the body and X-ray photographs; we work on this principle.

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4.4.2 Sources of ionising radiation at the workplace
Kahama refinery will use a nuclear densitometer to measure the sludge density in the pipes. The machine will use a Gamma emitter source, Cesium 137. Therefore, there will be exposure to actual radioactive material that can cause internal or external contamination. Also, the machine will be exposed to ionising radiation during operation.

Also, both the Kabanga Project and Kahama refinery have in-house medical clinics. Should radiological services later be provided, radiographers and the personnel who will be working in that section will be exposed to X-ray radiation. Finally, underground mining at the Kabanga site might expose employees to Radon Gas and Gamma rays from the rocks.

4.4.3 approach to the management of ionising radiation at the workplace.
All of the three approaches for management of ionising radiation will be used:

a) Justification
b) Optimisation
c) Limitation

A densitometer machine is needed to measure the sludge density for operation reasons. Also, X-ray machines are used for diagnostic purposes to assist with the optimal care of patients. How will the use of both be optimised by making sure the exposure is below the occupational exposure limit as far as reasonably practicable, as there is no safe exposure to ionising radiation? Finally, the mitigation measures will ensure, as far as reasonably practicable, that the occupational exposure limit will not be exceeded.

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4.4.3.1 Risk Assessment

The employer will ensure the risk assessment is in place. The risk assessment should be task/process related, followed by a specific risk assessment for the ionising radiation. The following must be adhered to when conducting the assessment:

a) The risk assessment must be conducted by a competent person.
b) All sources of ionising radiation must be identified, including their location.
c) Must identify who is exposed, including vulnerable employees, i.e. pregnant women.
d) Must identify if there are any actual radionuclides in place.
e) Must check for any previous radiation incident at the workplace.
f) The quantitative exposure assessment must be included.
g) The risk assessment must be well documented.
h) The risk assessment must be repeated annually or whenever needed based on the risk profile.
i) the nature of the sources of ionising radiation to be used or likely to be present, including accumulation of radon in the working environment.
j) estimated radiation dose rates to which anyone can be exposed.
k) the likelihood of contamination arising and being spread.
l) the results of any previous personal dosimetry or area monitoring relevant to the proposed work.
m) advice from the manufacturer or supplier of equipment about its safe use and maintenance.
n) Engineering control measures and design features are already in place or planned.
o) any planned systems of work.
p) estimated levels of airborne and surface contamination likely to be encountered.
q) the effectiveness and the suitability of PPE to be provided.
r) the extent of unrestricted access to working areas where dose rates or contamination levels are likely to be significant.
s) Possible accident situations, including their likelihood and potential severity.
t) the consequences of possible failures of control measures – such as electrical interlocks, ventilation systems and warning devices – or systems of work.
u) steps to prevent identified accidents or limit their consequences.

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4.4.3.2 Engineering controls

a) The employer must ensure that the radionuclide supplied onsite must be sealed to prevent both internal and external contamination.

b) The equipment that uses the radionuclide must prevent the emission of excess ionising radiation.

c) For the X-ray machines that produce X-ray radiation, thick lead/wall shielding must be used to prevent exposure.

d) All employees working in areas where exposure to ionising radiation is likely must wear a personal dosimeter.

e) *An employer who provides any engineering control, design feature, safety feature or warning device must ensure.*

I. that any such control, feature or device is properly maintained and

II. Where appropriate, thorough examinations and tests of such controls, features or devices should be carried out at suitable intervals.

4.4.3.3 Administrative controls

Radiation Register

a) The employer must open a register for radiation workers and enter the name of every radiation worker in the register, stating such personal particulars. Specific information that will be recorded are:

I. the date of registration and deregistration.

II. the age at the time of registration.

III. in the case of a female radiation worker, the periods of pregnancy, as such person informed the holder.

IV. the date of appointment in the employ of the holder and of dismissal and the reason for the dismissal.

V. the address at the time of dismissal.

b) No person shall be registered as a radiation worker unless:

I. He/she is 18 years old or older.

II. A medical practitioner has certified in the health record of the person concerned that, in the opinion of the medical practitioner, such a person is fit to perform radiation work and

III. in the case of a female person, the holder concerned has informed such person pertinently of the hazard to the foetus of ionising radiation during pregnancy,

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and the holder is satisfied after personal enquiry that the person concerned is not pregnant.

c) A holder shall remove the name of a radiation worker from the register of radiation workers in his employ as soon as:-

I. in the case of a female radiation worker, it comes to his knowledge that such a worker is pregnant.

II. A medical practitioner certifies in writing that, in his opinion, such a worker is not fit for radiation work.

Controlled Area

a) In respect of every controlled area pertaining to any activity for which his authority provides, a holder shall:-

I. Describe such areas in his internal rules.

II. physically mark off or demarcate such areas.

III. Place such area under entrance control, and

IV. Furnish such area with a radiation warning notice.

V. In the case of a building or part thereof, other structure or enclosed area, on the outside every door, gate, or similar entrance, as the case may be, or otherwise at any place or places on the boundary of the area from which it shall be visible.

VI. from all directions at a distance of at least 30 meters from such boundary.

VII. A warning notice referred to above shall be indicated in both English and Swahili.

VIII. controlled area that is dangerous and shall further contain at least the following particulars:-

a) that radioactive material is present in such area.

b) the international symbol that indicates the presence of ionising radiation.

c) the name and telephone number of the radiation protection officer and the acting Radiation protection officer concerned.

b) The employer, by means of an entrance control system, ensures that entry to a controlled area is gained only by:-

I. persons who are in the employ of such holder and who are authorised thereto by him.

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II. persons who are not in the employ of such holder but who have been approved by the holder concerned for the carrying out of an activity.

III. a patient or

IV. persons authorised thereto by law.

Classified Persons

a) The employer must designate as classified persons those of its employees who are likely to receive an effective dose greater than 6 mSv per year or an equivalent dose greater than 15 mSv per year for the lens of the eye or greater than 150 mSv per year for the skin or the extremities and must immediately inform those employees that they have been so designated.

b) The employer must not designate an employee as a classified person unless:

c) That employee is aged 18 years or over and

d) An Occupational Medical Practitioner/Physician has certified in the health record that that employee is fit for the work with ionising radiation which that employee is to carry out.

e) In deciding whether a person must be classified, the employer should take into account the potential for exposure to ionising radiation (including the possibility of accidents, etc., which are likely to occur) as a result of the work the individual is required to undertake.

f) An employer should designate as a classified person any employee who works with any source of ionising radiation capable of giving a dose rate where it is reasonably foreseeable an employee could receive an effective dose greater than 20 mSv or an equivalent dose in excess of a dose limit within several minutes.

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Information, Instruction and Training

a) Every employer must ensure the employees who are engaged in work with ionising 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:
   I. The risks to health created by exposure to ionising radiation as a result of their work.
   II. The general and specific radiation protection procedures and precautions which should be taken in connection with the work with ionising radiation to which they may be assigned and
   III. The importance of complying with the medical, technical and administrative requirements of these Regulations.
   IV. adequate information is given to other persons who are directly concerned with the work with ionising radiation carried on by the employer to ensure their health and safety so far as is reasonably practicable.

b) All those involved in work or affected by work with ionising radiation, including management and outside workers, need to know how to work safely and reduce risk to their health. They must be trained to help develop and sustain a commitment to restricting exposure wherever it is reasonably practicable.

c) Training must be appropriate to the nature of the work and designed to meet the specific needs of employees. Employers must provide clear instruction and training on both the general operational and working conditions of the practice and the particular setup to which the employee is assigned.

d) Employers must provide training to make sure employees are competent, and a system of work or PPE is provided to restrict exposure. Training is also needed where the employer arranges for employees to perform particular functions required by these Regulations, such as making entries in radiation passbooks for outside workers.

e) Some employees may not be closely involved with the work but must be given suitable and proportionate information or instruction to avoid being unnecessarily exposed to ionising radiation.

f) Employees involved in work with ionising radiation need to understand the results of the general risk assessment and what this means for them. They must be made aware of the main risks, including the risk of accidental exposures, and the control measures they must follow to prevent or reduce those risks.

g) Employees must also be instructed on their responsibilities. They must cooperate with their employer and follow the health and safety training provided.

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What is required?

a) Training must be effective, and employers should check its adequacy. Checks could include:
   I. requesting feedback from employees and supervisors.
   II. making sure that employees are working as they have been trained.
   III. monitoring the effect of training on accidents or near misses.

b) Employers should consider whether the training delivered its aims and objectives and, if it hasn't, make changes to the Programme.

c) Reviewing training material regularly will make sure that it remains current.

d) Employers must consider remedial training if a lack of competence is identified as the cause of an incident or has contributed to it. Keeping training records will help to identify when refresher training is needed.

e) Individuals should know when they need to seek help and where they should find it. Employers are advised to consult their RPAs when planning their information, instruction and training needs.

f) Its female employees who are engaged in work with ionising radiation are informed of the possible risk arising from ionising radiation to the foetus and to a nursing infant and of the importance of informing their employer in writing as soon as possible:
   I. after becoming aware of their pregnancy.
   II. if they intend to breastfeed an infant.

Information for employees who may become pregnant or start breastfeeding.

a) Employees should notify their employer in writing as soon as they become pregnant or if they are breastfeeding so the employer can put in place any special protection program.

b) As part of an employer's general duty to assess risks, they must consider the preventative and protective measures they will implement to reduce, remove or control risks to pregnant or breastfeeding workers. The risks and control measures must be communicated to female workers.

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Repeating Training at Regular Intervals

a) Refresher training should be scheduled at regular intervals to maintain competence levels. In addition, employers should review employees' capabilities and provide additional or refresher training for employees as needed.

b) Employers should determine the frequency of refresher training. It may be possible for such training to be given as part of other health and safety updates. A realistic risk-based approach to refresher training is needed to make sure that an employee's knowledge and awareness are maintained. If new equipment is brought in or working practices change, staff will require further training.

c) In addition to the above requirements, every employer who is engaged in work with ionising radiation involving a high-activity sealed source must ensure that the information and training given to employees involved in such work includes –

   I. specific requirements for the safe management and control of high-activity sealed sources for the purpose of preparing such employees for any events which may affect their radiation protection.

   II. particular emphasis on the necessary safety requirements in connection with high-activity sealed sources and specific information on the possible consequences of the loss of adequate control of high-activity sealed sources.

d) Training for high-activity sealed sources (HASS) should include the following:

   I. Training and instruction in the precautionary measures required when dealing with HASS.

   II. Training and instruction for those carrying out maintenance checks, including leak tests as designated under regulation.

   III. Training and instruction in fire prevention with regard to sources.

   IV. Training in the appropriate management procedures for handling any lost, loose or detached sources discovered.

   V. Training and instruction in the emergency procedures which must be followed in the event of any foreseeable accident that could result in damage to the sources, for example, fire.

   VI. Information on the risks and potential effects on people, including those who may come too close to HASS, touch them or pick them up, particularly if the sources are damaged.

   VII. Information on the possible serious consequences of the loss of adequate control of HASS.

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VIII. Training and instruction in the emergency procedures which must be followed in the event of loss, theft or unauthorised use of HASS.

IX. Employers may find it helpful to include past accident or incident scenarios involving the loss or theft of HASS in the training as a way of highlighting the risks.

Application of dose limits to different classes of person

The limit on effective Dose is:

a) 20 mSv a year, on average, over five years, to exceed 50 mSv in any year for any person aged 18 or over who is an employee.

b) 6 mSv a year for trainees aged between 16 and 18 and students aged between 16 and 18 who work with ionising radiation in the course of their studies.

c) Every employer must designate as a controlled area any area under its control which has been identified by an assessment as an area in which:

d) It is necessary for any person who enters or works in the area to follow special procedures designed to restrict significant exposure to ionising radiation in that area or prevent or limit the probability and magnitude of radiation accidents or their effects or

e) Any person working in the area is likely to receive an effective dose greater than 6 mSv a year or an equivalent dose greater than 15 mSv a year for the lens of the eye or greater than 150 mSv a year for the skin or the extremities.

f) Special procedures should always be necessary to restrict the possibility of significant exposure. Employers should designate controlled areas in cases where:

g) the external dose rate in the area exceeds 7.5 µSv per hour when averaged over the working day.

h) the hands of an employee can enter an area, and the 8-hour time average dose rate in that area exceeds 75 µSv per hour.

i) there is a risk of spreading significant radioactive contamination outside the working area.

Local Rules

a) Local rules should contain the following information:

b) The dose investigation level is specified above.

c) identification or summary of any contingency arrangements indicating the reasonably foreseeable accidents.

d) name(s) of the appointed RPS(s)

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e) The identification and description of the area covered.

f) A summary of the working instructions appropriate to the radiological risk associated with the source and operations involved, including the written arrangements relating to non-classified persons entering or working in controlled areas.

g) Where an employer has detailed written working instructions contained within operations manuals or work protocols, it will usually be sufficient for the local rules to refer to the relevant sections of these documents.

Washing Facilities

a) The employer is responsible for the controlled area must consider likely levels of contamination arising in these areas to assess the type and extent of washing and changing facilities needed.

b) The possibility of accidents, such as spillages, must also be taken into account when deciding whether it is appropriate to provide these facilities. Employers must provide washing facilities for places where contamination is likely.

c) What is adequate will vary from normal washing facilities for low levels of contamination to showers where high levels of contamination can be expected. Normally, the best position for these facilities will be next to the changing facilities.

d) Washbasins should be supplied with hot and cold water via jets or sprays, which can be operated without using hands (e.g. foot or elbow operated).

e) Soap and drying facilities such as disposable towels must be provided by the employer; nail brushes may also be needed. Static or roller towels are not suitable in most situations.

f) The washing facilities should be accessible but situated so that they do not themselves become contaminated.

Changing Facilities

a) Changing facilities are needed where protective clothing (other than disposable gloves) has to be worn in the area.

b) Employers must provide a system to allow protective clothing or RPE that has been worn, or any other contaminated clothing, to be left initially in the controlled area.

c) The system must prevent the spread of contamination from protective clothing to personal clothing.

d) Wear protective clothing, or RPE, in a controlled area; the following should be provided at or outside the entrance to the area:

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I. A bench or barrier to demarcate the exit. This is so protective clothing and RPE, which may be contaminated, can be removed and left within the area.
II. containers on the 'active' side of the barrier for discarded contaminated clothing.
III. Lockers on the 'clean' side of the bench or barrier for uncontaminated clothing, shoes, etc.
IV. A supply of clean protective clothing on the 'clean' side if not provided elsewhere.

Eating, Drinking and Smoking

a) Where there is a significant risk of people ingesting radioactive materials within the controlled area because of surface contamination, employers must make arrangements to prohibit eating, chewing, drinking, etc. in the area.
b) Where it is necessary to prohibit eating, drinking or smoking in the controlled area, suitable alternative facilities must be provided for these activities to be carried out in an uncontaminated area.

4.5 Personal Protective Equipment

The employer must ensure the employee is provided with appropriate personal protective equipment. The management of PPE will be through the TNCL-OHS-SOP-0020.

Medical surveillance

The medical surveillance will generally be managed through the Medical Surveillance Program SOP, TNCL-OHS-SOP-0016. The following will be the specific details that will be applicable to ionising radiation medicals.

a) All employees who are classified/Radion workers and those who employers wish to classify must be put under medical surveillance.
b) Before that person is classified, employers must make sure that the employee has been certified as fit for the intended type of work within the previous 12 months.
c) Also, employers must arrange for adequate medical surveillance for any employee who has received an overexposure, whether or not that employee has been designated as a classified person.

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Purpose of medical surveillance

a) The purpose of medical surveillance is to confirm that an individual is fit or continues to be fit for the intended work with ionising radiation.

b) The fitness of the person is not restricted to possible health effects from exposure to ionising radiation. The Occupational Medical Practitioner/Physician must consider specific features of the work with ionising radiation and the fitness of the individual where appropriate:

   I. to wear any PPE (including RPE) required to restrict exposure.

   II. with a skin disease, to undertake work involving unsealed radioactive materials.

   III. with psychiatric illness or personality disorder, to undertake work with radiation sources that involve a special level of responsibility for safety.

   IV. with a history of chronic pulmonary disease, a blood disorder, treatment with cytotoxic drugs, an inherited predisposition to cancers, or previous significant medical exposure to ionising radiation.

c) The Occupational Medical Practitioner/Physician's decision on fitness will be made on an individual basis, and the above considerations will not automatically exclude an individual from classified work.

d) In some posts, the nature of the work may be such that an employee is at risk from acute exposure to high levels of external radiation (e.g. site radiography) as a result of an accident.

e) In such cases, the Occupational Medical Practitioner/Physician may take into account this potential for acute exposure to ionising radiation when deciding what level of medical surveillance is appropriate, even where recorded doses are generally low.

f) For workers who have received overexposure, medical surveillance (including monitoring for possible biological effects) is mainly intended to assess fitness to continue the work with ionising radiation. It also gives the worker the opportunity to discuss any concerns that they may have in relation to the risks resulting from the overexposure.

Medical examination before designation as a classified person

In general, a medical examination will not usually be needed when a classified person changes employment if the person has been certified fit for that type of work with ionising radiation within the preceding 12 months.

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Where there is a change of work that involves exposure to a different risk from ionising radiation, the occupational medical practitioner/physician may decide that a medical examination is necessary to determine whether the person is fit for work in the new duties. This may be considered, for example, if the employee changes duties involving work with sealed sources to work with unsealed radionuclides or has to use PPE for the first time.

Periodic reviews of health

a) After the initial medical examination is conducted before designation as a classified person, periodic reviews of health should take place at least once every year.
b) The Occupational Medical Practitioner/Physician may specify a shorter period between reviews.
c) The format of the review is decided by the occupational medical practitioner/physician, who will take into account any guidance issued to the occupational medical practitioner/Physician.
d) The review will involve at least an assessment of the individual's dose profile and sickness absence records.
e) The Occupational Medical Practitioner/Physician may also need access to other records concerning the working conditions of the classified person.
f) Periodic reviews may also involve an interview with the individual and occasionally a medical examination and medical tests, depending on the nature of the work and the individual's state of health. Employers are responsible for making any necessary arrangements for medical surveillance.

Special medical surveillance

a) Special medical surveillance for any employee who has received an overexposure may be necessary. Special medical surveillance may include a medical examination if the Occupational Medical Practitioner/Physician considers this to be necessary in the circumstances.
b) The medical adviser will work in consultation with the Occupational Medical Practitioner/Physician and others, as appropriate, to determine the content of special medical surveillance.
c) It should include a medical assessment, counselling, and a detailed list of possible restrictions on further exposure.

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d) Specific tests, such as chromosome aberration analysis, may be warranted to help establish the degree of any overexposure. This will depend on the size and distribution of the Dose received and may not be appropriate unless a whole-body exposure in excess of 100 mSv has been received.

4.6 Compliance

Registration, authorisation, Certification and operation

The application for an operating license will be per the Atomic Energy Act 2004, part three and part nine, which guides controlling ionising radiation sources and installations and the operation of the Commission related to radiation protection services, respectively.

Radiation Safety officer

TNCL will appoint radiation protection officers as per section 57 of the Atomic Energy Act 2004. The Radiation protection officers will be appointed after receiving the statutory training, and then they will exercise their duties as per the Atomic Energy Act 2004.

Dosimetry services

The dosimetry services will be established and maintained as per part nine of the Atomic Energy Act, 2004, Section 56 (2) specifically mentioned the establishment of personal dosimetry services.

4.7 Transportation, Storage, Disposal, Safety aspects

The safe transportation, storage, disposal and safety aspects of ionising radiation will be as per the Atomic Energy Act, 2004, part four, which deals with Radiation Protection, Physical Protection, Nuclear Safety, Radioactive Waste Management and Emergency Preparedness.

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5. SYSTEM EVALUATION

This procedure shall be reviewed at least two years by members of the OHS department and presented to the Standard Committee for approval or when organisational changes take place or are required as part of internal and external audits. The TNCL Document Controller will monitor compliance with the document control system on an ongoing basis.

6. DISTRIBUTION

List physical locations which require a controlled copy of this document.

Table 2: Distribution

Copy	Controlled Document Folder Location
Master	Controlled Documents Central Filing System

7. CONTRAVENTION

Any breach of this procedure shall be regarded as refusal/failure to carry out a lawful instruction and will be dealt with as per the disciplinary procedure.

8. DOCUMENT CHANGE PROCESS

The process of document change starts when the document custodian identifies there is a need to make changes within the document. The document custodian/ owner shall complete the document change request form, sign it off and submit it to the Document Controller.

The Document controller shall issue the controlled word copy of the document to the respective document custodian/owner so that changes may be made. The document custodian/owner shall resubmit the updated document to the document controller so that the document can be controlled and updated within the filing system and ready for use by the end users.

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8.1 Reason for Change

Table 3: Reason for Change

A	As a result of incidents	F	Change in training requirements
B	As a result of the audit findings	G	Results of risk assessments
C	New / changes in governance documents	H	Change due to spelling or grammatical error
D	Changes in legislation	I	New document format
E	Changes in technology	J	To integrate special instruction into the document control system

8.2 History of Change

Table 4: History of Change

Date of Change	Revision No	Revised Item (paragraph Number reference if required)	Reason Code	Name of Reviewer

9. RECORD CONTROL

Table 5: Record Control

Document Title:	Document ID:	Responsible for Maintenance:	Responsible for Filling:	Location of Storage:	Retention Period:	Method of Disposal:
Management of Ionising Radiation Procedure	TNCL-OHS-SOP-0025	Document Controller	Document Controller	OHS Department	Hard Copy two Years	Hard copy shared file electronic

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10. DECLARATION

I, at this moment, declare that I have taken part in the discussion of this procedure, and I understand its contents and do commit that I shall ensure compliance hereto:

	Name and Surname	Company Number	Designation / Role	Signature	Date Signed
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