



**GUIDELINES FOR THE APPLICATION
OF LICENSE FROM THE ATOMIC
ENERGY LICENSING BOARD FOR
MILLING OF MATERIALS CONTAINING
OR ASSOCIATED WITH RADIOACTIVE
MATERIALS**



Lembaga Perlesenan Tenaga Atom
Kementerian Sains, Teknologi dan Inovasi
Batu 24, Jalan Dengkil, 43800 Dengkil
Selangor Darul Ehsan

Tel: 03-89225888
Fax: 03-89223685 / 03-89254578
Web Site: <http://www.aelb.gov.my>

GUIDELINE FOR LICENSE APPLICATION FOR FACTORY

A. SCOPE

1. This document is prepared with intention as a guideline for applicants who wish to obtain a license to mill materials containing or associated with radioactive materials. Materials subjected under these provisions are monazite, zirconium, xenotime, ilmenite and other materials determined by the Board from time to time.
2. This document is subject to the Atomic Energy Licensing Act 1984 (Act 304) and the regulations made thereunder.
3. In this guide, unless the context requires otherwise a different meaning:

'license fee' means a fee imposed on an applicant upon notification by the appropriate authority that his application to obtain, amend or renew any license is successful;

'application fee' means an administrative fee imposed by the appropriate authority upon the submission of an application to obtain, amend or renew any license;

'waste treatment facility' means any facility which is used for processing, treating or storing, prior to disposal, radioactive materials, nuclear materials or prescribed substances;

'workers' means a person working under the instruction of the licensee, whether or not employed by the licensee, in the handling or use of, or in any activity that will bring him into contact with, any radioactive material, nuclear material, prescribed substance or irradiating apparatus;

"approved registered medical practitioner" means a registered medical practitioner who is approved by the appropriate authority to be responsible for the medical surveillance of workers;

'milling' means any activity involved in the concentration and beneficiation of any material containing or is associated with radioactive materials, nuclear materials or prescribed substances;

'milling installation' means any installation built to undertake milling;

'the operation stage' means the stage where full operation of any nuclear installation, milling installation or waste treatment facility is allowed;

'temporary operation stage' means the stage where restricted operation

of any nuclear installation, milling installation or waste treatment facility is allowed for the purpose of confirming their expected normal operating characteristics predicted by the design information;

'amendment' of a license means amendment of any of the particulars contained in a license, but does not include an amendment which amounts to a transfer of the license;

'letter of intent "means a letter written to the Board informing it of the intention to site, construct and operate a nuclear installation, a milling installation or a waste treatment facility;

'dealings' in relation to any radioactive material, nuclear material, prescribed substances, or irradiating apparatus, means any activity involving radioactive material, nuclear material, prescribed substances, or irradiating apparatus, that is milled, traded, produced, processed, bought, owned, used, transported, moved, handled, sold, stored, imported, or exported.

B. Licensing

1. Subject to the provisions of sub section 12(1)b of the Atomic Energy Licensing Act 1984 (Act 304), no person shall have any dealing through the possession or disposal of any radioactive material, nuclear material, prescribed substance or irradiating apparatus unless he is the holder of a valid license issued under section 16 (5) Act 304.

In relation to this, any one who wishes to mill materials containing or associated with radioactive materials must obtain the following licenses where necessary:

a. Class A License

This license is in respect of the milling of materials containing or associated with radioactive materials or in respect to a radioactive installation and shall be in three parts, namely:

- i. the siting part;
- ii. the construction part; and
- iii. the operation part.

b. Class D License

This license is in respect to the transport of radioactive material, nuclear materials, prescribed substances or their wastes.

c. Class E License

Is a license to export or import of radioactive materials, nuclear

materials, prescribed substances, irradiating apparatus or their wastes.

d. Class G License

Is a license:

- i. to dispose of radioactive materials, nuclear materials, prescribed substances or their wastes.
- ii. to store radioactive materials, nuclear materials, prescribed substances or their wastes, prior to their disposal.
- iii. to decommission a milling installation.

C. GENERAL CONDITIONS OF OBTAINING A LICENCE

1. General conditions for obtaining a license are as follows:
 - a. The applicant shall employ or otherwise engage a person or persons having the necessary knowledge, skills and training to ensure that the activities sought to be licensed are carried out in such a manner as to protect the health of workers and members of the public and to minimize the danger to life, property and the environment, and
 - b. The applicant's proposed equipment, facilities and procedures shall be adequate to protect the health of workers and members of the public and to minimize danger to life, property and environment.

D. LICENSE APPLICATION

1. Anyone who intends to obtain a license that is classified, under the following:
 - a. **Class A License**

License with respect to:

 - i. the milling of among materials to extract monazite, zirconium, xenotime or ilmenite minerals by means of physical process.
 - ii. the milling of monazite, zirconium, xenotime or ilmenite by means of chemical process.
 - iii. the milling of other materials that may be prescribed from time to time.

Shall follow the procedure as follows:

- i. Write a letter of intent to the Board giving brief description of the applicant's particulars, including the name and percentage of shareholders, the details of the activities to be carried out and milling installation to be built, proposed siting, date and place of construction and date of operation.
- ii. The Board will review this letter of intent and then request the applicant to provide all the required information as follows:

The Siting Part

An application for a siting license shall submit the following information:

- A general description of the proposed installations and activities.
- The physical characteristics of the site, namely the geology, hydrology, meteorology, flora, fauna and aquatic biota.
- The population distribution around the site, including the future trend of the population growth and the distances of the population centres from the sites.
- The present land use in and around the site.
- An assessment of the environmental impact from the normal operation of the proposed installation including a preliminary analysis of the radiation hazards foreseen.
- A program for the pre-operational environmental monitoring.
- A description of storage facilities for the radioactive materials.
- A description of the decommissioning plans, its rationale and a plan for post-operational monitoring.
- A detail flow sheet, including a calculation of the input and output of materials and water balance and a description of the sump system, including its capacity, if any.

- The proposed dust control system.
- A description of the measures designed to control mill site drainage.
- Information on the grade and quantities of the materials to be processed and, if the materials are to be imported, the average monthly or yearly quantities to be imported.
- The emergency preparedness programme and mitigative measures to deal with accidental releases, including emergency monitoring and removal of released tailings.
- A detailed engineering plan of water diversions and treatment facilities and detailed monitoring plans and contingency measures for the construction phase of the facility.

The Construction Part

An application for a construction license shall submit the following information:

- A general layout and detailed plan and design of the facility, including its conceptual safety design.
- A description of the foreseen radiation and chemical hazards to the workers and members of the public during normal operation of the proposed installation, taking into account the anticipated chemical and physical characteristics and radioactive contents of all the effluents to be discharged and emissions from the facility.
- Statement with respect to potential accidents and unplanned releases of wastes and hazardous materials from the facility. This part includes the following explanations:
 - Statement of conditions that may cause accident and unplanned releases of wastes and dangerous materials.
 - Statement with respect to the potential effects of accident and releases to the health and safety of workers and members of the public, and to the environment.
 - Statement with respect to the proposed inspection and maintenance programme to prevent accidents and releases from happening, and

- Statement with respect the emergency plan and preparedness programme, and mitigation measures to deal with such accidents and releases.

The Operation Part

i. Temporary Operation Stage

- Any changes in the material used or in the design, introduced during the construction of the installation.
- A description of the proposed measures to control radiation exposures, including the operational radiation monitoring programme designed for the workers, members of the public and the environment, together with a complete list of the supporting services and facilities.
- A detailed medical surveillance programme.
- A programme for the initial and periodic training of workers on general safety and radiation protection.
- The facilities and equipment designed to contain spillage and the procedures to follow in handling spillage of radioactive materials.
- The proposed plan and procedures to prevent loss, theft or unauthorized use of radioactive materials.
- The plan for operational monitoring of the quality and quantity of effluents to be discharged and emitted from the facility, including:
 - The frequency and points of sampling.
 - The types of equipment and analytical methods to be used.
 - The contingency plan in the event of abnormal results.
- A description of the proposed procedures to prevent accidents and the proposed contingency plan in the event of an accident.
- The nominal daily and annual capacity of the mill, the anticipated recovery, and the anticipated composition of mill feed, concentrates and tailings.

- The procedures for handling and storage of materials containing radioactive materials.

ii. Full Operation Stage

Every application shall submit a Safety Analysis Report containing the following particulars:

- All valid information submitted for the temporary operation stage.
- All new information and all the changes to the plan, design and operation introduced following actual operation during the temporary operation stage, if any.

b. Class D License

A Class D license is required for every transportation of radioactive materials or their wastes. Applicant must fill out the form LPTA/BP/4 in 2 copies and submit them to the Board together with a RM 15.00 application fee payment.

c. Class E License

Class E license is required for activities related to the export and import of radioactive material. Applicant must fill out the form LPTA/BP/6 in 2 copies and submit them to the Board together with the application fee payment of RM 15.00.

d. Class G License

To obtain a Class G license, applicant must fill out the form LPTA / BP / 5 in 2 copies along with the application fee payment of RM15.00, and other information as required for Class A license for siting and construction.

2. The Board will impose a license fee to the applicant once the application has been approved. Payment of license fee must be made before the license is issued.

E. AMENDMENT AND RENEWAL OF LICENSE

1. Any licensee who intends to amend or to renew a license classified as follows:
 - a. Class A in respect to the milling of materials containing or associated with radioactive materials.

Shall write a letter to the Board.

2. Any licensee who intends to amend or to renew classified under Class D, E and G shall complete, sign and return the application form together with the application fee, to the Board.

F. MISCELLANEOUS

1. There is no application fee for a license issued under the Class A in respect to milling of materials containing or associated with radioactive materials.
2. The Board may, at any time during the construction and development of the facility, require, in writing, the applicant to furnish such information as it may consider reasonably necessary in order to evaluate the health and safety of workers and members of the public, the security of the country and the environmental aspects of the development and future operation of the facility.
3. Prior to the construction and development of any part of the facility, all principal plans and drawings shall be submitted to the Board for approval, and the approved plans, drawings and materials shall not be changed during the construction and development of the facility unless prior approval from the appropriate authority is obtained.
4. According to article C sub-regulation (1) regarding the person or persons employed or whose services are used by the applicant, to be known as Radiation Protection Officer, shall first undergo examination conducted by the Board, prior to the recognition by the Board. Particulars regarding this examination are as in APPENDIX 1.
5. The applicant shall provide an environmental monitoring programme, pre- and post-operation, in and around the installation. Particular regarding the programme are as in APPENDIX 2.
6. The applicant shall provide for the health and safety programme of the installation. Particulars of the programme are as in APPENDIX 3.
7. The applicant shall provide a detail medical surveillance programme. Details of the program are as in APPENDIX 4.

APPENDIX 1**Radiation Protection Officer examination for activities related to the milling of materials containing radioactive materials**

Examination conducted by the Board for Radiation Protection Officer candidates for activities related to the milling of materials containing radioactive materials is 2 parts:

<u>Part 1:</u>	-	Written exam
Total questions	-	10 subjective questions
Duration of examination	-	90 minutes
Content of syllabus is attached		
<u>Part 2:</u>	-	Oral exam
Duration of examination	-	30 minutes
Content of syllabus is attached		

Contents of syllabus for Parts 1 and 2 Radiation Protection Officer Examination

1. IONIZING RADIATION - BASIC INFORMATION

- 1.1 What is ionizing radiation
 - 1.1.1 Atomic structure
 - 1.1.2 Radioactivity
 - 1.1.3 Ionization
- 1.2 Properties of ionizing radiation
 - 1.2.1 Alpha radiation
 - 1.2.2 Beta particles
 - 1.2.3 X and gamma radiation
 - 1.2.4 Neutrons
- 1.3 Concepts of radiation units
 - 1.3.1 Exposure
 - 1.3.2 Absorbed dose
 - 1.3.3 Dose-equivalent
- 1.4 Sources of ionizing radiation
 - 1.4.1 Natural radiation
 - 1.4.2 Man-made radiation

2. BIOLOGICAL EFFECTS OF IONIZING RADIATION

- 2.1 Introduction
- 2.2 Mechanism of radiation injury
 - 2.2.1 Basic interaction of ionizing radiation with living cells.
 - 2.2.2 Effects on deoxyribonucleic acids (DNA)
- 2.3 Classification of radiation effects
 - 2.3.1 Somatic effects
 - 2.3.2 Hereditary effects
- 2.4 Risk estimates
 - 2.4.1 Risks from somatic effects
 - 2.4.2 Risks from hereditary effects

3. PRINCIPLES OF RADIATION PROTECTION

- 3.1 Objective of radiation protection
- 3.2 The system of dose limitation
 - 3.2.1 Justification
 - 3.2.2 Optimization
 - 3.2.3 Dose limits
 - a. Planned special exposure
 - b. Occupational exposure of pregnant women

- c. Dose limits for members of the public
 - d. Derived limits and authorized limits
 - 3.3 Protection from radiation hazards
 - 3.3.1 Classification of working areas
 - 3.3.2 Three basic principles
 - 3.4 Protection from external radiation hazards
 - 3.4.1 Time
 - 3.4.2 Shielding
 - 3.4.3 Distance
 - 3.5 Protection from internal radiation hazards
 - 3.5.1 Source control
 - 3.5.2 Environmental control
 - 3.5.3 Contamination control
- 4. METHODOLOGY IN RADIOLOGICAL MEASUREMENT AND MONITORING**
 - 4.1 Concept of radiation detection
 - 4.1.1 Type of detectors
 - 4.1.2 Choice and use of instruments
 - 4.1.3 Characteristics of a good instrument in radiological protection
 - 4.1.4 Calibration of the instruments in radiological protection
 - 4.2 Radiological monitoring
 - 4.2.1 Individual monitoring
 - 4.2.2 Area monitoring for airborne activity, radon and thoron progeny, water activity and other environmental sample analysis
 - 4.3 The interpretation and recording of monitoring results
- 5. SAFETY AND WORKING PROCEDURES**
 - 5.1 Introduction
 - 5.2 Classification of working areas
 - 5.3 Types of radioactive sources
 - 5.4 Safe handling of monozite, zirconium, xenotime, ilmenite or other open sources.
- 6. PLAN AND PROCEDURES FOR ABNORMAL SITUATIONS**

- 6.1 Introduction
- 6.2 Sources of the abnormal situations
- 6.3 Types of emergencies
 - 6.3.1 Local emergency
 - 6.3.2 Site emergency
- 6.4 Plan for the abnormal situation
 - 6.4.1 Hierarchy of command
 - 6.4.2 Reporting procedures
 - 6.4.3 Monitoring assessment
 - 6.4.4 Immediate control measures
 - 6.4.5 Coordination with Board and public authorities.
- 6.5 Equipment to be used in the cases of abnormal situation
- 6.6 Response action
 - 6.6.1 Accidents involving radioactive contamination
 - 6.6.2 Accidents involving external exposure only
 - 6.6.3 Accidents involving fire
- 6.7 Personnel decontamination
- 6.8 Maintaining the abnormal situation preparedness
- 7. THE SAFE TRANSPORT OF RADIOACTIVE MATERIAL**
 - 7.1 General procedures for transportation within an establishment
 - 7.2 General requirements for the safe transport of radioactive material
 - 7.2.1 Safety principles and requirements
 - 7.2.2 Type of packages
 - 7.2.3 Categories of packages
 - 7.2.4 Control for transport and storage in transit
 - 7.2.5 General accident provision
- 8. THE MANAGEMENT OF RADIOACTIVE WASTES**
 - 8.1 Definition of radioactive wastes
 - 8.2 Classification of radioactive wastes
 - 8.2.1 Solid waste
 - 8.2.2 Liquid waste
 - 8.2.3 Gaseous waste
 - 8.3 Steps in radioactive waste management
 - 8.3.1 Collection and transfer
 - 8.3.2 Principles and methods for treatment

8.4 Storage and disposal

8.4.1 Storage

8.4.2 Disposal

9. LAWS AND REGULATIONS PERTAINING TO THE USE OF ATOMIC ENERGY IN MALAYSIA

9.1 The Atomic Energy Licensing Act 1984 (Act 304)

9.2 Regulations under the Act which includes:

9.2.1 Radiation Protection (Licensing) Regulations 1986

9.2.2 Radiation Protection (Basic Safety Standards) Regulations 1988

9.2.3 Radiation Protection (Transportation) Regulation 1989

APPENDIX 2

Pre- and post-operation Environmental Monitoring Programme in and around the installation

1. In general this programme shall contain the following monitoring:
 - a. External radiation exposure monitoring.
 - b. Monitoring of exposure from radon and thoron daughter.
 - c. Sampling of air particulates to analyze radioactive material.
 - d. Sampling of environmental samples such as water, soil, plants and others deemed necessary to analyze radioactive contents.
 - e. Sampling of water sample around the installation and from the processing system to analyze the content of radioactive materials.

2. The applicant shall explain the types of equipment used for sampling and analysis.

APPENDIX 3

Safety and Health Program for Installation

The content of the Safety and Health Program in respect of the milling of radioactive materials shall be subjected to Section 25 of Act 304 that, among other contains the following:

1. ADMINISTRATIVE REQUIREMENTS
 - 1.1 The company's radiation protection organisational chart
 - 1.2 Responsibility:
 - a. Radiation Protection Officer
 - b. Radiation workers
 - 1.2 Exposure Limit based on the classification of area
 - 1.4 Procedures for record keeping:
 - a. Records of workers exposure (external radiation)
 - b. Records of workers exposure (internal radiation)
 - c. Medical records of radiation workers
 - d. Records of environmental monitoring
 - e. Inventory records of amang, monazite, zirconium, xenotime and ilmenite.
 - f. Records of maintenance and calibration of external radiation detectors.
 - g. Records of unusual and emergency operations.
 - h. Other records required by the Board from time to time.
 - 1.5 The training program for radiation workers
 - 1.6 The medical examination programme for radiation workers.
Please see APPENDIX 5
2. OPERATIONAL PROCEDURE
 - 2.1 Procedure and methods for normal operation
 - 2.2. Procedure and methods for abnormal operation
3. AREA CLASSIFICATION

4. TRANSPORTATION AND DISPOSAL PROCEDURES
 - 4.1 Import/export procedure
 - 4.2 Procedure for the transportation of radioactive materials
 - 4.3 Procedure for the storage/disposable of radioactive materials

APPENDIX 4

The applicant must employ an approved registered medical practitioner. The applicant shall ensure that the approved registered medical practitioner is capable of -

- a. Complete the form as APPENDIX 5 and submit it as soon as possible to the Board.
- b. Carry out medical surveillance of radiation workers, as determined by the Board.
- c. On medical grounds –
 - (i) Declare that a worker to be temporarily unfit to for the time being, is not capable to perform his normal duties;
 - (ii) Advise the licensee on the reinstatement of such worker to his normal duties.
 - (iii) Advise the licensee on the transfer of a worker to perform other duties; and
 - (iv) Inform workers about the conclusions derived from their medical examinations.
- d. Report any unusual circumstances immediately to the Board using the form LPTA/BM/1.
- e. Keeps the medical examination records of radiation workers (Form LPTA / BM / 5).
- f. Comply with other provisions issued by the Board in enforcing of the Atomic Energy Licensing Act 1984 (Act 304).

In respect to this, in the process of obtaining a license, the applicants are required to submit to the Board, a registered medical practitioner, who wants his services employed, to implement medical examinations of workers (radiation).

APPENDIX 5

APPROVED REGISTERED MEDICAL PRACTITIONER DECLARATION LETTER

I
(IC NO.....) hereby declare that I agree to conduct
medical examinations of workers from company
..... in accordance with the
requirements set by the Board.

Approved Registered Medical Practitioner:

Name :
IC No. :
Address :
Qualification :
Date :
Signature :
Official stamp :

NOTE: This portion must be sent directly to:

Director General
Atomic Energy Licensing Board
Batu 24, Jalan Dengkil,
43800 Dengkil,
Selangor Darul Ehsan