

GUIDELINES NO. AERB/FE&BE-FCF/SG-1



GOVERNMENT OF INDIA

GUIDELINES NO. AERB/FE&BE-FCF/SG-1

**AERB SAFETY GUIDELINES**

**RENEWAL OF LICENCE FOR OPERATION OF  
NUCLEAR FUEL CYCLE FACILITIES  
OTHER THAN NUCLEAR POWER PLANTS  
AND RESEARCH REACTORS**



**ATOMIC ENERGY REGULATORY BOARD**

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**Atomic Energy Regulatory Board  
Mumbai-400 094  
India**

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Price

Order for this guidelines should be addressed to:

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Atomic Energy Regulatory Board  
Niyamak Bhavan-A  
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Mumbai-400 094  
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## FOREWORD

Activities concerning establishment and utilisation of nuclear facilities and use of radioactive sources are to be carried out in India in accordance with the provisions of the Atomic Energy Act, 1962. In pursuance of the objective of ensuring safety of members of the public and occupational workers as well as protection of the environment, the Atomic Energy Regulatory Board (AERB) has been entrusted with the responsibility of laying down safety standards and framing rules and regulations for such activities. The Board has, therefore, undertaken a programme of developing safety standards, safety codes, and related guides and manuals for the purpose. While some of these documents cover aspects such as siting, design, construction, operation, quality assurance and decommissioning of nuclear and radiation facilities, other documents cover regulatory aspects of these facilities.

Safety codes and safety standards are formulated on the basis of nationally and internationally accepted safety criteria for design, construction and operation of specific equipment, structures, systems and components of nuclear and radiation facilities. Safety codes establish the objectives and set requirements that shall be fulfilled to provide adequate assurance for safety. Safety guides elaborate various requirements and furnish approaches for their implementation. Safety manuals deal with specific topics and contain detailed scientific and technical information on the subject. These documents are prepared by experts in the relevant fields and are extensively reviewed by advisory committees of the Board before they are published. The documents are revised when necessary, in the light of experience and feedback from users as well as new developments in the field.

The nuclear fuel cycle facilities cover all operating nuclear installations in both the front end and back end of nuclear power generation except nuclear power plants and research reactors. The front end facilities consist of uranium mining, conversion, fuel fabrication and the back end consist of reprocessing of spent fuel and radioactive waste management. This 'guidelines' provide guidance for renewal of licence for operation of the front and the back end of the nuclear fuel cycle facilities.

Consistent with the accepted practice, 'shall' and 'should' are used in the guidelines to distinguish between a firm requirement and a desirable option respectively. Appendix is an integral part of the document, whereas annexure and bibliography are included to provide further information on the subject that might be helpful to the user.

Approaches for implementation of desirable options which are different to those set out in the guidelines may be acceptable, if they provide comparable assurance against undue risk to the health and safety of the occupational workers and the general public, and protection of the environment.

For aspects not covered in this 'guidelines', applicable national and international standards, codes and guides acceptable to AERB should be followed. Non-radiological

aspects such as industrial safety and environmental protection, are not explicitly considered. Industrial safety is to be ensured through compliance with the applicable provisions of the Factories Act, 1948 and the Atomic Energy (Factories) Rules, 1996.

This document has been prepared and reviewed by the staff of Industrial Plants Safety Division of AERB. It has been reviewed by experts and relevant AERB Advisory Committee on Codes and Guides.

AERB wishes to thank all individuals and organisations who have prepared and reviewed the draft and helped in its finalisation. The list of persons, who have participated in this task, along with their affiliations, is included for information.



(S. S. Bajaj)  
Chairman, AERB

## DEFINITIONS

### **Accident**

An unplanned event resulting in (or having the potential to result in) personnel injury or damage to equipment which may or may not cause release of unacceptable quantities of radioactive material or toxic/hazardous chemicals.

### **Ageing Management**

The engineering, operations and maintenance actions taken to control ageing degradation and wearing out of systems, structures or components within acceptable limits.

### **Approval**

A type of regulatory consent issued by the regulatory body to a proposal.

### **Atomic Energy Regulatory Board (AERB)**

A national authority designated by the Government of India having the legal authority for issuing regulatory consent for various activities related to the nuclear and radiation facility and to perform safety and regulatory functions, including their enforcement for the protection of site personnel, the public and the environment against undue radiation hazards.

### **Commissioning**

The process during which structures, systems and components of a nuclear or radiation facility, on being constructed, are made functional and verified in accordance with design specifications and found to have met the performance criteria.

### **Competent Authority**

Any official or authority appointed, approved or recognised by the Government of India for the purpose of the Rules promulgated under the Atomic Energy Act, 1962.

### **Emergency Exercise**

A test of an emergency plan with particular emphasis on coordination of the many interfacing components of the emergency response, procedures and emergency personnel/agencies. An exercise starts with a simulated/postulated event or series of events in the plant in which an unplanned release of radioactive material is postulated.

### **In-service Inspection (ISI)**

Inspection of structures, systems and components carried out at stipulated intervals during the service life of the plant.

### **Inspection**

Quality control actions, which by means of examination, observation or measurement,

determine the conformance of materials, parts, components, systems, structures as well as processes and procedures with predetermined quality requirements.

### **Normal Operation**

Operation of a plant or equipment within specified operational limits and conditions. In case of a nuclear power plant, this includes, start-up, power operation, shutting down, shutdown state, maintenance, testing and refueling.

### **Nuclear Facility**

All nuclear fuel cycle and associated installations encompassing the activities from the front end to the back end of nuclear fuel cycle processes and also associated industrial facilities such as heavy water plants, beryllium extraction plants, zirconium plants etc.

### **Nuclear Fuel Cycle**

All operations associated with production of nuclear energy, including mining, milling, processing and enrichment of uranium or processing of thorium, manufacture of nuclear fuel, operation of nuclear reactors, reprocessing of irradiated nuclear fuel, decommissioning, and any activity for radioactive waste management and research or development activity related to any of the foregoing.

### **Regulatory Body**

(See 'Atomic Energy Regulatory Board')

### **Safety Culture**

The assembly of characteristics and attitudes in organisations and individuals which establishes that as an overriding priority, the protection and safety issues receive the attention warranted by their significance.

### **Significant Events**

Unusual occurrences exceeding the limits and conditions stipulated by the regulatory body.

### **Technical Specifications for Operation**

A document approved by the regulatory body, covering the operational limits and conditions, surveillance and administrative control requirements for safe operation of the nuclear or radiation facility. It is also called as 'operational limits and conditions'.

### **Worker**

Any person who works, whether full time, part-time or temporarily, for an employer and who has recognised rights and duties in relation to occupational radiation protection. (A self-employed person is regarded as having the duties of both an employer and worker).

**SPECIAL DEFINITIONS**  
(Specific for the present 'Guidelines')

**Competent Person**

Any official or authority approved by the Competent authority for the purpose to carry out definite test as per national/international standards or codes.

**Frequency Rate (F.R)**

Number of lost time injuries per million man-hours worked.

**Incidence Rate (I.R)**

Number of lost time injuries per thousand persons employed.

**Injury Index (I.I)**

It is product of frequency rate and severity rate divided by thousand.

**Severity Rate (S.R)**

Number of man-days lost per million man-hours worked.

**Unit Safety Committee**

A committee constituted by AERB for individual units which looks after the safety related aspects of operating plants, appraise all safety related documents, assess violations of plant Technical Specifications for Operation, evaluate all safety related unusual occurrences reports, examine from safety angle all new project proposals, monitor implementation of the recommendations etc.



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# 1. INTRODUCTION

## 1.1 General

AERB issues licence under section 6 of the Factories Act, 1948 and Rule 3 of Atomic Energy (Factories) Rule, 1996 as well as under the Atomic Energy (Radiation Protection) Rules, 2004 [AE(RP)R, 2004] to the industrial plants of nuclear fuel cycle facilities of DAE units. As per AE(RP)R, 2004, renewal of licence is for a period of five years.

Design life of the nuclear fuel cycle facilities depends on chemicals used, which typically is considered in the range of 5 to 25 years. Regulatory body grants initial licence for operation depending on safety review/assessment of project at commissioning stage as per AERB safety guide 'Consenting Process for Nuclear Fuel Cycle Facilities and related Industrial Facilities other than Nuclear Power Plants and Research Reactors [AERB/NF/SG/G-2]' and renewal of licence is based on the review of plant performance.

During operation, multi-tier approach is adopted for assessment of various operational safety aspects of the plant such as review of plant performance, adherence to technical specifications for operation, surveillance of various equipment through periodic regulatory inspections and effluent management.

For renewal of licence, comprehensive safety review of plant is required considering the cumulative effects of plant ageing, results of in-service inspection (ISI), system modifications, operational feedback, revision in applicable safety standards, technical developments, unusual occurrences, radiation safety status, waste management, manpower training etc. The process of safety review for renewal of licence is to be carried out a number of times, periodically during design life of nuclear fuel cycle facilities.

For renewal of licence, application form along with performance report will be reviewed by a multi-tier system. Initially concerned division of AERB will review and report will be forwarded to respective unit safety committee. The review and recommendations of the unit safety committee will be discussed in the SARCOP. Finally, SARCOP after review will give its recommendations to the Competent Authority to issue licence. The present structure for renewal of licence is shown in Annexure-I.

## 1.2 Objective

The objective of the 'guidelines' is to provide methodology for conducting periodic safety review for renewal of licence of a nuclear fuel cycle facility and submitting the same to the regulatory body.

### **1.3 Scope**

The 'guidelines' cover the essential requirements to be fulfilled for renewal of licence of a nuclear fuel cycle facility.

The 'guidelines' cover details of all aspects to be reviewed for plant operation till the design life. For life extension beyond design life, special review is to be carried out for assessment of safety.

## **2. PERIODIC SAFETY REVIEW FOR RENEWAL OF LICENCE**

### **2.1 Objective**

The main objective of the periodic safety review is assessment of safety during operation of a nuclear fuel cycle facility for the specified period under review and to assure that:

- (a) the nuclear fuel cycle facility continues to be capable of safe operation at the designed plant capacity within the operational limits and conditions specified in the Technical Specifications for Operation;
- (b) all structures, systems and components important to safety of the facility, have not shown signs of any unacceptable deterioration and are capable of reliably performing their intended design functions;
- (c) the management of facility is alive to safety related problems and the management system established at the nuclear fuel cycle facility to provide prompt response for taking effective measures to resolve the safety related problems; and
- (d) the nuclear fuel cycle facility has operated in a safe manner during the reported period and continued operation till next periodic safety review and renewal of licence would not pose undue risk to operating personnel, the public and the environment based on review of operation during assessment period.

### **2.2 Rationale of Periodic Safety Review (PSR)**

During the period specified in the licence, the operational fuel cycle facilities undergo routine and special safety reviews, which may have specified scope. PSR should be more comprehensive and takes into consideration improvement in safety standard and operating parameters, cumulative effects of plant ageing, modifications, and feedback of operating experience in safety related items. Therefore it is considered that periodic safety review would be appropriate to obtain assurance on safety of plants during the licence renewal period. Such review may bring out weakness, if any, and suitable changes/modifications that may have to be incorporated to improve and maintain required safety level of the plants.

### **2.3 Schedule of Renewal of Licence**

Initial licence after commissioning of the nuclear fuel cycle facility will be granted for a specified period up to a maximum period of five years as per the statutes. Thereafter renewal of licence will be granted for a specified period up to a maximum period of 5 years each time as per Atomic Energy

(Radiation Protection) Rules, 2004, till completion of design life of fuel cycle facility. Moreover, the period of licence depends at the discretion of AERB on safety status of the plants.

Periodic safety review for renewal of licence will be carried out by AERB on major safety aspects as mentioned in section 3 of this document. Necessary information and reports should be submitted by the respective unit along with renewal application form (Appendix-I).

Periodic safety review should cover period starting from the end of period covered in the last periodic safety review or from the date of initial licence in case of first PSR. Normally the review will cover all the factors identified in section 3. However, if sufficient justification exists, some of the elements could be excluded. In case some of the safety factors are not found totally satisfactory and need further action, licence may be renewed for shorter period.

To ensure that sufficient time is available for review and assessment by AERB, PSR document should be submitted at least six months prior to expiry of current licence.

### **3. CRITERIA FOR PERIODIC SAFETY REVIEW**

#### **3.1 General**

A comprehensive assessment of plant safety is an important task and is facilitated by dividing it into a number of factors. The factors required for consideration in the periodic safety review are:

- (a) plant performance,
- (b) safety performance,
- (c) procedures,
- (d) waste management and radioactive waste disposal,
- (e) management of ageing,
- (f) emergency preparedness,
- (g) environmental impact assessment, and
- (h) organisation and administration.

Some of the elements of review for each factor are identified below. These elements describe specific activities within the factor, which should be reviewed. The review should be carried out by specialists. The organisation may involve external consultants to examine specific elements for an objective review.

#### **3.2 Review Aspects of Safety Factors**

##### **3.2.1 *Plant Performance***

###### **3.2.1.1 Objective**

The objective is to determine the actual operational condition of the plant.

###### **3.2.1.2 Description**

- (a) With time, certain structures of the fuel cycle facility might have undergone some changes and deterioration which will have an effect on plant performance. Status records as far as possible, in respect of inspection, modifications, developments and maintenance should be available and updated for review.
- (b) The current record keeping methods and methodology to determine plant status even though not available at earlier dates should be utilised to generate and derive data through special test or inspection.
- (c) In case of major modification/equipment replacement and automation

of operations in the plant, all details should be included in safety review.

- (d) Details of unplanned/emergency plant shut down and their safety implications on plant equipment should be analysed.

#### 3.2.1.3 Major Elements of Review

- (i) Capacity utilisation: If capacity utilisation is more than licenced capacity, then plant should give a detailed justification of plant capacity utilisation.
- (ii) Major plant operational problems and corrective measures taken: Operational problems affecting systems, structures and components important to safety shall be brought out. The corrective measures taken/planned along with target dates for completion shall be given/presented.
- (iii) In-service inspection programme implementation status including major deficiencies: Implementation status of in-service inspection (ISI) programme with reference to ISI manual shall be presented along with reasons and justification for not meeting the requirements. Major deficiencies detected, by ISI and corrective measures taken or proposed to be taken, shall be brought out.
- (iv) Maintenance of items important to safety: Brief details of assessment of structures and equipment including engineered safety features carried out shall be presented to demonstrate adequacy of maintenance programme and testing requirements.
- (v) Major modification and equipment replacement: Brief description on addition/deletion of new equipment to the existing plant for enhancing energy efficiency or pollution control or for any other reasons shall be presented.
- (vi) Enforcement action against non compliance shall be given.
- (vii) Details of unplanned shutdowns and brief description of major jobs such as equipment replacement/repairs if any, and surveillance activities carried out during scheduled annual shutdowns shall be presented.
- (viii) Efforts put in automation of operations in the process plant: Brief description on any automation of manual operation carried out for hazardous situations in view of plant and personnel safety shall be brought out.

### 3.2.2 *Safety Performance*

#### 3.2.2.1 Objective



The objective of the review is to determine safety performance of an operating fuel cycle facility.

#### 3.2.2.2 Description

- (a) Safety performance is usually determined from assessment of operating experience, which includes significant event reports (SER), industrial safety status reports (safety, health and environment reports), health physics reports and generation of radioactive waste, discharge of effluents and emissions.
- (b) Proper records of safety related incidents and their safety significance should be mentioned. Detailed investigation of the incidents/accidents should be carried out. Safety statistics like frequency rate and severity rate should be analysed.
- (c) Review of industrial safety aspects.
- (d) Any technical specification violation should be described in detail. AERB recommendations, if any, and the implementation status should be given.
- (e) Analysis of radiation dose and radioactive effluents data provides important information on radiation risk to plant personnel and environment. Person-Sv consumption, radioactive effluent release/discharge and other performance indicators could be used for assessment of safety performance. Records of radiation doses and radioactive effluents should be reviewed along with trend analysis to determine whether these are within prescribed limits and as low as reasonably achievable.
- (f) Collective dose is total radiation dose incurred by plant personnel. It is an important parameter in implementation of ALARA (as low as reasonably achievable) principle. In any practice involving radiation exposure, it is not only important to restrict the dose of the workers below the individual dose limit specified by AERB, but also to minimise the stochastic risk due to radiation dose. Practice should be introduced in such a way that the total radiation exposure is controlled. For this, wherever possible, processes involving handling of radioactive sources should be mechanised. The units should adopt radiation practices such as better source control rather than employing more persons and sharing the dose.
- (g) Radiation levels in all accessible locations of the fuel cycle facilities should be monitored and maximum exposure to the operating persons should be controlled and a comparative statement of actual and annual budgeted Person-Sv should be given.

- (h) Summary of fire incidents of small, medium and large type of fire should be listed along with improvement carried out in the fire protection system to avoid recurrence of such incidents in future. Following table should be used for classification of fires.

S. No.	Type of fire	Loss in rupees	Loss in man-days
1.	Low	Less than 0.1 lakh	Nil
2.	Minor	0.1 – 2 lakhs	Injury treated but not hospitalised.
3.	Small	2 – 20 lakhs	Hospitalised but no fatalities
4.	Medium	20 – 400 lakhs	1-5 fatalities
5.	Large	More than 400 lakhs	More than 5 fatalities

Note: The higher of the two criteria will be considered for classification of the type of fire.

#### 3.2.2.3 Major Elements of Review

- (a) Safety management system: Safety organisation, Apex safety committee meetings, internal safety audits and non conformances, steps taken for improving safety culture and safety management system including analysis of low level/near-miss events and improvements in training programme should be brought out.
- (b) Brief description on Industrial Safety which includes:
- (i) Status of periodic testing of all cranes, hoists, lifts, chain pulley blocks, pressure vessels etc. used in the plants as per the Atomic Energy (Factories) Rules, 1996 shall be submitted.
  - (ii) Status of noise and illumination levels in the work areas monitoring and appropriate remedial measures shall be available for verification.
  - (iii) Records of personal protective equipment provided to all the employees including contract workers shall be available for verification.
  - (iv) Status of periodic inspection reports of all portable power tools and earth resistance measurement shall be available for verification.
  - (v) Details of periodic medical examinations of workers, canteen workers, forklift/crane operators, audiometry test of personnel working in high noise area shall be available for verification.

- (vi) Status of training of engineers and supervisors in the industrial safety (minimum two days training in industrial safety should be considered) should be provided.
- (vii) Efforts for improving housekeeping in plant area shall be submitted.
- (c) Technical specification violations.
- (d) Significant events.
- (e) Radiation protection.
- (f) Details of fire incidents as per AERB fire classification: Details of fire incident taken place, categorisation as per AERB classification, fire hazard analysis, fire load calculations and adequacy of fire protection measures ensured should be presented.
- (g) Safety performance indicators such as frequency rate, severity rate, incidence rate and injury index for the last five years shall be presented.
- (h) Status of recommendations given by AERB. (Status of implementation of pending recommendations of SARCOP and Unit Safety Committee, Advisory Committee on Industrial and Fire Safety, Fatal Accident Assessment Committee, Advisory Committee on Occupational Health and Safety should be presented along with plan of action with target dates.  
  
Pending recommendations of Regulatory Inspections: Pending recommendations arising from on-site, off-site, plant emergency exercises and fire emergency exercise should be presented.
- (i) Details of safety awards won by the plant.

### 3.2.3 *Procedures*

#### 3.2.3.1 Objective

The objective of the review is to determine whether procedures for operation, maintenance, modifications and inspection/testing are available and adequate.

#### 3.2.3.2 Description

- (a) Procedures should be comprehensive, unambiguous and formally approved by the designated authority.
- (b) Procedures and related drawings such as plot plan, equipment layout, flow sheets, piping and instrumentation diagrams etc. should be promptly modified based on changes/improvements carried out in the plant design and forwarded to the relevant operation and maintenance personnel.

### 3.2.3.3 Major Elements of Review

- (i) The availability of updated and approved operating procedures for normal operation.
- (ii) Availability of updated and approved maintenance, testing, inspection, radiation protection and work permit procedures.
- (iii) Availability of updated technical specifications, plant piping and instrumentation diagrams (P&IDs) and other related drawings.

### 3.2.4 *Waste Management and Radioactive Waste Disposal*

#### 3.2.4.1 Objective

The objective of the review is to determine whether there is adequate surveillance of both radioactive and non-radioactive effluents generated by the plants and whether procedures exist for safe disposal.

#### 3.2.4.2 Description

- (a) There should be effective surveillance programme that provides data on effluent releases from various stacks and discharge points.
- (b) The treatment given for various gaseous and liquid effluents before discharge to environment should be reviewed. It has to be ensured that effluent discharges are well within the prescribed limits.

#### 3.2.4.3 Major Elements of Review

Compliance based on the following:

- (i) Records of gaseous effluent releases from various stacks.
- (ii) Records of liquid effluent releases from various discharge points to public domain.
- (iii) Records of solid waste generated and their disposal.
- (iv) Efforts put in for minimising all types of waste generation.

### 3.2.5 *Management of Ageing*

#### 3.2.5.1 Objective

The objective of the review is to determine whether ageing is being effectively managed for civil (plant building columns and beams, heavy equipment foundations etc.) as well as mechanical structures (pipe racks, operating platforms of vessels, equipment supports etc.) and accordingly safety margins are maintained.

#### 3.2.5.2 Description

- (a) All civil and mechanical structures are susceptible to ageing which

could eventually lead to impairment in their safety functions. The rate of ageing depends on the materials of construction, environmental and operating conditions as well as preventive maintenance procedures. It is important to understand, monitor and control/mitigate ageing of all materials and components which could impair safety functions. Especially civil structures more than 25 years in operation need structural stability and life extension analysis study.

- (b) Managing the ageing of civil and mechanical structures and process equipment, piping etc. means predicting and or detecting the degradation of a plant component to the point wherein safety margins are eroded to unacceptable levels and taking appropriate actions. It is essential that the plant has established systematic and effective ageing management programme comprising such activities as in-service inspection (ISI), condition monitoring, preventive maintenance and feedback of operating experience required to establish adequate safety margin for mechanical structures and process equipment, vessels, piping throughout the service life.
- (c) The review of management of ageing should determine whether a systematic and effective ageing management programme is in place and whether there are adequate arrangements to maintain required safety margins during future plant operations.

#### 3.2.5.3 Major Elements of Review

- (i) List of civil and mechanical structures (pipe racks, equipment supports etc.), process equipment/vessels covered in the ageing management programme and criteria for their selection.
- (ii) Extent of understanding of dominant ageing mechanism for civil and mechanical structures (pipe racks, equipment supports etc.), process equipment/vessels and their impact on safety functions.
- (iii) Identification of relevant ageing indicators in respect of above elements and programme for timely detection and mitigation of ageing effects.
- (iv) Acceptance criteria and required safety margins.

#### 3.2.6 *Emergency Preparedness*

##### 3.2.6.1 Objective

The objective of the review is to determine whether the operating organisation has adequate plans, staff, facilities and preparedness to deal with emergencies when needed.

#### 3.2.6.2 Description

- (a) The design and operation of fuel cycle facilities (FCF) should prevent release of hazardous chemicals and radioactive substances that could affect the health of plant personnel, public and environment. To mitigate the effect of any accidental release, emergency planning is an essential requirement.
- (b) Emergency plans/Emergency operating procedures should be periodically updated.
- (c) Emergency exercises should demonstrate effectiveness of the emergency planning and should identify possible shortcomings in on-site and off-site plans where applicable.

#### 3.2.6.3 Major Elements of Review

- (i) Accident mitigation.
- (ii) Strategy and organisation for emergency response.
- (iii) Plans and procedures for emergency response.
- (iv) On-site emergency preparedness.
- (v) Transport and communications.
- (vi) Emergency training and exercises.
- (vii) Arrangement for periodic-review of the emergency plans/emergency operating procedures.
- (viii) Off-site emergency centers where off-site emergency is envisaged.

### 3.2.7 *Environmental Impact Assessment*

#### 3.2.7.1 Objective

The objective of the review is to determine whether there is adequate surveillance and assessment of environmental impact by the nuclear fuel cycle facilities.

#### 3.2.7.2 Description

- (a) There should be an established and effective surveillance programme that provides radiological /chemical release data on the surroundings of the plant site.
- (b) Periodically collected data from the plant surroundings should be compared with the values measured before the plant commissioning and the trend established.

#### 3.2.7.3 Major Elements of Review

- (i) Records of effluent releases in comparison with permissible limits.

- (ii) Off-site monitoring for contamination and radiation levels.
- (iii) Documentation of environmental data.
- (iv) Changes in use of land areas around the site.

### 3.2.8 *Organisation and Administration*

#### 3.2.8.1 Objective

The objective of the review is to determine whether the organisation and administration is adequate for safe operation of the plant.

#### 3.2.8.2 Description

- (a) Organisation and administration plays a significant role in ensuring safety culture at the FCF. The review should examine the organisation and administration to ensure that they comply with all the regulatory requirements for safe operation.
- (b) Various aspects of review under this safety criterion should include management, functioning of the dedicated groups looking after the special requirement of operation and maintenance, training and records.

#### 3.2.8.3 Major Elements of Review

- (i) Indicating roles and responsibilities of statutory /licensed persons.
- (ii) Staff training facilities and programme.
- (iii) Availability of readily retrievable comprehensive records.
- (iv) Response to public concerns in operational safety raised at various fora like courts, media etc.: Public concerns about operational safety of the plant since the last licence issued shall be presented. Major issues raised if any in courts as well as the media shall be identified and efforts made by plant authorities to mitigate genuine concerns and to satisfy public with regard to safe operation of the plant shall be brought out.

#### **4. ROLES AND RESPONSILBILTIES**

The responsibility for obtaining renewal of licence from AERB for operation of a fuel cycle facility (FCF) rests with the plant management/occupier/licensee under the Factories Act 1948.

The operating unit of FCF should carry out a periodic safety review, as mentioned in section 3 and submit to AERB the report as per the format specified in Appendix-I. The application form should reach the regulatory body at least six months before the expiry of the existing licence.

Regulatory body may specify any additional information to be submitted on the basis of current standards and practices for safety review.

The plant management should come out with strength and weakness of the facility in the safety review report. Also, plant management should indicate appropriate necessary corrective actions such as plant modifications/up gradation for rectification of weakness/shortfall with respect to safety aspects.

External assistance/consultants from outside the organisation may be availed in case of unavailability of sufficient in-house expertise.



## **5. REVIEW PROCEDURE**

The basic procedure for review of documents/reports along with application submitted by the fuel cycle facilities will be as per following steps:

After the receipt of the application form, Atomic Energy Regulatory Board (AERB) will scrutinize the form and ensure that it is complete in all respects and give the acknowledgement to the operating fuel cycle facility (FCF) within 15 days.

The document submitted by FCF will be initially reviewed within concerned division of AERB and review report will be forwarded to the appropriate Unit Safety Committee within 45 days.

The document submitted by operating FCF and the review report will be deliberated in the unit safety committee. The gist of the review and recommendations of the unit safety committee would be sent to SARCOP at least 2 months before the expiry of the licence. Before making any recommendations unit safety committee may visit the operating FCF to ensure the safety status of the unit.

SARCOP after review will give its recommendations to the competent authority within 2 months for renewal of licence. If required SARCOP may also visit the facility before giving recommendations for grant of licence.

## **6. REGULATORY CRITERIA FOR RENEWAL OF LICENCE**

The regulatory body will renew the licence for the operation of FCF subject to satisfactory resolution of following issues:

- (a) Continued operation will not pose danger to the health of workers, the public or the environment.
- (b) The minimum manpower specified in the technical specifications for authorised operators, safety officers, radiological safety officers, certifying surgeons and fire station staff is provided.
- (c) Adequate emergency preparedness plan exists to handle the emergency situations with the existing arrangement.
- (d) Adequate provision for prevention, suppression and mitigation of the effects of fire at the facility is available.
- (e) Safety management system to ensure adherence to work permit system, safe operating procedure, technical specifications, surveillance and medical surveillance is in place.
- (f) Required safety review including safety audit, fire hazard analysis, hazard and operability study (HAZOP), quantitative risk assessment (QRA) etc. are carried out.
- (g) Deficiencies observed are corrected or compensated by the unit.
- (h) Satisfactory compliance with the major recommendations of the regulatory body, which are made during regulatory inspection or by the unit safety committee or SARCOP is ensured.
- (i) Compliance with original licence conditions.

If any of the conditions specified in the Licence are not complied with, then the regulatory body may suspend the licence granted to the facility.

## **7. POST REVIEW ACTIVITIES**

A periodic safety review is complete when all analyses and required corrective actions such as modifications to the plant or procedures have been implemented and licence renewed.

Documentation on plant safety review should be preserved in a suitable manner, which would be easily retrievable by FCF and AERB at least till the next review.

## **APPENDIX-I**

### **APPLICATION FOR RENEWAL OF LICENCE**

(Under section 6 of the Factories Act, 1948 (as amended in 1987) and Rule 3 of the Atomic Energy (Factories) Rules, 1996 and Rule 3 of the Atomic Energy (Radiation Protection) Rules, 2004)

Note : Please attach additional sheets whenever required for more information.

**I1. Name of the Fuel Cycle Facility:**

- (i) Date of commissioning: \_\_\_\_\_
- (ii) Plant licensed capacity: \_\_\_\_\_
- (iii) Name of the products: \_\_\_\_\_
- (iv) Current licence period (dates): From \_\_\_\_\_ to \_\_\_\_\_
- (v) Period for licence renewal: From \_\_\_\_\_ to \_\_\_\_\_

**I2. Performance Review**

**I2.1 Plant Performance**

Details should be given in line with item no 3.2.1.3(i) for the current licence period.

**I2.2 Operational Problems**

Details should be given in line with item no 3.2.1.3(ii) for the current licence period.

**I2.3 ISI Programme**

Details should be given in line with item no 3.2.1.3(iii) for the current licence period.

<b>S.No.</b>	<b>ISI Activities planned in percentage</b>	<b>Activities actually completed in percentage</b>	<b>Reasons for deviation</b>	<b>Whether one ISI cycle has been completed</b>
1.				
2.				
3.				

- I2.4 Maintenance of Equipment and Structures  
Details should be given in line with item no 3.2.1.3(iv) for the current licence period
- I2.5 Any Major System Modifications  
Details should be given in line with item no 3.2.1.3(v) for the current licence period
- I2.6 Details of Enforcement Actions  
Details should be given in line with item no 3.2.1.3(vi) for the current licence period.
- I2.7 Major Jobs Carried Out During Planned/Unplanned Shutdowns  
Details should be given in line with item no 3.2.1.3(vii) for the current licence period.
- I2.8 Automation of Manual Operation  
Details should be given in line with item no 3.2.1.3(viii) for the current licence period.
- I3. Safety Performance**
- I3.1 Safety Management System.  
Details should be given in line with item no 3.2.2.3(i) for the current licence period.
- I3.2 Industrial Safety Aspects  
Details should be given in line with item no 3.2.2.3(ii) for the current licence period.
- I3.3 Technical Specification Violations  
Details should be given in line with item no 3.2.2.3(iii) for the current licence period.
- I3.4 Significant Events  
List of significant events and root cause analysis, corrective measures and implementation status.
- I3.5 Radiation Protection  
Details should be given in line with item no 3.2.2.2(e) (f) and (g) and detailed information for following items/table for last licence period.

- (a) Number of times surface contamination was above permissible level and reason thereof.
- (b) Number of times air activity exceeded permissible limit (DAC).

Analysis of radiation exposure (both internal and external) of radiation workers.

This shall include the following:

Year	Plant worker/ contractor/casual	Average individual external (mSv)	Average individual internal (mSv)	Average total (mSv)	No. of persons receiving dose above 20 mSv	Collective dose (person Sv)
1						
2						
3						
4						
5						

**I3.6 Details of Fire Incidents and Improvement in Fire Safety**

Details should be given in line with item no 3.2.2.2 (h) and 3.2.2.3 (vi) for the current licence period.

**I3.7 Safety Statistics**

Trends for severity rate, frequency rate, incident rate, injury index and fatality for last five years should be given.

**I3.8 Status of Recommendations given by AERB**

Details should be given in line with item no. 3.2.2.3 (viii) for the current licence period

**I3.9 Details of Awards Won by the Plant from Various Institutions.**

**I4. Procedures**

Details should be given in line with item no 3.2.3.3 (i), (ii) and (iii) for the current licence period

**I5. Waste Management**

Details should be given in line with item no 3.2.4.3 (i), (ii) and (iii) and detailed information to be filled in the followings tables for last licence period on following items:

I5.1 Information on Waste (Non- radioactive)

I5.1.1 Gaseous Effluents:

<b>Stack No./ Location</b>	<b>Quantity/ Flow rate in m<sup>3</sup>/hour</b>	<b>Effluent characteristics after treatment</b>	<b>Pollution Control Board Limits</b>	<b>Ref. no. and date of consent given by Pollution Control Board</b>

I5.1.2 Liquid Effluents:

<b>Number and Location of Outlets</b>	<b>Quantity/ Flow rate in m<sup>3</sup>/hour</b>	<b>Effluent characteristics after treatment</b>	<b>Pollution Control Board Limits</b>	<b>Ref. no. and date of consent given by Pollution Control Board</b>

I5.1.3 Non radioactive Hazardous Waste stored and/or handled at the Unit as in the schedules of the Hazardous Waste (Management and Handling) Rules, 1989 [amended up to 2003]:

<b>Name of hazardous waste</b>	<b>Category/ Schedule</b>	<b>Source of hazardous waste</b>	<b>Mode of treatment/ disposal</b>	<b>Quantity handled m<sup>3</sup>/MT</b>	<b>Ref. no. and date of authorisation from Pollution Control Board</b>

I5.2 Radioactive Waste Disposal

I5.2.1 Gaseous Effluent: Category \_\_\_\_\_

Year	Location of stack	Flow rate (m <sup>3</sup> /Hr)	Total volume of discharge, (m <sup>3</sup> )	No. of samples	Activity levels (Bq/m <sup>3</sup> )			Total activity (Bq)	Authorised limits as per technical specifications (Bq)
					Avg.	Max.	Min.		
1									
2									
3									
4									
5									

I5.2.2 Liquid Effluent: Category \_\_\_\_\_

Year	Location	Flow rate (m <sup>3</sup> /Hr)	Total volume of discharge, (m <sup>3</sup> )	No. of samples	Activity levels (Bq/m <sup>3</sup> )			Total activity (Bq)	Authorised limits as per technical specifications (Bq)
					Avg.	Max.	Min.		
1									
2									
3									
4									
5									

I5.2.3 Solid Waste: Category \_\_\_\_\_

Year	Location	Flow rate (m <sup>3</sup> /Hr)	Total volume of discharge, (m <sup>3</sup> )	No. of samples	Activity levels (Bq/m <sup>3</sup> )			Total activity (Bq)	Authorised limits as per technical specifications (Bq)
					Avg.	Max.	Min.		
1									
2									
3									
4									
5									

- Notes :** (i) Review of radioactive effluents (gaseous and liquid) shall be carried out to demonstrate that adequate control is being exercised and required measures are being taken to minimize the discharges. The data shall be presented on different categories of radioactive effluents. The data presented shall be in activity as well as in percentage of Technical Specifications limits and shall be presented both in tabular and graphical form and also indicate how many times discharges exceeded the limits.
- (ii) Review of radiological solid waste management at the plant should be presented including generation of solid waste, activity levels and its final disposal.



**I6. Management of Ageing**

Details should be given in line with item no 3.2.5.3(i) to (iv) for the current licence period.

**I7. Emergency Preparedness**

Details should be given in line with item no 3.2.6.3(i) to (viii) for the current licence period.

**I8. Environmental Impact Assessment**

Details should be given in line with item no 3.2.7.3(i) to (iv) for the current licence period.

**I9. Organisation and Administration**

Details should be given in line with item no 3.2.8.3(i) to (iv) for the current licence period for following items.

I9.1 Availability of Readily Retrievable Comprehensive Records as per given table below:

S. No.	Name of Document	Availability (Yes/No)	Date of last review
1	Safety, health and environment Policy		
2	Operation manual (for each plant)		
3	Safety manual		
4	Safety reports		
5	Fire order		
6	Technical specifications for operation		
7	Job hazard analysis		
8	HAZOP report		
9	Training records		
10	Emergency preparedness plans		
11	ISI manual		

I9.2 Status of Licensing of Plant Operating Personnel (at the time of application):

No. of licensed operating plant personnel required.	No. of licensed operating plant personnel available.	Remarks

I9.3 Availability of Competent Persons/Certifying Surgeons under various Sections of the Factories Act 1948 (as amended in 1987) (at the time of application):

S. No.	Section	Description	Number of competent persons available
1	Section 6	Civil construction and structural work.	
2	Section 21 (2)	Operation of dangerous machines.	
3	Section 28	Lifts and hoists.	
4	Section 29	Lifting machinery and lifting tackles.	
5	Section 31	Pressure plant.	
6	Section 36	Dangerous fumes.	
7	Section 41-C (b)	Supervision of handling of hazardous substances.	
8	Section 87	Ventilation system.	
9	Section 9	Occupational health.	

I9.4 Details of Safety, Fire, Occupational Health and Welfare Organisation.(at the time of application):

S. No.	Organisation	Staff strength	Name and designation of in-charge
(a)	Safety		
(b)	Fire		
(c)	Welfare officer		
(d)	Radiological safety officer		
(e)	Occupational health		

I9.5 Information on Pressure Vessels/Gas Cylinders:

Name of the plant	Identification no. of pressure vessel/gas cylinders	Capacity in m <sup>3</sup> , Design pressure in kg/cm <sup>2</sup> and design temperature in degree °C.	Details of inbuilt safety	Last tested on

I9.6 Storage of chemicals in plant whose quantity exceeds the threshold quantity specified in column 3 and Schedule 3 of the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 with latest amendment:

Name of chemical	Storage tank tag no.	Location and safety features of the storage tank	Inventories in storage tank in m <sup>3</sup>	Storage parameter (temperature and pressure)	Last integrity test date

I9.7 Information on Hoists and Lifts, Lifting Machinery and Lifting Tackles:

Name of the plant	Identification No. of lifts/ hoists/lifting machinery/ lifting tackles	Safe working load in MT	Last load tested on

**I10. Certification of Safety Assurance**

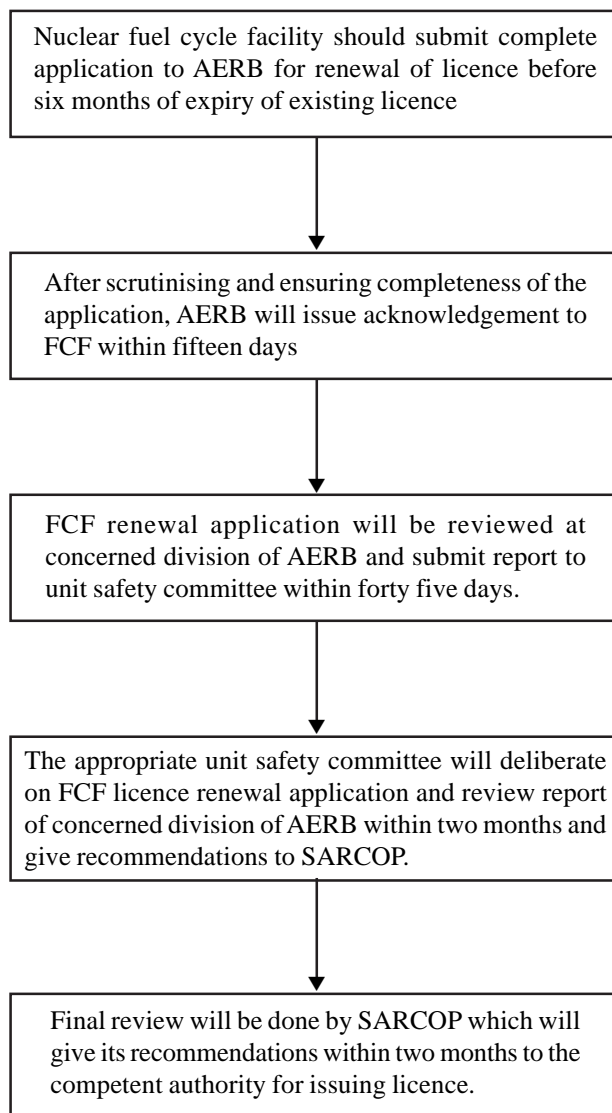
This is to certify that all information on safety, occupational health and environment pertaining to the plant operations during this reporting period is presented in the report and required assessment has been carried out. It is considered that the plant can be safely operated for further period of 5 years from \_\_\_\_\_ for which the renewal of licence is requested.

**Date:**

**Signature of the Occupier/Licensee**

## ANNEXURE-I

### PRESENT STRUCTURE FOR RENEWAL OF LICENCE FOR NUCLEAR FUEL CYCLE FACILITY



## ANNEXURE-II

### TIME FLOW CHART FOR PROCESSING OF FCF RENEWAL APPLICATION

S. No.	Task	Duration	Time required for processing of renewal application													
			15 d	15 d	15 d	15 d	15 d	15 d	15 d	15 d	15 d	15 d	15 d	15 d	15 d	
1	Total time from receipt of application to issue of renewal of licence, break up given as below in stages.	180 days														
2	Ensuring completeness of FCF renewal application and issue of acknowledgment	15 days														
3	Renewal application will be reviewed at concerned division of AERB and report submission to unit safety committee	45 days														
4	The appropriate unit safety committee will review report of concerned division of AERB and give recommendations to SARCOP.	60 days														
5	Final review will be done by SARCOP and give its recommendations to competent authority for issue of licence.	60 days														

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