



**FORMAT AND CONTENT OF APPLICATION FOR MODIFICATION
OF DESIGN AND SAFETY ANALYSIS REPORT IN
NUCLEAR INSTALLATIONS**

REGULATORY GUIDE

PAKISTAN NUCLEAR REGULATORY AUTHORITY

For Further Details

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FORMAT AND CONTENT OF APPLICATION FOR MODIFICATION OF DESIGN AND SAFETY ANALYSIS REPORT IN NUCLEAR INSTALLATIONS

ABSTRACT

PNRA Regulations require the licensee to submit the request for design modification for safety and safety related systems and its implementation to PNRA for approval. Moreover, as a result of design modification, relevant sections of Safety Analysis Report (SAR) are also modified in many cases. This Regulatory Guide (RG) is issued under Regulations on Safety of Nuclear Power Plants Operation - (PAK/913) and Regulations on the Safety of Nuclear Research Reactor(s) Operation - (PAK/923). This RG provides guidance to the licensee on submission of request for modifications in NIs encapsulating design and SAR modifications.

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1. INTRODUCTION

PNRA grants licenses/authorizations to Nuclear Installations (NIs) for effective control at different stages including site registration, construction, initial fuel loading, operation and decommissioning after extensive evaluation of licensing submissions including Safety Analysis Report (SAR). Licensees/applicants make different design/SAR modifications in the NIs for enhancement of safety or correction to SAR. Reasons for these changes may include: maintaining or strengthening existing safety provisions or improvement in the current design; removal of facility faults; improving the thermal performance or increasing the power rating; increasing the maintainability of the facility; reducing the radiation exposure of personnel or reducing the costs of maintenance; and extending the design life of the NIs [2].

According to PNRA regulations, approval for modifications in safety and safety related Structure, Systems and Components (SSCs) before implementation is mandatory. Further, as a result of design modification, relevant sections of SAR are also modified in many cases. It is also pertinent to mention that design modifications in safety and safety related SSCs during project phase need to be approved by PNRA before their implementation. This RG provides guidance to the licensee on the format and content of application for modifications in NIs including design and SAR modifications.

2. OBJECTIVE

The objective of this RG is to provide guidance to the licensee while seeking PNRA approval for modifications in design and SAR.

3. SCOPE

This guide applies to modifications in design and SAR (safety and non-safety) modifications of safety and safety related systems in NIs.

4. CONTENTS OF APPLICATION FOR MODIFICATIONS IN NIs

4.1 Contents of Application for Design Modification in NIs

This section should describe the contents of the application for modification and the required documents/reports to be submitted by the licensee.

4.1.1 Description of Original Design

Description of original design including the design basis should be provided with

modification request.

4.1.2 Proposed Modification

When modifications are proposed, these should be consistent with the intent and assumptions of the original design. The safety of the nuclear installations should be reassessed for the modified configuration and/or the new conditions of the NIs. Previous modifications and inputs on the basis of experience in the industry should not be inadvertently negated by modifications [2].

The scope, safety implications and consequences of proposed modifications should be reviewed by personnel not directly involved in design or implementation [2]. The reviewers should include representatives of the operators and engineering personnel, the design organization, safety experts and other technical or managerial advisers. The modification should be reviewed by plant safety committee before submitting to PNRA.

4.1.3 Need for Modification

Reasons for carrying out modifications to NIs may include:

- i. Maintaining or strengthening existing safety provisions or improvement in the current design;
- ii. Removal of faults;
- iii. Improving the performance or increasing production keeping in view the safety aspects;
- iv. Increasing the maintainability;
- v. Reducing the radiation exposure of personnel or reducing the costs of plant maintenance;
- vi. Extending the design life;
- vii. Implementation of new regulatory requirements as experience feedback; and
- viii. Ageing or obsolescence of equipment [2][3].

4.1.4 Justification

This section should provide appropriate justification including but not limited to the following information:

- i. Impact on design/operation;
- ii. Impact on safety;
- iii. Impact on other operating NIs and environment; and
- iv. Feedback after implementation of modification at reference NIs or at same type of NIs.

4.1.5 Safety Classification

Safety classification of the proposed modification should be clearly mentioned in the application. The modification should include design interfaces between SSCs of different classes to ensure that all safety requirements have been considered.

4.1.6 Drawings of Existing Design

To facilitate the review process, legible drawings of the existing design should also be attached.

4.1.7 Modified Drawings

Legible drawings of the modified design should also be provided so that a comparison can be made between the existing and modified drawings.

4.1.8 Applicable Codes and Standards

Applicable codes and standards for the original design and proposed modification should be provided. Moreover, the relevant pages of code and standards should be attached with the modification case.

4.1.9 Safety Assessment

Deterministic Safety Analysis (DSA) complemented by Probabilistic Safety Assessment (PSA) including adverse environmental or operating conditions, any implications for radioactive waste and any contamination and/or any exposure to radiation should be provided.

4.1.10 Proposed Changes in SAR/ Relevant Documents

Relevant changes in the SAR and/or other relevant documents should be identified and modified pages should be provided.

4.1.11 Qualification Program

Qualification program addressing qualification requirements (including Validation & Verification (V&V) of modified process software), qualification tests, personal qualification requirements, etc. should be provided with the application.

4.1.12 Changes in Surveillance and In-Service Inspection (ISI) Program

Changes in surveillance and ISI program including maintenance arrangements should be described and updated accordingly.

4.1.13 Specifications of New Parts and Material

Specifications of new parts and material to be installed for the implementation of modification should be provided.

4.1.14 Installation and Testing

Installation methods and testing including surveillance requirements should be described.

4.1.15 Internal Review and Approval

Evidence should be provided that the proposed modification has been reviewed and approved internally by the licensee.

4.1.16 Review by Designer

Depending upon the safety significance of modification, consent of designer may be sought and submitted with the application.

4.1.17 Generation of Radioactive Waste

This section should provide complete details of radioactive waste in terms of its quantity, radionuclides, activity and characteristics. Moreover, any effect on waste storage facilities during implementation of modification and during routine operations afterwards should also be described.

4.2 Contents of Application for SAR Modification

This sub-section describes the contents of proposed SAR modification and the documents/reports to be attached by the licensee. These documents include:

- i. Description of original SAR pages (Text/Drawing/Table);
- ii. Proposed SAR modification including revised pages (Text/Drawing/Table);
- iii. Reasons for modifications in SAR;
- iv. Justification of impact on the safety of design and operation;
- v. Identification of relevant documents affected by modification; and
- vi. Evidence that the proposed modification has been reviewed and approved internally by the licensee.

All other relevant documents to be affected by the proposed modification should be updated after completion of approval process. The documents should be made consistent with the design requirements of NIs and accurately reflect the modified configuration.

5. REFERENCES

1. Regulations on Safety of Nuclear Power Plants Operation - (PAK/913), Pakistan Nuclear Regulatory Authority (PNRA), Islamabad (2004).
2. Modifications to Nuclear Power Plants, Safety Standard Series (NS-G-2.3), International Atomic Energy Agency (IAEA), Vienna (2001).
3. Repairs, Modifications and Preventive Maintenance at Nuclear Facilities, Guide (YVL 1.8), Radiation and Nuclear Safety Authority (STUK), Finland (1986).
4. Regulations on the Safety of Nuclear Research Reactor(s) Operation - (PAK/923), Pakistan Nuclear Regulatory Authority (PNRA), Islamabad (2012).
5. Maintaining the Design Integrity of Nuclear Installations throughout their Operating Life, INSAG-19, International Atomic Energy Agency (IAEA), Vienna (2003).



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