Document Preparation Profile (DPP)

1. IDENTIFICATION

Document Category **Safety Guide**

Working ID: **DS 436**

Proposed Title: **Instrumentation and Control and Software Important to Safety for Research Reactors**

Proposed Action: **new document**

Review Committee(s) or Group: **NUSSC**

Technical Officer(s): **Boogaard, J.P., Research Reactor Safety Section/NSNI**

2. BACKGROUND/RATIONALE

There is a broad range of technologies existing for the Instrumentation and Control (I&C) systems of research reactors, ranging from early types of analogue controllers, transistorized systems, electromagnetic relay type trip/scram instrumentation, integrated circuitry, through to modern computerized control systems. Many old research reactors are faced with an increasing difficulty of obtaining spare parts for their original I&C systems. Many operating organizations have recently started or are planning upgrading, refurbishment, or replacement projects for the I&C system of their research reactors. Such projects are important to safety and should be submitted for review, assessment, and approval by the regulatory body.

This Safety Guide will provide guidance on the design, safety and operational aspects of new I&C systems, including those for computer based systems and software, and will consider the technical and safety issues involved with the upgrading and refurbishment of I&C systems for research reactors.

3. OBJECTIVE

The objective of the proposed Safety Guide is to provide practical guidance and recommendations on the design, safety and operational aspects of I&C systems of research reactors and experimental facilities on the basis of the current international good practices. The proposed Safety Guide is mainly intended to give guidance to research reactor operating organizations, but could be used by regulatory bodies and designers too.

4. JUSTIFICATION

The Safety Guide will address and elaborate upon the requirements established in paras 6.1-6.16, 6.35–6.43, 6.61–6.70 and 6.90-6.105 of the Safety Requirements publication, NS-R-4, “Safety of Research Reactors”, which cannot be addressed by the revision of an existing Safety Guide. This Safety Guide is part of the long term reference list of the Safety Guides to be published.

5. PLACE IN THE OVERALL STRUCTURE OF THE RELEVANT SERIES AND INTERFACES WITH EXISTING AND/OR PLANNED PUBLICATIONS

The proposed Safety Guide will interface with relevant parts of the following documents:

1. FS-1, “Fundamental Safety Principles”.

2. Safety Requirements NS-R-4, “Safety Requirements of Research Reactors”.
3. DS396: Safety Assessment and Preparation of Safety Analysis Report for Research Reactors.
4. DS 397, “Safety in the Utilization and Modification of Research Reactors”.
5. GS-G-3.1, “Application of Management System for Facilities and Activities”.
6. NS-G-4.2, “Maintenance, Periodic Testing and Inspections of Research Reactors”.
7. NS-G-4.4, “Operational Limits and Conditions and Operating Procedures for Research Reactors”.
8. NS-G-4.5, “The Operating Organization and the Recruitment, Training and Qualification of Personnel for Research Reactors.”
9. DS412, “Ageing Management for Research Reactors”.
10. DS431: Design of I & C Systems for NPPs, revision and combination of NS-G-1.1 “Software for Computer Based Systems Important to Safety in Nuclear Power Plants” and NS-G-1.3 “Instrumentation and Control Systems Important to Safety in Nuclear Power Plants”.
11. NP-T-1.4, Implementing Digital Instrumentation and Control Systems in the Modernization of Nuclear Power Plants.
12. Computer Security at Nuclear Facilities, IAEA Nuclear Security Series No. xx, latest Draft.

6. OVERVIEW

The intended Table of Contents for the proposed Safety Guide is as follows:

1. Introduction
2. Safety classification of instrumentation and control systems
   Safety systems
   Safety related systems
   System not important to safety
3. I&C System Architecture
   Supervision level
   Control
   Field level
4. Design guidelines
   Reactor shut down system
   Reactor protection system
   Experiment control systems
5. Human machine interface
6. Computer based systems and Software
   Development
   Verification
   Validation

7. I&C modification projects
   Safety considerations
   Review and assessment

7. PRODUCTION SCHEDULE:

Approval of DPP by the Coordination Committee	August 09
Approval of DPP by the Safety Standards Committees	October 09
Submittal of DPP to CSS	November 09
Approval of DPP by the CSS	March 10
Approval of draft by the Coordination Committee	February 11
Approval by the NUSSC for submission to Member States for comments	June 11
Approval of the revised draft by the Coordination Committee	February 12
Approval by the NUSSC for submission to the CSS	June 12
Endorsement by the CSS	October 12
Approval by the Publications Committee	4 Q 12
Target publication date	1 Q 13

8. RESOURCES

From IAEA: 3 Staff-month

From Member States: 6 Man-week