

## **Document Preparation Profile (DPP)**

### **1. IDENTIFICATION**

**Document Category** Safety Guide

**Working ID:** DS 388

**Proposed Title:** Chemistry Programme for Water Cooled Nuclear Power Plant

**Proposed Action:** New Safety Guide

**Published Title/Date**

**Safety Series No.:**

**SS Committee(s):** NUSSC

**Technical Officer(s):** A. Renev, NSNI

### **2. OBJECTIVE**

The purpose of this publication is to help power plants to maintain high standards of chemistry programme in operation of nuclear power plants with water reactors in accordance with the plant safety policy and the regulatory requirements.

This publication is intended to be useful to operating plant personnel for reviewing existing programmes to identify opportunities for improvement. It can also be used to develop new programmes or assist in developing corrective actions to deviations in existing programmes.

This publication is also intended to be useful to corporate managers and staff members responsible for direct supporting or monitoring plant activities as well as for oversight of the plant chemistry programme implementation. In particular, this document could be used to assess the implementation effectiveness and adequacy of corporate policies and plant practices in the areas addressed. In addition, groups reviewing plant performance could use this document as a reference to support their efforts.

The regulatory authorities could also use this publication as a basis for regulatory requirements and for performing inspections and evaluation of plant performance. This document will elaborate requirements established in IAEA Safety Standards Series No. NS-R-2 "Safety of Nuclear Power Plants: Operation, Safety Requirements" and include good international practice realized from many national and international missions including OSART missions.

This document will include occupational radiation protection issues due to chemically induced degradation and so include RASSC and WASSC in the review process. Some reasonable technical details will also be included into the document as an attachment.

Bearing in mind that in the future this standard will become a part of joint standard on conduct of operation this publication is to be issued for transition period to provide

with guidance on chemistry process at NPPs as well as reference document for future OSART missions.

### **3. BACKGROUND**

Chemistry control, which is the control of chemical parameters of substances and mediums in different systems of NPPS, is one of the most important directions of activity in NPP operation from the point of view of safety. The objective of the chemistry programme includes maintaining the reliability of plant systems and components, reducing the harmful effects of chemical impurities and corrosion on plant systems (to extend the life of the plant components and reduce dose rates), supporting the long-term operation and reliability of plant equipment and reducing radiation dose rates in the plant and releases of radioactivity and harmful chemicals to the environment.

Chemistry policies should clearly establish and communicate the mission, goals and performance standards of the plant chemistry programme. Implementation and control of the chemistry programme can be enhanced by monitoring and assessing performance and effectively solving problems.

The level of performance in a plant chemistry programme is enhanced by the following practices:

- establishing and clearly communicating chemistry goals, objectives, performance standards and responsibilities for chemistry performance to plant personnel and providing sufficient resources to accomplish these objectives;
- communicating with other groups to ensure that chemistry goals and objectives are understood and developing co-operation in resolving chemistry issues;
- periodically monitoring progress in meeting chemistry goals and assessing chemistry personnel performance. Specific details dealing with chemistry activities and reference to the existing management programme will be discussed;
- holding supervisors, operators and chemistry personnel accountable for their performance in chemistry and chemistry related activities;
- incorporating chemistry "lessons learned" from plant, utility and external operating experience and remaining informed on technology advances in the industry;
- developing and assessing the effectiveness of chemistry action plans to correct identified problems and following up to determine the effectiveness of the corrective actions taken. Specific details dealing with chemistry activities and reference to the existing management programme will be discussed;
- giving attention to the details and using self checking in chemistry activities
- closely monitoring plant systems to determine the effectiveness of the chemistry programme in improving reliability. Specific details dealing with chemistry activities and reference to the existing management programme will be discussed

- recruiting (hiring) and maintaining highly educated and trained staff for the chemistry department. Specific details dealing with chemistry activities and reference to the existing management programme will be discussed
- coordinating chemistry activities including correction of problems affecting chemistry with operations, maintenance, engineering and other plant departments

#### 4. INTERFACES

The publication will use experience gained by the World Association of Nuclear Operators (WANO) Moscow Centre and will be prepared taking into account the relationship with the following IAEA publications on the operation of nuclear power plants:

1. **Safety of Nuclear Power Plants: Operation, Safety Requirements**, Safety Standards Series No. NS-R-2 (2000)
2. **Operational Limits and Conditions and Operating Procedures for Nuclear Power Plants**, Safety Guide, Safety Standards Series No.NS-G-2.2 (2000)
3. **Operating Organization for Nuclear Power Plants**, Safety Guide, Safety Standards Series No.NS-G-2.4 (2001)
4. **Core Management and Fuel Handling for Nuclear Power Plants**, Safety Guide, Safety Standards Series No.NS-G-2.5 (2002)
5. **Radiation protection and radioactive waste management in the operation of Nuclear Power Plants**, Safety Guide, Safety Standards Series No.NS-G-2.7 (2002)
6. **High temperature on-line monitoring of water chemistry and corrosion control in water cooled power reactors**, IAEA-TECDOC-1303 (2002)
7. **New approaches for stable isotope ratio measurements**, IAEA-TECDOC-1247 (2001)
8. **Water chemistry and corrosion control of cladding and primary circuit components**, IAEA-TECDOC-1128 (1999)
9. **Influence of water chemistry on fuel cladding behaviour**, IAEA-TECDOC-927 (1997)
10. **Safety aspects of water chemistry in light water reactors**, IAEA-TECDOC-489 (1988)

#### 5. OVERVIEW

Publication should include at least following sections:

1. Functions, responsibilities and interfaces
2. Chemistry programme
3. Chemistry control
4. Chemistry surveillance
5. Chemistry Data Management
6. Training and Qualification
7. Quality Control of chemicals and other substances

Some explanation to the contents of the proposed document is included into the Attachment 1 of this DPP.

**6. PRODUCTION:** Provisional schedule for preparation of the document, outlining expected dates for:

Approval on DPP by the Steering Committee	February 2006
Approval on DPP by the Safety Standards Committees	March 2006
Approval on DPP by the CSS	June 2007
Consultant meetings	May 2006/II Quarter 2008
Technical committee meetings)	II Quarter 2007
Approval on draft by the Steering Committee 2007,	preliminary draft - IV Quarter
Approval by the committees for submission to Member States	I Quarter 2008
Revision of draft by taking into account the Comments by the Member States	III Quarter 2008
Approval on the revised draft by the Steering Committee	IV Quarter 2008
Approval by the committees for submission to the CSS; Editing	IV Quarter 2008
Endorsement by the CSS*	IV Quarter 2008
Submission to Publications Committee	I Quarter 2009
Target publication date	English version – II Quarter 2009

## Table of content

## 1. Introduction

This section will include background, objectives of the publication, scope, and structure.

## 2. Functions, Responsibilities and Interfaces

This section will include main recommendations to organization on interfaces and sharing of responsibilities among all the organizations involved into the chemistry process. Main responsibilities of the individuals responsible for the activities in frame of the chemistry will be discussed.

## 3. Chemistry Programme

This section will include main recommendations to the operating organization on arranging and maintaining of it's chemistry programme. All main tasks of the chemistry programme should be paid attention.

## 4. Chemistry control

This section will include recommendations for the main activities in frame of the chemistry process as well as main parameters to be included into the chemistry programme. It will cover also those aspects, which differ of common ones depending on the reactor type:

- water chemistry of PWR/WWER (primary and secondary circuit);
- water chemistry of BWR;
- water chemistry of HWR (primary and secondary circuit).

## 5. Chemistry surveillance

This section will be based on Section 4 indicating the bases of the surveillance programme including those which parameters are to be taken into account while monitoring (grab sampling, analyzing), trending (indicators), and feedback (diagnostics) of the chemistry process. It also will provide guidance on specific activities in Self Assessment.

## 6. Occupational doses

This section will include recommendations on how to keep the occupational radiation doses at the lowest reasonable level by enhancing the effectiveness of the Chemistry Programme.

## 7. Chemistry Data Management

This section will include recommendations to the processing of the data collected during the Chemistry activities.

#### 8. Training and Qualification

This section will include recommendations to the specific chemistry issues and activities related to the training and qualification in frame of chemistry.

#### 9. Quality Control of chemicals and other substances

This section will include recommendations and activities related to the quality control of laboratories, chemicals and other substances.