# Document Preparation Profile (DPP)

## 1. IDENTIFICATION

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| **Document Category** | **Safety Guide** |
| **Working ID:** | **DS371** |
| **Proposed Title:** | **Storage of Spent Fuel** |
| **Proposed Action:** | **New document, combining two published safety guides and a published safety report** |
| **Published Title/Date** | **Design of SFSF;Operation of SFSF;Safety Assessment for SFSF/1994** |
| **Safety Series No.:** | **Safety Series No. 116 / 117 / 118** |
| **SS Committee(s):** | **NUSSC & WASSC** |
| **Technical Officer(s):** | **G. Jones (NSNI), E. Warnecke (NSRW)** |

## 2. OBJECTIVE

Spent fuel (SF) is typically being stored at a nuclear reactor to allow cooling. If necessary, it will be transferred to a designated spent fuel storage facility (SFSF) until it is retrieved either for reprocessing or disposal. The storage periods may range from a few years to about 100 years or more.

The objective of this initiative is to prepare a Safety Guide (SG) on spent fuel (SF) storage that provides up-to-date recommendations on the storage of SF, including the type of spent fuel storage facility (wet and dry) and the different SF types from nuclear reactors. It is intended to delineate the respective recommendations for safety in design and construction as well as the operation and decommissioning, including safety assessment and management systems for SFSFs, taking due account of existing IAEA Safety Standards. It is also an objective of this initiative to take new developments and their implications on safety into account, e.g. advanced fuel design, increased enrichment and burnup, MOX fuel, re-racking, burnup credit and extension of storage periods beyond design life.

The SG is intended to provide recommendations to regulators and operators of SFSFs. Consideration will also be given to the safety of existing facilities that were commissioned prior to present day standards.

## 3. BACKGROUND

Spent fuel is generated continually by operating nuclear reactors. It is normally stored at the reactor for a short time period for cooling and then transferred to a designated dry or wet SFSF waiting for reprocessing or disposal.

Originally SFSFs were intended to serve for a limited period of time as a buffer between unloading of SF from a reactor and its reprocessing or disposal. As reprocessing is decreasing and disposal is being deferred, storage periods are being extended to up to 100 years or even more. This conceptual change in SF management is associated with other developments, e.g. the increase of initial enrichment and the increase of burnup. It is important to analyse such

new developments and give safety recommendations in order to ensure that safety can be provided under all circumstances.

These new developments are not covered by the existing three documents (Safety Series No. 116, 117 and 118) that were published in 1994. Consequently, it is necessary now to initiate the process of review, revision and update of the 1994 recommendations on SF storage. It is suggested to merge the existing three documents (Design; Operation; Safety Assessment) into one. The new Safety Guide will supersede the existing three Safety Series documents.

In April 2004, NUSSC agreed on the need for a Safety Guide on "Design and operation of spent fuel facilities" to combine and supersede Safety Series Nos. 116, 117 and 118.

## 4. INTERFACES

The proposed SG will be developed as part of the IAEA Safety Standards Series. Due account will be given to existing safety standards, for example the thematic ones, e.g. on governmental infrastructure, management systems, assessment and verification, radiation protection, decommissioning and transport, and in particular the ones specific to facilities / activities. It is necessary to liase and co-ordinate with the development of relevant new safety standards, as necessary.

The existing three Safety Series documents on SFSF (Safety Series No. 116; 117 and 118) and the guidance on fuel handling and storage at nuclear power plants and research reactors given in SSS No. NS-G-1.4 (2003) and NS-G-2.5 (2002) and in DS350 are used as a basis for the preparation of the planned new SG. Furthermore, co-ordination with the ongoing work on the SG "Storage of Radioactive Waste" (DS292) is necessary to ensure consistency among the documents.

Emphasis will be given to specific properties of spent fuel under storage conditions, in particular ensuring sub-criticality, shielding, removal of heat, and containment of gaseous / volatile radionuclides.

The new SG will be based on the relevant Safety Requirements, i.e. "Predisposal Management of Radioactive Waste, including Decommissioning" (SSS WS-R-2) and the draft requirements document on "Radioactive Waste Management" (DS353) that is going to supersede WS-R-2 as well as the draft requirements on "Fuel Cycle Facilities" (DS316). It should also be consistent with the new Safety Fundamentals (DS298) and the Joint Convention.

NSNI and NSRW will co-author the SG. It is intended to co-operate with NSNS and NEFW in the preparation of the new SG.

## 5. OVERVIEW

The SG is intended to provide recommendations that cover all types of SFSF and all types of SF from nuclear reactors. It is not intended to cover the storage of spent fuel as long as it is part of an operation of a nuclear reactor or a spent fuel reprocessing facility.

The recommendations will also apply to the storage of SF from research reactors. It is recognised that research reactor fuel is very diverse and differs from nuclear power reactor fuel. Consequently, issues specifically related to the storage of research reactor fuel need special attention and have to be addressed separately.

The SG is also intended to provide recommendations on all stages of a SFSF, from planning, siting and design to operation and decommissioning, and in particular retrieval of SF.

A tentative table of contents is attached.

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

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| Approval on DPP by the Steering Committee | Aug. 2005 |
| Approval on DPP by the Safety Standards Committees | Oct. 2005 |
| Approval on DPP by the CSS | Nov. 2005 |
| Development: (consultant meetings, technical committee meetings) | 2006 |
| Approval on draft by the Steering Committee | I/2007 |
| Approval by the Safety Standards Committees for submission to Member States | IV/2007 |
| Revision of draft by taking into account the Comments by the Member States | II/2008 |
| Approval on the revised draft by the Steering Committee | II/2008 |
| Approval by the Safety Standards Committees for submission to the CSS; | IV/2008 |
| Editing | IV/2008 |
| Endorsement by the CSS | II/2009 |
| Submission to Publications Committee | II/2009 |
| Target publication date | III/2009 |

**ATTACHMENT**
**Proposal for the CONTENT of the draft safety guide on**
**"Safe Storage of Spent Fuel"**

**1. Introduction**
Background
Objective
Scope
Structure

**2. Protection of human health and the environment**

**3. Roles and responsibilities**
General
Responsibilities of the Government
Responsibilities of the regulatory body
Responsibilities of operators

**4. Management systems**

**5. Safety assessment**

**6. Common safety considerations for spent fuel storage facilities**
General
Siting
Emergency preparedness
Safety documentation
Characterisation and acceptance of spent fuel
Safeguards and physical protection

**7. Safety considerations for dry storage of spent fuel**
Characteristics of spent fuel and containers
Design of spent fuel storage facilities
Commissioning of spent fuel storage facilities
Operation of spent fuel storage facilities
Decommissioning
Safety considerations for long term storage of spent fuel

**8. Safety considerations for wet storage of spent fuel**

See Section 7.

**9. Safety considerations for the storage of spent fuel from research reactors**

The contents of this Section should be developed in the drafting process. This Section may be omitted if safe storage of spent fuel from research reactors is coherent with safe storage of spent fuel from power reactors.

**References**
**Glossary**
**Contributors to Drafting and review**
**Bodies for the Endorsement of Safety Standards**