of the European Atomic Energy Community (Euratom)
for nuclear research and training activities (2007-2011)

Collaborative Project

LONGLIFE

Project title:	**Treatment of long term irradiation embrittlement effects in RPV safety assessment**
Project number:	**249360**
Project coordinator:	**Helmholtz-Zentrum Dresden - Rossendorf e.V., Germany**
Project homepage :	http://projects.tecnatom.es/webaccess/LONGLIFE/
HZDR participant:	**Institute of Safety Research**
Starting date:	**01.02.2010**
Duration (months):	**36**

Summary

In view of the increasing age of the European NPPs and envisaged life time extensions up to an EOL of 80 years, there is a need for an improved understanding and prediction of RPV irradiation embrittlement effects connected with long term operation (LTO). Effects caused by high neutron fluences such as the possible formation of late blooming phases and as yet unknown defects must be considered adequately in safety assessments.

However, the surveillance database for long irradiation times (>20 years) and low neutron flux is sparse, which leads to uncertainties in the treatment of LTO irradiation effects. In this context microstructural data are essential for the understanding of the involved mechanisms.

The proposed project aims at: 1) Improved knowledge on LTO phenomena relevant for European reactors; 2) assessment and proposed improvements of prediction tools, codes and standards; 3) elaboration of best practice guidelines for irradiation embrittlement surveillance.

The suggested scope of work is:

i) Summary of boundary conditions for LTO and systematic (re)evaluation of the international prediction procedures of irradiation embrittlement

ii) Generation of microstructural data of irradiated representative or original RPV materials; demonstration that damage models are (or not) consistent with the mechanisms of irradiation damage in the LTO (use of PERFORM60 prediction tools)

iii) Investigation of specific LTO relevant phenomena like late blooming phases and flux effect from available results; role of Cu, Ni, Mn, P, Si under the aspect of LTO

iv) Correlation of microstructural data with mechanical properties and identification of the most important influencing factors (link with PERFORM60)

v) Influence of high neutron fluences on fracture toughness curves shape

vi) Comparison of embrittlement results from decommissioned plants with surveillance data

vii) Elaboration of recommendations for RPV embrittlement surveillance under LTO conditions