



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

Collaborative Project

PERFORM 60

Project title: **Prediction of the Effects of Radiation FOr reactor pressure vessel and in-core Materials using multi-scale modeling – 60 years foreseen plant lifetime**

Project number: **232612**

Project coordinator: **Electricite de France, Paris, France**

Project homepage : <http://perform60.net>

FZD participant: **Institute of Safety Research**

Starting date: **01.03.2009**

Duration (months): **58**

Summary

In nuclear power plants, materials may undergo degradation due to severe irradiation conditions that may limit their operational life. Utilities that operate these reactors need to quantify the ageing and the potential degradations of some essential structures of the power plant to ensure safe and reliable plant operation. So far, the material databases needed to take account of these degradations in the design and safe operation of installations mainly rely on long-term irradiation programs in test reactors as well as on mechanical or corrosion testing in specialized hot cells.

Continuous progress in the physical understanding of the phenomena involved in irradiation damage and continuous progress in computer sciences have now made possible the development of multi-scale numerical tools able to simulate the effects of irradiation on materials microstructure. A first step towards this goal has been successfully reached through the development of the RPV-2 and Toughness Module numerical tools by the scientific community created around the FP6 PERFECT project.

Relying on the existing PERFECT Roadmap, the proposed 4 year Collaborative Project PERFORM 60 has mainly for objective to develop multi-scale tools aimed at predicting the combined effects of irradiation and corrosion on internals (austenitic stainless steels) and also to improve existing ones on RPV (bainitic steels). PERFORM 60 will be based on two technical sub-projects i) RPV and ii) Internals.

The Users' Group and Training sub-project shall allow representatives of constructors, utilities, research organizations ... from Europe, USA and Japan to receive the information and training to get their own appraisal on limits and potentialities of the developed tools. An important effort will be made to teach young researchers in the field of materials' degradation.

PERFORM 60 will be run with 20 European organizations and Universities involved in the nuclear field.