

Preface

The aim of this work was to increase the nuclear safety of the VVER-440 by improving fission product limitation systems (barriers) and implementing special non-destructive spectroscopic methods for the testing of structural materials (mostly steels). All theoretical and experimental studies performed were done to improve the deterministic approach to defence in depth for the VVER-440. Defence in depth is an extremely important principle for assuring nuclear safety in nuclear power plants, and this work focused on the barrier system through which this principle is achieved:

- nuclear fuel matrix;
- fuel cladding;
- integrity of the primary circuit;
- confinement system.

All of these barriers are described in Chapter 4 of this work, which contains the most important topics that comprised the objectives of the author's previous (and present) investigations. The integrity of the barriers was evaluated mostly from a materials degradation perspective. The contributions of ageing, neutron irradiation and thermal treatment were also studied in view of the expected extension to the operation of VVER-440.

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Safety of VVER-440 Reactors

Barriers Against Fission Products Release

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