

Reviewing the Interim Safety Analysis Report of Belene NPP (1)

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History

2005: the Council of Ministers of Republic of Bulgaria approved the construction of two 1000 MW PWR units at a site located near the town of BELENE.

2006: selected reactor type has been the AES-92 (V-466B), an upgraded variant of the new generation VVER AES-92 (V-412) presently under construction at Kudankulam (India).

According to Bulgarian laws the holder of the design permit is obliged to make comprehensive and systematic safety assessment of the unit to demonstrate compliance of the design solutions with the applicable safety requirements and to reflect this assessment in the interim safety assessment report (ISAR).

The information contained in ISAR shall enable possibility for verification the sufficiency of the design technical means and organizational measure used for ensuring their conformity with the requirements, norms and rules for nuclear safety, radiation protection and physical protection.

2008: launch of the cooperation between BNRA and RISKAUDIT IRSN/GRS International in view of ensuring a high level of nuclear safety in the Belene Nuclear Power Plant (BNPP) by implementing the regulatory review process in conformity with international safety standards (IAEA, e.g.), additional specific safety requirements defined by BNRA and best safety assessment practices.

The assessment and in-depth analysis work were carried out from November 2008 to November 2009.

Generation III Reactor Concepts

The Generation III reactor concepts representing the current best international practice of design safety have been elaborated in the 90ths; their safety features have been internationally accepted as the new safety standards.

They use evolutionary designs of the Generation II reactor designs incorporating new safety features. Generation III reactors use improved fuel technology, higher thermal efficiency, simplified design, passive safety systems and standardized design for reduced maintenance and capital costs.

Improvements in reactor technology are expected to result in a longer operation-life (60 provisional years of operation) as well as in a substantial reduction of damage frequencies (CDF) to $\sim 10^{-7}/y$ in comparison to the currently accepted Generation II CDF of $10^{-5}/y$.

The BELENE NPP has been developed as an evolutionary concept featuring all well-known VVER-1000 safety systems plus some innovative complementary passive safety systems, as shown in the figure 3.

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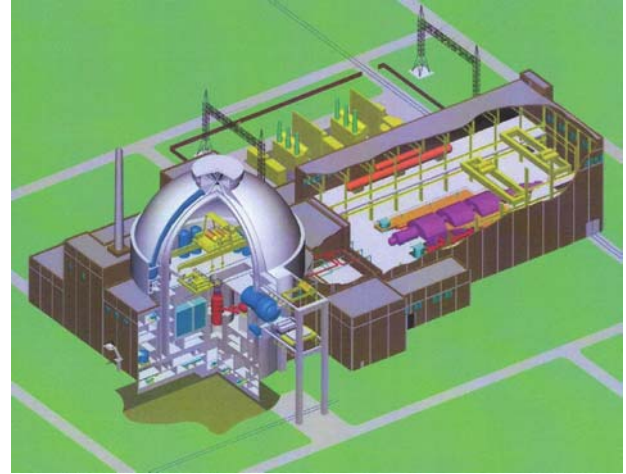


Fig. 1: Overall layout of an AES-92 NPP with a VVER-1000 reactor (courtesy: Atomstroy export)

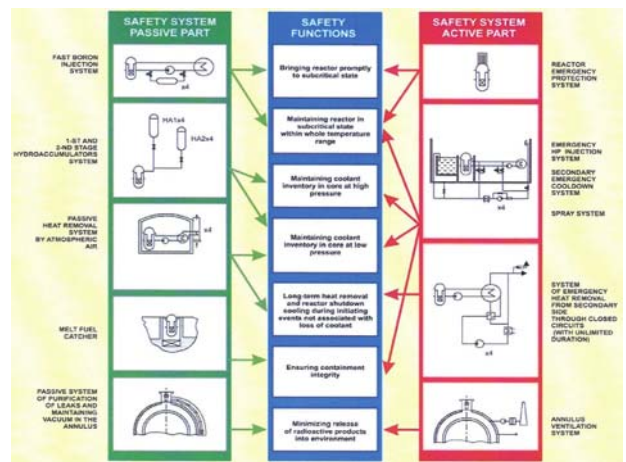


Fig. 2: The safety concept: systematic implementation of diversity for all safety functions (courtesy: Atomstroy export)

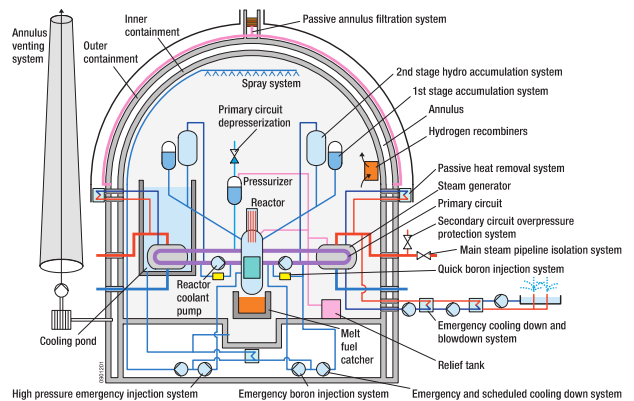


Fig. 3: Schematic of AES-92 (Belene NPP)