



QUICK BACKGROUND ON EU NUCLEAR POWER PLANT STRESS TESTS

September 2014, Joint Project

Key Stress test results for the 2 units of the Kozloduy nuclear power plant in Bulgaria:

- ✓ The Peer Review Team pointed out that in station black-out situations – when all **electric power supply is lost**, e.g. during earthquake, and when the heat removal from the reactor fails, the core melt will start already after 7,5h. Thus, the time span for intervention measures is very short.
- ✓ Kozloduy is not fully protected against **flooding**. The site is located at the first non-flooded terrace of the Danube. However, in case of the calculated high water level the Bank Pumping Station (BPS) would be flooded. Thus, possibilities for protecting the equipment of the BPS were investigated by October 2012. Back-fitting measures (including time schedule) are not described.
- ✓ One of the major topics of the Stress Tests are the lessons learnt from Fukushima: Weather related natural hazards like **heavy rains, strong wind and extreme temperatures** are seriously underestimated. However, Bulgaria is taking too much time to even find out what kind of dangers to the reactors might arise: While the Stress Tests revealed that a review of extreme weather hazards is necessary, not even the analysis will be completed until 2015. Many more years will be needed to implement possibly identified measures.
- ✓ The Stress Tests pointed to the need to protect the plants against more forceful earthquakes than they currently are fit to withstand. However, technically the measures consist of adding two mobile diesel generators - instead of rendering the safety systems themselves more resistant against earthquakes.
- ✓ Once an accident has started to develop, quick and reliable measures are needed to contain the further development and consequences for the environment, the so called severe accident management (SAM). At Kozloduy the SAM are currently insufficient, as the Stress Tests revealed the need for significant improvement. Most important, is the lack of measures to deal with the molten core to prevent a major release. However, only the study about this issue is to be performed by 2017 the implementation might take even more years! Until then: Appropriate **Severe Accident Management** provisions do not exist, but the reactors are operated anyway.
- ✓ Another very serious warning the Stress Tests formulated for the reactors at Kozloduy: During accidents the nuclear fuel inside the reactor could start to melt not only at one but at both units; and/or inside the pool where the used fuel is stored in high density. At Fukushima the melt-down accidents took place at the same time in several units. This kind of threat needs to be analyzed in detail in Bulgaria. Even though this is a very serious issue, not even the assessment of organizational measures and technical means will be completed by December 2015. The timescale for necessary improvements is not mentioned – the risk might exist for years to come.
- ✓ A hydrogen explosion like those during the accident at Fukushima cannot be excluded for Kozloduy, because the equipment installed there to prevent hydrogen explosions in the containment (Passive Autocatalytic Recombiners – PAR) might be insufficient for severe accidents. A hydrogen explosion in the containment can destroy the containment and thus lead to an enormous release of radioactive substances.



Stress Tests - what is happening now?

Currently two nuclear reactors are operating in Bulgaria: Kozloduy 5 and 6 (WWER-1000/V-320), put into operation in 1988 and 1993 respectively.

It is necessary to understand that the issues mentioned will be solved much later than the deadlines mentioned suggest, because it is not always clear what the solution might be and, in particular, whether it is sufficient at all. The implementation of all actions is planned before the end of 2017. Only a few actions are already completed, the majority of actions are “in progress”, and some have not started yet. However some actions consist of studies only, consequently the implementation of necessary back-fitting measure will take place several years after 2017.

The general impression is that the operator and even the responsible Nuclear Safety Authority (NRA) underestimate the urgency to implement those measures or shut the plant down, at least until those measures are completed. This attitude points to the traditional lack of safety culture in Bulgarian nuclear power plants. It became infamous when even the Nuclear Regulator tried to cover up a serious incident caused by the control rods of unit 5 proved in 2006. Years later, in December 2012 the IAEA concluded after its two-week safety review at Kozloduy (OSART Mission) that the lack safety culture persists: "Analyses of the cause of events are not always performed in a thorough and timely manner to prevent the recurrence of events related to human performance"¹

Conclusions & Demands: Currently, earthquake protection is not sufficient, nor the measures to cope with the consequences once a severe nuclear accident starts to develop, because Severe Accident Management provisions have not been implemented– but the reactors are operating, and there is more ahead: Life Time Extension.

The current plan to prolong the operating time above the originally designed lifetime of 30 years by 10 or 20 years more is not safe under the current circumstances. They include not only lack of measures a nuclear power plant needs as minimum to cope with accidents, or the hard-ware and equipment installed for this purpose, but also the safety culture. This is defined for example by taking smaller events seriously instead of covering them up. The same goes for the increase of the reactor power output, because a higher electricity production based on a higher thermal power in the reactor core, results in faster developing accidents with larger consequences.

¹ www.iaea.org/newscenter/pressreleases/2012/prn201232.html