



Stress test peer review
Follow-up fact finding site visit

Czech Republic

1. BACKGROUND/INTRODUCTION

The initial stress test peer review process is finished and follow-up of the implementation of safety improvements will occur through an ENSREG action plan. One step is for ENSREG to organize a limited number of fact-finding site visits. The objective of the fact finding visits are as follows:

- Information exchange with respect to measures taken, planned or under consideration at the site level to improve safety as a result of the stress test and peer review focusing mainly on the three stress test topical areas (natural hazards, loss of safety systems, and severe accident management).
- Identify good practices, noteworthy successes as well as any lessons learned or difficulties encountered implementing these measures.

The information gathered during these site visits will be used to assist the process by which ENSREG will follow-up of the National Action Plans. These follow-up site visits will promote cooperation and confidence building between European countries.

This report summarises the fact finding visit to the Czech Republic which took place at Temelin nuclear power station on 11th and 12th September 2012. The visit included discussions with the national regulator and operator and a visit to the power plant. The report was drafted by the team and shared with the national regulator and operator during an exit meeting at the end of the visit.

The team comprised five members representing each of the three disciplines upon which the stress test peer review process was based – external events, loss of safety functions and severe accident management. Each of the team members had taken part in the original reviews earlier in 2012 and all had been part of the initial visit to Czech Republic.

2. TEMELIN NPP

At the Temelín site there are two pressurized water reactor units (Type WWER 1000 series type V 320). The licensee is ČEZ. Current valid licences were issued by the State Office for Nuclear Safety (SÚJB) for the first unit on October 4, 2010 and for 2nd unit on May 25, 2012. Both licences are valid for 10 years. Each reactor has a nominal output of 3,000 MW thermal and electrical output of 1,000 MW. The WWER are four loops units. Each of the cooling circulation contains a main circulation pump and a horizontal-type steam generator. The primary circuit system is enclosed in a full pressure containment. The spent fuel pools are also located inside the containment. Under normal condition, the ultimate heat sink of both units is the atmosphere via cooling towers (two for each unit). The essential service water system (ESW) including cooling pools with sprinkler systems is designed as safety classified ultimate heat sink. In emergency situations residual heat can be removed also via the steam generators and steam discharge atmosphere valves. The service water supply (technological purposes) is piped from the Hněvkovice water reservoir on the Vltava river, about 5 km east to the plant.

The power plant is connected to the external electrical grid by two 400 kV lines and two 110 kV lines.

The relevant safety systems are 3 x 100% independent, physically separated and redundancy. The passive safety systems (hydro accumulators inside the containment) for design basis events have 2 x 100% redundancy. The seismic resilience of all redundant safety systems, including power supply, control systems and all auxiliary systems, is ensured and consistent with the

regulations of SUJB. The backup power sources and control systems are independent, physically separate and seismically qualified.

One important result of the PSR in 2009 was to create SAMG and PSA Level 2 for shutdown modes and to modify the simulator models for training the control room personnel during the first phases of severe accident.

3. SUMMARY OF OBSERVATIONS

3.1 Measures already decided or considered

A safety enhancement programme has been agreed between SUJB and CEZ and its execution is linked to the renewal of the new 10 year licence. It contains all measures from EU stress test national report, and the peer review report.

The following measures have been agreed upon upgrades in light of the national and international safety reviews of the Fukushima event:

Seismic

- Seismically qualifying the fire brigade building: *Implementation planned for 2013*

Flooding

- Increasing the protection of the diesel fuel tanks against the effects of flooding (with a reference to the latest PSR): *In progress, implementation planned for 2013*

- Increase resistance against rainfall of several buildings (DG's building and emergency shelter): *Implemented in 2013*

- Setting up an alternative shelter for the emergency response organization (e.g. when the dedicated emergency response centre is damaged due to some external hazard – like flooding): *Implementation planned for 2014*

Extreme weather

- Elaboration of procedures for special handling of weather related threats with some specific additions to the emergency management procedures. (e.g. organizational arrangements to ensure the necessary staff in case of lasting extreme weather conditions): *In progress, implementation planned for 2013*

SBO and Loss of UHS

- Installing new hook up points for fire trucks: *In progress, implementation planned for 2013*

- Developing procedures for complex accidents (e.g. loss of UHS and ESW systems, procedure for the alternative replenishment of water to steam generator/SFP/primary circuit (with unsealed primary circuit, use of mobile DGs during SBO's, long term DG operation.). *Implementation planned for 2013*

- Analysis of the heat removal from I&C systems following a loss of ESW: *Implementation planned for 2013*

- Backup (SBO) DG installation: *Implementation planned for 2013*

- Emergency response provisions such as providing long term Communication, alternative means (cell phones, radios, limited wire telephone) etc. *In progress, implementation planned for 2013*

- Developing extensive damage mitigation guidelines: *Implementation planned for 2015.*

- Elimination of Mid-loop operation state: *Implementation done.*

Severe Accidents

- Development of SAMGs for shutdown modes including open reactor, SFP accidents and multi unit accidents: *In progress, implementation planned for 2014*
- Selection of appropriate strategy to protect containment against overpressure (filtered venting system is one option): *Analysis, strategies and implementation schedule planned for 2014*
- Installation of additional sufficient hydrogen recombiners for severe accident conditions: *Implementation planned for 2014 (Unit 1) 2015 (Unit 2)*
- Instrumentation for SA harsh conditions (Analysis and measures) - *Implementation planned for 2014*
- Improving the battery depletion time and implement battery recharging by SBO DG: *Implementation planned for 2013*
- Valves power reconnection to batteries for containment isolation during SBO: *Implementation in progress*
- Corium in/ex vessel cooling: *Analysis, strategies and implementation schedule for corium cooling strategy planned for 2014*
- Further analyses of the impacts from the infrastructure damages, multiple Unit accidents etc on the SAM and emergency response provisions. *Completion planned for 2013*

3.2 Good practices and noteworthy successes

- The proposal by the regulatory authority to establish common (regional) emergency response.
- An effective PSR being legally binding, including for example measures for severe accidents.
- Regular update of PSA Level 1 to reflect the up-to-date state of the plants.
- Proposal to increase the amount of coolant (water) on-site.
- The seismic monitoring system around Temelin NPP is a strong safety feature.
- Replacement of emergency light bulbs to energy saving ones (increases battery depletion time).
- Tent Solution to temporarily store safety related equipment that was stored in a non seismic building which is now being re-qualified.
- Mobile equipment provided in the emergency shelter to monitor key technological parameters.

4.0 Conclusions

The regulatory body has a good and open communication with the license. They agreed on a safety enhancement program (that includes the stress tests recommendations) as condition for the next 10-year licence.

Among the comprehensive safety enhancement programme to be implemented in the next years, an important decision is due in 2014 regarding strategy for containment integrity during SA including the option of filtered venting.

The essential cooling water (safety system) is independent from cooling towers and cooling towers are not safety related.