

RAPPORTEURS' REPORT - BULGARIA
ENSREG NATIONAL ACTION PLANS REVIEW WORKSHOP 2015

1.0 ASSESSMENT OF THE STRUCTURE OF NATIONAL ACTION PLAN

1.1 Compliance of the national action plan with the ENSREG Action Plan:

Bulgaria followed the structure proposed in the ENSREG National plan guidance quite closely. In Part I of the NAcP, Bulgaria provided an update of the National Stress test report as well as addressed the issues identified in the ENSREG compilation of recommendations. CNS EOM aspects in relation to Topic 1 to 3 have not been considered and referred directly.

The Bulgarian NAcP addresses the comments and recommendations formulated by the Peer Review team in the Peer review country report in Part III: Additional topics. This approach does not fully correspond to the intention of the guidance document, but this is only a formal issue.

2015: *No change*

1.2 Adequacy of the information supplied, taking into account the guidance provided by ENSREG.

The NAcP of Bulgaria follows the ENSREG national action plan guidance quite closely. The Introduction section outlines the stress test process carried out in Bulgaria, the responsibilities of participating organizations and the structure of the action plan.

Part I follows the structure and content as suggested in the ENSREG “Compilation of recommendations and suggestion” document, discussing all the items suggested there, covering the topics 1 to 3. Part II covers the 3 additional topics of the extraordinary meeting of the CNS. Part III covers the actions as responses to the ENSREG Peer review country report recommendations; and also the actions based on recommendations initiated by WANO, IAEA and the extraordinary meeting of the CNS, but these latter are all related to topic 6 (International co-operation), therefore are outside of this review.

In Part IV, Attachments in tabular form identify each of the actions. Attachment 1 covers the actions related to Topics 1 to 3 as described in Part I. The table refers to the installation where the action is applicable, the name of the Topic, a short description of the action, a reference number to the ENSREG recommendation, the source for the action (in 16 cases both ENSREG and CNS are referred, in 11 cases only ENSREG), and the status and the scheduled final date of completion.

2015 update: *Attachment No. 4 lists the new measures and activities resulting from the performed analyses and studies. The descriptive sections of the NAcP clearly describe the sources and the justification of the actions.*

2.0 ASSESSMENT OF THE CONTENT OF NATIONAL ACTION PLAN

2.1 How has the country addressed the recommendations of the ENSREG Action Plan?

The actions covering the ENSREG action plan issues are covered in the appendices 1 and 3.

In relation to Topic 1 to 3 Bulgaria has established altogether 32 measures, 27 actions are established on the basis of the ENSREG Compilation of Recommendations document and on the CNS EOM report, and additional 5 are on the ENSREG peer review report. Out of these actions, 8 are related to the Kozloduy plant (KNPP) as a whole, 21 are to units 5&6 of KNPP, 2 actions to the Wet Spent Fuel Storage Facility and 1 action to the River Bank Pump Station.

The actual content of the actions cannot be derived from the short description provided in the attachment tables, however in the descriptive parts (Part I and Part III) sufficient information is given with references to the individual action IDs in the attachment tables. Note that several of the actions are quite complex, e. g. “*Develop technical means to provide direct injection of water to the reactor core, SG, SFP and the containment by mobile fire protection equipment in extreme conditions*”, which implies that presumably very different technical modifications shall be elaborated for direct injection into the reactor core, as compared to the steam generator or to the spent fuel pool.

The aspects of the ENSREG compilation of recommendations and suggestions are explicitly referenced and all the actions mentioned above seem to reply to them. The aspects of the CNS are discussed but are difficult to identify.

The review discussions clarified that concerning the aspects of possible multi-unit accidents, both the existing and the planned new emergency management centres are well equipped for such situation, and according to a recent review, there is adequate personnel available.

The molten core handling issues were also discussed during the review, and it is clarified that common studies are on-going among the VVER-1000 users for determining the proper solution (in-vessel retention or the use of a core catcher). The studies are expected to be completed by the end of 2017 and the related modifications can only be scheduled after.

Each of the recommendations of the peer review country report is covered in Part III, but no reference is given to report's sub-chapters, making the identification somewhat difficult.

Update 2015: *While the Parts I through III are basically unchanged, Part IV of the report describes in detail the developments, achievements, analysis results, the justification of modified measures and of the new measures.*

2.2. Schedule of the implementation of the NAcP

From the 32 complex actions, 9 are already completed, 7 are in “planned” status, and the remaining 16 are in progress. The longest planned completion date is the end of 2017. Several of the actions have different completion schedules for the different units. Some are in “completed” status for one unit and in “in progress” status for the other one. The majority of the actions are scheduled to be completed by the end of 2014.

Internal milestones for the phases of the actions (e. g. regulatory approval, or completion of required analyses) are not presented.

Update 2015: *The updated NAcP of Bulgaria contains altogether 77 actions (including the 14 new measures and several of the earlier complex actions are sub-divided into elementary actions). Out of these 48 measures (62.3%) are completed and 29 measures (37.7%) are under implementation. Regarding the plant level actions (Topics 1-3), 38 measures (64.4%) are completed and 21 measures (35.6%) are under implementation. Regarding national level measures (Topics 4-6) 10 (55.6%) are completed and 8 (44.4%) are under implementation. No measures are in “planned” status.*

Considering the original 32 actions in relation to Topics 1-3, 23 are completed and 8 are in progress (5 of these are re-scheduled), while one is transformed into 2 new actions. The latest schedule of the “in progress” actions is December 2017. Of the 14 new actions, 2 are completed and 12 are in progress. The latest schedule of the new actions is December 2016.

2.3 Transparency of the NAcP and of the process of the implementation of the tasks identified within it

The NAcP of Bulgaria – along with all other reports in relation to the European stress test – is accessible through the home page of Bulgarian Nuclear Regulatory Authority (BNRA), both in English and in Bulgarian.

The nuclear energy law of Bulgaria stipulates the requirement for BNRA to openly and transparently communicate regulatory decisions and safety information to the public. To satisfy this, BNRA uses several channels and mechanisms, as web page, media, formal letters and Annual Report to provide all necessary information to the public. The law also requires the licensees to inform the public about possible radiation risks associated with the facilities and activities. No additional action is being considered in this field.

2015: No change

2.4 Commendable aspects (good practices, experiences, interesting approaches) and challenges

The action to develop a programme to review the regulatory requirements by the end of 2013 in the light of the Fukushima Daiichi accident lessons learned is a good and commendable practice.

Another commendable action is the plan to elaborate a probabilistic analysis to include the effects of extreme weather conditions on the KNPP site, according to the IAEA methodology and considering credible combination conditions.

Re-evaluation of external hazards within the framework of the recent Periodic Safety Review PSR (after the Fukushima Daiichi accident) is a commendable aspect.

It is a good practice that regular walk-downs are arranged in order to verify the conditions of severe accident management guide (SAMG) related premises and equipment.

The implementation of some planned complex actions and modifications can be a challenge within the schedule given. The design and the implementation of some actions are depending on the results of the on-going studies, such as the provisions for retention of a molten core as well as for management of large volumes of radioactive water.

2015 update: *The application of interchangeable mobile diesel generators of 0.4 kV and 6 kV is a good practice due to its flexibility and effectiveness. Also the applied solution for plugging the ionisation chamber channels with “plugging ball” in case of ex-vessel core melt scenarios – in order to avoid early containment by-pass – is an exceptionally simple and effective approach that even does not require human intervention.*

It is also notable that options for supplying coolant water from external, mobile sources are under implementation for the reactor vessel, for the steam generators, for the containment and for the spent fuel pool, respectively.

The final decision for the approach to molten core retention (in-vessel or ex-vessel) has not been taken yet, though several important actions are already implemented to mitigate the consequences or reduce the risk of an ex-vessel scenario.

2.5 Technical basis related to main changes and relevant outcomes of studies and analysis (2015)

The strategy for molten core handling is not decided, because the related international research programmes have not been concluded yet. In the meantime, some important modifications are implemented to mitigate a potential ex-vessel scenario and these are also supported by appropriate SAMG arrangements.

Feasibility study of the power supply of hydro-accumulator valves to provide make-up in cold shutdown conditions and failure of the emergency DGs was carried out. The outcome of the study demonstrates the need for supplying power to the hydro-accumulator connecting valves from the batteries. The implemented modification enables the operators to control the hydro-accumulator valves in case of cold shutdown conditions with loss of all AC power sources.

According to the recent seismic re-evaluation of the site, the maximum horizontal PGA is estimated as 0,22 g. The definition of the new RLE and the seismic stability analysis of the SSCs of Kozloduy NPP will be performed in connection with the ongoing PSR. The analysis results have shown that in the current situation the radiological conditions in the Main Control Room in some phases of a core melt scenario may prevent its habitability, thus the appropriate arrangements are included in the SAMG to move the control to the Emergency Control Room. At the same time appropriate solutions are looked at to maintain the habitability of the MCR even during such situations.

3.0 PEER-REVIEW CONCLUSIONS

Bulgaria gives comprehensive and understandable information on the improvement of safety of its NPPS in the light of the Fukushima Daiichi accident, in accordance to the national stress tests, to the recommendations and suggestions of ENSREG and to those of the EO CNS. In addition to the operating two NPP units, the spent fuel storage facilities are also covered by the action plan.

The NAcP closely follows the structure proposed by ENSREG with some specific interpretation of "Additional actions". Some of the actions referred in the NAcP are quite complex, actually covering several elementary actions.

The implementation of all actions is planned before the end of 2017 and this is still valid in the up-dated NAcP of 2015. Several actions were already completed by the time of the 2013 review workshop, while the majority of actions were "in progress", and some were not started yet, but their completion dates were scheduled. Internal milestones were not referred to in the document. The up-dated report of 2015 presents that 2/3 of the total number of actions are already completed and all the remaining actions are in progress, including 12 of the 14 new actions defined in the meantime, while 2 of those are already completed. A small fraction of the actions have been re-scheduled.

Several good practices and experiences were identified in the 2013 report and, in addition to those, additional commendable actions are spotted in the 2015 review. The most important are: the establishment of flexible connectivity of 0.4 kV and 6 kV mobile diesel generators, making their application interchangeable, including their applicability to re-charging the batteries; the use of a "plugging ball" in the ionisation chamber channels to prevent early containment by-pass in case of an ex-vessel molten core scenario; flexible and universal connectivity to external water sources applicable for re-filling the reactor, the SG, the containment or the spent fuel pool.

The optimum strategy for molten core handling for the VVER-1000 reactors has not been decided yet in the framework of an international research programme, however, several measures have already been completed in order to mitigate the consequences of or prevent an ex-vessel scenario. The management of large volumes of radioactive water after a severe accident is still under investigation. The SAMG is complemented by special instruction to evacuate the operating staff from the Main Control Room, if – during a severe accident – the dose rate exceeds a 1 mSv/h limit. At the same time an action is in progress to develop means to avoid this situation.

The Bulgarian action plan systematically covers all the items expected by ENSREG, outlining the situation in relation to every item and assigning action, whenever it is applicable. The progress demonstrated during the 2015 review meeting is substantial and shows that the action plan is basically progressing according to schedule.