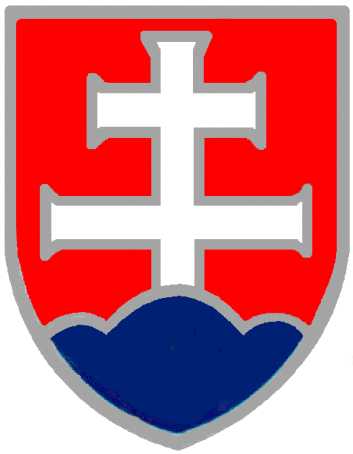
NATIONAL ACTION PLAN
of the
SLOVAK REPUBLIC



Update

Nuclear Regulatory Authority of the Slovak Republic

December 2019

Content

Abbreviations

AC	Alternating Current
CCS	Central Crisis Staff
DG	Diesel Generator
EBO34	Bohunice Nuclear Power Plant Units 3 and 4
EMO12	Mochovce Nuclear Power Plant Units 1 and 2
EMO34	Mochovce Nuclear Power Plant Units 3 and 4
ENSREG	The European Nuclear Safety Regulators Group
ESFAS	Engineering Safety Features Actuation System
EOP	Emergency Operating Procedures
ERC	Emergency Response Centre
ERO	Emergency Response Organization
ESWS	Essential Service Water System
EU	European Union
HP	High-pressure
IAEA	International Atomic Energy Agency
IPSART	International Probabilistic Safety Assessment Review Team
IRRS	Integrated Regulatory Review Service
MCP	Main Circulation Pump
MDBE	Maximal Design Basic Earthquake
MOD V-2	Programme on Modernization and Improvement of NPP Bohunice 3&4
NAcP	National Action Plan
NPP	Nuclear Power Plant
NSSS	Nuclear Steam Supply System
OCG	Operational Control Group
OSART (Pre OSART)	(Pre) Operational Safety Review Team
PC	Primary Circuit
PRZ	Pressurizer

PSA	Probabilistic Safety Assessment
PSR	Periodic Safety Review
RLS	Reactor Limitation System
RPS	Reactor Protection System
RTS	Reactor Trip System
RPV	Reactor Pressure Vessel
SAM	Severe Accident Management
SAMG	Severe Accident Management Guidelines
SBO	Station Black-out
SG	Steam Generator
SCRMN	Slovak Centre of Radiation Monitoring Network
SEFWS	Super Emergency Feed Water System
SE, a. s.	Slovenské Elektrárne, Inc.
SFP	Spent Fuel Pool
SIRM	Safety Improvement of Mochovce NPP Project Review Mission - occlusions of IAEA mission performed at Mochovce in June 1994
SO	Secondary Circuit
SSEL	Safe Shutdown Equipment List
TSSM	Technical Specifications for Safety Measures
UJD SR	Nuclear Regulatory Authority of the SR
UVZ SR	Public Health Authority of the SR
VARVYR	Warning and Notification
WANO	World Association of Nuclear Operators
WENRA	Western European Nuclear Regulators' Association

Preface

This report updates the information contained in the 2017 report including the progress in implementing each of the individual actions within the NAcP. Members of ENSREG agreed to update their NAcPs on biannual bases until all measures are completed..

This report is available on the web page of ENSREG and on UJD SR web page (www.ujd.gov.sk).

I. Introduction

Following the accident at Fukushima Daiichi in 2011, the European Union (EU) countries that operate nuclear power plants each produced a national action plan (NAcP). These plans identified the actions necessary to enhance nuclear safety focusing on nuclear power plants (NPPs), and within the Terms of Reference of ENSREG.

The NAcP follows the Structure proposed in the ENSREG Action Plan. It contains comprehensive information on the actions planned/complete/under implementation after Fukushima as well as information on safety improvements and measures adopted before Fukushima.

The first NAcP workshop was held on 22 – 26 April 2013 and the second on 20 – 24 April 2015 to discuss and review the status of implementation of the NAcPs for the EU countries together with Switzerland and Ukraine. The workshop reports are available on the ENSREG website.

Most of the measures listed are completed. The remaining once are in an advanced stage of implementation.

Slovakia is committed to continue in implementing the NAcP until all measures had been completed. Safety improvement is a continuous process which will continue even the activities within the NAcP are completed. Periodic safety reviews, international peer review and other instruments are an important elements of this process.

General information

Regulatory Framework

The state regulatory authority performing the state supervision upon nuclear safety of nuclear installations is the Nuclear Regulatory Authority of the Slovak Republic (UJD SR). The state supervision over nuclear safety is performed in accordance with the Atomic Act (No. 541/2004 Coll.) and subsequent set of regulations, in particular Regulation No. 430/2011 (as amended) laying down details on requirements for nuclear safety. The whole set of legislative basis has been updated in 2011 - 2012, in line with the progress in the development of the IAEA Safety Standards and WENRA Reference Levels. Radiation protection is performed by the Public Health Authority (ÚVZ SR) in accordance with the Act No. 355/2007 Coll.

The most recent change in the legal framework is the Act No. č. 279/2019 Coll. by which Act No. 541/2004 Coll. (Atomic Act) was amended. Changes stipulated by Act No: 279/2019 Coll. relates to administrative proceeding in the licensing process.

WENRA Reference Levels

One of the objectives of WENRA, as stated in its terms of reference, is to develop a harmonized approach to nuclear safety and radiation protection issues and their regulation in Europe. A significant contribution to this objective was the publication, in 2006, of a report on harmonisation of reactor

safety in WENRA countries. This report addressed the nuclear power plants in operation and it included “Safety Reference Levels” (SRLs), which reflected expected practices to be implemented in the WENRA countries. The SRLs were updated in 2007, 2008 and 2014.

The SRLs have been established for greater harmonisation within WENRA countries raising the level of nuclear safety in Europe by their implementation in the national regulatory framework and in NPPs. The emphasis of the SRLs has been on nuclear safety, primarily focussing on safety of NPPs. Up to now the SRLs specifically exclude nuclear security and with a few exceptions, radiation safety.

Full harmonisation of safety regulations with WENRA SRL 2008 has been achieved /1/. As regards WENRA SRL 2014, there are 322 RLs out of 342 transposed into the regulatory framework.

Nuclear Power Plants

Currently there are 4 WWER-440/V213 nuclear units in operation in Slovakia, 2 units in Jaslovské Bohunice and another 2 in Mochovce site. In Mochovce there are also two WWER- 440/V213 units with significantly upgraded design in commissioning. The owner and operator (the holder of the operating permit) of all operating and constructed nuclear units in Slovakia is the stock company Slovenské elektrárne, a. s. (SE, a. s.).

Basic data about all units covered by this report are in the table.

Plant	NPP Bohunice 3&4	EMO12 NPP	EMO34 NPP
Site	Bohunice	Mochovce	Mochovce
Reactor type	WWER-440/V213	WWER-440/V213	WWER-440/V213
Reactor thermal power, MWt	1471	1471	1375
Gross electric power, MWe	505	470	470
Plant status	In operation	In operation	Under construction
Date of first criticality	1984-85	1998-99	Under construction

Upgrading of the plants since the original design

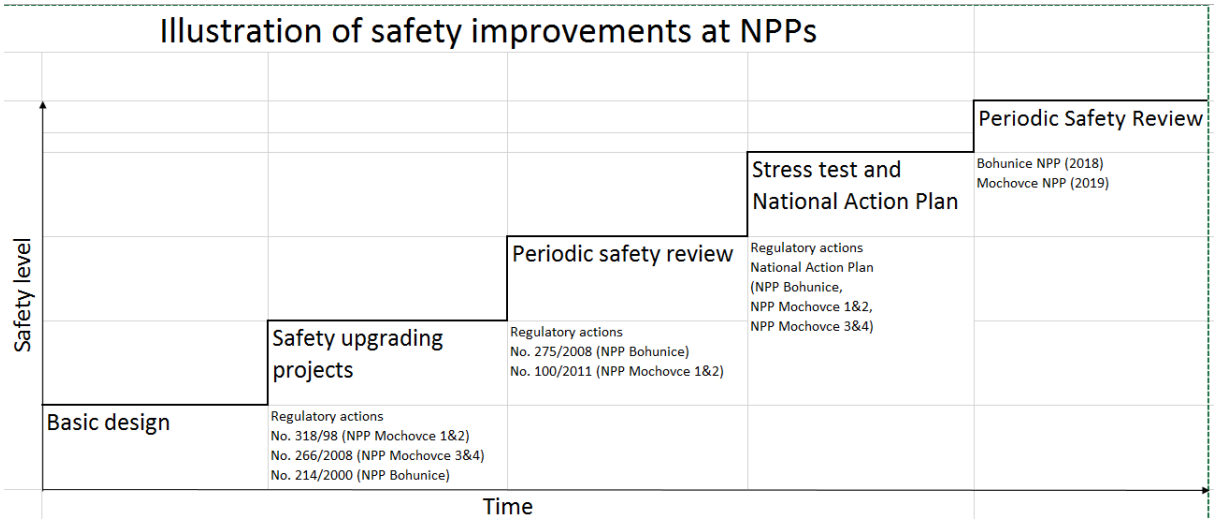
The NPPs have been significantly upgraded throughout their operation. In spite of the robustness of the original design, several modifications based on operational experience and by international and national safety assessments/reviews have been carried out (see picture below). Improvement of the containment tightness/integrity of existing plants is one of the major achievements.

All nuclear power plants have their safety reports (SAR) that are continuously updated according to legal requirements and reviewed by the regulator. In accordance with the national legislation. Probabilistic Safety Assessments (PSA Level 1 and Level 2) confirm that the NPPs meet

internationally recognized safety targets. The Probabilistic Safety Assessment studies (PSA Level 1 and Level 2) are regularly updated as well.

All operating units have been subject of a number of international missions performing independent review of their safety level. Since 1991 there were more than 20 IAEA missions (site review, design review, OSART, IPSART missions), 6 WANO missions, 2 RISKAUDIT missions and 1 WENRA mission. The latest (Pre-OSDART) mission at the Mochovce unit 3 took place in November – December 2019.

Just after Fukushima and based on WANO recommendations during the period from April to October 2011, non-standard tests and checks of equipment important for coping with extreme conditions exceeding the basic design were successfully performed on the operating units. The tests included e.g. verification of the long-term run of diesel generators, the possibility for delivery of cooling water from the bubbler-condenser to the spent fuel pool, feed water supply to steam generators from a mobile source, supplying of water from cooling towers to essential service water system, connection of a back-up power supply from the hydro power plant, and others.



II. Basic approach and monitoring

Several ENSREG recommendations adopted on the basis of the stress tests coincided with the projects on:

1. Severe accidents management (SAM) such as
   - To analyse the necessity of filtered venting of the containment to support SAM,
   - To analyse a response to severe accidents at multi units at the same site.
2. NPP resistance against external risks with very low probability of occurrence (occurrence less than 1.10^{-4}/year)
   - External floods (spreading of floods inside the power plant, drain system capacity etc.),

- Seismic event.

The measures, from which some have already been implemented before Fukushima, are divided into the following groups:

- Short-term – finished by 31/12/2013
- Medium-term – finished by 31/12/2015
- Additional measures, which resulted from analyses performed or have been identified during implementation. .

Monitoring of the Action Plan implementation

Majority of tasks resulting from the NAcP are covered by UJD SR decisions issued in the past and in particular after completion of the periodic safety assessment of NPPs in the years 2008 (NPP Bohunice) and 2011 (NPP Mochovce). According to these decisions the operator was obliged to report to UJD SR on the progress and the results achieved annually.

Due to the specific nature of the stress tests and as a provision for accepting the measures proposed by the licensee, UJD SR performed inspections within its annual inspection plans the aim of which were to monitor the implementation of measures.

The inspection results confirmed the operator´s overall compliance with the Action plan in terms of substance and deadlines as well. Some measures have been completed before deadline. The previously identified delays related to verification and validation of SAMGs were resolved during 2018 and the verification and validation of SAMG were completed for the operating units.

Status of ongoing activities:

Units EBO34:

ID 3 - Prevention of accidents because of natural risks and limitation of their consequences. The remaining activity concerns risks caused by strong wind. The relevant design modification documentation was developed by the licensee . The implementation has been rescheduled.

ID 31 - Bunkered/Hardened systems Original project documentation for sheltering of mobile DG and cabling is revised. New location for the placement of mDGs is selected to avoid impact of surrounding buildings. The mDGs are already placed in an existing seismically reinforced building within the site.

Units EMO 12 :

ID 3 - Prevention of accidents because of natural risks and limitation of their consequences, In 2018 delays in the completion of seismic reinforcement of units EMO1 and 2 were identified by UJD and confirmed by the licensee – SE a.s.. The main reasons for the delay were in the inability of the contractors to provide the expected results using acceptable methodologies (specific GIP VVER

methodology), The used methodologies for example does not included some steam pipelines and their impact on other components. During the early phase of the project several contractors were changed for different reasons (e.g. not providing the complete Safe Shutdown Equipment List (SSEL). The SSEL after an earthquake was finally developed during 2017 – 2018 by a group of contractors. The assessment of seismic capacity of SSC which are on the SSEL list is ongoing. Majority of SSC comply with the seismic capacity.

In parallel to the assessment of seismic capacity of SSC, seismic reinforcement of buildings/structures (were the SSEL components and systems are located) have been completed or is ongoing e.g. :

- Fire station building – completed
- Emergency feed water system - completed
- Emergency Response Centre – completed
- Air duck to venting stack - completed
- Venting stack - completed
- Diesel Generator Station – ongoing
- Diesel oil system – ongoing
- Central pumping station of ESW and firefighting water - completed
- Forced draft cooling towers of ESW system - completed
- Nuclear auxiliary service building - ongoing
- Reactor building of EMO12 - ongoing
- Electrical buildings - ongoing etc.

From the procedural aspect the Act on environmental impact assessment is applied i.e. relevant activities were and are subject to an environmental impact assessment. This process in conjunction with the administrative proceedings under the Atomic Act , Construction Act, Act on Administrative Order and particularly the Act on Public Procurement significantly influencing the implementation of safety related projects particularly in case of complex projects like this project on seismic reinforcement.

Based on these facts and taking into account the complexity of the project on seismic reinforcement UJD accepted the proposal of the licensee to reschedule the date for the completion of seismic reinforcement until 2022 provided that the licensee – SE a.s. will provide reports to UJD on the status of implementation and planned measures on annual bases.

In the above mentioned cases UJD SR apply a more thorough review of the progress made supported by in depth inspections annually.

Unit Mochovce 3 :

For the first time the NAcP contains information on the implementation for Mochovce unit 3 (MO34) which is in commissioning .

The Pre OSART mission (December 2020) at Mochovce unit 3 identified findings (suggestions and recommendations) and made observations some of which are related to the stress test action plan:

- complete seismic qualification of equipment
- multiple unit accident exercise, involving 3 units (Mochovce units 1,2,3)
- assessment of accessibility of locations for the local SAM actions during emergencies

The Pre OSART team also identified several good performances in the area of accident management:

- development and use of an online Crisis Staff Decision Support Tool to support event classification and prognosis
- additions to the basic design such as enhancements to the management of simultaneous severe accidents in multiple units
- modifications for refilling of the open reactor, when low-pressure safety injection pumps could be unavailable due to maintenance etc.

The licensee is developing a specific action plan to resolve findings of the Pre OSART mission. The final report of the Pre OSART mission will be issued expectedly in March 2020.

The following documents served to develop the NAcP:

- ENSREG Compilation of recommendations
- Peer review country report
- EC Communication Annex
- Extraordinary meeting under the Convention on Nuclear Safety (XCNS)

Several actions in these documents are similar or identical, however the NAcP addresses each of them and makes reference to the relevant document.

Technical details of the Action Plan are reported in Chapter III.

III. Status of implementation

RECOMMENDATIONS OF TOPIC 1 (NATURAL RISKS)

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
1.	ENSREG Compilation of recommendations 2.2	Periodic safety review	Review of natural risks as a part of periodic safety review (PSR) Status: According to UJD SR Regulation No. 33/2012 Coll., Section 2 the licensee is obliged to conduct periodic review. The objective of PSR (§9) is to assess the extent, up-to date and quality of deterministic safety evaluations, probability-related safety evaluations and analyses of the effect of internal and external hazards, as well as in terms of the condition predicted by the date of the next periodic evaluation (see picture in chapter I).	Completed	Completed	Not relevant
2.	ENSREG Compilation of recommendations 2.3 EC Communication – specific to Slovakia 5.11 XCNS	Confinement integrity	To analyse a necessity of filtered venting of the containment and other potential technical measures for long-term heat removal from the containment and reduction of radiation load of the environment taking into account activities in this area at other operators of WWER-440/V213 NPP types and considering measures implemented within the SAM project. Status: Analyses completed. The best solution based on the outcomes is a SAM dedicated, independent long-term heat removal system.	Completed	Completed	Completed

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			Concept of a full-fledged filtered containment venting system for severe accident (FVKTH) raises problems with permanent loss of coolant from the containment required for external cooling of reactor pressure vessel. FVKTH additionally sets high requirements for cooling of discharged steam-air mixture or for creating large inventory of coolant. Technical meetings are organized (information exchange) with other operators of VVER 440 on the subject matter.			
3.	**ENSREG Compilation of recommendations 2.4**	**<u>Prevention of accidents because of natural risks and limitation of their consequences</u>**	**The National Action Plan covers all tasks in an integrated/comprehensive manner.** **<u>Status:</u>** **<u>Short term (immediate) measures:</u>** **Based on WANO recommendations during the period from April to October 2011 the non-standard tests and inspections of equipment important for coping with extreme conditions exceeding the basic design were successfully performed. (Immediate measures - flood protection bags were implemented in buildings where safety systems are located).** **<u>Long-term measures:</u>** *** See chapter II**	**Completed** **In progress ***	**Completed** **In progress***	**Included in the basic design***

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
4.	**ENSREG Compilation of recommendations 3.1.1 XCNS**	**Hazard frequency related to weather**	**To evaluate resistance of selected systems, structures and components (SSC) at extreme external events (floods caused by heavy rain, high and low external temperatures, direct wind and other relevant events for the given locality) on the basis of updated new studies on meteorological conditions for Jaslovské Bohunice and Mochovce localities, and to consider events with intensity corresponding to the probability of occurrence once per 10,000 years or less; to prepare a plan for implementation of additional measures or to implement them.** **Status:** **Metrological studies for the site were developed for EBO /2/ and for EMO /3/.**	**Completed**	**Completed**	**Completed**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
5.	**EC Communication Annex**	**Hazard frequency related to seismicity**	**To analyse seismic margins of selected systems, structures and components (SSC).To evaluate the resistance of selected SSC at a seismic event with intensity corresponding to the probability of occurrence less than once per 10,000 years.** **Status:** **Seismic margins of civil structures evaluated /4/.** *** see chapter II**	**Completed**	**In progress***	**Included in the basic design***
6.	**EC Communication Annex** **EC Communication– specific to Slovakia 5.11**	**Seismicity – minimum peak ground acceleration 0,1 g**	**Status:** **Bohunice site : PGA value is 0.344 g.** **Mochovce site: PGA value is 0.15g**	**Completed**	**Completed**	**Included in the basic design**
7.	**ENSREG Compilation of recommendations 3.1.2**	**Secondary effects of earthquakes**	**To prepare a scenario for putting the NPP units into safe condition after a seismic event.** **Status:** **Updated scenarios were incorporated into Operating Instructions for Emergency Situations.** **(See ID 21)**	**Completed**	**Completed**	**Included in the basic design (completed)**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			Additional measures: **Contract concluded with the Research institute of Transport on analysis of critical roads at the plant. Reports for EBO and EMO completed and the outcomes were analysed. Measures for safe shut down after a seismic event have been adopted.** **(See ID 55)**			
8.	**ENSREG Compilation of recommendations 3.1.3** **Peer review country Report of the SR 4.3** **EC Communication Annex** **EC Communication – specific to Slovakia 5.11**	**Protection against penetration of water into buildings. Proving of protection against floods for identified rooms and**	**To evaluate resistance of selected systems, structures and components (SSC) at extreme external events (floods caused by heavy rain, high and low external temperatures, direct wind and other relevant events for the given locality) on the basis of updated new studies on meteorological conditions for Jaslovské Bohunice and Mochovce sites, and to consider events with intensity corresponding to the probability of occurrence once per 10,000 years or less; to prepare a plan for implementation of additional measures or to implement them.** **Status:** **Short term (immediate) measures:** **Based on WANO recommendations during the period from April to October 2011 the non-standard tests and inspections of equipment important for coping with extreme conditions**	**Completed**	**Completed**	

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			exceeding the basic design were successfully performed. (Immediate measures - flood protection bags were implemented in buildings where safety systems are located). **Long-term measures:** **The procurement process and the implementation of measures in EBO and EMO is completed. All measures for protection against penetration of water into buildings as well as protection against floods for identified rooms are implemented.** **Updated scenarios were incorporated into Operating Instructions for Emergency Situations**	**Completed**	**Completed**	**Included in the basic design**
9.	**ENSREG Compilation of recommendations 3.1.4**	**Notices on time warning**	**To implement the warning and notification system in case of deteriorating weather and to implement procedures of NPP operating staff response.** **Status:** **The predictive regulation No. 0-HP/3006, 0HP-3005, 0HP-3006 – EMO12, MO34, 4LPS-064, 065 – EBO34 - For measures against extreme climatic conditions was prepared and implemented.** **Additional measures:** **Contract concluded with the Hydro-meteorological institute on providing data.**	**Completed**	**Completed**	**Completed**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
10.	**ENSREG Compilation of recommendations 3.1.5** **EC Communication Annex**	**Monitoring of seismicity**	**Arrangement of Bohunice, Mochovce seismic monitoring stations was proposed and built based on detailed seismic and geological survey prepared by the Geophysical Institute of the Slovak Academy of Science and reviewed by IAEA missions in 1998 and 2004. Monitoring results are summarized in quarterly reports.** **Updated scenarios were incorporated into Operating Instructions for Emergency Situations**	**Completed**	**Completed**	**Included in the basic design (completed)**
11.	**ENSREG Compilation of recommendations 3.1.6**	**Qualified walkdowns**	**To prepare regulations for qualified walk downs related to natural risks and to update them after preparation of an international guide.** **Status:** **Guidelines for the walk down checks of equipment which are defined for the management of external events (seismicity, floods, low and high temperatures, wind) were updated (e. g. EMO/NA-332.0201).** **Procedures for the actions necessary in response to EEE are developed, implemented and exercised in accordance with the plan of emergency exercises (e. g. EBO 2015).** **(See ID 21)**	**Completed**	**Completed**	**Completed**
12.	**ENSREG Compilation of recommendations 3.1.7**	**Assessment of reserves for floods**	**To analyse maximal potential water levels in the locality on the basis of 10,000 annual values. To specify places where water collects.**			

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			To immediately implement temporary solutions and to propose a final solution. **<u>Status:</u>** **<u>Short term (immediate) measures:</u>** **Based on WANO recommendations during the period from April to October 2011 the non-standard tests and inspections of equipment important for coping with extreme conditions exceeding the basic design were successfully performed. (Immediate measures - flood protection bags were implemented in buildings where safety systems are located).** **New metrological studies for the site were developed for EBO /2/ and for EMO /3/.** **<u>Long-term measures:</u>** **Measures for protection against penetration of water into buildings as well as protection against floods for identified rooms are implemented.** **Updated scenarios were incorporated into Operating Instructions for Emergency Situations.** *** Reassessment (2019) of risk due to extreme rain is ongoing.**	**Completed** **Completed**	**Completed** **Completed**	**Included in the basic design***
13.	**Peer review country**	**<u>Reserves at external</u>**	**The National Action Plan covers all tasks in an**			

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
	report of the SR 2.3.3	**<u>risks</u>**	**integrated/comprehensive manner.** **<u>Status:</u>** **<u>Short term (immediate) measures:</u>** **Based on WANO recommendations during the period from April to October 2011 the non-standard tests and inspections of equipment important for coping with extreme conditions exceeding the basic design were successfully performed. (Immediate measures - flood protection bags were implemented in buildings where safety systems are located).** **<u>Long-term measures:</u>** *** See chapter II**	**Completed** **In progress***	**Completed** **In progress***	**Included in the basic design**
14.	**ENSREG Compilation of recommendations 3.1.8**	**<u>Protection against extreme weather conditions</u>**	**The National Action Plan covers all tasks in an integrated/comprehensive manner.** **<u>Status:</u>** **<u>Short term (immediate) measures:</u>** **Based on WANO recommendations during the period from April to October 2011 the non-standard tests and inspections of equipment important for coping with extreme conditions exceeding the basic design were successfully performed.** **<u>Long-term measures:</u>**	**Completed** **In progress***	**Completed** **In progress***	**Included in the basic design**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			*** See chapter II**			
15.	**Peer review country report of the SR 2.2.3** **EC Communication– specific to Slovakia 5.11** **XCNS**	**Regulatory monitoring of actions (flooding)**	**The activity is subject to regulatory review and inspection.** **Status:** **The inspection plans contained inspection activities.**	**Completed**	**Completed**	**Completed**
16	**Peer review country report of the SR 2.3.3** **EC Communication– specific to Slovakia 5.11** **XCNS**	**Regulatory monitoring of actions (extreme weather conditions)**	**The activity is subject to regulatory review and inspection.** **Status:** **The inspection plans contains inspection activities.**	**In progress**	**In progress**	**In progress**
17	**Peer review country Report of the SR 2.1.3**	**Regulatory monitoring of actions (seismic upgrade)**	**The activity is subject to regulatory review and inspection.** **Status:** **The inspection plans contains inspection activities.** *** See chapter II**	**Completed**	**In progress***	**In progress***

RECOMMENDATIONS OF TOPIC 2 (LOSS OF SAFETY SYSTEMS)

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
18.	**ENSREG Compilation of recommendations 3.2.1**	**Alternative cooling and heat sink**	**a) To diversify the emergency feed water source to SG by assurance of mobile high-pressure sources.** **Status:** **Feed water make-up pumps to steam generators for each reactor units were purchased in 2012. The pumps are situated on a fire truck chassis.** **In 2014, flow rate sensors were additionally installed on the mobile feed water source high-pressure pump discharge pipe.** **The mobile feed water sources are regularly tested during operation and main overhauls as well.**	**Completed**	**Completed**	**Included in the basic design (completed)**
			b) To review physical availability of technology needed for gravity filling of SG from feed water tanks in case of SBO. **Status:** **Physical access for gravity filling of SG was tested. Because of the necessity of physical manipulation with selected valves it was decided to procure power supply to ensure a remote operation of these valves. This measure is part of EOP.** **In addition: electricity generators for control of selected valves were tested.**	**Completed**	**Completed**	**Included in the basic design (completed)**
			c) To finish required modifications of existing equipment for connection of	**In progress***	**Completed**	**Included in the basic design**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			diverse mobile feed water and power sources resistant to external events. **<u>Status:</u>** **The project of feed water connection point to SG and diverse power sources in EBO and EMO completed.** **<u>Additional measures:</u>** *** See Chapter II**			**(completed)**
			d) To analyse and if needed to ensure means for cooling water make up from in-site and off-site water sources in the case of lack of cooling water, incl. preparation of respective procedures. **<u>Status:</u>** **Necessary equipment has been analysed and purchased for example: portable pumps, portable switchboards.** **Training programmes for the diverse mobile devices for cooling water make up from in-site and off-site water sources were prepared implemented and through emergency exercises tested (e. g. EBO 2015).** **<u>Additional measures:</u>** **Contract concluded with the Research Institute of Transport on analysis of critical roads at the plant. Reports for EBO and EMO**	**Completed**	**Completed**	**Included in the basic design**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			completed. The outcomes were analysed. Measures for putting the unit into safe condition after a seismic event have been adopted.			
19.	ENSREG Compilation of recommendations 3.2.2	AC Power supplies	a) To install a 400 kV circuit breaker in the local substation for disconnection of units from the power grid and thus to enable operation in the home consumption mode in the case of damaged transmission lines. Status: Modifications to the power outlet and power supply schemes of EMO12 at the 400kV EMO12 substation together with installation of circuit breakers are completed.	Completed	Completed	Included in the basic design (completed)
			b) To update the operating documentation for DG (in case of failure of DG connection to the 6 kV section of the emergency power supply of the 2nd category).	Completed	Completed	Included in the basic design (completed)
			c) To diversify emergency power sources by assurance of mobile DG. Status: Mobile DG 0.4 kV with connecting cabling were purchased in 2012 for all units. (See also ID 18).	Completed	Completed	Included in the basic design (completed)
20.	ENSREG Compilation	Power supply (DC)	To diversify emergency power sources by	Completed	Completed	Included in the

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
	of recommendations 3.2.3		**assurance of mobile DG for charging of accumulator batteries.** **<u>Status:</u>** **Mobile DG 0.4 kV with connecting cabling were purchased in 2012 for all units.** **<u>Additional measures:</u>** **Mobile rectifiers 240 V, 24 V for each units to charge accumulators from the mobile 0.4 kV DG were supplied.**			**basic design (completed)**
21.	**ENSREG Compilation of recommendations 3.2.4**	**<u>Operating and training activities</u>**	**To prepare operating procedures and to implement training programmes for operators of diverse mobile devices.** **<u>Status:</u>** **Updated scenarios were incorporated into Operating Instructions for Emergency Situations** **Procedures for the actions necessary in response to EEE are developed, implemented and exercised in accordance with the plan of emergency exercises (e. g. EBO 2015).**	**Completed**	**Completed**	**Completed**
22.	**ENSREG Compilation of recommendations 3.2.5**	**<u>Instrumentation and monitoring</u>**	**To specify a list of important parameters needed for monitoring of safety functions.** **<u>Status:</u>**	**Completed**	**Completed**	**Completed**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			a) EBO34, EMO12 - A list of important parameters needed for monitoring of safety functions has been defined.			
			b) To analyse the availability of important parameters, and if needed, to ensure mobile measuring units which can use stabile sensors also without standard power supply.	**Completed**	**Completed**	**Completed**
23.	**ENSREG Compilation of recommendations 3.2.6**	**<u>Improvement of shutdown</u>**	**a) To diversify emergency power sources by assurance of mobile DG.** **<u>Status:</u>** **Mobile DG 0.4 kV with connecting cabling were purchased in 2012 for all units.** **(See ID 19, 20)**	**Completed**	**Completed**	**Included in the basic design (completed)**
			b) To finish required modifications of existing equipment to enable connection of diverse feed water sources and power sources ensuring physical access and resistance under conditions evoked by an external event. **<u>Status:</u>** ***Original (completed) project documentation for sheltering of mobile DG and cabling (EBO) is revised and more effective technical solution is implemented.**	**Completed***	**Completed**	**Included in the basic design (completed)**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			(See ID 18c and ID 31c).			
24.	**ENSREG Compilation of recommendations 3.2.7**	**Seals of reactor coolant pumps (RCP)**	**a) To check if the existing procedures sufficiently solve the situation after de-sealing of RCP glands.** **Status:** **The sufficiency of existing procedures checked JSC VNIIAS-All Russian Scientific Institute for NPP Operation 109507, Russian Federation, Moscow, May 2013.**	**Completed**	**Completed**	**Completed**
			b) To obtain data documenting behaviour of RCP glands at long-term failure of cooling (more than 24 hours) and to prepare a plan of potential necessary measures. **Status:** **The analyses made by VNIIAS are available. Resistance of RCP glands GCN-317 for 72 hours confirmed.**	**Completed**	**Completed**	**Completed**
25.	**ENSREG Compilation of recommendations 3.2.8**	**Ventilation**	**To analyse conditions of the environment of rooms where equipment for control of events with long-term station blackout (SBO) and events with long-term loss of ultimate heat sink (UHS) and severe accidents is situated. To prepare a plan of required measures.** **Status:** **Environment of rooms, where safety systems**	**Completed**	**Completed**	**Completed**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			ensuring fulfilment of key safety function in the main reactor building and safety systems which are in direct contact with the external environment (ESW, AFWS, DGS) were analysed /6/. Impact of extreme external climate conditions in selected rooms (for both NPPs). **The SAM project includes also the habitability of the main control room and the control of selected equipment from the ERC.** **Preliminary analysis indicates that no additional measures are necessary.**			
26.	**ENSREG Compilation of recommendations 3.2.9**	**<u>Main control room and emergency control room</u>**	**a) To diversify emergency power sources by assurance of mobile DG.** **<u>Status:</u>** **Mobile DG 0.4 kV with connecting cabling are available for both EBO34 and EMO12 units. (See also ID 18).** **<u>Additional Measures</u>:** **Mobile rectifiers 240 V, 24 V for each unit to charge accumulators from the mobile 0,4 kV DG were supplied.**	**Completed**	**Completed**	**Included in the basic design**
			b) Remote control of selected equipment installed within the SAM project in all EMO units in the ongoing project of EMO Emergency Centre modification. **<u>Status:</u>** **EMO12 - The SAM project requiring remote**	**Completed**	**In progress***	**Included in the basic design**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			control of selected equipment installed within the project in all EMO units (1,2,3,4) has been considered in the ongoing project of EMO Emergency Response Centre upgrade. *** Implementation of the seismic reinforcement with qualification to extreme external conditions is in progress.**			
27.	**EC Communication Annex**	**<u>External hazard safety</u>**	**To analyse seismic margins of selected systems, structures and components (SSC). To evaluate the resistance of selected SSC at a seismic event with intensity corresponding to the probability of occurrence less than once per 10,000 years.** **<u>Status:</u>** **The procurement process and the implementation of measures in EBO and EMO is ongoing. Some of the measures are already implemented.** *** Remaining activity is limited to risks caused by strong wind.** ****Measures resulting from assessment of EMO12 civil structures are being incorporated into the ongoing seismic reinforcement documentation .** **(See ID 4, 8, 12, 13, 14)**	**In progress***	**In progress****	**Included in the basic design**
27.bis	**ENSREG Compilation of recommendations 3.2.10**	**<u>Spent fuel pool</u>**	**To analyse the SAM project from the viewpoint of severe accident management at multi units (all) at the same site (fuel situated**			

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			in the reactor core and in the spent fuel pool); to modify the SAM project, if needed, so that sufficient measures can be implemented. To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site. **<u>Status:</u>**			
			a) SAMG are developed and implemented and cover all plant states (for single units) – full power, shut down, spent fuel pool, …	**Completed**	**Completed**	**Completed**
			b) The analysis of severe accident management at all units on the site (including reactors at full power, reactors in shutdown and spent fuel pool) has been prepared (Report No. CVV 12/2014-01 "Management of Severe Accidents on All Units on Site").	**Completed**	**Completed**	**Completed**
			c) To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site. **Comm.: The licensee performed a self-assessment on the implementation of severe accident management /7/ and /8/.**	**Completed**	**Completed**	**Completed**
			d) Necessary measures are being	**Completed**	**Completed**	**Included in the**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			implemented and inspected by UJD. Post Fukushima SAMG update to implement Post Fukushima Westinghouse Owners Group /Pressurized Water Reactor Owners Group enhancement is completed. **(See ID 32, 34. 39, 41, 43, 44**			**basic design**
28.	**ENSREG Compilation of recommendations 3.2.11**	**<u>Isolation and independency</u>**	**a) To diversify the emergency feed water source to SG by assurance of mobile high-pressure sources.** **<u>Status:</u>** **Feed water make-up pumps to steam generators for each reactor unit were purchased in 2012.The pumps are situated on a fire truck chassis.** **In 2014, flow rate sensors were additionally installed on the mobile feed water source high-pressure pump discharge pipe.** **The mobile feed water sources are regularly tested during operation and main overhauls as well.**	**Completed**	**Completed**	**Included in the basic design**
			b) To diversify emergency power sources by assurance of mobile DG. **<u>Status:</u>** **Mobile DG 0.4 kV with connecting cabling are available for both EBO34 and EMO1,2 units.** **(See also ID 18, 26)**	**Completed**	**Completed**	**Included in the basic design**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			<u>Additional measures:</u> **Mobile rectifiers 240 V, 24 V for each unit to charge accumulators from the mobile 0.4 kV DG were supplied and were tested.**			
			c) To finish required modifications of existing equipment to enable connection of diverse feed water sources and power sources ensuring physical access and resistance under conditions evoked by an external event. **(See ID 18, 23)** **<u>Status:</u>** **The project of feed water connection point to SG and diverse power sources in EBO and EMO completed.** **<u>Additional measures:</u>** *** Original (completed) project documentation for sheltering of mobile DG and cabling is revised** **(See ID 18c)**	**In progress***	**Completed**	**Included in the basic design**
29.	**ENSREG Compilation of recommendations 3.2.12**	**<u>Flow path and access availability</u>**	**a) To prepare operating procedures and to implement training programmes for operators.** **<u>Status:</u>**	**Completed**	**Completed**	**Completed**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			Updated scenarios were incorporated into Operating Instructions for Emergency Situations **Training programmes for the diverse mobile devices were prepared implemented and through exercises tested at EBO and EMO.** **Procedures for the actions necessary in response to EEE are developed, implemented and exercised in accordance with the plan of emergency exercises (e. g. EBO 2015).** **(See ID 11, 21)**			
			b) To diversify emergency power sources by assurance of mobile DG. **<u>Status:</u>** **Mobile DG 0.4 kV with connecting cabling are available for both EBO34 and EMO12 units.** **<u>Additional Measures</u>:** **Mobile rectifiers 240 V, 24 V for each unit to charge accumulators from the mobile 0.4 kV DG were supplied.** **(See ID 18, 26, 28)** **Physical access to critical equipment is ensured (e. g. bypass to turne stilles).**	**Completed**	**Completed**	**Included in the basic design**
			c) To finish required modifications of	**In progress***	**Completed**	**Included in the**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			existing equipment to enable connection of diverse feed water sources and power sources ensuring physical access and resistance under conditions evoked by an external event. (See ID 18) <u>Status:</u> The project of feed water connection point to SG and diverse power sources in EBO and EMO completed. *.Original project documentation for sheltering of mobile DG and cabling is revised (See ID 18, 28)			basic design
			d) To diversify the emergency feed water source to SG by assurance of mobile high-pressure sources. (See ID 18a) <u>Status:</u> Feed water make-up pumps to steam generators for each reactor unit were purchased in 2012. The pumps are situated on a fire truck chassis. In 2014, flow rate sensors were additionally installed on the mobile feed water source high-pressure pump discharge pipe.	Completed	Completed	Included in the basic design

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			The mobile feed water sources are regularly tested during operation and main overhauls as well.			
30.	**ENSREG Compilation of recommendations 3.2.13**	**<u>Mobile devices</u>**	**a) To diversify the emergency feed water source to SG by assurance of mobile high-pressure sources.** **(See ID 18a, 28a, 29)** **<u>Status:</u>** **Feed water make-up pumps to steam generators for each reactor unit were purchased in 2012. The pumps are situated on a fire truck chassis. In 2014, flow rate sensors were additionally installed on the mobile feed water source high-pressure pump discharge pipe.** **The mobile feed water sources are regularly tested during operation and main overhauls as well.**	**Completed**	**Completed**	**Included in the basic design**
			b) To diversify emergency power sources by assurance of mobile DG. **<u>Status:</u>** **Mobile DG 0.4 kV with connecting cabling are available for both EBO34 and EMO12 units.** **<u>Additional Measures</u>:** **Mobile rectifiers 240 V, 24 V for each unit to charge accumulators from the mobile 0.4 kV**	**Completed**	**Completed**	**Included in the basic design**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			DG were supplied. **(See ID 20, 26, 28, 29)**			
			c) To finish required modifications of existing equipment to enable connection of diverse feed water sources and power sources ensuring physical access and resistance under conditions evoked by an external event. **<u>Status:</u>** **The project of feed water connection point to SG and diverse power sources in EBO and EMO completed.** **<u>Additional measures:</u>** ***.Original project documentation for sheltering of mobile DG and cabling is revised.** **(See ID 18, 28, 29)**	**In progress***	**Completed**	**Included in the basic design**
			d) To prepare operating procedures and to implement training programmes for operators of diverse mobile devices. **<u>Status:</u>** **Updated scenarios were incorporated into Operating Instructions for Emergency Situations**	**Completed**	**Completed**	**Completed**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			Training programmes for the diverse mobile devices were prepared implemented and through exercises tested at EBO and EMO. Procedures for the actions necessary in response to EEE are developed, implemented and exercised in accordance with the plan of emergency exercises (e. g. EBO 2015). **(See ID 11, 21, 29)**			
31.	**ENSREG Compilation of recommendations 3.2.14**	**<u>Bunkered/Hardened systems</u>**	**To finish required modifications of existing equipment to enable connection of diverse feed water sources and power sources ensuring physical access and resistance under conditions evoked by an external event.** **<u>Status:</u>** **The project of feed water connection point to SG and diverse power sources in EBO and EMO has been completed.** ***.Original project documentation for sheltering of mobile DG and cabling is revised (see chapter II).** **(See ID 18, 28, 29, 30)**	**In progress***	**Completed**	**Included in the basic design**
32.	**ENSREG Compilation of recommendations 3.2.15**	**<u>Multiple accidents</u>**	**To analyse the SAM project from the viewpoint of severe accident management at multi units (all) at the same site (fuel situated in the reactor core and in the spent fuel pool); to modify the SAM project, if needed, so that sufficient measures can be implemented. To prepare a plan of implementation of**	**Completed**	**Completed**	**Completed**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site. **<u>Status:</u>** **a) The analysis of severe accident management at all units on the site (including reactors at full power, reactors in shutdown and spent fuel pool) has been prepared (Report No. CVV 12/2014-01 "Management of Severe Accidents on All Units on Site").**			
			b) To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site. **Comm.: The licensee performed a self-assessment on the implementation of severe accident management /7/ and /8/.**	**Completed**	**Completed**	**Completed**
			c) Necessary measures are being implemented and inspected by UJD. Post Fukushima SAMG update to implement Post Fukushima Westinghouse Owners Group /Pressurized Water Reactor Owners Group enhancement is completed. **(See ID 27bis, 34. 39, 41, 43)**	**Completed**	**Completed**	**Completed**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
33.	**ENSREG Compilation of recommendations 3.2.16**	**Equipment inspection and training programmes**	**To prepare operating regulations and to implement training programmes for operators of diversity mobile devices.** **Status:** **Updated scenarios were incorporated into Operating Instructions for Emergency Situations.** **Training programmes for the diverse mobile devices were prepared implemented and through exercises tested at EBO and EMO.** **Procedures for the actions necessary in response to EEE are developed, implemented and exercised in accordance with the plan of emergency exercises (e. g. EBO 2015).** **(See ID 11, 21, 29, 30)**	**Completed**	**Completed**	**Completed**
34.	**ENSREG Compilation of recommendations 3.2.17**	**Further studies to address uncertainties**	**To analyse the SAM project from the viewpoint of severe accident management at multi units (all) at the same site (fuel situated in the reactor core and in the spent fuel pool); to modify the SAM project, if needed, so that sufficient measures can be implemented. To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site.** **Status:**			

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			a) The analysis of severe accident management at all units on the site (including reactors at full power, reactors in shutdown and spent fuel pool) has been prepared (Report No. CVV 12/2014-01 "Management of Severe Accidents on All Units on Site"). **(See ID 27bis, 32, 7 and 18d)**	**Completed**	**Completed**	**Completed**
			b) To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site. **Comm.: The licensee performed a self-assessment on the implementation of severe accident management /7/ and /8/.**	**Completed**	**Completed**	**Completed**
			c) Necessary measures are being implemented and inspected by UJD. Post Fukushima SAMG update to implement Post Fukushima Westinghouse Owners Group /Pressurized Water Reactor Owners Group enhancement is completed. **(See ID 34. 39, 41, 43)**	**Completed**	**Completed**	**Completed**
35.	**EC Communication Annex**	**The time the operator has at disposal for recovery**	**Heat removal from PC:** **Due to interruption of feed water supply and**	**Completed**	**Completed**	**Included in the basic design**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
		of safety functions in case of SBO and/or loss of UHS should be longer than an hour.(without human action)	**failure of RCP after SBO, the residual heat removal from the core in the natural circulation regime is to the detriment of gradual reduction of the secondary circuit coolant. Exploitation of nominal inventory of coolant in SG occurs during 5 hours.** **Containment integrity:** **After two days, 60 ºC is expected in the containment wall centre. The containment integrity isn't endangered at this temperature.** **Coolant inventory in PC:** **Time reserve: PC coolant inventory is sufficient for fuel cooling for 24 hours.**			
36.	**EC Communication Annex**	**EOPs should cover all conditions of a power plant (from full power to shut-down reactor)**	**Symptom oriented procedures for design basis and beyond design basis emergency conditions were fully implemented in EMO12 and EBO34 in 1999 (for events initiated during power operation) and in 2006 (for events initiated at shut-down reactor or in SFP). Long-term maintenance programme with Westinghouse provides for the cutting edge status of EOPs.**	**Completed**	**Completed**	**Completed**

RECOMMENDATIONS OF TOPIC 3 (SEVERE ACCIDENT MANAGEMENT)

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
37.	**ENSREG Compilation of recommendations 3.3.1**	**Reference WENRA levels**	**A. In corporation of reference WENRA values related to severe accident management (SAM) to the national legal framework.** **Status:** **The Atomic Act takes into account new EU legal documents:** **e. g. Directive 2014/87/Euratom, Directive 2013/59/Euratom.** **Full harmonisation of regulatory framework with WENRA Reference Levels (2008) has been achieved in Slovakia. As regards WENRA SRL 2014, there are 322 RLs out of 342 transposed into the regulatory framework.**	**Implemented**	**Implemented**	**Implemented**
38.	**ENSREG Compilation of recommendations 3.3.2 XCNS**	**SAM technical measures**	**To implement the SAM project.** **Status:** **SAM project implemented and completed at EBO and EMO.** **The licensee performed a self-assessment on the implementation of severe accident management /7/ and /8/. The plan of implementation of additional measures has been implemented.** *** Some minor deficiencies identified**	**Completed**	**Completed***	**Included in the basic design**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			during implementation are corrected			
39.	**ENSREG Compilation of recommendations 3.3.3**	**<u>Evaluation of SAM measures after severe external events</u>**	**To analyse the SAM project from the viewpoint of severe accident management at multi units (all) at the same site (fuel situated in the reactor core and in the spent fuel pool); to modify the SAM project, if needed, so that sufficient measures can be implemented. To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site.** **<u>Status:</u>** **a) The analysis of severe accident management at all units on the site (including reactors at full power, reactors in shutdown and spent fuel pool) has been prepared (Report No. CVV 12/2014-01 "Management of Severe Accidents on All Units on Site").**	**Completed**	**Completed**	**Completed**
			b) To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site.	**Completed**	**Completed**	**Completed**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			Comm.: The licensee performed a self-assessment on the implementation of severe accident management /7/ and /8/.			
			c) Necessary measures are being implemented and inspected by UJD. Post Fukushima SAMG update to implement Post Fukushima Westinghouse Owners Group /Pressurized Water Reactor Owners Group enhancement is completed. **(See ID 27bis, 34. 41, 43)**	**Completed**	**Completed**	**Completed**
40.	**ENSREG Compilation of recommendations 3.3.4**	**<u>Update of severe accident management guidelines (SAMG)</u>**	**To analyse the SAM project with regard to potential damage of infrastructure, including violation of communication at a level of power plant, branch and state, long-term accidents (taking several days) and accidents with an impact on several units and neighbouring industrial facilities.** *** Based on the Pre OSART mission the SAMG will be reviewed (see chapter II)**	**Completed**	**Completed**	**Completed***
41.	**ENSREG Compilation of recommendations 3.3.5**	**<u>SAMG verification</u>**	**To analyse the SAM project from the viewpoint of severe accident management at multi units (all) at the same site (fuel situated in the reactor core and in the spent fuel pool); to modify the SAM project, if needed, so that sufficient measures can be**	**Completed**	**Completed**	**Completed**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			implemented. To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site. **<u>Status:</u>** **Verification and validation of SAMG according to legal requirements following their post Fukushima SAMG update with Westinghouse to implement up to date Post Fukushima Westinghouse Owners Group / Pressurized Water Reactor Owners Group enhancement is completed.**			

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
42.	**ENSREG Compilation of recommendations 3.3.6**	**SAM exercises**	**a) To prepare conditions for cooperation with selected external organisations at emergency response control during external events and severe accidents.** **Status:** **Agreement with the Ministry of Interior of the Slovak Republic on mutual assistance and cooperation and its provision at occurrence of an extraordinary event in nuclear installation (No. SE/2012/22100-01).** **The cooperation tested during the emergency exercise (2014) in EBO and EMO (2015).** **Multiple unit exercise at Mochovce site involving all 3 units is planned for 2020 (finding of Pre OSART)** **(See ID 50)**	**Completed**	**Completed**	**Completed**
			b) Review of the national emergency arrangements based on the outcomes of the so called HAVRAN exercise. **Status** **(See ID 57)**	**Completed**	**Completed**	**Completed**
43.	**ENSREG Compilation of**	**SAM training**	**a) Based on the extended SAM to**	**Completed**	**Completed**	**Completed**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
	recommendations 3.3.7		**modify the SAM training taking into account the severe accident occurrence at multi (all) units at the same site.** **<u>Status:</u>** **The analysis of severe accident management at all units on the site (including reactors at full power, reactors in shutdown and spent fuel pool) has been prepared (Report No. CVV 12/2014-01 "Management of Severe Accidents on All Units on Site").** **The licensee performed a self-assessment on the implementation of severe accident management /7/ and /8/.** **Multiple unit exercise at Mochovce site involving all 3 units is planned for 2020 (finding of Pre OSART)**			
			b) Modifications to training materials **<u>Status:</u>** **Regular training and practical training in the area of severe accidents for members of Emergency Response Organization have been introduced. Training programs, training cards and long-term plans for this preparation have been revised for both shift personnel and the Emergency Response Organization.**	**Completed**	**Completed**	**Completed**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			(See ID 27bis, 32, 34, 39, 41)			
44.	**ENSREG Compilation of recommendations 3.3.8** **EC Communication Annex**	**<u>Extension of SAMG to all plant states</u>**	**To analyse the SAM project from the viewpoint of severe accident management at multi units (all) at the same site (fuel situated in the reactor core and in the spent fuel pool); to modify the SAM project, if needed, so that sufficient measures can be implemented.** **<u>Status:</u>**			
			a) SAMG are developed and implemented and cover all plant states (for single units) – full power, shut down, spent fuel pool, …	**Completed**	**Completed**	**Completed**
			b) The analysis of severe accident management at all units on the site (including reactors at full power, reactors in shutdown and spent fuel pool) has been prepared (Report No. CVV 12/2014-01 "Management of Severe Accidents on All Units on Site").	**Completed**	**Completed**	**Completed**
			c) To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site.	**Completed**	**Completed**	**Completed**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			Comm.: The licensee performed a self-assessment on the implementation of severe accident management /7/ and /8/.			
			d) Necessary measures are being implemented and inspected by UJD. Post Fukushima SAMG update to implement Post Fukushima Westinghouse Owners Group /Pressurized Water Reactor Owners Group enhancement is completed. *** Based on the Pre OSART mission the SAMG will be reviewed** **(See ID 27bis, 32, 34. 39, 41, 43)**	**Completed**	**Completed**	**Completed***
45.	**ENSREG Compilation of recommendations 3.3.9**	**<u>Improved communications</u>**	**Remote control of selected equipment installed within the SAM project in all EMO units in the ongoing project of EMO Emergency Centre modification.** **<u>Status:</u>** **Remote control of selected equipment and technological information system installed.**	**Completed**	**Completed**	**Included in the basic design**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
46.	**ENSREG Compilation of recommendations 3.3.10** **EC Communication Annex**	**Presence of hydrogen in unexpected places**	**To implement the SAM project. To analyse the SAM project from the viewpoint of potential migration of hydrogen to other places.** **Status:** **a) Analyses completed. The main outcomes are as follows: the atmosphere of the reactor hall is inertized by steam and probability of hydrogen detonation is very low; migration to selected rooms outside the containment identified.**	**Completed**	**Completed**	**Included in the basic design**
			b) Relevant measures included in updated revision of SAMG.	**Completed**	**Completed**	**Completed**
47.	**ENSREG Compilation of recommendations 3.3.11**	**Large volumes of contaminated water**	**To prepare solutions for treatment of large volumes of contaminated water after an accident at a study level from the conceptual viewpoint.** **Status:** **Study completed. The aim of the study was the preparation of a conceptual study for addressing issues, dealing with high activity liquid wastes after severe accident.**	**Completed**	**Completed**	**Completed**
48.	**ENSREG Compilation of recommendations 3.3.12**	**Radiation protection**	**To implement the SAM project. To analyse the SAM project from the viewpoint of severe accident management at multi units (all) at the same site (fuel situated in the reactor**	**Completed**	**Completed**	**Included in the basic design**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			core and in the spent fuel pool); to modify the SAM project, if needed, so that sufficient measures can be implemented. To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site. **<u>Status:</u>** **The analysis of severe accident management at all units on the site (including reactors at full power, reactors in shutdown and spent fuel pool) has been prepared (Report No. CVV 12/2014-01 "Management of Severe Accidents on All Units on Site") The SAM project includes also the habitability of the main control room and the control of selected equipment from the ERC. The licensee performed a self-assessment on the implementation of severe accident management /7/ and /8/.** **This self-assessment contained a chapter dealing with local radiation conditions in those technological premises to which access is necessary for long term control of SAM.** **(See ID 27bis., 32, 34, 39, 41, 43, 44)**			
49.	**ENSREG Compilation of**	**<u>On site emergency</u>**	**Remote control of selected equipment**	**Completed**	**Completed**	**Included in the basic**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
	recommendations 3.3.13 **EC Communication Annex**	**<u>center</u>**	**installed within the SAM project in all EMO units in the ongoing project of EMO Emergency Centre modification.** **<u>Status:</u>** **Remote control of selected equipment for all EMO units (1,2,3,4) has been completed within the project of Emergency Response Centre upgrade.** **The seismic reinforcement project – technology in the emergency centre (e.g. reinforcement of air-condition, electrical cabinets, etc.) – has been completed.** **(See ID 45)**			**design**
50.	**ENSREG Compilation of recommendations 3.3.14**	**<u>Support of local operators</u>**	**To prepare conditions for cooperation with selected external organisations at emergency response control during external events and severe accidents.** **<u>Status:</u>** **Agreement with the Ministry of Interior of the Slovak Republic on mutual assistance and cooperation and its provision at occurrence of an extraordinary event in nuclear installation (No. SE/2012/22100-01).** **The cooperation was tested during the all-plant emergency exercise in EBO (2014) and EMO (2015).**	**Completed**	**Completed**	**Completed**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			(See ID 42)			
51.	**ENSREG Compilation of recommendations 3.3.15**	**Level 2 Probabilistic Safety Assessment**	**The PSA Level 2 were prepared for EBO34, EMO12 and for MO3 and are continuously updated.**	**Completed**	**Completed**	**Completed**
52.	**ENSREG Compilation of recommendations 3.3.16**	**Severe accident studies.**	**To analyse the SAM project from the viewpoint of severe accident management at multi units (all) at the same site (fuel situated in the reactor core and in the spent fuel pool); to modify the SAM project, if needed, so that sufficient measures can be implemented. To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site.** **Status:** **The analysis of severe accident management at all units on the site (including reactors at full power, reactors in shutdown and spent fuel pool) has been prepared (Report No. CVV 12/2014-01 "Management of Severe Accidents on All Units on Site"). The licensee performed a self-assessment on the implementation of severe accident management /7/ and /8/.**	**Completed**	**Completed**	**Completed**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			(See ID 27bis, 32, 34, 39, 41, 43, 44)			
53.	**Peer review country Report of the SR 4.3** **EC Communication– specific to Slovakia 5.11**	**SAM modification implemented according to the proposed schedule**	**The activity is subject to regulatory review and inspection.**	**Annually** **In progress**	**Annually** **In progress**	**Annually**
54.	**Peer review country Report of the SR 4.3**	**To verify leak-tightness of all penetrations (e.g. RPV cap, SG cap) through the containment under severe accident conditions (in particular leak-tightness of seals).**	**To analyse the SAM project from the viewpoint of resistance of seals and penetrations of the containment under severe accident conditions.** **Status:** **A study (including experimental verification) was prepared by UJV Řež to test the sealing under SA conditions. This study was prepared within the implementation of SAM project.** **Additional measures:** **Replacement of seals at the reactor pressure vessel cavity lids completed. Sealing of doors in line with the maintenance schedules.**	**Completed**	**Completed**	**Completed**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
55.	**Regulatory initiative**	**The concept of large-area fire control – (bigger than considered in the design)**	**To prepare the fire control documentation – operative plan of large-area fire control.** **Status:** **A report was prepared by the Technical University in Ostrava.** **Based on the analysis, the fire brigade on the site prepared an operative fire control plan. Plan of procurement of technology, training of the personnel in cooperation with external organisations in progress.** **Additional measures:** **Purchase of special streamlines large-scale fire extinguishing flammable liquids, hose wagon with automatic laying, etc. for both EBO and EMO .**	**Completed**	**Completed**	**Completed**
56.	**Regulatory initiative**	**Physical protection**	**To harmonise the implementation of additional SAM measures with potential new increased requirements for physical protection in case of aggravated assaults.** **All equipment which are part of SAM measures are located within the physical protection barriers of the NPPs (e.g. fire brigade, mobile equipment).**	**Completed**	**Completed**	**Completed**
57.	**Regulatory initiative**	**Emergency**	**Comprehensive review of the national**	**Completed**	**Completed**	**Completed**

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
		arrangements	**emergency arrangements based on the outcomes of the so called HAVRAN exercise.** **Status:** **Government Resolution No. 28/2013 requested the Minister of Interior to submit to the Government a report on the progress in implementing the measures resulting from the HAVRAN 2012 exercise. The report was submitted to the government in January 2014 and took note of the progress achieved.** **Additional measures:** **A comprehensive review of the civil protection and emergency management has been initiated. The Ministry of Interior proposes that an amendment to Law No. 42/1994 Coll. on Civil Protection of Citizens to be prepared. This amendment is also necessary to implement the Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances.** **The Government by its resolution No. 3/2016 approved "The National Strategy for the Management of Security Risks (Emergency situations)".** **The material dealing with management of security/emergency risks, register and assessment of security/emergency**			

ID	Source	Recommendation	Fulfilment of recommendation	EBO34	EMO12	MO34
			risks, risk mitigation measures, financing options, processes of continuous improvement, etc. **The Government approved "The Assessment Report on the Conduct and Evaluation of the Crisis Management Exercise INEX 5 in the Slovak Republic" and adopted measures for further improvements in November 2015.**			

References

/1/ WENRA: Qualitative Reporting on Status of Harmonisation of Safety of Existing Reactors.

/2/ Súhrnná správa SHMÚ pre lokalitu Jaslovské Bohunice, Bratislava, Január 2012.

/3/ Súhrnná správa SHMÚ pre lokalitu Mochovce, Bratislava, Marec 2011.

/4/ Report on estimation of limit seismic margin of civil structures for EBO, EMO12).

/5/ Seismic PSA for seismic re-evaluation of the 1st and 2nd NPP EMO-Final Report.

/6/ Impact of extreme external climate conditions in selected rooms (for both NPPs) STMSE000015.

/7/ Report on targeted self-assessment in the area of civil accidents according to WANO methodology (POC 2013 – 1) at EMO.

/8/ Report on targeted self-assessment in the area of civil accidents according to WANO methodology (POC 2013 – 1) at EBO.