European Stress Tests for Nuclear Power Plants

Status of activities presented in the Finnish action plan

December 2013

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INTRODUCTION

There are two nuclear power plants operating in Finland: the Loviisa and Olkiluoto plants. The Loviisa plant comprises two VVER units (Soviet type pressurised water reactors) operated by Fortum Power and Heat Oy and the Olkiluoto plant two BWR units (boiling water reactors) operated by Teollisuuden Voima Oyj (TVO). In addition, a new nuclear power plant unit is being constructed by TVO at the Olkiluoto site (EPR type pressurised water reactor). At both sites there are interim storages for spent fuel as well as final repositories for intermediate and low level radioactive waste.

Following the accident at the Fukushima Dai-ichi nuclear power plant on the 11th of March in 2011 (TEPCO Fukushima Dai-ichi accident), safety assessments in Finland were initiated after Radiation and Nuclear Safety Authority (STUK) received a letter from the Ministry of Employment and the Economy (MEE) on 15 March 2011. The Ministry asked STUK to carry out a study on how the Finnish NPPs have prepared against loss of electric power supply and extreme natural phenomena in order to ensure nuclear safety. STUK asked the licensees to carry out assessments and submitted the study report to MEE on 16 May 2011. Although immediate actions were not considered necessary, STUK required the licensees to carry out additional assessments and present action plans for safety improvements. Assessments were conducted and reported by the Finnish licensees to STUK on 15 December 2011. STUK has reviewed the results of national assessments, and made licensee specific decisions on 19 July 2012 on the suggested safety improvements and additional analyses.

Finland also participated in the EU Stress Tests and submitted the national report to European Commission in the end of 2011 and the national action plan in the end of 2012. An EU level peer review on the national report was completed by April 2012 and a peer review concerning the national action plan was carried out in April 2013. In addition, Finland participated in the second Extraordinary Meeting of the Convention of Nuclear Safety (CNS) in August 2012. All STUK's related decisions, the national reports to European Commission and the report to the Extraordinary CNS have been published on STUK's website (http://www.stuk.fi/ydinturvallisuus/fi_FI/fukushima-selvitykset/).

This report presents the current status of activities presented in the Finnish National Action Plan addressing the measures initiated on a national level and at the nuclear power plants as a result of the TEPCO Fukushima Dai-ichi accident.

IMPLEMENTATION OF ACTIVITIES

This Section concludes all activities taken, planned or already implemented on a national level and at the nuclear power plants as a result of the TEPCO Fukushima Dai-ichi accident. Activities are presented in a table format including time schedules. References are given to the Finnish National Action Plan (December 2012) Sections 2-7 regarding more detailed description of the related responses and conclusions. The status of the activities is updated and represents the current situation in the end of 2013.

Table 1. National level activities.

No.	Action/Activity	Related Section	Status	Schedule
Topics 1-4 – Natural Hazards, Design Issues, Severe Accident Management and National Organisations				
1	Including new issues (extreme external hazards, spent fuel pool issues) in the national research programme	Sections 2 and 5.4	In progress	2012-2014
2	Implementing the new requirements to Finnish Regulatory Guides (YVL Guides)	Sections 2, 3.1 and 4.5	Implemented	12/2013
3	Preparations to implement rapid support from TSOs to the authority in emergencies	Section 5.2	Implemented	2013
Topic 5 – Emergency Preparedness and Response and Post-Accident Management (Off-Site)				
4	National Nuclear Power Plant Emergency Preparedness Forum to be launched in order to co-ordinate issues related to: –long term accidents of several NPP units, –recovery phase actions, –emergency measures outside the planning zones, –scope of the emergency exercises, –radiation monitoring capability during prolonged emergency situations, –communication capability during prolonged emergency situations, –availability of the emergency centres with respect to power supply, filtration of the intake air and the distance from the NPPs, –public information, information between the authorities, –clearance of the roads, alternative transport ways and means, –decontamination resources and facilities, –supply of contractor staff during the emergencies, –warning the population	Section 6.1	In progress	2013 ->
5	Further improvement of arrangements for the coordination of information to the public and media during emergencies is needed. Guidelines for co-operation among authorities have been written in a guidebook	Section 6.3	In progress	2014

	published in November 2012. To help the implementation of guidelines seminars and workshops will be organised from the beginning of 2013.			
6	Emergency exercises exceeding 24 hours or exercises containing aspects of recovery have not been organised systematically, and should be included in the exercise calendar.	Section 6.3	In progress	2014
7	Ensuring sufficient amount of radiation protection equipment and radiation monitoring devices for rescue services	Section 6.6	In progress	2014
Topic 6 – International Co-operation				
8	Participation in the IAEA-ISSC work	Section 7.2	In progress	According to the work of the IAEA-ISSC
9	Participation in the WENRA RHWG work	Section 7.2	In progress	According to the WENRA RHWG
10	Participation in the CNRA and CNRA STG on Fukushima	Section 7.2	In progress	According to the CNRA and STG
11	Participation in the MDEP STC and EPR design specific working group	Section 7.2	In progress	According to the MDEP STC and EPRWG
12	Participation in EU Stress Tests	Section 1	Implemented	06/2012

Table 2. Measures at the Loviisa NPP units 1 and 2.

No.	Action/Activity	Related recom-mendation	Status	Schedule
Topic 1 – Natural Hazards				
101	Evaluation of fragility of the spent fuel pools at high temperature and at high pressure	Section 2.1	Implemented	09/2012
102	Updating the seismic fragility analyses of - the spent fuel pools - fire fighting systems	Sections 2.1 and 2.3	 Implemented In progress	 09/2012 06/2014
103	improving preparedness for high seawater level	Sections 2.1 and 2.2	Under evaluation	2014*
104	Analysis of consequences of beyond design basis low and high temperature	Section 2.1	Implemented	12/2011
105	Analysis of consequences of tornados and down-bursts on plant structures and systems	Section 2.1	Implemented	12/2011
Topic 2 – Design Issues				
106	Implementation of an alternative ultimate heat sink	Section 3.1	In progress	2014
107	Securing the availability of the auxiliary emergency feed water system	Section 3.1	Implemented	2012-2013
108	Acquiring a container to transfer diesel fuel at site	Section 3.2	Implemented	2012
109	Enhancing the battery power sources	Section 3.3	In progress	2013-2014
110	Acquiring mobile power supply and mobile pumps	Sections 3.3 and 3.5	Under evaluation	2014*
111	Connecting the additional diesel power engine to the plant switchgears by a dedicated cable	Section 3.2	Implemented	10/2012
112	Evaluation of demineralised water reservoirs	Section 3.1	Implemented	12/2011
113	Evaluation of demineralised water usage in an accident concerning all units and spent fuel pools at the site	Section 3.1	Implemented	5/2013
114	Enhancing the diesel fuel transfer capabilities on-site; acquiring a new diesel fuel storage tank at site	Section 3.2	Under evaluation	2014*
115	Evaluation of suitability of biodiesel for the diesel engines	Section 3.2	Implemented	2012
116	Ensuring the water injection into the spent fuel pools and monitoring the conditions of the pool	Sections 3.4 and 4.3	In progress	2015-2017
Topic 3 – Severe Accident Management				
117	Capability of dealing with multi-unit severe accidents; updating of emergency plans and organisation	Section 4.5	Implemented	2013
118	Improving the containment decay heat removal in case of multi-unit accidents	Section 4.1	Further improvement needs are under evaluation	2013-2014
119	Plans for restoring the access routes to the site	Section 4.5	In progress	2014
120	Evaluation of suitability of emergency preparedness personnel to their duties	Section 4.5	Implemented	2013
121	Plans for access control and radiation monitoring of the staff and decontamination measures in extreme natural hazards	Section 4.5	In progress	12/2013

Table 3. Measures at the Olkiluoto NPP units 1 and 2.

No.	Action/Activity	Related recom-mendation	Status	Schedule
Topic 1 – Natural Hazards				
201	Updating the seismic fragility analyses of the spent fuel pools and fire fighting systems	Sections 2.1 and 2.3	In progress	2013-2014
202	Improvement against exceptionally high seawater level on the cooling systems of the spent fuel interim storage	Section 2.2	Implemented	2013
203	Analysis of consequences of beyond design basis low and high temperature	Section 2.1	Implemented	12/2011
204	Analysis of consequences of tornados and downbursts on plant structures and systems	Section 2.1	Implemented	12/2011
Topic 2 – Design Issues				
205	Conceptual design of independent way of pumping water into the RPV	Section 3.1	In progress	2015-2016
206	Conceptual design and implementation of modification to prevent overheating of the auxiliary feed water system (independent of sea water cooling)	Section 3.1	In progress	2013-2014
207	Evaluation of suitability of biodiesel for the diesel engines	Section 3.2	Implemented	2012
208	Implementation of mobile power supply (including recharge of DC batteries)	Section 3.5	In progress	2014
209	Evaluation of demineralised water reservoirs	Section 3.1	Implemented	12/2011
210	Evaluation of demineralised water usage in an accident concerning all units and spent fuel pools at the site	Section 3.1	Implemented	2012
211	Ensuring the water injection into the spent fuel pools and monitoring the conditions of the pool	Sections 3.4 and 4.3	In progress	2013-2014
Topic 3 – Severe Accident Management				
212	Capability of dealing with multi-unit severe accidents; updating the emergency plans and organisation	Section 4.5	In progress	2014
213	Reactor building top venting for steam escape; hydrogen possibly formed could be exhausted through this route as well	Sections 3.4 and 4.1	In progress	2014
214	Plans for restoring the access routes to the site	Section 4.5	In progress	2014
215	Enhancement of the emergency plan on radiation measurement patrols	Section 4.5	Implemented	03/2013
216	Enhancement of adequacy of the maintenance personnel in case of emergency	Section 4.5	In progress	12/2014
217	Evaluation of suitability of emergency preparedness personnel to their duties	Section 4.5	Implemented	03/2013
218	Plans for access control and radiation monitoring of the staff and decontamination measures in extreme natural hazards	Section 4.5	In progress	12/2013
219	Improvement of communication capabilities	Section 4.5	Implemented	12/2012

Table 4. Measures at the Olkiluoto NPP unit 3.

No.	Action/Activity	Related recom-mendation	Status	Schedule
Topic 1 – Natural Hazards				
301	Analysis of consequences of beyond design basis low and high temperature	Section 2.1	Implemented	12/2011
302	Analysis of consequences of tornados and downbursts on plant structures and systems	Section 2.1	Implemented	12/2011
Topic 2 – Design Issues				
303	Evaluating modifications required for independent decay heat removal system	Section 3.1	Under evaluation	to be decided
304	Ensuring the water injection into the spent fuel pools with mobile pumps	Section 3.4	In progress	Before start of operation
Topic 3 – Severe Accident Management				
305	Capability of dealing with multi-unit severe accidents; updating the emergency plans and organisation (in connection with Olkiluoto units 1 and 2)	Section 4.5	In progress	Before start of operation

* Schedule means the time schedule for the evaluation. After that the licensee proposes the possible measures and their schedule.