Ministry of Economic Affairs

Netherlands' NAcP

National Action Plan (NAcP) for the follow-up of post-Fukushima Dai ichi related activities

Report for the ENSREG-led NAcP Peer Review Workshop to be held in April 2013

December 2012

Abstract

This is the National Action Plan (NAcP) of the Kingdom of the Netherlands for the follow up of Fukushima Dai ichi related activities at the single NPP in the Netherlands as well as at the governmental bodies involved. The report will be subject to Peer Review within the ENSREG Stress Test Action Plan. In April 2013 there will be an ENSREG-led NAcP Peer Review Workshop where the results of the National Action Plans will be discussed.

This National Action Plan reflects the intended focus of aforementioned meeting. It is structured along six main topics identified by ENSREG and the Contracting Parties to the Convention on Nuclear Safety. For each topic it presents the analyses conducted, activities performed by the operator and those performed by the regulator. It also provides for a tabled summary of the planning of activities at the Licensee (EPZ of NPP Borssele).

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List of Symbols and Abbreviations

AC	Alternating Current
BORI	'Back Office Radiologische Informatie'; back-office of the National Nuclear Assessment Team for radiological analyses and information
CNRA	Committee on Nuclear Regulatory Activities (of the OECD/NEA)
CNS	Convention on Nuclear Safety
CP	Contracting Parties
CSA	Complementary Safety margin Assessment, a.k.a. 'stress test'
CSNI	Committee on the Safety of Nuclear Installations (of the OECD/NEA)
DBA	Design Basis Accident
DBE	Design Basis Earthquake
DBF	Design Basis Flood
DC	Direct Current
DG	Diesel Generator
EDG	Emergency Diesel Generator
EDMG	Extensive Damage Mitigation Guidelines
EIA	Environmental Impact Assessment
EL&I	Former 'Ministerie van Economische zaken, Landbouw & Innovatie'; Ministry of Economic Affairs, Agriculture & Innovation, now 'Ministry of Economic Affairs' (EZ).
ENSREG	European Nuclear Safety Regulators Group
EOP	Emergency Operating Procedure
EPRI	Electric Power Research Institute
EPZ N.V.	Elektriciteits-Produktiemaatschappij Zuid-Nederland EPZ, licensee of the Borssele NPP
ERO	Emergency Response Organisation
EU	European Union
EUROSAFE	Forum organized by European TSOs
EZ	'Ministerie van Economische Zaken'; Ministry of Economic Affairs
10EVA13	Current 10 yearly safety evaluation; periodic safety review (PSR)
HERCA	Heads of the European Radiological protection Competent Authorities
HF	Human Factors
HOF	Human and Organisational Factors
ICMS	'Intensivering Civiel-Militaire Samenwerking'; intensifying civil-military cooperation
IenM	'Ministerie van Infrastructuur & Milieu'; Ministry of Infrastructure & the Environment

IAEA	International Atomic Energy Agency
I & C	Instrumentation and Control
ILT	Human Environment and Transport Inspectorate
IPPAS	International Physical Protection Advisory Service
IRRS	Integrated Regulatory Review Service
KCB	Kerncentrale Borssele; NPP Borssele
KFD	Kernfysische Dienst; Department for Nuclear Safety, Security, Safeguards, and Radiation Protection of ILT
KNMI	'Koninklijk Nederlands Meteorologisch Instituut'; Royal Netherlands Meteorological Institute
KTA	Kerntechnische Ausschuss
KWU	Kraftwerk Union
LOCC	'Landelijk Operationeel Coördinatiecentrum', national operational coordination centre for operational and logistic assistance and support
LOOP	Loss Of Offsite Power
LUHS	Loss of Ultimate Heat Sink
MCR	Main Control Room
mSv	milliSievert
MWe	Megawatts Electrical
MWth	Megawatts Thermal
NAcP	National Action Plan (for post-fukushima Dai ichi activities)
NEA	Nuclear Energy Agency of the OECD
NERIS	European Platform on Preparedness for Nuclear and Radiological Emergency Response and Recovery
NIV	'Projectdirectie voor Nucleaire Installaties en Veiligheid'; directorate for nuclear installations and nuclear safety
NL	Netherlands
NMR	'Nationaal Meetnet Radioactiviteit'; national radiological monitoring network
NPK	'Nationaal Plan Kernongevallenbestrijding'; national plan for nuclear emergency management and response
NPP	Nuclear Power Plant
NRC	Nuclear Regulatory Commission (in the USA)
NRG	Nuclear Research & consultancy Group (in the Netherlands)
NS 1	Nood Stroom net 1 (Emergency Grid 1)
NS 2	Nood Stroom net 2 (Emergency Grid 2)
OECD	Organisation for Economic Cooperation and Development
PAR	Passive Autocatalytic Recombiner
PGA	Peak Ground Acceleration

PORV	Power-Operated Relief Valve
PRA	Probabilistic Risk Analysis
PSA	Probabilistic Safety Analysis
PWR	Pressurised Water Reactor
RB	Regulatory Body or 'regulator'
RCS	Reactor Coolant System
RIVM	'Rijksinstituut voor Volksgezondheid en Milieu'; National Institute for Public Health and the Environment
ROT	Regional Operational Team
RPV	Reactor Pressure Vessel
RWS	'Rijkswaterstaat', executive arm of Ministry of I&M, responsible for the design, construction, management and maintenance of the main infrastructure facilities in the Netherlands
SALTO	Safety Aspects of Long Term Operation
SAM	Severe Accident Management
SAMG	Severe Accident Management Guidelines
SBO	Station Blackout
SFP	Spent Fuel Pool
SG	Steam Generator
SMA	Seismic Margin Assessment
SOER	Significant Operating Experience Report (WANO)
SSCs	Structures, Systems and Components
TSO	Technical Support Organisation, in this NAcP organizations supporting Regulatory Bodies.
UPS	Uninterrupted Power Supply
US, USA	United States, United States of America
WANO	World Association of Nuclear Operators
WENRA	Western European Nuclear Regulators Association
xCNS	Extraordinary Meeting of the Contracting Parties to the Convention on Nuclear Safety – in this NAcP reference is made to the 2nd xCNS

Introduction

This section starts with the background of the National Action Plan (NAcP) Peer Review Workshop to be organised by ENSREG from 22 to 26 April 2013 and then sets out the purpose and scope of this document: '*Netherlands' Action Plan 2012 for post-Fukushima Dai ichi related activities'*. It then continues with the intended audience, links to detailed information on the single operating Dutch Nuclear Power Plant (NPP), and introduction to the Regulatory Body. The introduction finishes with a description of the structure of the present report.

Background

In 2011 the licensees of NPPs in the EU produced their reports ('Licensee Reports') on the 'stress test' of their facilities, in accordance with the ENSREG specifications. In a second step, the regulatory bodies evaluated these reports, and reported their findings in 'National Reports' and submitted these to ENSREG. Later in a third step there was a Peer Review of these reports. This yielded a set of so-called Country Reports and a Summary Report with recommendations for consideration by the participating countries, which was endorsed by ENSREG in April 2012. This publication was one of the actions of the ENSREG action plan to assist the member states.

In parallel with the European efforts, the international community took important steps. On the 5th regular review conference of the CNS (4 – 14 April 2011) it was decided to organize from 27 – 31 August 2012 a 2nd CNS Extraordinary Meeting[1] on the lessons learnt after 'Fukushima Dai-ichi'. In May 2012, all participating countries submitted a National Report to the CNS secretariat, dedicated to the purposes of this 2nd Extraordinary Meeting ('xCNS'). A summary of the findings of the meeting was published in a CNS summary report[2].

Since then ENSREG has pursued continuation of the efforts of European countries in strengthening nuclear safety. Among others it published a 'Compilation of recommendations and suggestions'[3] (July 2012).

It has been decided that in December 2012 National Action Plans (NAcPs) on the follow-up of post-Fukushima actions, will be submitted to ENSREG to be discussed in a dedicated ENSREG National Action Plan Peer Review Workshop in April 2013. The NAcP Review Workshop will be a focused review meeting, concentrating on actions and their implementation, responses and new developments that have been initiated or influenced by the accident at the Fukushima Dai-ichi Nuclear Power Plant in Japan, and have been presented earlier in National Reports to ENSREG and the 2nd Extraordinary Meeting of the CNS.

Purpose and Scope of this National Action Plan

This NAcP has been drafted observing the requirements of ENSREG and aims to present the current status of implementation of most actions reported earlier and presenting further planning and specification of actions agreed with the licensee.

The NAcP addresses the six topics identified in the 'Guidance for National Reports' of the 2nd Extraordinary Meeting of the CNS. For the first three topics the elaboration is in line with those of the ENSREG-led Complementary Safety Assessment (CSA, a.k.a. 'stress test').

The ENSREG secretariat has provided detailed guidance on the structuring of the NAcP. Per ENSREG guidance, the NAcP features four main parts.

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[1] The first Extraordinary Meeting of the CNS on 28 September 2009 was dedicated to the revision of the Guidelines regarding National Reports and rules of procedure and guidelines for training purposes.

[2] Mr Li Ganjie, Mr William Borchardt, Mr Patrick Majerus, '2nd Extraordinary Meeting of the Contracting Parties to the Convention of Nuclear Safety 27-31 August 2012 – Final Summary Report', IAEA, CNS/ExM/2012/04/Rev.2, August 2012.

[3] 'Compilation of recommendations and suggestions – Peer review of stress tests performed on European nuclear power plants', ENSREG, 26 July 2012

Part I

This part features the topics of the ENSREG-led CSA.

- Topic 1: External Events
- Topic 2: Design Issues
- Topic 3: Severe Accident Management and Recovery (On-Site)

Part II

This part features the remaining topics of the Extraordinary Meeting of the CNS.

- Topic 4: National Organisations
- Topic 5: Emergency Preparedness and Response and Post-Accident Management (Off-Site)
- Topic 6: International Cooperation

Part III

- Generic activities and conclusions from National Review and related discussions.

Part IV

- National implementation of activities, with schedules.

Further explanation of the Dutch approach to the reporting in the NAcP can be found in the last section of the Introduction; 'Structure of the Dutch National Action Plan (NAcP)'.

Intended Audience

This National Action Plan (NAcP) is mainly targeted at regulatory bodies of other states that have participated in ENSREG-led Complementary Safety Assessments (a.k.a. 'stress tests') and related Peer Review, to enable them to perform a peer review of the present NAcP. As agreed the report is written in English. Nevertheless, it will be made available to the general public. The report will also be sent to the Dutch Parliament.

Detailed information on the Borssele NPP and its robustness

Detailed information on the Borssele NPP and assessment of its robustness can be found in:

- The self assessment by utility EPZ, also called 'Complementary Safety margin Assessment' (CSA), following the format prescribed by ENSREG, can be found at: http://www.rijksoverheid.nl/bestanden/documenten-en-publicaties/rapporten/2011/11/02/final-report-complementary-safety-margin-assessment/complementary-safety-margin.pdf
- The regulatory body's evaluation of the CSA performed by utility EPZ: http://www.rijksoverheid.nl/bestanden/documenten-en-publicaties/rapporten/2011/12/20/netherland-s-national-report-on-the-post-fukushima-stress-test/netherland-s-national-report-on-the-post-fukushima-stress-test.pdf

Regulatory Body or Regulator

All nuclear facilities in the Netherlands, including the NPP of Borssele, operate under licence, awarded after a safety assessment has been carried out.

The licence is granted by the regulatory body under the Nuclear Energy Act. The 'regulatory body' is the authority designated by the government as having legal authority for conducting the regulatory process, including issuing licences, and thereby regulating nuclear, radiation, radioactive waste and transport safety, nuclear security and safeguards.

For more information on the regulatory body, refer to chapter 4.

Structure of the Dutch National Action Plan (NAcP)

The present NAcP (version 2012) is designed to be a 'stand alone' document to facilitate the international review by regulatory bodies of other nations. On the other hand it refers to publicly available material.

The information is presented largely in tables to provide maximum clarity.

The present NAcP has four main parts, per ENSREG-guidance.

The first two parts present the national (Dutch) positions on international post-Fukushima Dai ichi observations collected by ENSREG and/or CNS. Utmost care has been taken to ensure the correctness of the texts provided by the Dutch RB. However, the texts of these first two parts, being reflections of the Dutch RB on ENSREG and/or CNS-collected observations, may not exactly match the wordings of official RB positions regarding the single NPP in the Netherlands.

The third part presents actions that are specific for the Netherlands and that have not been inventoried by ENSREG and/or CNS. The fourth part presents details about all post-Fukushima actions and their planning in the Netherlands. Below, the four parts are described in more detail.

PART I

Chapter 0 'General' addresses general conclusions as described in the ENSREG document 'Compilation of recommendations and suggestions' and the way these apply to the situation in the Netherlands.

Chapter 1 on 'External Events' addresses conclusions and activities related to External Events, as described in the ENSREG document 'Compilation of recommendations and suggestions'. Actions proposed are described to limited detail.

Chapter 2 on 'Design Issues' focuses on actions to prevent severe damage to the reactor and the spent fuel pool, including any last resort means, as well as an evaluation of the time available to prevent severe damage. The focus is on LOOP-SBO events and LUHS events.

Chapter 3 addresses the 'Severe Accident Management' (SAM) and Recovery on site. It focuses on actionss to improve the capability in terms of mitigating actions taken if severe reactor or spent fuel pool damage occurs, in order to prevent large radioactive releases.

PART II

Chapter 4 'National Organisations' reviews actions taken by the organisations involved in maintaining and enhancing nuclear safety, and on the strength of these organisations. This review extends past governmental organisations, incorporating vendors and Technical Support Organisations cooperating with the governmental organisations in maintaining a high level of safety.

Chapter 5 is about 'Emergency Preparedness and Response and Post Accident Management off site'. These are essential to prevent or reduce the potential health effects of a release of radioactive materials.

Chapter 6 'International Cooperation' considers just that. The present report considers the actions taken to strengthen the global nuclear safety regime and reports on actions that have been taken or are being planned to enhance international cooperation.

PART III

Chapter 7 'Additional Topics' addresses generic activities and conclusions from the National Review and related discussions that have not been addressed in Parts I and II.

PART IV

Chapter 8 'Implementation of Activities' identifies timelines and key milestones of each improvement activity in the Netherlands.

PART I Topics 0, 1, 2 and 3

Part I of this National Action Plan (NAcP) consists of the Chapters 0, 1, 2 and 3. Activities in the domain of Part I mostly are the responsibility of the licensee. However governmental bodies have many associated tasks like assessing actions proposed by the licensee, reviewing the progress of actions agreed, imposing actions and overseeing their correct implementation.

0. General

0.0 Introduction

This chapter of the present NAcP addresses issues of a general nature that do not fit in one of the categories 'natural hazards', 'design issues' and 'severe accident management' or apply to more than one category.

The items reported have been listed in a table, refer to section 0.1.

0.1 Tabled summary of items reported

Table 0-1 **Tabled summary of items reported for Topic 0 'General'**.
In the first column, the original numbering of ENSREG observations (items) is found between parentheses, combined with a code with the format '0.x' which results from a renumbering per theme by the Dutch RB.
The second column presents the ENSREG observations, the third column gives the associated Theme, and the fourth the source of the observation.
The fifth column presents the reflections of the Dutch RB on the ENSREG observations, the Action numbers mentioned in the reflections refer to Part IV of this NAcP, in which these national Actions can be found with their planning.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
0.1 (1)	a. The peer review Board recommends that WENRA, involving the best available expertise from Europe, develop guidance on natural hazards assessments, including earthquake, flooding and extreme weather conditions, as well as corresponding guidance on the assessment of margins beyond the design basis and cliff-edge effects.	general	ENSREG Compilation of Recommendations, xCNS	a. Several studies contracted by the Regulatory Body (RB) have been performed to develop guidance on external hazards. A final guidance document has not been established yet. The RB participates in the WENRA T1 task force.
0.1 (1)	b. Thereby the harmonization of licensing basis methods, the use of deterministic and probabilistic methods, the definition of probabilistic thresholds and clarification of the BDBA/DEC scenarios considered in the safety assessment should be integrated. Further studies should use state-of-the-art data and methods and address trends in hazard data.	general		b. The RB notes the use of deterministic & probabilistic methods is an established practice in the Netherlands. BDBAs are part of the safety assessments, but the stress test may have an influence on the future scope of these studies. The use of state-of-the-art data is compulsory. The NL expertise on magnitudes and frequency of earthquake and flooding hazards rests with several governmental bodies. The Dutch RB has required the NPP to specify a list of SSCs that are necessary for

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
				(severe) accident management and assign to these SSCs the required qualifications and availability under accident conditions. This is related to Action 27 (refer to Part IV of this NAcP): "Assessment of the need to upgrade equipment and/or instrumentation dedicated to SAM purposes".
0.1 (1)	c. It should be stated, that safety assessments should benefit from timely operational experience feedback and include organizational and human aspects, and that regulations and regulatory guidance should be regularly updated. In order to avoid blind spots, a peer review of assessments should be considered.	general		c. The current practice is that operational experience and maintenance status is fed into the PSA model. HF aspects are mandatory aspects to be considered by the licensee. The Dutch regulations and guides for existing reactors have been updated recently, taking into account the WENRA RLs. A project is underway to define regulations for new (research)reactors, considering its application for the existing ones as well. Major safety assessments generally are reviewed and assessed by or together with the TSO.
0.2 (2)	a. The peer review Board recommends that ENSREG underline the importance of periodic safety review. In particular, ENSREG should highlight the necessity to reevaluate natural	general	ENSREG Compilation of Recommendations,	a. The NL has a practice of PSRs for NPPs. There are 10-yearly PSRs and 2-yearly smaller exercises. Natural hazards

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
	hazards and relevant plant provisions as often as appropriate but at least every 10 years. b. External hazards and their influence on the licensing basis should be reassessed periodically using state-of-the-art data and methods. PSR was identified as one good tool.		xCNS	are part of the 10-yearly PSRs. At this moment the 4th PSR is ongoing at Borssele NPP. b. PSRs are mandatory in the NL.
0.3 (3)	Urgent implementation of the recognised measures to protect containment integrity is a finding of the peer review that national regulators should consider.	general	ENSREG Compilation of Recommendations, xCNS	In the NL there is one water cooled reactor (PWR) type. The necessary facilities are in place like autocatalytic recombiners, means to depressurize and to lower H2 concentrations, associated procedures, (filtered) containment venting facilities and associated procedures, etc. In addition, the RB has demanded the licensee to perform additional studies to establish the reliability of the facilities present. Depressurisation of primary system and procedures (EOPs and SAMGs) are implemented fully with special SA-proof valves. One of the identified measures from the stresstest is ensuring the availability of the filtered containment venting system under seismic conditions (Action 14 / M10).
0.4 (4)	Necessary implementation of measures allowing prevention of accidents and limitation of their consequences in case of extreme natural hazards is a finding of the peer review that national regulators should consider.	general	ENSREG Compilation of Recommendations	Various measures have been proposed by licensee and endorsed by the RB. In addition the RB has demanded compliance with some extra post-stress test

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
				requirements. E.g. ensure availability of venting systems and others after seismic events etc.

1. External Events (Natural Hazards)

1.0 Introduction

This chapter focuses on the natural external hazards earthquakes, flooding and extreme weather conditions. The items reported have been listed in a table, refer to section 0.

The phenomena loss of electrical power and loss of ultimate heat sink may be caused by natural or man-made extreme events. In the present NAcP, these topics are addressed in chapter 2 'Design Issues'.

1.1 Tabled summary of items reported

Table 1-1 **Tabled summary of items reported for Topic 1 – External Events / Natural Hazards**.
In the first column, the original numbering of ENSREG observations (items) is found between parentheses, combined with a code with the format '1.x' which results from a renumbering per theme by the Dutch RB.
The second column presents the ENSREG observations, the third column gives the associated Theme, and the fourth the source of the observation.
The fifth column presents the reflections of the Dutch RB on the ENSREG observations, the Action numbers mentioned in the reflections refer to Part IV of this NAcP, where these national Actions can be found with their planning.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
1.1 (5)	Deterministic methods should form the basis for hazard assessment. Probabilistic methods, including probabilistic safety assessment (PSA), are useful to supplement the deterministic methods.	natural hazards	xCNS	This is the long standing practice in the NL. The licensee has a full scope PSA (PSA 1, 2 and 3) for all operational states, which is continuously updated with operating and maintenance data.
1.2 (6)	Hazard Frequency The use a return frequency of 1E-4 per annum (0.1g minimum peak ground acceleration for earthquakes) for plant reviews/back-fitting with respect to external hazards safety cases.	natural hazards	ENSREG Compilation of Recommendations, xCNS	*Earthquake*: A new seismic safety assessment is being conducted (SMA). The DBE has a PGA 0.06 g at ground level and 0.075 at pile foundation level corresponding with a return period > 1 E4. However according to the stress test analysis it is judged that there is a safety margin up to at least 0.15 g. Post-stresstest, the PSR will consider a DBE 0.1 g at free field, as per IAEA guidance. *Flood*: KCB has the wet side concept which can withstand high tides with a

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
				return period of longer than 1M years (DBF). There is also protection by dykes which is not part of the NPP design, but protects the plant against waves with a return frequency of 10^{-4} per annum. The seadyke was improved in 2012. The NPP KCB has to analyze if the multiple layer concept of IAEA-regulation is fulfilled.
1.3 (7)	Secondary Effects of Earthquakes The possible secondary effects of seismic events, such as flood or fire arising as a result of the event, in future assessments.	natural hazards	ENSREG Compilation of Recommendations	Flood as a result of a local earthquake is not a likely scenario for the Netherlands. Floods from other origins are more likely. Fire from earthquakes is a possible scenario. Fire fighting systems (and some other not seismically qualified systems) and their resistance against seismic impact are subject of a study that is being conducted; Action 12 (M8): Ensuring the ability of fire annunciation and suppression systems after seismic events. Action 33 (S3): Study Seismic Margin Assessment (SMA)
1.4 (8)	Protected Volume Approach The use of a protected volume approach to demonstrate flood protection for identified rooms or spaces.	natural hazards	ENSREG Compilation of Recommendations	The Protected Volume Approach has been implemented since 1984 and modified in the PSRs of 1993 and

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
				2006. It is known at EPZ as "beveiligde zone". Measures are being implemented to increase the margin within which certain volumes will remain 'dry', e.g.: Action 18 (M11): Wave protection beneath entrances; Action 2 (M2): Storage facilities for portable equipment - enhancing robustness warehouse for SAM equipment; Action 1 (M1): Emergency Response Centre (ERC) - study and consider options to better protect ERC like alternative location ERC, new building, strengthening current building etcetera.
1.5 (9)	Early Warning Notifications The implementation of advanced warning systems for deteriorating wheather, as well as the provision of appropriate procedures to be followed by operators when warnings are made.	natural hazards	ENSREG Compilation of Recommendations	Early warning and appropriate procedures for high tide exist and are in preparation for extreme weather. Action 23 (P3) ' Develop check-lists for plant walk-downs and the necessary actions after various levels of the foreseeable hazards', will assure adequate preparation in case of extreme weather.
1.6 (10)	Seismic Monitoring The installation of seismic monitoring systems with related	natural hazards	ENSREG Compilation of	Seismic monitoring systems will be operational from June 2013. This

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
	procedures and training.		Recommendations	measure was planned before the Fukushima Dai ichi accident.
1.7 (11)	Qualified Walkdowns The development of standards to address qualified plant walkdowns with regard to earthquake, flooding and extreme weather – to provide a more systematic search for non-conformities and correct them (e.g. appropriate storage of equipment, particularly for temporary and mobile plant and tools used to mitigate beyond design basis (BDB) external events).	natural hazards	ENSREG Compilation of Recommendations	Periodic walkdowns to check availability and correct storage of ERO equipment exist. Walkdowns as reaction to early warnings (severe weather approaching) are under development. Action 23 (P3) ' Develop check-lists for plant walk-downs and the necessary actions after various levels of the foreseeable hazards'. The Dutch RB has the opinion standards for such checklists should be developed by international expert groups which will also contribute to harmonisation of such standards.
1.8 (12)	Flooding Margin Assessments The analysis of incrementally increased flood levels beyond the design basis and identification of potential improvements, as required by the initial ENSREG specification for the stress tests.	natural hazards	ENSREG Compilation of Recommendations	This is the current practice. The flooding margin assessment was performed by incrementally increasing the flood levels beyond the DBF levels in the flooding studies performed in the frame work of the past stress test.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
1.9 (13)	External Hazard Margins In conjunction with recommendation 1 and 17, the formal assessment of margins for all external hazards, including seismic, flooding and severe weather, and identification of potential improvements. Licensing basis protection against external hazards (e.g. flood seals and seismic supports) should be verified to be effective. Margin assessments should be based on periodic re-evaluation of licensing basis for external events considering possible cliff-edge effects and grace periods.	natural hazards	ENSREG Compilation of Recommendations, xCNS	Margin assessments were part of the stress test performed in 2011. Licensee has to perform additional studies on seismic (SMA, e.g. Action 33 S3), flooding and extreme weather hazards. E.g.: Action 33 (S3): Study Seismic Margin Assessment (SMA); Action 30 (S2): Investigate measures to further increase safety margin in case of flooding - this includes study of flooding (Action 31) and superstorms (Action 32).

2. Design Issues

2.0 Introduction

This chapter 'Design Issues' focuses on the hazards loss of electrical power and loss of ultimate heat sink. These may be caused by natural or man-made extreme events. In general these topics are referred to in terms of Loss Of Offsite Power (LOOP), Station Blackout (SBO) and Loss of Ultimate Heat Sink (LUHS). These are all considered to be within the design basis of the NPP. In addition loss of all AC power is considered.

The items reported have been listed in a table, refer to section 2.1.

2.1 Tabled summary of items reported

Table 2-1 **Tabled summary of items reported for Topic 2 – Design Issues**.
In the first column, the original numbering of ENSREG observations (items) is found between parentheses, combined with a code with the format '2.x' which results from a renumbering per theme by the Dutch RB.
The second column presents the ENSREG observations, the third column gives the associated Theme, and the fourth the source of the observation.
The fifth column presents the reflections of the Dutch RB on the ENSREG observations, the Action numbers mentioned in the reflections refer to Part IV of this NAcP, in which these national Actions can be found with their planning.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
2.1 (14)	Alternate Cooling and Heat Sink The provision of alternative means of cooling including alternate heat sinks.	design issues	ENSREG Compilation of Recommendations, xCNS	Ample means of alternate cooling and heat sink are available. Borssele has ground water pumps, fire water pool and can apply feed and bleed. Refer to National Report on the stress test of the Netherlands (2011) for details.
2.2 (15)	AC Power Supplies The enhancement of the on-site and off-site power supplies.	design issues	ENSREG Compilation of Recommendations, xCNS	Examples are: Action 9 (M5): Reduction of time to connect mobile diesel generator to 2 hrs, Action 10 (M6): Establishing ability to transfer diesel from any of the storage tanks to active diesels; Action 36 (S4): Study regarding strenghtening off-site power supply; Action 37 (S5): Study for more extensive use of steam for powering emergency feed water pump;

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
				Action 43: Reassessment of alternative power sources (alternative to emergency grids) including reassessment of the possibility of having extra fixed external connections for mobile diesel generator.
2.3 (16)	DC Power Supplies The enhancement of the DC power supply.	design issues	ENSREG Compilation of Recommendations, xCNS	Action 43: Reassessment of alternative power sources (alternative to emergency grids); Action 44: Better arrangements for mobile diesel generator and batteries; This includes studies of small mobile emergency power facilities for recharging purposes or as backup facility, as well as drafting of instructions for using such facilities. Action 16 (M9): Increasing autarky time beyond 10h.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
2.4 (17)	Operational and Preparatory Actions Implementation of operational or preparatory actions with respect to the availability of operational consumables.	design issues	ENSREG Compilation of Recommendations	Examples are: Action 10 (M6) - Establishing ability to transfer diesel fuel from all storage tanks to active diesels Action 42 - Study amount of lubrication oil in crisis situations Action 19 (P1) Also the introduction of EDMGs to restore equipment in case of extreme external events Action 27 Assessment of the need to upgrade equipment dedicated to SAM purposes.
2.5 (18)	Instrumentation and Monitoring The enhancement of instrumentation and monitoring.	design issues	ENSREG Compilation of Recommendations, xCNS	Action 27: Assessment of the need to upgrade equipment and/or instrumentation dedicated to SAM purposes (increasing robustness of existing equipment/instrumentation, protection of equipment/instrumentation against BDB hazards, periodic test/inspection program of those equipment/instrumentation, well defined and trained procedures to use those equipment / instrumentation).

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
2.6 (19)	Shutdown Improvements The enhancement of safety in shutdown states and mid-loop operation.	design issues	ENSREG Compilation of Recommendations	There are several measures being implemented, related to this topic, e.g.: Action 21 (P2): Training of the procedure to ensure water supply during midloop operation and loss of AC power Action 22: Prepare and validate the capabilities to cope with SBO during midloop operation Action 29 (S1): A reserve SFP cooling system independent of power supply
2.7 (20)	Reactor Coolant Pump Seals The use of temperature-resistant (leak-proof) primary pump seals. Study of RCP pump seal leakage following long term AC power failure.	design issues	ENSREG Compilation of Recommendations, xCNS	The licensee states that the Sulzer MCPs have a sealing concept that is not dependent on AC (once MCPs stopped).
2.8 (21)	Ventilation The enhancement of ventilation capacity during SBO to ensure equipment operability.	design issues	ENSREG Compilation of Recommendations	The licensee states that: Equipment required to be operational under SBO conditions are supplied by the SBO diesels. This includes the required ventilation systems. In case of complete loss of AC, no forced ventilation is required for operable equipment.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
2.9 (22)	Main and Emergency Control Rooms The enhancement of the main control room (MCR), the emergency control room (ECR) and emergency control centre (ECC) to ensure continued operability and adequate habitability conditions in the event of a station black-out (SBO) and in the event of the loss of DC (this also applies to Topic 3 recommendations). Habitability of control rooms/emergency centers under DEC conditions.	design issues	ENSREG Compilation of Recommendations, xCNS	There are several measures being implemented that are related to this topic, e.g.: Action 1 (M1) and Action 4 : Realization of a emergency response centre facility that can give shelter to the emergency response organization after all foreseeable hazards, including habitability (analysis of the potential doses to workers during severe accident management activities, including habitability of MCR and ECR). Action 43: Reassessment of alternative power sources (alternative to external grid) Action 44: Better arrangements for mobile diesel generator and batteries This includes studies of small mobile emergency power facilities for recharging purposes or as backup facility, as well as drafting of instructions for using such facilities.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
2.10 (23)	Spent Fuel Pool The improvement of the robustness of the spent fuel pool (SFP).	design issues	ENSREG Compilation of Recommendations, xCNS	Action 6 (M3) Possibility for refilling the SFP without entering containment, design & implementation of coupling to system that provides water for fire fighting (UJ); Action 7 (M4) Additional possibilities for refilling the SFP (and sustaining cooling), design & implementation; Action 29(S1) Reserve SFP cooling system independent of power supply; Action 33 (S3) Study SMA will also contribute to more certainty of the robustness of the SFP. Also refer to ENSREG point 2.17 (30) of this table.
2.11 (24)	Separation and Independence The enhancement of the functional separation and independence of safety systems.	design issues	ENSREG Compilation of Recommendations	Separation & independence are part of the design basis. However several measures will enhance these. Refer to other topics in this table.
2.12 (25)	Flow Path and Access Availability The verification of assured flow paths and access under SBO conditions. Ensure that the state in which isolation valves fail and remain, when motive and control power is lost, is carefully considered to maximise safety. Enhance and extend the availability of DC power and instrument air (e. g. by installing additional or larger accumulators on the valves). Ensure access to critical equipment in all circumstances, specifically when	design issues	ENSREG Compilation of Recommendations	The operability of the major safety valves has been checked. The PORVs need DC power. Further analysis is ongoing.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
	electrically operated turnstiles are interlocked.			
2.13 (26)	Mobile Devices The provision of mobile pumps, power supplies and air compressors with prepared quick connections, procedures, and staff training with drills.	design issues	ENSREG Compilation of Recommendations, xCNS	Several measures are implemented that are related to this topic, e.g.: Action 44 : Better arrangements for mobile diesel generator and batteries This includes studies of small mobile emergency power facilities for recharging purposes or as backup facility, as well as drafting of instructions for using such facilities. Action 9 (M5), Reduction of the time to connect mobile diesel generator to 2 hours Action 19: Further development of EDMGs.
2.14 (27)	Bunkered/Hardened Systems The provision for a bunkered or "hardened" system to provide an additional level of protection with trained staff and procedures designed to cope with a wide variety of extreme events including those beyond the design basis (this also applies to Topic 3 recommendations).	design issues	ENSREG Compilation of Recommendations	The NPP has bunkered systems, however some measures will be implemented that will further enhance nuclear safety, e.g.: Action 1 (M1), Emergency Response Centre (ERC) - study and consider options to better protect ERC like alternative location ERC, new building, strengthening current building etc

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
				Action 2 (M2), Storage facilities for portable equipment - enhancing robustness warehouse for SAM equipment. Action 19 (P1) addresses training; 'Develop set of EDMGs and implement training program'.
2.15 (28)	Multiple Accidents The enhancement of the capability for addressing accidents occurring simultaneously on all plants of the site and consideration of the site as a whole for a multi-units site in the safety assessment.	design issues	ENSREG Compilation of Recommendations, xCNS	The Borssele site features one NPP and a coal fired plant. Effects of the coal fired plant and other nearby industry on NNP risk has been studied during the CSA and in preparing the Safety Analysis Report; no specific issues have been identified.
2.16 (29)	Equipment Inspection and Training Programs The establishment of regular programs for inspections to ensure that a variety of additional equipment and mobile devices are properly installed and maintained, particularly for temporary and mobile equipment and tools used for mitigation of BDB external events. Development of relevant staff training programmes for deployment of such devices.	design issues	ENSREG Compilation of Recommendations	Equipment and training programs are in place. However enhancement of these is part of the focus of several measures like: Action 27B, Study regarding the need to upgrade equipment dedicated to SAM purposes, Action 19 (P1) Further development of EDMGs and associated training programme.
2.17 (30)	Further Studies to Address Uncertainties The performance of further studies in areas were there are uncertainties. Uncertainties may exist in the following areas:	design issues	ENSREG Compilation of	a. Integrity of the SFP is part of the SMA. Impact on liner of boiling effects is under consideration.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
	a. The integrity of the SFP and its liner in the event of boiling or external impact. b. The functionality of control equipment (feedwater control valves and SG relief valves, main steam safety valves, isolation condenser flow path, containment isolation valves as well as depressurisation valves) during the SBO to ensure that cooling using natural circulation would not be interrupted in a SBO. c. The performance of additional studies to assess operation in the event of widespread damage, for example, the need different equipment (e.g. bulldozers) to clear the route to the most critical locations or equipment. This includes the logistics of the external support and related arrangements (storage of equipment, use of national defence resources, etc.).		Recommendations	b. Refer to ENSREG point 25. c. Action 19(P1) Develop set of EDMGs and implement training programme, the licensee was in the process of developing EDMGs before the start of the ENSREG-led CSA.

3. Severe Accident Management and Recovery (on site)

3.0 Introduction

This chapter focuses on SAM and Recovery on site.

The items reported have been listed in a table, refer to section 3.1.

3.1 Tabled summary of items reported

Table 3-1 **Tabled summary of items reported for Topic 3 – Severe Accident Management (SAM)**.
In the first column, the original numbering of ENSREG observations (items) is found between parentheses, combined with a code with the format '3.x' which results from a renumbering per theme by the Dutch RB.
The second column presents the ENSREG observations, the third column gives the associated Theme, and the fourth the source of the observation.
The fifth column presents the reflections of the Dutch RB on the ENSREG observations, the Action numbers mentioned in the reflections refer to Part IV of this NAcP, where these national Actions can be found with their planning.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
3.1 (31)	WENRA Reference Levels The incorporation of the WENRA reference levels related to severe accident management (SAM) into their national legal frameworks, and ensure their implementation in the installations as soon as possible.	severe accident management	ENSREG Compilation of Recommendations	WENRA RLs have been implemented fully into the regulations. This has been verified in the WENRA RH project dating from 2005-2008. The implementation in NPP KCB was complete too. The issue of molten corium stabilization /in vessel retention has been analyzed in PSRs before and will be analyzed again in the upcoming PSR 2013. Action 39 (S7) In previous periodic safety reviews an extensive set of formal analyses has been performed to address the threats of hydrogen to the containment. In 10EVA13 these studies will be reviewed and where necessary renewed and extended, e.g. the management of hydrogen from the SFP, into the filtered containment venting system and into the neighbouring buildings. Action 14 (M10) Ensuring the availability of the

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
				containment venting system TL003 after seismic events would increase the margin in case of seismic events.
3.2 (32)	SAM Hardware Provisions Adequate hardware provisions that will survive external hazards (e.g. by means of qualification against extreme external hazards, storage in a safe location) and the severe accident environment (e.g. engineering substantiation and/or qualification against high pressures, temperatures, radiation levels, etc), in place, to perform the selected strategies.	severe accident management	ENSREG Compilation of Recommendations	Action 1 (M1), Action 2 (M2), Action 3, Action 4, Action 12 (M8), Action 14 (M10), Action 19 (EDMGs) and Action 27. Also refer to ENSREG No. 2.14 (27) in Table 2-1 of section 2.1 of this NAcP.
3.3 (33)	Review of SAM Provisions Following Severe External Events The systematic review of SAM provisions focusing on the availability and appropriate operation of plant equipment in the relevant circumstances, taking account of accident initiating events, in particular extreme external hazards and the potential harsh working environment.	severe accident management	ENSREG Compilation of Recommendations	Action 26: Improvements of SAMGs and EOPs (e.g. focusing on longer term accidents and including better training provisions) Action 27: Assessment of the need to upgrade equipment and/or instrumentation dedicated to SAM purposes.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
3.4 (34)	Enhancement of Severe Accident Management Guidelines (SAMG) In conjunction with the recommendation 4, the enhancement of SAMGs taking into account additional scenarios, including, a significantly damaged infrastructure, including the disruption of plant level, corporate-level and national-level communication, long-duration accidents (several days) and accidents affecting multiple units and nearby industrial facilities at the same time.	severe accident management	ENSREG Compilation of Recommendations, xCNS	Several measures are being implemented to further enhance the SAMGs, including training of long term SAMG measures (Action 24), developing specific SAMGs for the SFP (Action 25), assessment of the need to upgrade equipment for SAM (Action 27). In addition there are actions on EDMGs (like Action 19). For communication issues refer to ENSREG No. 3.5 (35) of this table.
3.5 (35)	Analysis of human resources, communication, personnel training and guidance during severe long term accidents (esp. multi-unit) and validation of effectiveness through exercises.	severe accident management	xCNS	This is addressed in measures mentioned with ENSREG topic 34. In addition there is: Action 5 'Assessing ERO staffing regarding its adequacy 24/7.' Action 11 (M7) attention to communication issues; 'Establishing independent voice and data communication under adverse conditions'.
3.6 (36)	SAMG Validation The validation of the enhanced SAMGs.	severe accident management	ENSREG Compilation of Recommendations	This is part of the measures mentioned with ENSREG No. 3.4 (34).

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
3.7 (37)	SAM Exercises Exercises aimed at checking the adequacy of SAM procedures and organisational measures, including extended aspects such as the need for corporate and nation level coordinated arrangements and long-duration events.	severe accident management	ENSREG Compilation of Recommendations	SAM exercises are a frequent phenomenum at Borssele NPP. Structures & procedures are in place for interfacing with the national and local authorities in crisis situations. Exercises often involve more than 1,000 people. There are additional exercises for specific scenarios (like flooding) in cooperation with the armed forces. Related Actions are: Action 24 (training of long term-term SAM measures should improve the reliability of existing procedures), Action 26 (improvements to SAMGs and EOPs, e.g. focusing on longer term accidents and including better training provisions, and Action 27 (well defined and trained procedures to use those equipment/instrumentation).
3.8 (38)	SAM Training Regular and realistic SAM training exercises aimed at training staff. Training exercises should include the use of equipment and the consideration of multi-unit accidents and long-duration events. The use of the existing NPP simulators is considered as being a useful tool but needs to be enhanced to cover all possible accident scenarios.	severe accident management	ENSREG Compilation of Recommendations	Refer to ENSREG No. 3.4 (34) for enhancing training SAM. Also refer to ENSREG No. 3.7 (37) of this list. A full scope simulator (in Essen, Germany) is used regularly, but its purpose does not extend to SAM exercises. KCB uses a desktop simulator for support of its exercises/training of severe accidents and the improvement of this facility is under consideration.
3.9 (39)	Extension of SAMGs to All Plant States The extension of existing SAMGs to all plant states (full and low-power, shutdown), including accidents	severe accident management	ENSREG Compilation of Recommendations	The SAMGs cover all plant states. Dedicated SAMGs are being developed for the SFP.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
	initiated in SFPs.			
3.10 (40)	Improved Communications The improvement of communication systems, both internal and external, including transfer of severe accident related plant parameters and radiological data to all emergency and technical support centre and regulatory premises.	severe accident management	ENSREG Compilation of Recommendations	Structures and procedures are in place to communicate and cooperate with local and national authorities in crisis situations. Plant data can be shared with the authorities. All important plant data and radiological data are available in the ECC and the TSC. Some enhancement of communication systems is being pursued (Action 11 / M7 Establishing independent voice and data communication under adverse conditions)
3.11 (41)	Presence of Hydrogen in Unexpected Places The preparation for the potential for migration of hydrogen, with adequate countermeasures, into spaces beyond where it is produced in the primary containment, as well as hydrogen production in SFPs.	severe accident management	ENSREG Compilation of Recommendations, xCNS	The SFP is in the containment of Borssele NPP. So the facilities to lower H_2 concentration (autocatalytic recombiners, ventilation, dispersion over larger volumes etc) that are present in the containment also apply to the SFP. Action 39 (S7): In previous periodic safety reviews an extensive set of formal analyses has been performed to address the threats of hydrogen to the containment. In 10EVA13 these studies will be reviewed and where necessary renewed and extended, e.g. the management of hydrogen from the SFP, into the filtered containment venting system and into the neighbouring buildings.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
3.12 (42)	Large Volumes of Contaminated Water The conceptual preparations of solutions for post-accident contamination and the treatment of potentially large volumes of contaminated water.	severe accident management	ENSREG Compilation of Recommendations	Enhancement of the means to handle contaminated water is being pursued in Action 45 'procedures for handling of large amounts of radioactively contaminated water'
3.13 (43)	Radiation Protection The provision for radiation protection of operators and all other staff involved in the SAM and emergency arrangements.	severe accident management	ENSREG Compilation of Recommendations	In Dutch legislation there are dose limits for several categories of staff involved in crisis situations. An analysis is being conducted to analyse the potential dose to workers (Action 4).
3.14 (44)	On Site Emergency Centre The provision of an on-site emergency centre protected against severe natural hazards and radioactive releases, allowing operators to stay onsite to manage a severe accident.	severe accident management	ENSREG Compilation of Recommendations	Borssele NPP has an on-site Emergency Response Centre (ERC). The protection against extreme severe natural hazards is being re-evaluated (flooding, seismic events). This includes the protection against radiation from radioactive releases. (Actions 3 and 4).
3.15 (45)	Support to Local Operators Rescue teams and adequate equipment to be quickly brought on site in order to provide support to local operators in case of a severe situation.	severe accident management	ENSREG Compilation of Recommendations	At Borssele NPP, there are procedures for bringing new or additional staff on site in case of severe situations. A recent exercise (with the armed forces) showed it is possible to bring staff and equipment on site under flooding conditions. It has been arranged to have these exercises with the armed forces each year, the next exercise has been scheduled for 30th January 2013. Action 19 (development of EDMGs and training program) will among others identify necessary staff, equipment and procedures.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
3.16 (46)	Level 2 Probabilistic Safety Assessments (PSAs) A comprehensive Level 2 PSA as a tool for the identification of plant vulnerabilities, quantification of potential releases, determination of candidate high-level actions and their effects and prioritizing the order of proposed safety improvements. Although PSA is an essential tool for screening and prioritising improvements and for assessing the completeness of SAM implementation, low numerical risk estimates should not be used as the basis for excluding scenarios from consideration of SAM especially if the consequences are very high.	severe accident management	ENSREG Compilation of Recommendations	Borssele NPP features a full scope PSA, including PSA-1, PSA-2 and PSA-3. During the PSR, the PSA is used to identify potential weaknesses. The development of the PSA is driven by the instrument of PSR in combination with the IAEA IPSART missions, initiated by the RB. The upcoming IPSART follow-up mission in April 2013 will address a number of post-stress test (post-Fukushima Dai ichi) aspects.
3.17 (47)	Severe Accident Studies The performance of further studies to improve SAMGs.	severe accident management	ENSREG Compilation of Recommendations	This is covered by Actions 24, 25, 26 and 27 as explained before and Action 3 and 4 (severe) accident management under all extreme circumstances). Furthermore the areas of study related to this item are important and will be covered in international framework.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
3.18 (48)	Containment venting for new NPPs	severe accident management	xCNS	The NPP Borssele has facilities for filtered containment venting, dating from long before 'Fukushima'. For new NPPs in the Netherlands it is expected it will be part of the requirements. There is one action regarding this system: Action 14 (M10) Ensuring the availability of the containment venting system TL003 after seismic events.

PART II Topics 4, 5 and 6

Part II of this report consists of the Chapters 4, 5 and 6. Activities in the domain of Part II mostly are the responsibility of governmental bodies.

4. National Organisations

The licensee is primarily responsible for nuclear safety. However, the government, the regulator, technical support organizations, vendors, service providers and other stakeholders are also important to improve and to maintain a high standard of safety. Section 4.0 presents a general introduction to the various National Organisations relevant for nuclear safety. The developments and actions regarding National Organisations have been listed in a table, refer to section 4.1.

4.0 Introduction to National Organisations

4.0.a Regulatory Body (RB)

All nuclear facilities in the Netherlands, including the NPP of Borssele, operate under licence, awarded after a safety assessment has been carried out. The licence is granted by the regulatory body under the Nuclear Energy Act.

The 'Regulatory Body' is the authority designated by the government as having legal authority for conducting the regulatory process, including issuing licences, and thereby regulating nuclear, radiation, radioactive waste and transport safety, nuclear security and safeguards.

In the Netherlands the minister of Economic Affairs (EZ[4]) is the principal responsible authority for conducting the regulatory process under the Nuclear Energy Act and for the main functions of the Regulatory Body.

The structure of the current regulatory body is presented in the figure below.

[4] Dutch: EZ, 'Economische Zaken' (i.e. Economic Affairs)

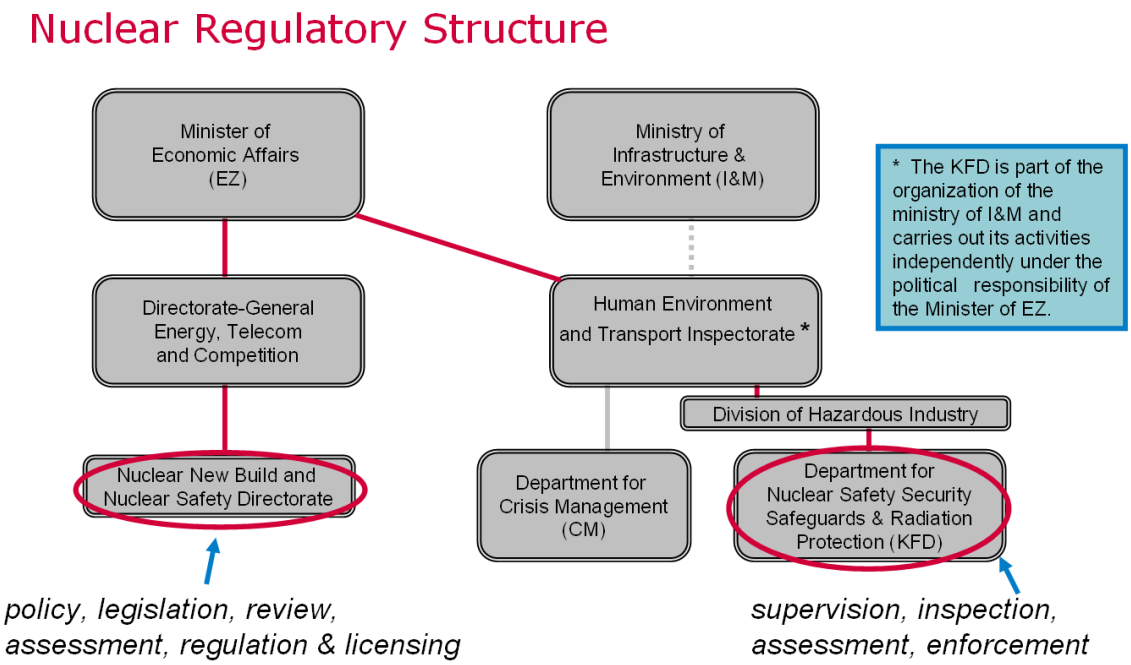

Figure 1 Regulatory structure in the Netherlands, with the ministry of EZ as the principal responsible authority for conducting the regulatory process under the Nuclear Energy Act.

Within the ministry of EZ, the 'programmadirectie voor Nucleaire Installaties en Veiligheid' (NIV), i.e. Nuclear Installations and Nuclear Safety Directorate, is involved in the preparation of legislation, formulating policies (excluding energy policy) and licensing.

The nuclear inspectorate, the 'Kernfysische dienst' (KFD) is within the general responsibility of the Minister of EZ the responsible organisation for the independent oversight (safety assessment, inspection and enforcement) of the safety, security and non-proliferation of activities and facilities (including nuclear facilities). The KFD is embedded in an organisational division of the Human Environment and Transport Inspectorate (ILT), which is the inspection branch of the ministry of Infrastructure and the Environment (IenM).

Activities of the RB on regulation

Not related to Fukushima Dai-ichi, an update and extension of Dutch Safety Rules (which are based on IAEA-requirements and guides) has been introduced for the existing NPP. A new regulation framework is developed based on IAEA requirements.

Implementation of COUNCIL DIRECTIVE 2009/71/EURATOM of 25 June 2009 on nuclear safety also has no direct relation with the Fukushima Dai-ichi accident.

The Netherlands has brought this directive into force on July 22, 2011: Regulation of the Minister of Economic Affairs, Agriculture (EL&I) and Innovation and the Minister of Social Affairs and Labour of 18 July 2011, No WJZ/11014550, concerning the implementation of Directive No 2009/71/Euratom of the Council of the European Union 25 June 2009 establishing a Community framework for nuclear safety of nuclear installations (PB EU L 172/18). The Netherlands forth withed to inform the European Commission thereof. This regulation prescribes the systematic evaluation and investigation of the nuclear safety of nuclear installations during the lifetime of the nuclear installation. Also, the regulation prescribes inter alia that:

- Licensees should give sufficient priority to nuclear safety systems;
- Licensees must provide adequate human and financial resources to meet the obligations on the nuclear safety of a nuclear installation;

- All parties, including the licensee, are required to provide a mechanism for educating and training their staff responsible for the safety of nuclear plants to meet the expertise and competence in the field of nuclear safety to be maintained and developed.

4.0.a.1 Emergency preparedness organizations

This issue is addressed in chapter 5.

4.0.b Governmental supporting organisations: RIVM

The National Institute for Public Health and the Environment (RIVM) is a specialised Dutch government agency. Its remit is to modernise, gather, generate and integrate knowledge and make it usable in the public domain. By performing these tasks RIVM contributes to promoting the health of the population and the environment by providing protection against health risks and environmental damage.

The RIVM among others coordinates the back-office of the National Nuclear Assessment Team for radiological analyses and information (BORI).This issue is also addressed in chapter 5. The RIVM supports the Ministries with scientific studies. RIVM works together with other (governmental) expert organisations as the Royal National Meteorological Institute (KNMI) with models for the prediction of the effects of discharges of radioactive material in the air. RIVM also operates the national radiological monitoring network.

4.0.c Education and training organisations

The RID/R3 organisation at the Technical University in Delft and the Nuclear Research & consultancy Group (NRG) in Petten and Arnhem provide education and training in nuclear technology and radiation protection to clients from nuclear and non-nuclear businesses and various governmental organisations. NRG also provides training for the NPP staff.

For the education and training in radiation protection a national system exists with four levels of education. The government recognizes training institutes for a specific training of radiation protection. For getting a degree in radiation protection, an exam has to be passed.

A change in the system of education for radiation protection is under construction. Registration of radiation protection experts of the levels 2 and 3 is foreseen in 2013. There are formal requirements to obtain registration certificates are laid down for the initial education, for continuing education and for work experience.

4.0.d Technical (Support) Organisations

GRS, Germany

The Dutch Regulatory Body (RB) cooperates with the Technical Support Organization (TSO) from Germany, GRS. This is TSO for the German national regulator and one of the large German TSOs. Occasionally GRS provides education and training for governmental and commercial organisations.

NRG, Netherlands

The Nuclear Research & consultancy Group (NRG) in Petten and Arnhem provides consultancy services to government and industry and operational support to utilities.

4.0.e Utility N.V. EPZ

N.V. EPZ operates the only NPP in the Netherlands, in Borssele, the KCB. The KCB shares its site with a conventional power plant which is mainly a coal fired plant and seven wind turbines.

4.0.f Vendor

The architect engineer and original vendor of the Borssele NPP is Siemens-KWU. The nuclear part of Siemens-KWU is now named Areva NP GmbH. For the non-nuclear part of the plant, the vendor is Siemens AG.

Both companies are contracted by EPZ for specialised services in their respective areas.

With respect to nuclear incidents, the Areva NP Emergency response support service is particularly noteworthy. Areva NP maintains an emergency support organisation for its customers. KCB is one of the customers that has a contract in place for support during and after incidents, with the emphasis on beyond design-base incidents including core melt scenarios. In both Areva NP crisis centres (Erlangen and Offenbach) real-time KCB process information can be displayed and all necessary documentation is kept current and available on a dedicated computer. Specialised equipment for (post-) accident support can be made available through Areva. The Areva NP crisis centre participates yearly in three to four emergency exercises with the ERO of EPZ. During these exercises the full scope simulator in Essen is used with forwarding of the process data of the simulator to both Areva NP crisis centres.

4.1 Tabled summary of items reported

Table 4-1 **Tabled summary of items reported for Topic 4 –National Organisations**.
In the first column, the original numbering of ENSREG observations (items) is found between parentheses, combined with a code with the format '4.x' which results from a renumbering per theme by the Dutch RB.
The second column presents the ENSREG observations, the third column gives the associated Theme, and the fourth the source of the observation.
The fifth column presents the reflections of the Dutch RB on the ENSREG observations, the Action numbers mentioned in the reflections refer to Part IV of this NAcP, where these National Actions can be found with their planning.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
4.1 (101)	a. Review and revision of nuclear Laws, Regulations and Guides. b. Where the RB is constituted of more than one entity, it is important to ensure efficient coordination. c. Emphasis on the need for comprehensive periodic reviews of safety, using state-of-the-art techniques. d. To remind CP that national safety frameworks include the RB, TSO and Operating Organisations. e. Wide participation in safety networks for operating organizations, RB and TSOs will strengthen them.	National organisations	xCNS	a. The RB is revising and drafting nuclear regulations and guides. b. The RB is constituted of two entities (NIV and KFD) residing in two ministries, NIV is responsible for licensing and regulations, KFD is responsible for supervision. Coordination is provided and will be subject to review in the IRRS self assessment. For details on current organisation of the RB, refer to section 4.0. c. The licensees of power and research reactors are required by law and through the licence to perform PSRs, every two years and 10 years. d. The safety framework in the Netherlands includes the RB and the Operating Organisations. To date there is no national dedicated TSO. Organisations are contracted to support the RB with various tasks. Support is provided by foreign TSOs and national and international consultancy organisations. e. The RB and the licensees are participating in

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
				international activities and working groups of WANO, OECD/NEA, WENRA, EU (e.g. ENSREG) and IAEA.
4.2 (102)	Changes to functions and responsibilities of the RB. a. Effective independence of the RB is essential, including the following aspects: b. Transparency in communicating its regulatory decisions to the public. c. Competent and sufficient human resources. d. Adequate legal powers (e.g. suspend operation). e. Financial resources.	National organisations	xCNS	Present situation: a. The nuclear safety policy is independent from energy policy. b. It is transparent in its communication of regulatory decisions to the public; such decisions are published with supporting documentation on governmental websites. Information about supervision issues is also published on the website of the KFD. A special act gives citizens the right to request information related to an administrative matter as contained in documents held by public authorities or companies carrying out work for a public authority. c. Recently the RB staffing has been strengthened and the staffs receive dedicated training. d. The RB has adequate legal powers; if needed it can suspend operation of a nuclear facility. e. The financial resources seem adequate. The situation is under evaluation. Action: New financing mechanisms are being studied for handling of license applications and supervision. Action: Evaluation in the framework of the IRRS self assessment and coming mission.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
4.3 (103)	Importance of inviting IRRS missions, and to: • Effectively implement the findings. • Make the findings and their means of resolution publicly available. • Invite follow -up missions.	National organisations	xCNS	Action: The RB will be subjected to an IRRS mission in 2014. Action: In advance of the IRRS mission, the RB will perform a self assessment.
4.4 (104)	Review and improvements to aspects of National EP&R • How to routinely exercise: - All involved organizations, up to ministerial level - Scenarios based on events at multi-unit sites • How to train intervention personal for potentially severe Accident conditions • Rapid intervention team to provide support to sites • Determination of the size of the Emergency Planning Zone is variable • Trans- border arrangements need to be further considered and exercised • The use of regional centers to provide support to sites • Education of the public and the media in aspects related to emergencies (e.g. radiation does and their effects)	EP&R	xCNS	The Netherlands has a national EP&R plan, refer to chapter 5 for a description. It includes the lines of command, communication and informing the public. The EP&R is regularly trained, often in large scale exercises involving some 1,000 staff and occurring once in every 4-5 years. For Training and Exercises the NL has a long range policy plan. Based on this plan and the lessons learned from exercises, every year, a yearly schedule for training and exercise is developed. There are arrangements with bordering countries for crisis situations. There are MoUs with Belgium and Germany. In addition there is a MoU with Great Britain, supported by infrequent meetings.
4.5 (105)	Openness, transparency and communication improvements: a. Communication with stakeholders is a continuous activity not just in an emergency b. Active stakeholder engagement in the decisionmaking process builds public confidence c. International bilateral cooperation can be beneficial (eg joint regulatory inspections)	National organisations	xCNS	a. RB and operator communicate with the public. Meetings are organised at special occasions, however these are frequent. Via websites information is provided continuously. Parliament is informed by the RB via the ministry of Economic Affairs. b. Stakeholder involvement is embedded in the

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
	d. The proper balance of understandable information provided to informed groups and the general public needs to be addressed e. The transparency of the operators activities needs to be enhanced.			process of the EIA (under the Environmental Protection Act) and licensing. The Licensee makes considerable efforts to communicate with stakeholders. c. Based on bilateral agreements and MoUs, cooperation with bordering countries (Belgium, Germany) is operational. Arrangements for bilateral information exchange (preparation and response) are in place. d. The RB is aware of the different backgrounds of informed groups and the general public. The ministries, of which the RB is part of, often produce easy to understand press releases, as well as detailed reports. Of some reports, there are detailed and summary versions. e. The operator presents its activities via presentations, dedicated websites and publicly available reports. The RB publishes its findings related to the performance of the licensee on governmental websites.
4.6 (106)	Post- Fukushima safety reassessments and action plans. a. All CP should perform a safety reassessment and the resolution of their findings should be progressed through a national action plan or other transparent means and should not be limited to NPPs in operation. b. Established safety networks should be efficiently used by CP to disseminate and share relevant information.	National organisations	xCNS	a. The Netherlands' RB produced the present NAcP and participates in all CNS and ENSREG-led efforts to enhance nuclear safety. In the Netherlands for all nuclear installations stress tests have been performed: research reactors, enrichment facilities and waste management facilities. The NPP Dodewaard which is in safe enclosure (fuel removed) was not considered relevant.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
				b. The RB participates in most relevant networks to share information.
4.7 (107)	Human and organizational factors (HOF) a. There is a need to further develop human resource capacity and competence across all organizations in the field of nuclear safety. b. Governmental level commitment is needed to ensure along-term approach is developed for capacity building. c. Collaborative work is needed in the area of improving and assessing HOF, including safety culture. d. The role of sub-contractors may be important; can they be harnessed quickly?	National organisations	xCNS	a. Recently the RB staffing (both NIV and KFD) has been strengthened and the staff receives dedicated training. The common project 'lessons learned Fukushima' and the self-assessment for the IRRS will promote the knowledge throughout the whole organisation of the RB. Licensee EPZ is in the process of further enlarging HR capacity and competence since the signing of the Covenant that allows Borssele to operate till 2034. As of November 2012, the NPP organisation has about 75 fte more than the organizational chart lists. This surplus is in initial training and/or in knowledge transfer phase. b. The long-term approach (capacity plan) will be evaluated in the IRRS self assessment and mission. c. The KFD is involved in OECD working group 'OECD/NEA WG HOF' . Licensee EPZ: HOF has been a focus point at Borssele NPP already for several years. INPO guides and practices (e.g. AP928, AP913) are introduced to improve on work management and

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
				preparation. Also a loop flow simulator is in development to practice worker and supervisor skills and behaviours. HOF are an explicit part of WANO Peer Reviews. The Borssele NPP had a WANO Peer Review last September-October (2012). d. The RB makes use of foreign TSOs. One of the future actions of KFD is to have TSO-support during the accident itself. Licensee EPZ addresses the contractor involvement in the HOF improvement program.
4.8 (133)	Public discussion of safety issues should be encouraged (Transparency)	National Organisations	xCNS	The RB endorses and practices this objective.
4.9 (134)	An open and trustful relationship between regulators, operators and the public with keeping in mind their respective roles and functions are essential.	National Organisations	xCNS	The RB endorses and practices this objective.
4.10 (135)	Recognizing differences in national cultures, each CPs should define appropriate actions to ensure that the desired safety culture characteristics are achieved in the regulatory and operational organizations.	National Organisations	xCNS	The RB endorses this objective. The supervision on safety culture at the operating organisation already is an important part of the yearly inspection programme. In the light of the self-assessment within the framework of the IRRS-mission special attention will be paid to explain the management of Safety Culture within the Regulatory Body.

5. Emergency Preparedness and Response and Post Accident Management (off site)

Off site emergency preparedness and response (EP&R) and post accident management (PAM) mainly is a national responsibility. Nevertheless utility's responsibility is also important especially regarding technical information on plant conditions and the potential risk for emissions.

Section 5.0 presents a general introduction to the EP&R and PAM in the Netherlands. The developments and actions regarding EP&R and PAM have been listed in a table, refer to section 5.1.

5.0 Introduction to organisation of EPR and PAM in the Netherlands

5.0.a Regulatory frame work - National Plan for Nuclear Emergency Management and Response, NPK

Chapter VI of the Dutch Nuclear Energy Act describes the responsibilities and tasks of the authorities that are responsible for nuclear emergency management (preparation and response)

Under Article 40 of the Act, the national government is responsible for the preparatory work and for actually dealing with any emergency that may occur in case of nuclear accidents. The operational structure of nuclear emergency preparation and response is described in the National Plan for Nuclear Emergency Management and Response: NPK[5] and the NPK Response Plan.

5.0.b Organisation - National Nuclear Assessment Team, EPAn

The key organization in this structure is the National Nuclear Assessment Team, ('EPAn')[6]. This team advises the policy teams on local and national level when there is a real threat of an off-site emergency in a nuclear installation or a radioactive release (in the Netherlands or in a neighbouring country). This team consists of a front-office, where the emergency situation is analysed and advice on measures is drafted, and back-offices for radiological, and medical information. The back-office for radiological information provides projected dose data on the basis of dispersion calculations and monitoring data concerning the environment, drinking water and foodstuff. It is located within the National Institute for Public Health and the Environment (RIVM[7]). RIVM operates the national radiological monitoring network (NMR[8]) and in addition monitoring vans. It also collects data from other institutes. Alongside the radiological experts, the inspectorate of the nuclear regulatory body (KFD) has an important role in assessing the status of the relevant nuclear installation, the accident prognoses and the potential source term. In addition, KFD inspectors go to the nuclear installation to closely monitor the events and support the oversight process.

5.0.c Training and exercises and their organisation

Based on the NPK, the Dutch training and exercise programme for nuclear emergency management and response is based on a four-years training- and exercise-cycle that is implemented in the annual programmes. Training is organized for different topics e.g. the use of

[5] Dutch: 'National Plan Kernongevallenbestrijding', NPK
[6] Dutch: 'Eenheid Planning en Advies nucleair', EPAn
[7] Dutch: 'Rijksinstituut voor volksgezondheid en milieu', RIVM
[8] Dutch: 'Nationaal Meetnet Radioactiviteit', NMR

Emergency Information and Decision Support Systems, and some exercises. A full scale exercise is planned approximately every five years. In these national exercises the interaction between generic national emergency management structures and nuclear emergency management and response are integrated.

Officials of different departments and organisations of the National Nuclear Assessment Team (EPAn) participate in exercises and trainings. They all have their own expertises and roles during such an exercise and during an actual accident-response. Examples of such roles are performing radiological/technical analyses, advising on health aspect, etc.

Nuclear and radiological training and exercises are organised by the Ministry of Infrastructure and the Environment (IenM/ILT), under the responsibility of the Ministry of Economic Affairs (EZ). The Ministry of Safety and Justice is responsible for the generic national response-organisation and for exercises to train this organisation. Ministries work together in the organisation of integrated large scale exercises.

5.1 Tabled summary of items reported

Table 5-1 **Tabled summary of items reported for 'Emergency Preparedness and Response and Post Accident Management off-site'**
In the first column, the original numbering of ENSREG observations (items) is found between parentheses, combined with a code with the format '5.x' which results from a renumbering per theme by the Dutch RB.
The second column presents the ENSREG observations, the third column gives the associated Theme, and the fourth the source of the observation.
The fifth column presents the reflections of the Dutch RB on the ENSREG observations, the Action numbers mentioned in the reflections refer to Part IV of this NAcP, where these national Actions can be found with their planning.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
5.1 (108)	Expansion of the set of scenarios on which the plan was based – NPP PLUS Infrastructure / NPP PLUS chemical plant	EP&R	xCNS	External threats other than nuclear facilities (e.g. transport, chemical plants) have been considered in safety assessments, up to certain levels of severity in the process of licensing the NPP. In the EP&R multiple scenarios, multiple units (there is only one NPP) and damage of infrastructure are not fully taken into account yet. Action: Damage to infrastructure (hampering EP&R activities) is subject to renewed evaluation in the light of post-Fukushima learning.
5.2 (109)	Increasing the scope of off-site exercise programs to reflect NPP plus external infrastructure simultaneous problems	EP&R	xCNS	Under consideration.
5.3 (110)	Blending mobile resources into planning and drill programs	EP&R	xCNS	Mobile monitoring equipment is included in exercising; other mobile equipment eg. diesel engines or fuel tanks can be supported in the framework of the national mechanism assistance program from the ministry of Defence ("ICMS"). Licensee EPZ has annual exercises together with the armed forces, simulating harsh conditions.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
5.4 (111)	Increasing emphasis on drilling with neighbouring countries	EP&R	xCNS	On a regular base, several national exercises in NL or the bordering countries are joint exercises. Bilateral exercise planning and organization is ongoing.
5.5 (112)	Exercising all interface points (national, regional, municipal,…)	EP&R	xCNS	During exercise and training all interface points are involved.
5.6 (113)	Performing of longer term exercises to reflect the challenges of extreme events	EP&R	xCNS	In NL every year a national exercise is preformed. Extreme events like high tides/flooding, extreme weather, forest fire, loss of electricity, cyber crime etc. are part of the exercises.
5.7 (114)	Enhancing radiation monitoring and communication systems by additional diversification / redundancy		xCNS	The Netherlands has an extensive radiation monitoring network. There are several communication systems available in crisis situations, providing redundancy and diversity. The communication via the National Radiation Monitoring Network proved to be robust in the assessment in 2009. Redundant power supply, telephone lines, dedicated internet etc. communication is available. Expansion of mobile monitoring equipment is ongoing. Assessment for further improvement of monitoring and communication systems is ongoing (post-Fukushima).
5.8 (115)	Development of a common source term estimation approach	EP&R	xCNS	This is being developed by a Working Group with participation by licensee EPZ, inspectorate KFD and governmental institute RIVM (National Institute for

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
				Public Health and the Environment).
5.9 (116)	Provide access to a "big picture" (international picture) of radiological conditions	EP&R	xCNS	There are no dedicated arrangements; USIE (Unified System for Information Exchange in Incidents and Emergencies) and ECURIE (European Community Urgent Radiological Information Exchange) information exchange and sharing of information with other RBs are the common sources of information.
5.10 (117)	Development of reference level for trans-border processing of goods and services such as container transport	EP&R	xCNS	Some international reference levels are available. Further policy development is ongoing.
5.11 (118)	Re-examination of approach and associated limits to govern the "remediation" phase	EP&R	xCNS	Framework and mechanism for remediation and recovery is developed. Further implementation and policy development is ongoing.
5.12 (119)	Develop criteria for the return to evacuated area and criteria for return to normal from emergency state	EP&R	xCNS	Refer to ENSREG No. 5.11 (118) of this table.
5.13 (120)	Improvement of the approach to establish contamination monitoring protocols and locations during the recovery phase	EP&R	xCNS	Refer to ENSREG No. 5.11 (118) of this table.
5.14 (121)	Hardening of support infrastructure (Emergency Response Centers, Sheltering facilities, essential support facilities (like Corporate Offices) with back-up power, environmental radiological filtering, etc.	EP&R	xCNS	The National Operational Coordination Centre ("LOCC") organises operational and logistic assistance and facilities.
5.15 (122)	Analyzing medical and human aspects of response to support Emergency workers	EP&R	xCNS	Back-Office Health Information is involved.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
5.16 (123)	Implementation of processes to enable access to inter-country support including customs processes for access for diplomats and emergency response personal	EP&R	xCNS	Improvement is under consideration.
5.17 (124)	Systematic assessment of all aspects of organizations that contribute to emergency response using tools like job and task analysis	EP&R	xCNS	Improvement is under consideration.
5.18 (125)	Develop radiological reference levels for rescue and emergency response personnel in extreme events	EP&R	xCNS	Such reference levels are documented in Dutch regulations, like 'Besluit Stralenbescherming' and 'Responsplan NPK'.
5.19 (126)	Develop reference levels for the application of immediate countermeasures such as sheltering, iodine distribution and evacuation	EP&R	xCNS	These have been documented in the official ' Responsplan NPK'.

6. International Cooperation

Section 6.0 presents a general introduction to contributions of the Netherlands to international cooperation. The developments and actions regarding this topic have been listed in a table, refer to section 6.1.

6.0 Introduction to contributions of the Netherlands to international cooperation

The regulatory body in the Netherlands has always participated in the most important international organisations like OECD/NEA, IAEA and Euratom. Also the Netherlands is a 'Contracting Party' to various (nuclear safety-related) conventions.

International cooperation

Regular exchange meetings are taking place with Germany and Belgium, also in relation with post-Fukushima Dai-ichi lessons learned. Other ways of communications are established through the incident reporting and communication channels that are well established (e.g. IAEA/NEA IRS[9], IRSRR[10], INES, NEA/CNRA/WGPC[11]).

International organisations, apart from the above mentioned, with which there is cooperation are for instance WENRA, ENSREG, EUROSAFE Forum, HERCA[12] and NERIS[13].

The regulatory body in the Netherlands participates in working groups of IAEA (Safety Standard Committees), WENRA (reactor harmonisation working group), and ENSREG (nuclear safety, decommissioning/waste). There is also cooperation in various OECD/NEA committees like the NEA/CSNI[14] and NEA/CNRA[15] and their working groups. Examples of CNSI-groups are WGFS, WGAMA, WGRISK, WGHOF, and WGIAGE. CNRA-groups are WGIP and WGOE.

Peer reviews

International peer reviews have always been part of the strategy for improvement. Regularly OSART (once in 10 years) and INSARR missions are invited. Also there is a lot of experience with other missions like IPSART, AMAT/SALTO, IPPAS, and Waste Safety Appraisal. In 2014 there will be an IRRS mission. Members of the regulatory body have participated in several IRRS missions to France, Germany and Sweden.

[9] IRS: IAEA and OECD/NEA Incident Reporting System, using operational experience to improve safety
[10] IRSRR: Incident Reporting System for Research Reactors at the IAEA
[11] NEA/CNRA/WGPC: Working Group on Public Communication of Nuclear Regulatory Organisations
[12] HERCA: Heads of the European Radiological protection Competent Authorities
[13] NERIS: European platform on preparedness for nuclear and radiological emergency response and recovery
[14] CSNI: Committee on the Safety of Nuclear Installations
[15] CNRA: Committee on Nuclear Regulatory Activities

6.1 Tabled summary of items reported

Table 6-1 **Tabled summary of items reported for Topic 6 – International Cooperation**[16].
In the first column, the original numbering of ENSREG observations (items) is found between parentheses, combined with a code with the format '6.x' which results from a renumbering per theme by the Dutch RB.
The second column presents the ENSREG observations, the third column gives the associated Theme, and the fourth the source of the observation.
The fifth column presents the reflections of the Dutch RB on the ENSREG observations, the Action numbers mentioned in the reflections refer to Part IV of this NAcP, where these national Actions can be found with their planning

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
6.1 (127)	Strengthening the peer reviews process of CNS and of missions (IAEA, WANO and Industry) a Effectiveness of IAEA peer review processes should be reviewed in response to concerns raised by the public and Non Governmental Organizations. b. The CNS national reports should include how peer review and mission findings have been addressed. c. Processes and initiatives should be strengthened to ensure implementation of findings of the peer review and missions. d. CNS review meetings should ensure robust peer reviews and reporting of peer review results and findings.	International cooperation	xCNS	The RB endorses this objective. RB and licensee are in their respective roles involved in the Peer Review process of CNS, IAEA activities, WANO evaluations and missions etc. a. The RB endorses efforts to improve the process. b. The Dutch CNS reports have addressed the topic of Peer Review in much detail to disseminate this concept and its benefits. In future CNS reports the findings and their resolution will be presented. c. The RB already incorporates the findings of international peer review efforts in its own national evaluations and actions. Almost all

[16] Several of the actions mentioned in this and other tables of the report are related to the IAEA action plan.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
				IAEA missions are organised by the RB as part the supervision strategy. The RB will study possibilities to strengthen further the implementation of measures. d. The Dutch RB endorses this intention.
6.2 (128)	Strengthening the peer reviews process of CNS and of missions (IAEA, WANO and Industry) - continue e. Plant design safety features and related modifications should be considered in WANO and OSART missions. f. Better coordination of WANO and IAEA peer review activities should be established. g. International experience gained from the review of Russian designs after Chernobyl could be considered as an example of good international practice.	International cooperation	xCNS	e. The Dutch RB and NPP-licensee endorse this intention. f. Coordination of missions is essential for keeping them effective & efficient and prevent unnecessary burden on human resources of licensees and RB. WANO and IAEA have concluded an agreement. The Dutch RB will take into account coordination in the planning of future missions. g. The Dutch RB agrees with this statement.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
6.3 (129)	Optimisation of the Global Safety Regime a. Primary responsibility for safety remains with operators. b. The collective responsibility of the various institutions and organizations should be optimized. c. The growing number of international meetings, assessments, peer reviews and expanding mandates is placing high demands on existing human resources, which may become counter productive. d. Efforts should be continued to reduce duplication of initiatives and actions by various organizations such as IAEA, NEA, EU, WANO, etc. e. The respective roles and objectives of the various organizations, institutions and missions should be recognized in the optimization process.	International cooperation	xCNS	a. This is the basis of most regulatory frameworks and thus also applies to the Dutch situation. It should be ensured this principle applies globally. b. The Dutch RB endorses this statement. c. The Dutch RB agrees with this statement. d. The Dutch RB endorses this statement. e. The Dutch RB endorses this statement.
6.4 (130)	Strengthening communication mechanisms through regional and bilateral cooperation a. Initiatives relating to the Regional Crisis center for operators of NPPs with VVER type reactors as being implemented by Moscow WANO Center and also considered by some other vendor countries. b. Bilateral agreements between vendor countries and new embarking countries, complemented by IAEA Standards and review processes, have been reported to be effective and should be encouraged. c. Strong support of political leaders is important to establish the necessary nuclear safety infrastructure. d. Countries with established nuclear programmes should assist with the establishment of nuclear and regulatory infrastructure. e. Countries should cooperate with neighbouring and regional countries and exchange information on their civil nuclear power programmes.	International cooperation	xCNS	The Dutch RB endorses this objective. a. The Dutch RB agrees with statement b. The Dutch RB agrees with statement c. The Dutch RB agrees with statement d. The Dutch RB agrees with this statement. Countries with established nuclear programmes already contribute to the establishment of infrastructure elsewhere by disseminating their experience, publishing their regulation and actions on the

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
				internet and participating in various international processes. The Netherlands has a small nuclear programme and a dedicated but lean RB. Its contribution to international assistance programs is expected to be constrained by the allocation of resources to national day-to-day duties and international processes under the CNS, ENSREG activities, IRRS and the like. Action: The RB in the Netherlands will undergo an IRRS mission for the first time in 2014 (follow-up in 2017). This will claim a considerable part of available resources at the RB. e. The RB agrees with this statement. Examples of the Dutch activities are participation in activities in WENRA, ENSREG and other EU activities like the EU HERCA WG Emergencies. Also bilateral contacts with neighbouring countries Belgium and Germany on EP&R are frequent.

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
6.5 (131)	Effectiveness of experience feedback mechanisms a. Information exchange and feedback should be enhanced by using the established mechanisms (eg. IRS, INES) and organisations (eg. WANO). b. The sharing and utilisation of information is limited and not always necessarily well coordinated or disseminated. This has been identified as an area for improvement. c. All nuclear power plants should share Operating Experience. d. The current focus is on reporting events and not necessarily on learning from the events. Effectiveness of Operating Experience Feedback should be assessed and its implementation should be included in peer reviews.	International cooperation	xCNS	a. The Dutch RB and licensees already use these mechanisms. b. The RB agrees that sharing and utilization of information can be improved. The Dutch RB will seek gradual increase dissemination of information. c. The single operating NPP in the Netherlands is part of the WANO and the German VGB network. The operator actively collects relevant information from workshops, conferences and regular participation in experience feedback working groups like WANO and VGB. German full phase out by 2022 will hamper the option VGB. Therefore the NPP is considering becoming a member of the WH-owners group. The Dutch RB will evaluate the possibility to increase exchange of information with other regulators of German design plants like Spain and Switzerland. d. In the Netherlands the focus is on learning from events. The RB will evaluate the

ENSREG No.	Measure / Requirement identified by ENSREG / xCNS	Theme	Source	NL Implementation
				possibility to increase the feedback on improvements in the Netherlands.
6.6 (132)	Strengthening and expanded use of IAEA Safety Standards a. The Safety Fundamentals remain appropriate as a sound basis for nuclear safety when properly implemented. b. Implementation should strike the right balance between prevention and mitigation. c. The IAEA Safety Standards should be taken into account in developing national nuclear safety regulations. d. These Safety Standards have a role to play in seeking continuous improvements to safety at existing nuclear power plants.	International cooperation	xCNS	The RB endorses the statement. a/b. The nuclear safety framework in the Netherlands is under review. The question to incorporate the Safety Fundamentals is being discussed. c. IAEA Safety Standards, they are the basis for parts of the Netherlands' nuclear regulation. d. Continuous improvement already is incorporated in the national framework through the implementation of the EU-Nuclear Safety Directive.

PART III Additional Topics

7. Specification of Additional Topics

7.0 Introduction

This chapter addresses topics, not identified in the ENSREG-led Peer Review or the Extraordinary Meeting of the CNS, but that have been identified in the national review.

7.1 Tabled summary of items reported on 'Additional Topics'

All Actions on the part of the Regulatory Body (RB) can be found in a table in Part IV of the present report. The next table presents Actions on the part of licensees in the Netherlands. However, all Actions on the part of the licensee of the NPP already have been addressed in Part I and II, and their planning can be found in Part IV of the present report. The Actions listed below extend to all licensees, so also to those not operating the NPP.

Table 7-1 **Additional Topics regarding licensees, specific for the Netherlands and not inventoried or listed by ENSREG and/or CNS**

No.	Measure / Requirement
1	All licensees with nuclear installations have undertaken a Complementary Safety Assessment (a.k.a. stresstest) to assess the robustness of their facilities. This applies to waste management facilities, research reactors, nuclear research laboratories, and the enrichment plant

PART IV Implementation of Activities

8. Specification of the Implementation of Activities

8.0 Introduction

This chapter presents the measures agreed with or imposed on the licensee (EPZ). It also details their planning and status. In addition it presents a numbered list with Actions on the part of the Regulatory Body (RB).

8.1 Tabled summary of national implementation of post-stress test actions

This section features two tables, one table with the Actions initiated by or imposed on licensee EPZ, and another table with Actions mainly related to the functioning of the Regulatory Body (RB).

Table 8-1 **National post-stress test Actions – initiated by or imposed on Licensee EPZ (operator of one NPP unit)**.
This is the official national list of Actions. Mx-, Px- and Sx- numbers between parentheses refer to original list of proposed measures of licensee EPZ. Other numbers in between parentheses: NR refers to section in National Report (2011), PR refers to section in Peer Review Report (2012).

NL Action No.	Topic	Action / Activity	Related Recommendation No. on European Level	Status	Finalization
1 (M1)	design issues	Emergency Response Centre (ERC) - study and consider options to better protect ERC like alternative location ERC, new building, strenghtening current building etc.	1, 8, 22, 27, 32, 44	in progress	end 2014
2 (M2)	design issues	Storage facilities for portable equipment (needed for accident management), study and consideration of options to improve resistance against external hazards	1, 8, 27, 32, 44	in progress	end 2014
3 (NR 7.3.1)	design issues	Improvement of accessibility under extreme conditions	32, 44	in progress	end 2014
4 (PR 4.2.4.2)	SAM	Analysis of potential doses to workers	22, 32, 43, 44	in progress	April 2013
5 (NR 6.1.5)	SAM	Reassessment of ERO Staffing regarding its adequacy 24/7	35	in progress	eval March-2013 impl end-2013
6 (M3)	SAM	A possibility for refilling the spent fuel pool without entering the containment - this will increase the margin to fuel damage in certain adverse containment conditions.	23	implemented	end-2012

NL Action No.	Topic	Action / Activity	Related Recommendation No. on European Level	Status	Finalization
7 (M4)	SAM	Additional possibilities for refilling the spent fuel pool - this will increase the number of success paths and therefore increase the margin to fuel damage in case of prolonged loss of spent fuel pool cooling.	23	in progress	end-2013
8 (NR 7.3.1)	SAM	Improvement of possibilities to sustain cooling SFP - *this is covered under action 7 (M4).*		refer to 7	
9 (M5)	SAM	Reduction of the time necessary to connect the mobile diesel generator to Emergency Grid 2 to 2 hours - this will increase the margin in case of loss of all AC power supplies including the SBO generators.	15, 26	in progress	apr-13
10 (M6)	SAM	Establishing ability to transfer diesel fuel from storage tanks of inactive diesels to active diesel generators. Phase 1: emergency grid 1 EDGs, Phase 2: remaining diesels.	15, 17	in progress	mid-2014
11 (M7)	SAM	Establishing independent voice and data communication under adverse conditions, both on-site and off-site, would strengthen the emergency response organisation. Includes evaluation current means, procurement satellite communication apparatus, and arrangements with Ministry of Defence.	35	in progress	end-2013
12 (M8)	design issues	Ensuring the availability of fire annunciation and fixed fire suppression systems in vital areas after seismic events - this will improve fire fighting capabilities and accident management measures that require transport of water for cooling/suppression.	7, 32	in progress	studies mid-2014 impl's end-2016

NL Action No.	Topic	Action / Activity	Related Recommendation No. on European Level	Status	Finalization
13 (NR 7.3.1)	design issues	Quality fire fighting systems buildings 01/02 and 35 for a DBE. *This is covered under action 12 (M8).* [The fire fighting systems in buildings 01/02 (dome) and 35 (backup control room) are not designed for operability after occurrence of the design base earthquake (DBE). To enhance their reliability after a DBE they should be qualified. However, any enhancement should be based on the results of the proposed advanced seismic analysis. This position is linked to licensee's proposal S3 (Action 33) but also (for implementation) to its measure M8 (Action 12).]		refer to 12	
14 (M10)	design issues	Ensuring the availability of the containment venting system TL003 after seismic events - this will increase the margin in case of seismic events.	3, 31, 32, 48	in progress	studies end-2013 impl's end-2016
15 (NR 7.3.1)	design issues	Technical and organisational improvement of availability under earthquake conditions of systems for containment filtered venting and fire fighting - should be based on results of advanced seismic analysis. *This is covered in actions 12 (M8) and 14 (M10).*		refer to 14 & 12	
16 (M9)	design issues	Increasing the autarky-time beyond 10 h - this will increase the robustness of the plant in a general sense.	16	in progress	studies end-2012 impl's end-2016
17 (NR 7.3.1)	design issues	Increasing the autarky time beyond 10 hours (M9). Further study to define its proper implementation. *This is covered in action 16 (M9).*		in progress	Sep-13

NL Action No.	Topic	Action / Activity	Related Recommendation No. on European Level	Status	Finalization
18 (M11)	design issues	Wave protection beneath the entrances to the bunkered back-up injection- and feedwater systems and to the bunkered emergency control room - this will mitigate the sensitivity to large waves combined with extreme high water and will make the plant fully independent from the dike.	8	in progress	mid-2013
19A (P1)	SAM	Develop set of EDMGs and implement training program (phase 1)	17, 27, 29, 30, 32, 45	in progress	end-2013
19B (P1)	SAM	Develop set of EDMGs and implement training program (phase 2)		in progress	end-2013
20 (NR 7.3.2)	SAM	Developing set of EDMGs - This is covered in action 19A and 19B		refer to 19	
21 (P2)	SAM	Training of the procedure to ensure water supply during mid-loop operation and loss of AC power	19	implemented	end-2012
22 (PR 3.3)	SAM	Prepare and validate capabilities to cope with SBO during mid-loop operation.	19	in progress	study end-2012 impl's end-2013
23 (P3)	SAM	Develop check-lists for plant walk-downs and the necessary actions after various levels of the foreseeable hazards		in progress	extr weather & flooding: Jan 2013. earthquakes: May-2014
24 (NR 6.1.5)	SAM	Training of long term SAMG measures	34, 47	in progress	study end-2013 training March-2015
25 (PR	SAM	Develop specific SAMG for SFP	34, 47	in progress	end-2013

NL Action No.	Topic	Action / Activity	Related Recommendation No. on European Level	Status	Finalization
4.2.2.2)					
26 (PR 4.2.4.2)	SAM	Improvement of SAMGs and EOPs focusing on long term accidents. Operator EPZ will also become member of the Westinghouse Owner Group	33, 34, 47	in progress	end-2013
27A (NR 7.3.2)	SAM	Assessment of the need to upgrade equipment and/or instrumentation dedicated to SAM purposes (hardened core approach). Part A includes: study increasing robustness existing equipment & study protection of equipment against BDB extreme hazards	1, 17, 18, 32, 33, 47	in progress	end-2013
27B (NR 7.3.2)	SAM	Assessment of the need to upgrade equipment and/or instrumentation dedicated to SAM purposes . Part B includes study of accessibility of locations for manual operation, including relocation options.	1, 17, 18, 29, 32, 33	in progress	end-2013
27C (NR 7.3.2)	SAM	Assessment of the need to upgrade equipment and/or instrumentation dedicated to SAM purposes. Part C includes study of periodic test/inspection programs for equipment & of well defined and trained procedures to use the equipment.		in progress	end-2013
28 (NR 7.3.2)	SAM	Develop set of clear criteria to provide a basis for deciding when to switch the turbine oil pump off to increase the battery time. Disabling this pump will damage the turbine		implemented	end-2012

NL Action No.	Topic	Action / Activity	Related Recommendation No. on European Level	Status	Finalization
29 (S1)	SAM	Study of a reserve SFP cooling system independent of power supply. This is also addressed in action 7 (M4).	19, 23	in progress	study end-2013 impl's end-2016
30 (S2)	design issues	Investigate measures to further increase the safety margins in case of flooding (survey & analysis). When needed, proposal for modifications and implementation.	13	in progress	study end-2012 impl's end-2016
31 (NR 7.3.3)	design issues	Study flooding - this is covered by action 30 (S2).		refer to 30	
32 (PR 2.3.3)	design issues	Study super storms - this is covered by action 30 (S2).		refer to 30	
33 (S3)	design issues	Study Seismic Margin Assessment, this includes various studies: Study SMA and SPSA methods Evaluation KNMI: Recommendation study 'Seismic Hazard in context IAEA' Drafting of proposal SMA Determining RLE Undertake SMA	7, 13, 23	in progress	end-2013
34 (NR 7.3.3)	design issues	Study SMA - this is covered by action 33 (S3)		refer to 33	
35 (PR 2.1.3)	design issues	Consider update hazard assessment, including DBE and liquefaction. *This is covered by action 33 (S3)*		refer to 33	

NL Action No.	Topic	Action / Activity	Related Recommendation No. on European Level	Status	Finalization
36 (S4)	design issues	Study on strengthening off-site power supply, includes studies and when needed implementation.	15	in progress	end-2013
37 (S5)	design issues	Study more extensive use of steam for powering an emergency feed water pump; includes studies and when needed implementation.	15	in progress	studies end-2013 impl's end-2016
38 (S6)	design issues	Study impact aircraft impact on safety functions		in progress	end 2013
39 (S7)	design issues	Study hydrogen threat to containment. The NPP has ample provisions to deal with this threat. Nevertheless additional studies will be undertaken.	31	in progress	March 2014
40 (NR 7.3.3)	SAM	Water accumulation if drain pipes are blocked during fire fighting; studies and when needed implementation of measures. The studies will also cover prevention of freezing of underground piping, other weather related hazards.		in progress	mid-2014
41 (PR 2.3.3)	design issues	Study freezing of underground piping, operation of diesels in cold conditions, effects of snow. *This is covered in action 40.*		refer to 40	
42 (NR 5.1.5)	SAM	Study amount of lubrication oil (for diesels) in crisis situations	17	in progress	mid-2014
43 (NR 5.1.5)	design issues	Re-assessment of alternative power sources (alternative to emergency grids). This includes planning and implementing extra external connection points for mobile diesel generator and the fire fighting system (water supply)	15, 16, 22, 26	in progress	Jan-14

NL Action No.	Topic	Action / Activity	Related Recommendation No. on European Level	Status	Finalization
44 (PR 4.2.4.2)	SAM	Better arrangements for mobile diesel generators and batteries. This includes study of small emergency power generators or fuel cells as a means for recharging or backup power. Possibly also instructions for recharging or switching to such power sources.	16, 22, 26	in progress	study mid-2013 impl end-2013
45 (NR 6.4.3)	SAM	Study of procedures for handling of large amounts of radioactively contaminated water. Includes study & when needed implementation.		in progress	study mid-2013 impl end-2013
46 (PR 4.3)	SAM	Unambiguous tagging of keys of rooms in bunkered building (ECR). Keys will be numbered and the necessity of having SAMG documentation in the ECR will be evaluated.		implemented	2012

Table 8-2 **National post-stress test actions – acting on and initiated by the national RB**

NL Action No.	Topic	Action / Activity	Related Recommendation No. on European level	Status	Finalization
RB-4.001	national organisation	The RB is drafting requirements for the design and construction of new nuclear reactors - they will be implemented in the regulatory framework.	101	in progress	draft 2013 final 2014
RB-4.002	national organisation	The RB is in the process of drafting requirements related to internal & external hazards - they will be implemented in the regulatory framework.		in progress	draft 2013 final 2014

NL Action No.	Topic	Action / Activity	Related Recommendation No. on European level	Status	Finalization
RB-4.003	national organisation	The RB is studying new financing mechanisms for handling of license applications and supervision.	102	in progress	2014
RB-4.004	national organisation	RB evaluation in the framework of the IRRS self assessment and coming IRRS mission. In the self-assessment the RB will take notice of the xCNS summary 'Action oriented objectives for strengthening Nuclear Safety'.	102	in progress	2014
RB-4.005	national organisation	Consequences of German phase out. The Dutch RB will study the possible long term impact of the German phase out on the operation of the German-design Dutch NPP. The Dutch RB will evaluate the possibility to increase exchange information with other regulators of German design plants like Spain and Switzerland.	131	in progress	2014
RB-4.006	national organisation	In the light of the self-assessment within the framework of the IRRS-mission special attention will be paid to explain the management of Safety Culture within the Regulatory Body.	135	in progress	end 2013
RB-4.007	national organisation	The Netherlands is implementing the IAEA action plan. A number of actions are already practice, like the adoption of the IAEA-regulations, the IAEA missions, and evaluation and strengthening of EP&R.		in progress	no end date

NL Action No.	Topic	Action / Activity	Related Recommendation No. on European level	Status	Finalization
RB-4.008	national organisation	Taking into account the European developments on this matter, research is in progress into clearance levels and protocols for measurement, decontamination and clearance, applicable to clearance of containers and other materials		in progress	end 2013
RB-5.001	EP&R	Planning and organisation of bilateral exercises with Belgium and Germany is ongoing.	111	in progress	no end date
RB-5.002	EP&R	Damage to infrastructure (hampering EP&R activities) is subject to renewed evaluation in the light of post-Fukushima learning	108	in progress	no end date
RB-6.001	international cooperation	Drafting and publishing national report for CNS 2014		planned	August 2013
RB-6.002	international cooperation	EU/ENSREG, participation in Peer Review Workshop regarding National Action Plans (post Fukushima measures)		planned	April 2013
RB-6.003	international cooperation	EU/ENSREG, participation in workshops 'Natural Hazards' and 'Emergency response', publication guidance documents planned for review.		planned	Nat Haz, June 2013 Em zones, March 2013
RB-6.004	international cooperation	Harmonisation effort with neighbouring countries regarding emergency countermeasure zones (and associated intervention levels) and responses		planned	2014
RB-6.005	international cooperation	Two workshops of Dutch RB with peers in Belgium (FANC)		planned	2013
RB-6.006	international cooperation	Collaboration in international forums is continued	101	in progress	no end date

NL Action No.	Topic	Action / Activity	Related Recommendation No. on European level	Status	Finalization
RB-6.007	international cooperation	cooperation with foreign TSOs		in progress	no end date

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