



РОСЭНЕРГОАТОМ

ЭЛЕКТРОЭНЕРГЕТИЧЕСКИЙ ДИВИЗИОН РОСАТОМА

Changes in emergency situation management at Russian NPPs made after the Fukushima accident

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Updating of safety issues

Events at Fukushima NPP in Japan

Level 7
on INES scale



Insufficient
efficiency of
measures taken to
exclude severe
accidents



Impact of
extreme external
events of natural
origin and their
combinations

New impulse to nuclear power plant
safety review at global level



Actions resulting from the analysis of NPP resistance and 'stress-tests'

2011

U r g e n t

ОЦЕНКА



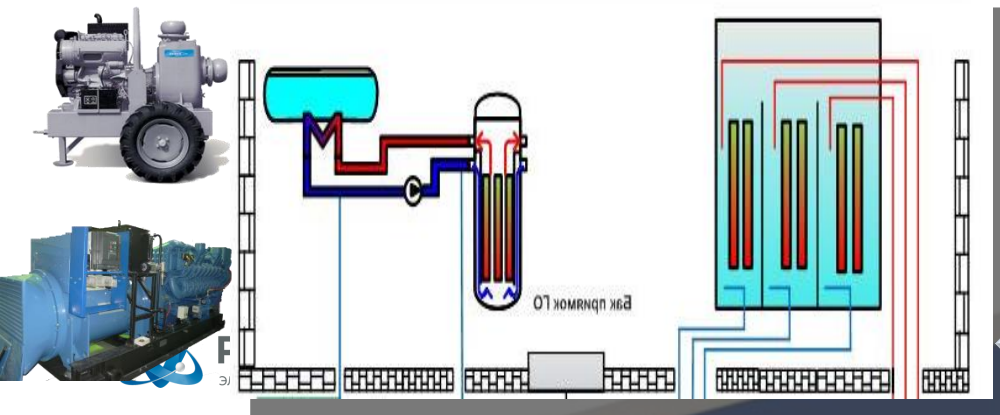
2012

S h o r t - t e r m



2014 – 2016

L o n g - t e r m



M e d i u m - t e r m



2013

Measures to improve accident management preparedness

- Implementation of additional emergency equipment for emergency water and power supply at nuclear power plants;
- Confining system reliability improvement;
- Provision of nuclear power units with ‘emergency’ I&C, designed to operate under BDBA conditions;
- Implementation of emergency and post-accident sampling;
- Analysis of feasibility and expediency for implementation of the reactor pressure vessel outer cooling;
- Enhancement of main control room and emergency control room protection;
- Qualification of safety system components for ‘harsh’ environmental conditions;
- Improvement of the emergency response interaction system;
- Development and implementation of Guidelines for severe accident management;
- Improvement of personnel competences and preparedness



Implementation of mobile emergency equipment at nuclear power plants

Comprehensive emergency exercises were conducted at Kursk and Kalinin NPPs with successful demonstration of new emergency equipment



Supplied for 10 nuclear power plants of Russia in 2012



29

Mobile diesel-generators
2,0 MW (6kV;
0,4 kV; 220V DC)



36

Mobile diesel-generators
0,2 MW (0,4 kV)



35

High pressure mobile
pumping units of different
capacity and head



80

Monoblock pumps of
different capacity and head



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TOTAL: 180 pcs.

Ensuring availability of additional emergency equipment

Preparation of mobile equipment

Tests of mobile facilities supplied at NPPs were performed.

Operating documentation was developed.

Preparation of conditions for use of mobile equipment

Diagrams for temporary use were developed for BDB accident management.
Implementation of design connection diagrams

Areas were prepared for its storage and use during BDB accident management.
Personnel training on its use was conducted

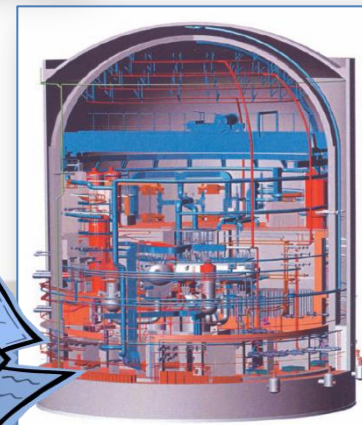
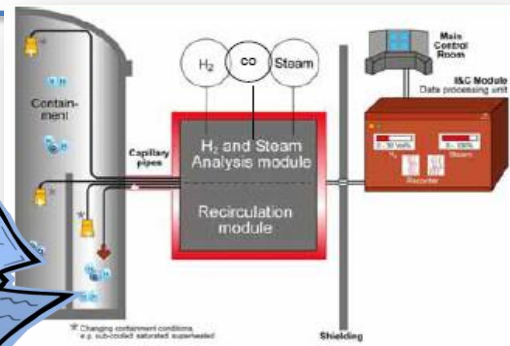
Availability of mobile equipment for BDBA management

Additional emergency facilities are being installed using special equipment (time for deployment and connection: 1,5-3 h.).

Conduct of maintenance operations, periodic checks and tests with water supply, according to regulations.



Documentation development and implementation of additional design solutions



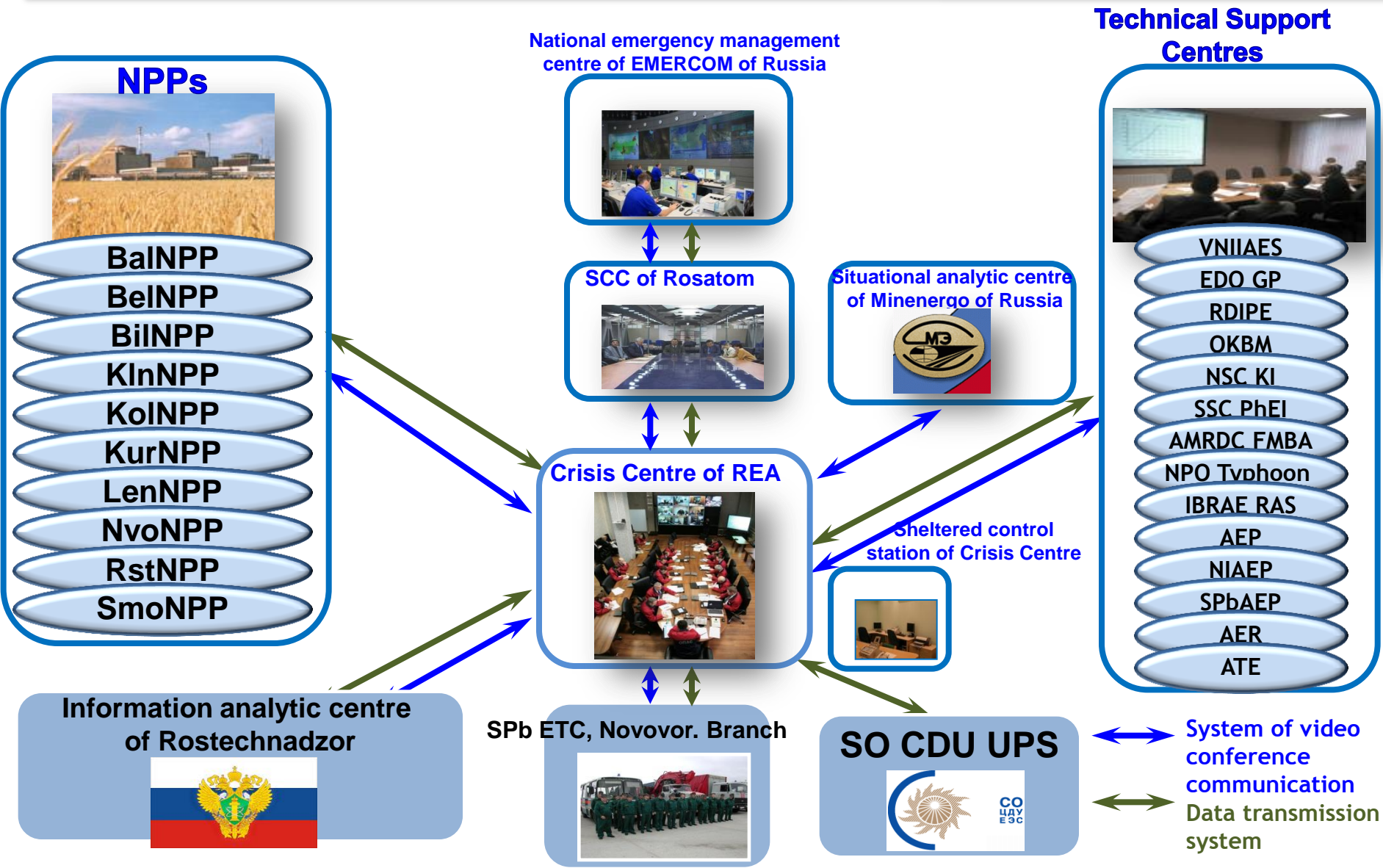
Measures for improvement of the emergency response interaction system



- Creation of the state-of-the-art digital radio communication system of 'TETRA' standard at NPPs and in the CC
- Creation of standby software and hardware systems for data transmission at NPPs and in the CC
- Creation of mobile control stations and communication centres at NPPs
- Creation of a WANO MC Regional Crisis Centre



Emergency response system of Russian nuclear power plants



Management Stations

Headquarters

Crisis Centre

Mobile communication station

Sheltered management station of Concern

At NPPs

Sheltered station for management of on-site emergency actions with internal EC

Mobile management station of the Emergency Response Manager

Sheltered station for management of emergency actions in the town near NPP with external EC

Sheltered station for management of emergency actions in NPP area



Crisis Centre of JSC Concern Rosenergoatom

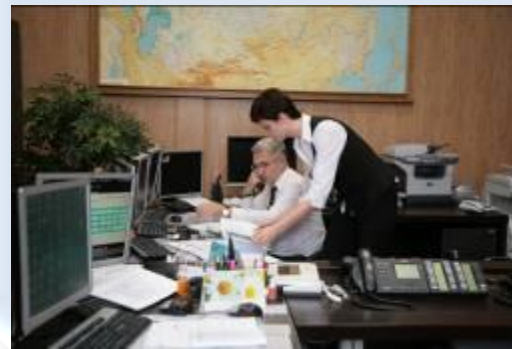
WORKING AREAS OF NPP ASSISTANCE GROUP



MOBILE COMMUNICATION STATION OF NPP ASSISTANCE GROUP



DISPATCHING CENTRE



SHELTERED MANAGEMENT CENTRE OF CONCERN



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Technical support centres

TSC of Scientific project managers

Kurchatov Institute
(Moscow)

FEI (Obninsk)

TSC of Chief designers

NIKIET (Moscow)

Gidropress
(Podolsk)

OKBM (N.Novgorod)

TSC of Architect engineering organizations

AEP (Moscow)

SPbAEP (St-Petersburg)

NIAEP (N.Novgorod)

TSC of radiation safety and meteorology

IBRAE RAN (Moscow)

NPO Typhoon
(Obninsk)

FMBTs (Moscow)

TSC of scientific manager for operations

VNIIAES (Moscow)

TSC of support organizations

Atomenergoremont
(Mytischki)

Atomtechenergo
(Mytischki)



Improvement of communication system

Creation (modernization) of mobile control stations and mobile communication stations for emergency response managers and NPP assistance group (OPAS) manager



Emergency drills and exercises



The OPAS group drills and exercises are used to practice:

- ✓ Actions in case of events similar to Fukushima accident;
- ✓ Use of emergency facilities at NPP;
- ✓ Actions in case of loss of communication channels between the Crisis Centre and NPP.

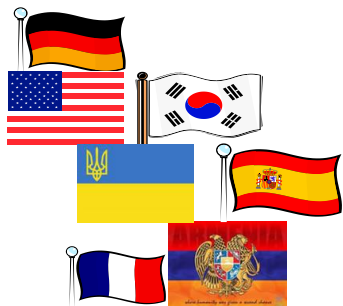


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Comprehensive emergency exercise (CEE) in 2013 at Kalinin NPP

During CEE:

- The Regulation for RCC and Regulation for Information Exchange were used as a basis for training;
- All purchased mobile emergency facilities were tested;
- 15 international observers participated in the exercise



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Actions for development and improvement of emergency response documents

Emergency response documents were reviewed for completeness and adequacy of specified actions

The emergency procedures EOP (AMP and SAMG) were updated based on the review results and in the course of additional design solutions implementation;

Severe BDBA operator action cards were developed and implemented at all NPPs (2012)

Generic severe accident management guidelines (SAMG) for VVER-1000 and RBMK plants were developed and put in action;

A schedule was made up for SAMG development for all operating NPP units (SAMG has been implemented at Balakovo Unit 4 in 2012, at the other units it is scheduled for 2014-2015)

A plan exists for development of generic and unit-specific SAMGs for shut-down reactor state and spent fuel pool

Improvement of personnel preparedness for beyond-design-basis accident management actions

- The operator support system (safety parameter display system - SPDS) has been implemented at all NPP units;
- Personnel is trained in accident management actions using simulators;
- The number of regular emergency exercises at NPPs in BDBA personnel actions has been doubled.



Improvement of personnel preparedness for severe accident management actions

- NPP full scope simulators are being equipped with severe accident modelling module;
- The emergency exercise plans have been complemented with scenarios of overall plant severe BDB accidents with simultaneous involvement of all available mobile emergency facilities;
- Every year Concern Rosenergoatom conducts a comprehensive emergency exercise at one of its plants using all mobile emergency facilities available at NPP.



Creation of the Regional Crisis Centre

WANO-MC Governing Board approved in April 2012 the idea proposed by operating organizations on creation of a WANO-MC Regional Crisis Centre (RCC)



Regional Crisis Centre (RCC)

RCC of WANO Moscow Centre was commissioned at the beginning of 2013



Conclusion

- Actions have been developed and are under implementation for improvement of operating NPPs resistance to extreme external impacts and accident management preparedness
- The emergency prevention and mitigation system at Concern Rosenergoatom meets the regulatory requirements and the best world practices
- Maintaining of personnel qualification and preparedness for accident management actions is ensured



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Thank you for your attention!

Спасибо за внимание!