

A faint, dotted world map is centered in the background of the slide. The map is composed of small grey dots forming the outlines of continents. Two horizontal lines, one above and one below the map, extend across the width of the slide.

Nuclear Safety Enhancement in China after Fukushima Event

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1. Introduction
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1. Introduction

- ❑ In 1991, Qinshan unit 1 was connected to the grid. It is the first nuclear power plant in China mainland.
- ❑ By now, there are 16 nuclear power reactors in operation and 28 reactors under construction.
- ❑ All operating nuclear power reactors in China mainland have good performance. No nuclear events at or over INES level 2 were occurred.



1. Introduction



1. Introduction

- ❑ Due to the increasing concerns about air quality, climate change and fossil fuel shortages, Nuclear power is indispensable to the development in China.
- ❑ Nuclear safety is the lifeline for undertaking development of nuclear energy and nuclear technology utilization.
- ❑ China all long adhered to the basic principle of “Safety First”, and carried it out in every stage of a nuclear power plant.
- ❑ After Fukushima accident, the task for nuclear safety and development become much tougher.



1. Introduction

- ❑ China selects the proven PWR technique at the beginning. Learned from the two severe accident, the operating reactors are G-II(+) technique, more advance and safe than Fukushima NPPs.
- ❑ China has set up road map of introduction, digestion, absorption and innovation for nuclear power technology development. With introduction of AP1000, the new type CAP1400 with independent property is under developed.

2. State Policy

- The state policy on nuclear energy was continuously adjusted, to reflect increasing concern on nuclear safety:
 - Appropriate development;
 - Active development;
 - High efficiency development on the basis of nuclear safety;
 - Assurance of safety first and use of advanced tech.

2. State Policy

- After the Fukushima accident, the State Council reaffirmed that safety must be given top priority during the progress of nuclear power development, and approved 4 resolutions:
 - Start safety evaluation on nuclear facilities immediately;
 - Enhance safety management on operation nuclear facilities;
 - Conduct a comprehensive review of the NPPs under construction;
 - Strictly authorize the new nuclear power projects.

3. Regulatory requirement

- ❑ According to the State Council resolutions, the national nuclear safety administration(NNSA) issued detailed requirements for all nuclear facilities, including following aspects:
 - External events: flood, seismic, fire...
 - Severe accident: power supply, measures and reliability...
 - Emergency response: mass disturbances event...
 - Other: Engineering, QA...
- ❑ The requirements became more strict and specific:

Self-review:9 ➡ General Inspection:11 ➡ Improvement:13

3. Regulatory requirement

- ❑ The safety checks of NPPs (in operation and under construction), using the latest safety regulations and guidelines issued by IAEA and NNSA, was completed in October 2011.
- ❑ In general, all NPPs in China mainland are safe and reliable, no critical change is required.
- ❑ In order to further increase the nuclear safety, NNSA issued the “General technical requirements” to guide the potential design improvement.



3. Regulatory requirement

- The general technical requirements covers 8 topics:
 - Flood resistance
 - Emergency water supply
 - Mobile power supply
 - Monitor of spent fuel pool
 - Monitor and control of hydrogen
 - Emergency operating facility
 - Monitor of radiation and environment
 - External hazards



3. Regulatory requirement

- ❑ Based on the feedback from review and inspection, NNSA prepared the nuclear safety plan.
- ❑ The plan raised 9 key tasks, 5 key projects and 8 safeguard measurements, in order to achieve the international advanced nuclear safety level by 2020.
- ❑ In October 2012, the new nuclear safety plan was accepted and the resumption of approvals is given by the State Council.

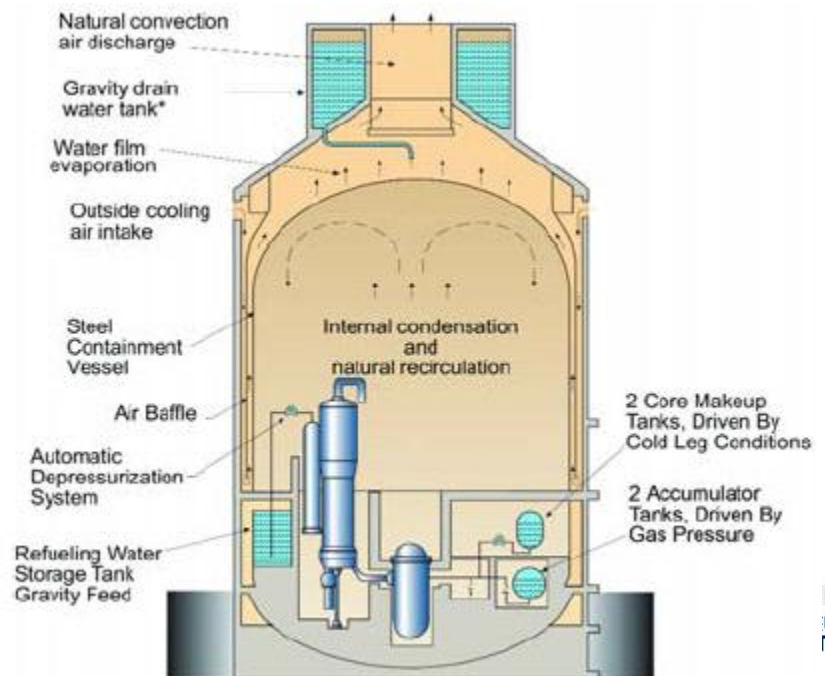
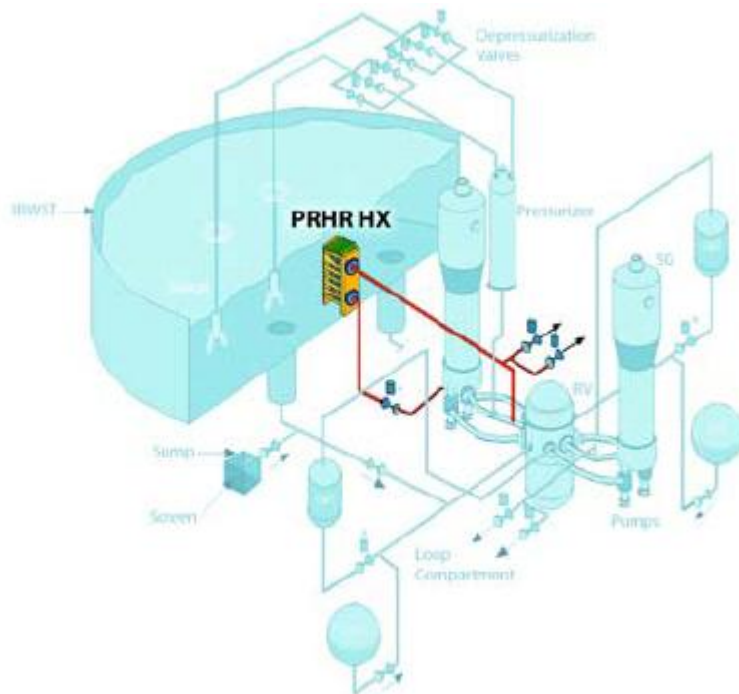


4. Margin Improvement

- According to the government requirements, the operating NPPs made following improvement:
 - Water tight measure to prevent flood incursion;
 - Emergency facilities to against extended SBO;
 - Severe accident prevention and mitigation;
 - External events PSA;
 - ...

4. Margin Improvement

- ❑ For those NPPs under construction, the latest regulation codes and standards were used, and the G-III techniques was required.
- ❑ Based on the special “passive safety” design, AP1000/CAP1400 has good capability against external hazards.



4. Margin Improvement

- According to the evaluation, even in postulated Fukushima type accident, AP1000/CAP1400 could maintain the NPP safety with limited offsite support:
 - No fuel damage occurs in the reactor core or in the spent fuel pool.
 - Containment integrity is maintained.
 - No unacceptable radiological releases occur.
 - No off site assistance is required for 72 hours.



4. Margin Improvement

- In order to further increase the margin of NPP safety, effective measures are taken into account:
 - Provide mobile water supply
 - Provide mobile power supply
 - Improve environment radiation monitor
 - Strengthen EOF design



4. Margin Improvement

- In addition, 119 research topics were developed:
 - Reactor safety——12 topics
 - Site safety——7 topics
 - Equipment reliability——10 topics
 - Nuclear fuel——10 topics
 - ...

5. Summary

- ❑ Enhance the safety of NPPs is the first important issue for the continuous development of Nuclear Power.
- ❑ In order to ensure energy supply, optimize energy structure, and control greenhouse-gas emissions, China's development could not be lack of nuclear power.
- ❑ China will work close with other countries, and try our best to increase the nuclear safety level under the guide of IAEA .