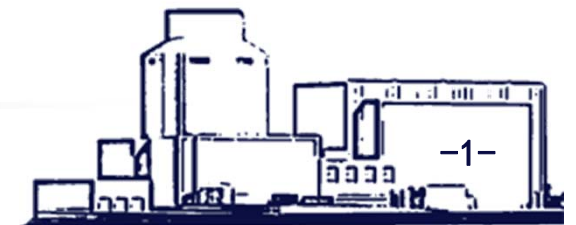


China Practice after Fukushima Accident

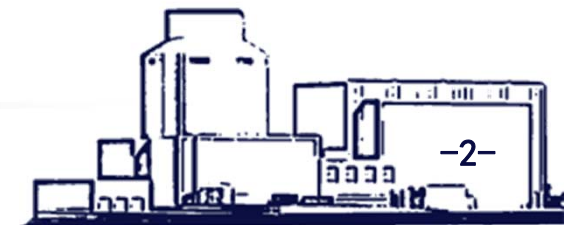
by Dou, Yikang & Wang, Ying

SNERDI & SIPAI





- ◆ 2011.3.16 国务院总理温家宝主持召开国务院常务会议，会议强调要充分认识核安全的重要性和紧迫性，核电发展要把安全放在第一位。Premier Wen Jiabao chaired the State Council routine meeting on March 16, 2011 and emphasized the importance and the urgency of sufficient recognition for nuclear safety, the nuclear safety is the most important thing during nuclear development. In this meeting, 4 actions are determined:
 1. 立即组织对我国核设施进行全面安全检查 Immediately carrying out **safety inspection** for all nuclear facilities.
 2. 切实加强正在运行核设施的安全管理 Firmly strength the safety management of operation nuclear facilities.
 3. 全面审查在建核电站 Fully review of plant under construction.
 4. 严格审批新上核电项目 Strict assessment and approval for new projects





◆ **核电发展 Nuclear power development**

- 发改委：总体目标不变，评估安全后完善规划

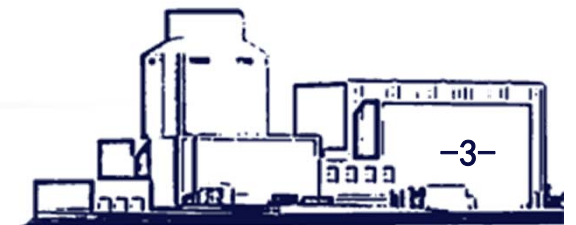
The National Development and Reform Commission's opinion: the general objective will be the same as before, but need to consummate the plan after estimate the security.

- 暂缓核电发展节奏，为了将来走得更好，或8月恢复审批

Temporarily slowing down the steps is better for the future development. The approve of new project maybe continued in later.

- 在确保安全的基础上，发展核电：坚持安全、高效

Safety is the basic for nuclear power development: safety and efficiency





民用核设施综合安全检查 Safety inspection for nuclear facilities after Fukushima accident

◆ 组织 organization

安全检查由环境保护部（国家核安全局）、国家能源局、国家地震局联合组织实施 Organized by National Nuclear Safety Administration(NNSA), National Energy Administration, and State Seismological Bureau.

◆ 检查形式 inspection ways

检查形式包括技术审查和现场检查 Technical review and site inspection

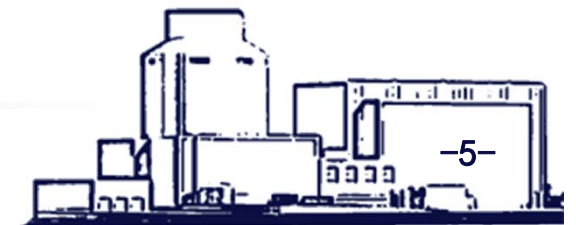
- 技术审查由环境保护部核与辐射安全中心在国家核安全局的指导下具体承担 Technical review is done by Nuclear and radiation safety center, guide by NNSA
- 现场检查由环境保护部（国家核安全局）、国家能源局、国家地震局联合实施 Site inspection is carried out by NNSA, National Energy Administration, and State Seismological Bureau.





◆ 检查标准 Content and Criteria

- 对运行核电厂的安全检查重点是评估其抵御极端外部事件的能力。将参照《核动力厂运行安全规定》（HAF103），评估和检查核安全审评中各项要求的落实情况、核电厂抵御叠加的极端外部事件的能力，并按照国际通用标准中有关防范外部事件的技术要求进行相应的技术改进。同时检查核电厂运行管理规程、操作规范和应急计划的可用性，提高安全水平。
For operation units, the inspection is focused on its resistibility for external events based on the HAF103 and other technical improvement from international for resisting external event. And also includes the operation procedure, specification, the availability of emergency plan.
- 对在建核电厂，采用最先进的安全标准进行检查。依据国家核安全局已颁发的现行有效的核安全法规和安全导则、国际原子能机构所颁布的最新安全标准，主要包括《核电厂厂址选择安全规定》（HAF101）、《核动力厂设计安全规定》（HAF102）以及国际原子能机构新发布的配套安全导则。
For plants under construction, the most advanced criteria is employed, including HAF101, HAF102 and other new safety criteria from IAEA.



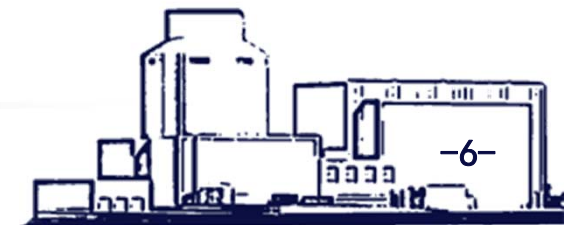


◆ 阶段 Steps

- 自查与复核 (3.19~3.31) Self inspection by utilities
- 在役核电厂的检查 (4月~5月) Operation units inspection
- 在建核电厂的检查 (5月~8月) Under construction units inspection

◆ 内容范围(12条) Detail inspection items(12)

1. 厂址选择过程中所评估的外部事件的适当性；
The appropriateness of external event review during site selection
 2. 核电厂防洪预案和防洪能力评估；
The availability for flooding resistance and the action plan
 3. 核电厂抗震预案和抗震能力评估；
The availability for seismic resistance and the action plan
 4. 核电厂消防系统的检查；
Fire protection system inspection
 5. 严重事故预防和缓解措施及其可靠性评估；
Severe accident prevention and mitigation measure, and its reliability
- (待续 to be continue)



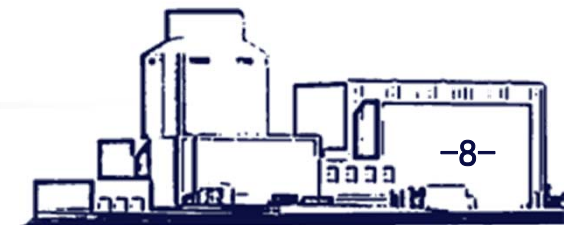


- ◆ 内容范围(12条) Detail inspection items(12) (continued)
 6. 多种极端自然事件叠加事故的预防和缓解措施;
Multiple extreme natural events, prevention and mitigation.
 7. 全厂断电事故的分析评估以及失去应急电源后附加电源的可用情况及应急预案;
Station black out(SBO) accident and the availability of addition power after losing of emergency power, and emergency action plan.
 8. 应对群体性事件预案;
Plan for multiple units event.
 9. 环境监测体系和应急体系有效性;
The availability of environment monitoring and emergency action program.
 10. 核电厂土建、安装、调试的质量保证体系;
The QA procedure for construction, installation, and testing.
 11. 核电厂建造各环节的工程管理和过程控制评估;
The engineering management and process monitoring for under construction units.
 12. 其他可能存在的薄弱环节。
Other potential problems.



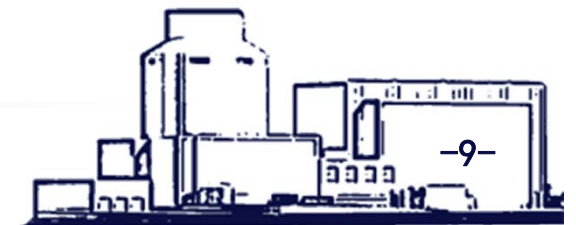


- ◆ AP1000设计总体上符合国内最新有效的核安全法规，采用非能动的安全系统，具有很高的安全性。Generally, the design of AP1000 meet the most newly nuclear safety regulations of china, based on the passive technical, with very high safety.
- ◆ AP1000依托项目厂址是安全可靠的，不会发生类似福岛的外部事件。The site selection of progressive projects of AP1000 is safe and reliable, external events like Fukushima will never happen at that site.
- ◆ 即使在类似福岛的极端外部事件下，AP1000也具有很强的应对能力：Even though, the same external events happens, the AP1000 reactor can survive because of:
 - 具有很强的抗震能力，在PGA水平0.52g的地震事件下不会发生结构失效。High seismic resistance, the structure will be fine even at horizontal 0.52g PGA.
 - 可有效应对SBO工况，72小时内无需外部支持。Can deal with SBO by itself, no need for extra actions in 72 hrs.
 - 在SBO叠加LOCA工况下，只要非能动安全系统的爆破阀成功开启，就能保证堆芯的长期冷却。When the LOCA happen during SBO, if only the explosion value open successfully, the long term cooling of core is satisfied.
 - 72小时后PCS补水有效的情况下，能保证安全壳和乏燃料组件的长期冷却。The long term cooling of containment and spent fuel can be satisfied by the water supply of PCS after 72 hrs.





- ◆ 如需考虑类似福岛的极端事件下，并由此引发SBO叠加LOCA工况，为确保堆芯、乏燃料和安全壳的长期冷却，需考虑如下保障措施：Considering about the external events like Fukushima, and LOCA happens during SBO, to make sure the safety, measures needed:
 - 需确保非能动安全系统爆破阀的驱动，可考虑 To make sure the certainty of drive for explosion value of passive safety system, which may need:
 - ⇒ 恢复DAS可用的备用措施，或 To recover the backup measures for DAS, or
 - ⇒ 关键部位设置防水门，以保证PMS有效性 To set up water door at key position to make sure the availability of PMS.
- ◆ 事故后72小时后的PCS补水，需通过下述措施实现：Measures for water supply of PCS after 72 hrs:
 - 外部水源保障 To make sure the external water supply
 - 配置临时泵 To deploy temporary (backup) pump
- ◆ 考虑事故后电厂监测和照明等功能的恢复，需要配置车载式移动电源。Considering about the recovery of monitoring and lighting of plant, movable power station is needed.



Thank you for your attention!

