Status of the Near-Term Task Force (NTTF) Recommendation Implementation in Taiwan

Taiwan Power Company

July 2, 2014

Outline

1. *General Introduction of Taipower's NPPs*
2. *Status of the Near-Term Task Force (NTTF) Recommendation Implementation in Taiwan*
3. *Summary*

1. General Introduction of Taipower's NPPs

GE BWR-4
636 MWe x 2
Commercial
Operation Date :
 # 1 Dec. 1978
 # 2 July 1979

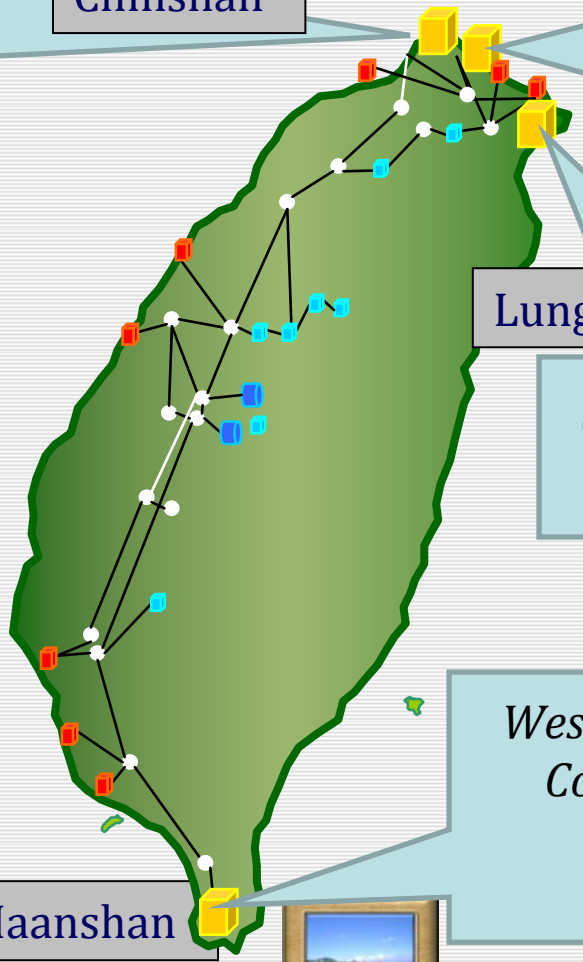
Chinshan

Kuosheng

GE BWR-6 985 MWe x 2
Commercial Operation
Date :
 # 1 Dec. 1981
#2 Mar. 1983

Lungmen

GE ABWR 1350 MWe x2
(Under Construction)

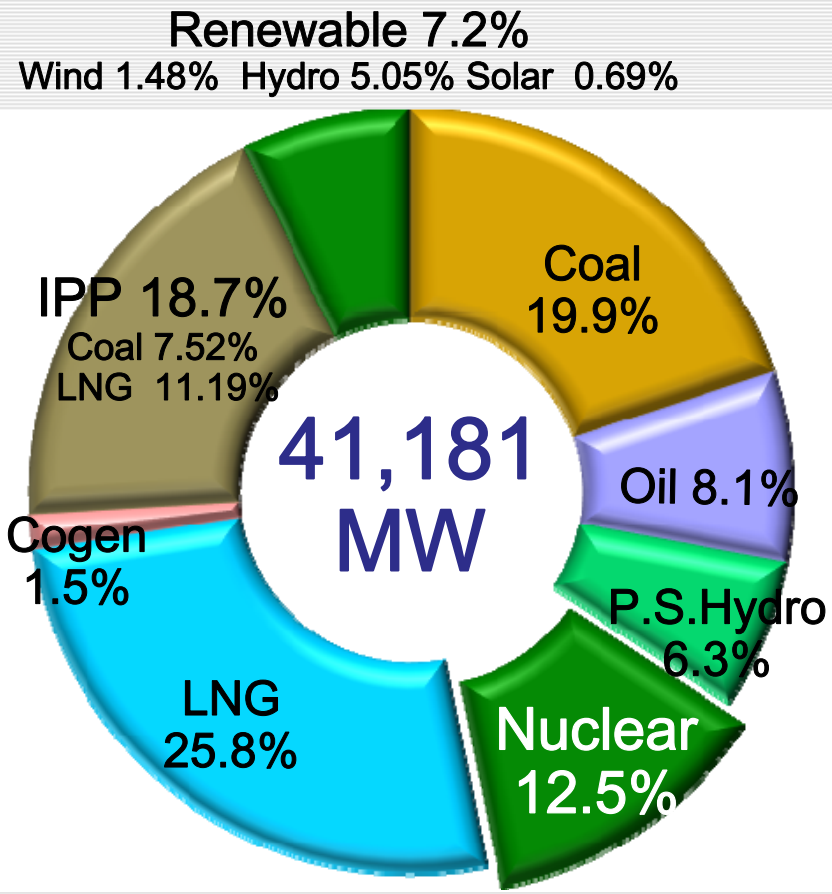


In 2013
Nuclear Installed Capacity
5,144 MW

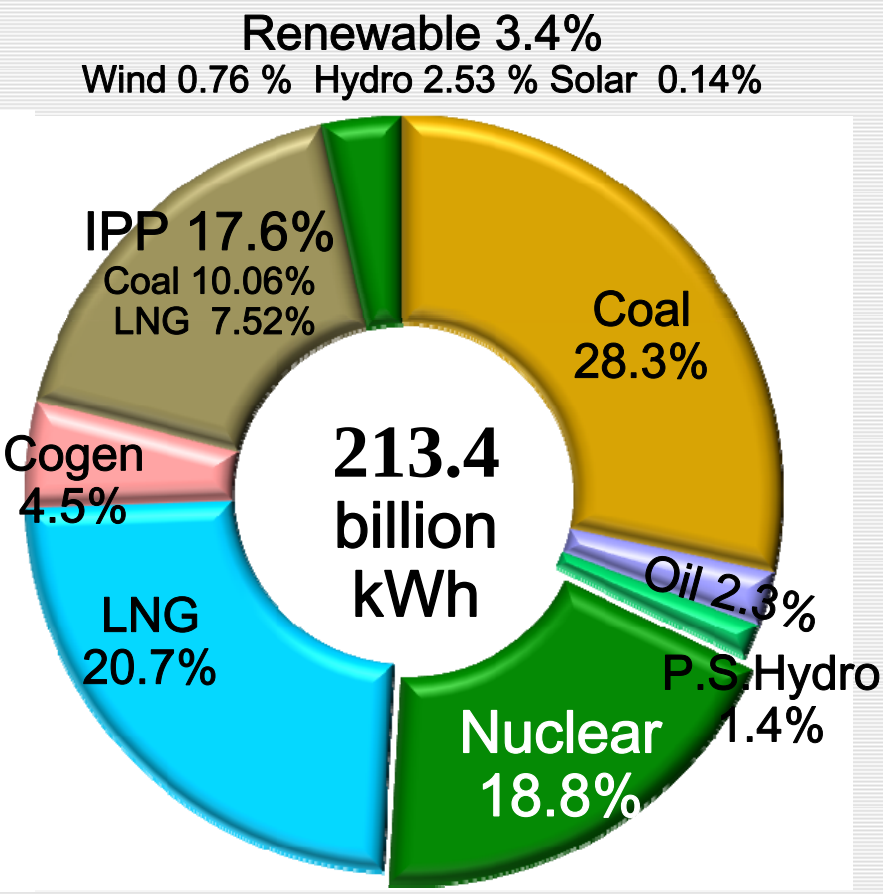
Westinghouse PWR 951 MWe x 2
Commercial Operation Date :
 # 1 July 1984
#2 May 1985

Maanshan

1. General Introduction of Taipower's NPPs-- Capacity & Gen



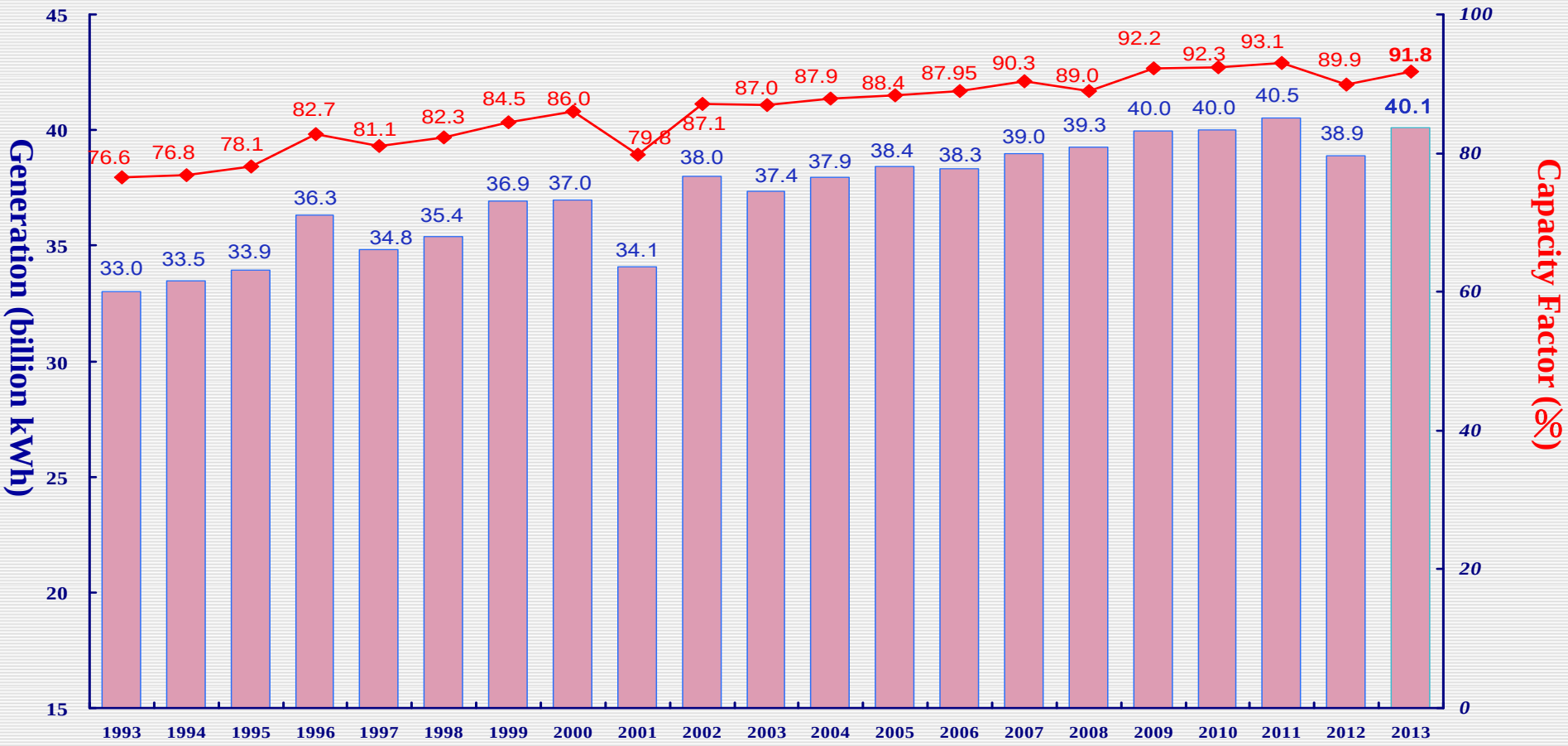
Installed Capacity in 2013



Electricity Generation in 2013

1. General Introduction of Taipower's NPPs –

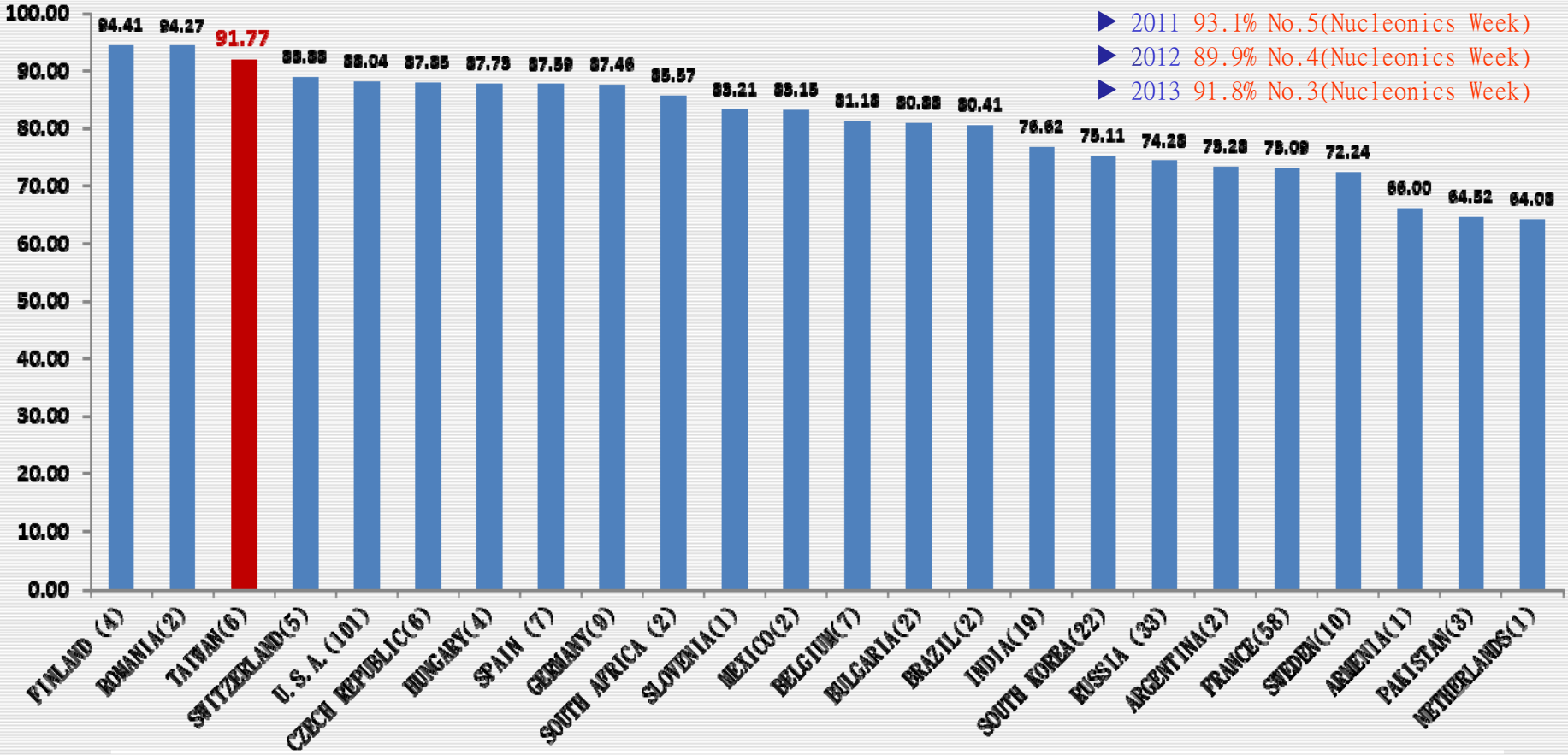
Electricity Generation and CF



1. General Introduction of Taipower's NPPs –

Generation Performance(Capacity Factor)

- 2008 89.0% No.7 (NEI)
- 2009 92.2% No.4(NEI)
- 2010 92.3% No.2
- 2011 93.1% No.5(Nucleonics Week)
- 2012 89.9% No.4(Nucleonics Week)
- 2013 91.8% No.3(Nucleonics Week)



1. Source：Nucleonics Week, February 13, 2014
2. According to the units' CFs provided by Countries ,and calculating average of the CF by country then ranking it.
3. Because it lack of providing units' CF data(Less than 80% of its operating units' CFs were provided), UNITED KINGDOM 、CANADA、CHINA and JAPAN were not been included.

2. Status of the NTTF Recommendations Implementation in Taiwan

Item	Recommendation	Regulatory orders issued by AEC
NTTF 2.1	Reevaluations of Seismic/Flooding/Other Natural External Hazards	XX-JLD-10101 Reevaluations of Seismic Hazards XX-JLD-10102 Reevaluations of Flooding (including Tsunami) Hazards
NTTF 2.3	Facility Walkdowns Related to Seismic and Flooding Hazards	XX-JLD-10105 Facility Walkdowns Related to Seismic and Flooding Hazards
NTTF 4.1	Rulemaking Regarding Station Blackout Events	XX-JLD-10106 SBO Regulation Improvement XX-JLD-10109 Extend the SBO Coping Time to at Least 24 Hours
NTTF 4.2	Order Related to Mitigating Strategies for Beyond Design Basis Events	XX-JLD-10113 Strengthen protection of equipment from external hazards described in NEI 06-12
NTTF 5.1	Order Related to Reliable Hardened Vents for Mark I and II Containments	XX-JLD-10114 Install reliable filtered hardened vents for Mark I and Mark II containments
NTTF 7.1	Order Related to Spent Fuel Pool Instrumentation	XX-JLD-10115 Install spent fuel pool (SFP) instrumentation
NTTF 8.0	Rulemaking on Integration of Emergency Operating Procedures, Severe Accident Management Guidelines, and Extensive Damage Mitigation Guidelines	XX-JLD-10116 Strengthen and integrate EOPs、SAMGs and EDMGs
NTTF 9.3	Enhanced Emergency Preparedness Staffing and Communications	XX-JLD-3002 Enhanced Emergency Communications XX-JLD-3004 Enhanced Emergency Preparedness Staffing

◎XX-JLD-10101 Reevaluations of Seismic External Hazards

◆Status of implementation：

1. Geological survey -
   According to newly identified active faults near-site, further geological survey is on going. (scheduled to be completed in Oct 2014)
2. Reevaluations of Seismic Hazards-
   Perform Seismic Hazard Re-evaluation
   Implement betterments based on results of SMA (Completed)
   Implement betterments based on results and SPRA (scheduled to be completed in 2016).

◎XX-JLD-10102 Reevaluations of Flooding External Hazards

◆Status of implementation：

1. Conduct assessment the influence of tsunami induced by the 22 potential earthquakes of massive scale. (Completed)
2. Volcano、landslide on seabed and ancient tsunami investigation and assessment is in progress. (scheduled to be completed in 2018)
3. Planning to build Tsunami-protective wall for all plants with a margin of 6 meters above the current licensing basis. (scheduled to be completed in 2016)
4. Planning to build flooding-protective plate to enhance the water-tightness of the fire doors and penetrations of buildings containing important safety related equipment. (scheduled to be completed in 2015)

◎Completed Safety Enhancements Against Seismic/Tsunami Hazards

- ◆Enhanced RCIC and RHR system earthquake-resistant capabilities to guarantee success of URG.
- ◆Setup Central Weather Bureau earthquake and tsunami alert system.
- ◆Enhanced earthquake-resistant capabilities of raw water pool, raw water piping and added flexible expansion joints.
- ◆Conducted an enhancement evaluation of safety related SSCs for CS, and followed by the SSE upgrade from 0.3g to 0.4g.
- ◆Inspected all tsunami/flooding – protection devices and seal functions.
- ◆Simulated the mechanism of seismic and tsunami hazards.

◎Completed Safety Enhancements Against Seismic/Tsunami Hazards

- Added water-tight barrier on emergency sea water system.
- Enhanced tsunami protective gates in CS (motor operated).
- Procured 40 sets of engine driving drain pumps to strengthen portable drain capabilities.

Establish flood-protection walls and water-tight doors

Kuosheng NPP

◎XX-JLD-10105 Facility Walkdowns Related to Seismic and Flooding Hazards

◆Status of implementation：

1. Completed Seismic Walkdowns for the 3 operating NPPs. (March 2013)
2. Completed Flooding and other external hazards Walkdowns for the 3 operating NPPs (June 2013)
3. Completed walkdowns of the facility on site for Lungmen NPP in June 2014.

◎XX-JLD-10106 SBO Regulation Improvement

◎XX-JLD-10109 Extend the SBO Coping Time to at Least 24 Hours

◆Status of implementation：

1. Extend the battery capacity in response to requirement to extend SBO coping time from 8 to 24 hours. (scheduled to be completed in Dec 2014 for KS, in 2016 for MS)
2. Conducted engineering analysis according to NUMARC 87-00. (Completed)
3. Keep tracking of the policies of NRC and strategies of other NPPs.

◎ Additional Enhancement Measures Against SBO

◆5th D/G (swing D/G) can now supply emergency loads to both units simultaneously.
◆Black-start D/G used to start G/T can now supply emergency loads to both units simultaneously.
◆Planning to seal up the air-cooled swing D/G for 3 operating NPPs, and to install air-cooled G/T for Lungmen (inside a seismically isolated building).
◆Procured 6 sets of 4.16 kV power vehicles and 26 sets of 480V portable D/Gs.
◆Prepared portable 480VAC generators and batteries for control power and supervisory instruments.

Emergency Power

◆Mobile power (480V / 120V D/G) preparation.

◆Install pre-fitted junction box for mobile power supply & pre-connect the emergency circuit to selected essential equipment.

NTTF 4.2	Order Related to Mitigating Strategies for Beyond Design Basis Events

◎XX-JLD-10113 Strengthen Protection of Equipment from External Hazards Described in NEI 06-12

◆Status of implementation：

1. Completed MAAP/RELAP/GOTHIC analyses. (May 2013)
2. Refer to the Integrated Plan of same type NPP in USA, submitted Integrated Plan in Aug 2013.
3. Update the Integrated Plan according to comments from AEC.
4. Submitted status report every six months.
5. Completed FLEX Phase 1, 2 and part of Phase 3 equipment preparation. The remaining FLEX Phase 3 equipment are scheduled to be completed before Aug 2016.

NTTF 5.1	Order Related to Reliable Hardened Vents for Mark I and II Containments

◎ XX-JLD-10114 Install Reliable Filtered Hardened Vents for Mark I and Mark II Containments

◆Status of implementation：(for CS)

1. Conducted conceptual design and feasibility study.
2. Placed purchase contract with GEH in March 2014.
3. Submitted severe accident analysis report in May 2014.
4. Equipments setup are scheduled to be completed in May 2016 for CS-1, in May 2017 for CS-2.
5. AEC also requested other NPPs to install filtered CTMT vents. KS/MS/LM conducted conceptual designs and feasibility studies. Severe accident analysis for KS is completed, and analysis for MS is on going. Equipment setup will be completed in 2016 for KS, and in 2017 for MS.

NTTF 7.1	Order Related to Spent Fuel Pool Instrumentation

◎XX-JLD-10115 Install Spent Fuel Pool (SFP) Instrumentation

◆Status of implementation：

1. Conducted specification design and Semi-annual report including the information listed in NEI 12-02 Appendix A-2.
2. Due to seismic level not determined, the process of purchase have not been finalized.
3. Equipment setup will be completed in 2016 for the 3 operating NPPs.
4. Placed purchase contract with GEH in Dec. 2013 for LM. But, the instruments will not be installed due to the policy of government.

NTTF 8.0	Rulemaking on Integration of Emergency Operating Procedures, Severe Accident Management Guidelines, and Extensive Damage Mitigation Guidelines

◎XX-JLD-10116 Strengthen and Integrate EOPs、SAMGs and EDMGs

◆Status of implementation：

1. Developed the Ultimate Response Guidelines (URG).
2. Revised procedures according to URG, including the strategies of emergency depressurization, containment venting, and inject service water or seawater by mobile, low pressure fire-fighting truck when necessary.
3. Refer to BWROG/PWROG EPG/SAG developments, conduct improvement of EOP and SAMG.
4. Strengthen and Integrate will be completed in six months after approval by NRC.

NTTF 9.3	Enhanced Emergency Preparedness Staffing and Communications

◎XX-JLD-3002 Enhanced Emergency Communications

◆Status of implementation：

1.Battery capacity of microwave system had been extended to 72 hours in 2013.

2.Setup VSAT satellite communication system and improved power system in 2013.

3.Submitted analysis report about communication system in 72 hours after SBO.

NTTF 9.3	Enhanced Emergency Preparedness Staffing and Communications

◎XX-JLD-3004 Enhanced Emergency Preparedness Staffing

◆Status of implementation：

1. Submitted assessment report in reference to Calvert Cliffs Nuclear Power Plant NEI 12-01 On-Shift Staffing Analysis in 2013.
2. Updated assessment report in response of comments from AEC in March 2014.

6. summary

- Proactive plans had been made to enhance the resistance of extreme disasters. Countermeasures have been made based on the condition of Station- Blackout & Loss of Ultimate Heat Sink.
- Ultimate Response Guidelines authorize operators to inject raw water or seawater into the reactor or steam generator during BDBA through a guideline written in procedure.
- Mandatory drills against multiple severe hazards to NPP have been scheduled and implemented, enhancing the effectiveness of responses.
- Keep collecting and referring to countermeasures from the international nuclear community.
- Taipower will do the best to enhance and to improve for achieving the ultimate goal of nuclear safety.

Thank you for your attention