



Strengthening the Implementation of Defence in Depth: Current Status and Actions of Korea



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Regulatory framework in DiD perspective

5 Protection Levels and corresponding Regulatory Basis

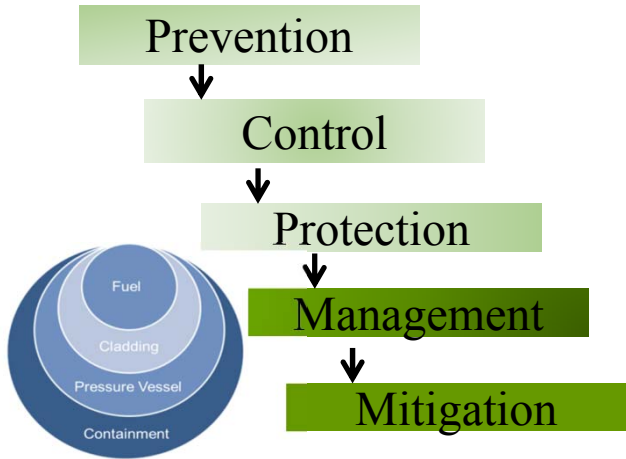
Levels of Protection		Regulatory Basis	
Level	Objective	Law	Policy
1	Prevention of abnormal operation and failures	Nuclear Safety Act	
2	Control of abnormal operation and detection of failures		
3	Control of accidents within the design basis		
4	Control of severe conditions including prevention & mitigation of the accident		Severe Accident Policy
5	Mitigation of the radiological consequences of external releases of radioactive materials	Act on Physical Protection and Radiological Emergency	

Regulatory framework reform

- Nuclear Safety Act (Regulations and Guides) will be reviewed and modified considering beyond Design Basis Accidents(DBAs)

Our Approach to strengthen DiD

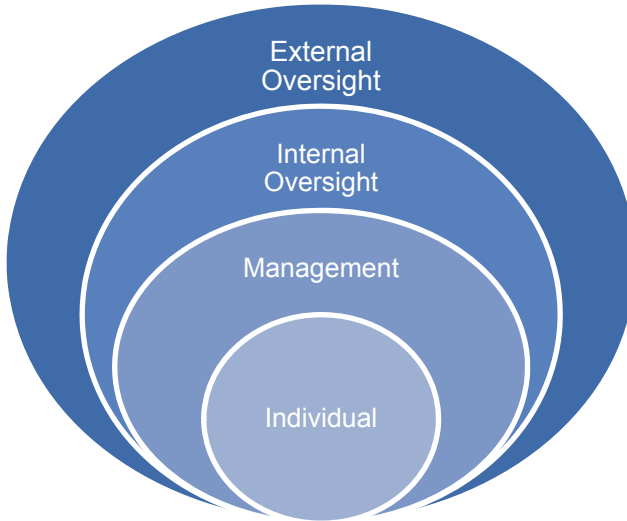
Technical



Lessons learned from Fukushima

Reevaluate External Event

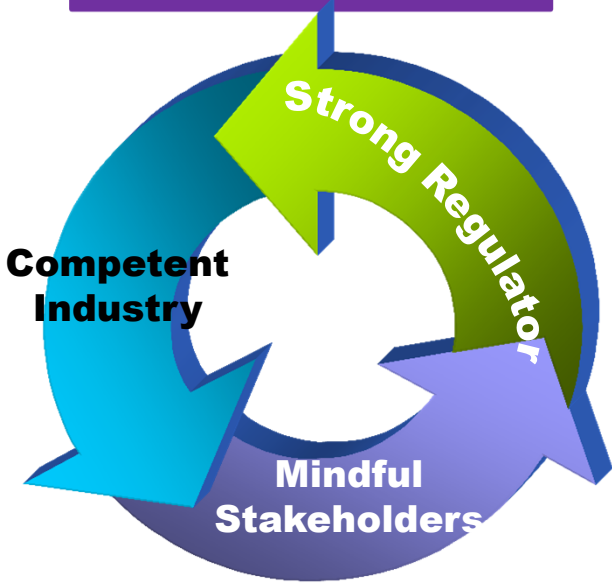
Human/Organizational



Fukushima lessons + Issues in Korea

Safety Culture, Quality Assurance

Institutional



Fukushima lessons + Issues in Korea

Independence, Peer Reviews, 3Cs

❑ Action items of the Fukushima lessons-learned Program

- 50 action items were recommended by a Special Safety Assessment Team
- 36 of 50 action items have been implemented so far
- Complementary measures and its implementation plan to be raised (~ 2014), after effectiveness review using Result of Augmented Stress Test for old reactors and PSA results

Earthquake

Equipment to automatically shut down reactors was installed.

Flooding of Sea water

Flood barriers were reinforced.

Flood control gates and water-tight drainage pumps were installed.

Loss of Power

Each site secured emergency power generating cars.

Supplementary EDGs were reinforced.

Hydrogen Explosion

Hydrogen removal devices that work without electricity were installed.

Pressure reducing equipment was installed in containment buildings.

Emergency Response

Additional protective gears for residents were secured.

Emergency drills were improved considering multiple-unit events.

Enhancement of DiD in Human/Organizational aspect (Safety Culture) 5

❑ Importance of Safety Culture(SC)

- Detection and correction of deficiencies in defences
- Fukushima accident and Cover-up of Station Blackout event at Kori Unit 1 in 2012

❑ National mid-term plan to foster safety culture (2012~2016)

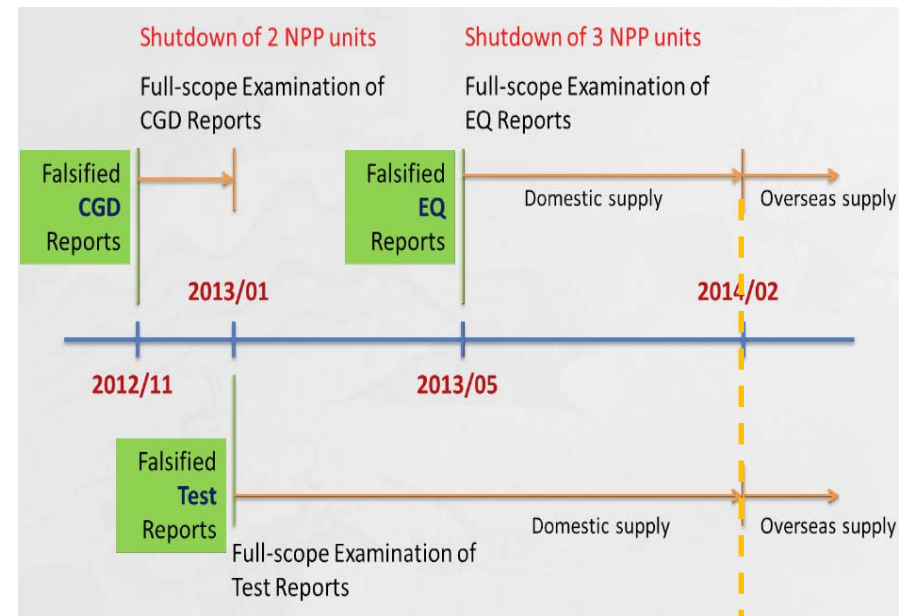
- Regulatory oversight of Licensee's Safety Culture is decided in 2012
- Research project for more systematic and elaborate oversight (2013-2016)
- Pilot safety culture inspection program for all NPPs started in the late 2013
- Special Safety culture inspection in KHNP head office performed in 2014
- Legal basis for safety culture oversight will be developed till 2015
- Regulatory Oversight including Regular Inspections is expected from 2016

❑ Major Findings and Lessons from Inspections

- Leadership for Safety : Oversight of licensee's head office is crucial
- Organizational Change Management : Competency / Ethics
- Safety Culture Management System : Alignment between head office & NPP Sites

Enhancement of DiD in Human/Organizational aspect (Quality Assurance) 6

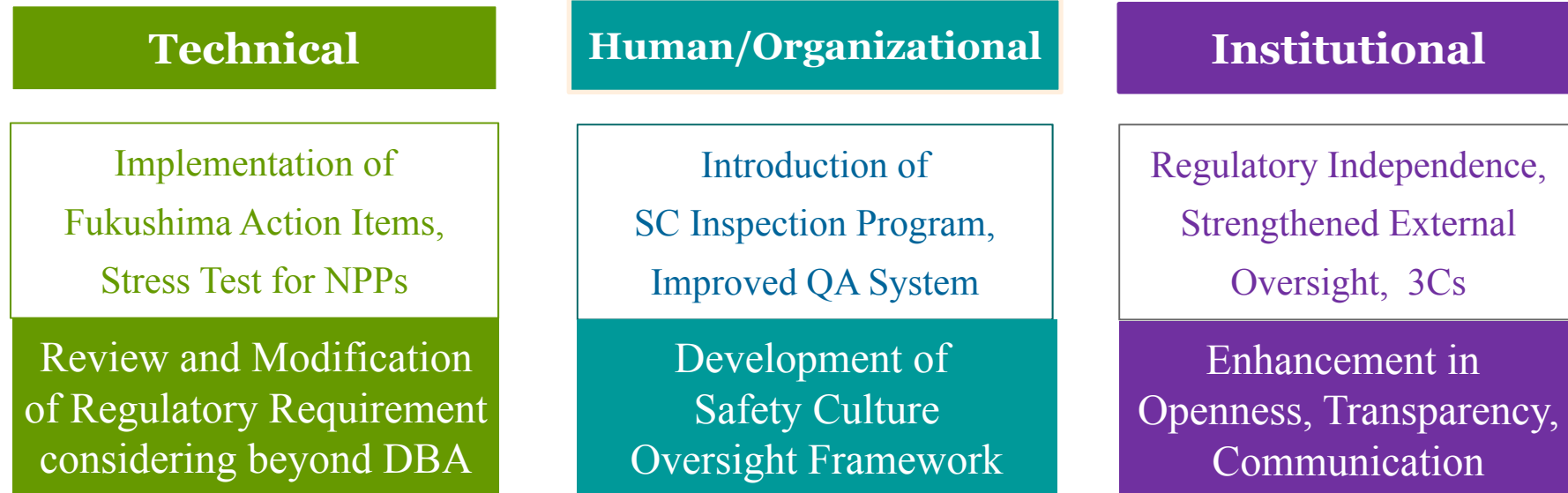
- ❑ Use of Falsified quality documents was revealed by whistleblower's tip
- ❑ Regulatory body(RB) performed full scale forgery investigation
 - ✓ For all NPPs, for all type of reports
 - Investigation of QVDs issued by domestic institutes completed
 - Additional report forgery investigation into imported items in progress
- ❑ Countermeasures to CFSI issues
 - Revision of Act to widen regulatory oversight scope to cover Overall Supply Chain
 - Introduction of “Non-compliance reporting” and “Contract notifying”
 - Set up of Equipment & Material Tracking system for all safety-related items
 - Encourage anonymous reporting (Nuclear Safety Ombudsman)



About 1% of EQ and 2.3% of Test reports falsified out of 287,600

- ❑ Improved Regulatory Independence (‘11.10)
 - ❖ Establishment of NSSC, the Independent nuclear regulatory authority
 - ❖ Separation of Nuclear Safety Act from Atomic Energy Act(1958)
- ❑ Strengthened peer pressure and peer reviews
 - ❖ IAEA IRRS Mission(‘11, ‘14) to improve regulatory effectiveness
 - ❖ IAEA special expert mission and 3rd party review to Industry
 - ❖ Civil group participation in Stress Test and Special Inspections
 - ❖ 2 Commissioners in RB recommended from Opposition party
- ❑ Better 3Cs(Communication, Cooperation and Collaboration)
 - ❖ Nuclear Safety Policy Coordination Committee to effectively manage nuclear safety policies and issues between ministries
 - ❖ RB’s Regional Offices to enhance oversight of NPP sites and to strengthen local communication
 - ❖ Regional safety councils to discuss matters related with safety of the NPPs with local residents

What we have done and what we will do



Reactive & Enforce
Verification, Ex-post Action
Specific Issues
SSCs
(Hardware)



Proactive & Influence
Prediction, Ex-ante Response
Big Picture
Organization,
Safety Culture, Leadership