



**RIC 2009  
Current Research Issues in  
PSA: Korean Status**

Joon-Eon YANG  
Integrated Safety Assessment Division  
Korea Atomic Energy Research Institute  
10 Mar. 2009

1

---

---

---

---

---

---

---

---



**Contents**

- Current Korean Status
- R&D for PSA & its Applications in Korea
- R&D Results
- Future Directions

2

---

---

---

---

---

---

---

---



**Korean Organizations Related to Nuclear Program**

- KAERI (Korea Atomic Energy Research Institute)
  - The Government Funded Research Institute
- KINS (Korea Institute of Nuclear Safety)
  - The Institute supporting the Regulatory Body (Ministry of Education, Science & Technology)
- KHNP (Korea Hydr. & Nuclear Power)
  - The Utility that owns all NPPs of Korea

3

---

---

---

---

---

---

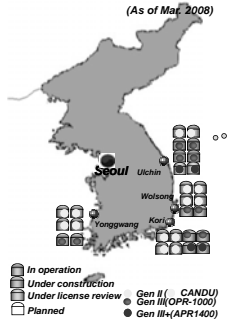
---

---



### Current Korean Status

- Building New Plants
  - 6 under construction, 2 under licensing review process
- From PSA to RIPBA
  - Severe Accident Policy Statement
  - From Generic to Specific



4

---

---

---

---

---

---

---

---



### On-going Programs in Korea

- PSA
  - Level 2 PSAs for all units have been finished & being updated
- Risk-informed Applications
  - RI-ISI: Under Review of Regulatory Body
  - RI-TS: Extension of STI of ESFAS/RPS
    - Permitted for some NPPs
    - New Projects are on-going for other NPPs (AOT Extension of EDG)
  - RI-LRT
- Performance-monitoring
  - MR: Standardized MR Approach is being tested by KHNP
- Regulatory Activity
  - Guidelines for RIR & PSA Quality
  - RIPI (Risk-informed Periodic Inspection) is being tested by KINS

5

---

---

---

---

---

---

---

---



### We need R&D on PSA for

- the RIPBA in Korea
  - Ex.) Korean Specific RIPBA Framework (No ROP/MR) Ex.) PSA Quality Issues
- the licensing/RI-Design of new NPPs
  - Ex.) Digital I&C PSA
  - Ex.) RI-Design Framework
- resolving some social issues
  - Ex.) Human Induced Trip -> Human Performance
  - Ex.) Seismic PSA
- tech. that we are good at
  - Ex.) PSA S/W (FTREX/FORTE & BDD)

6

---

---

---

---

---

---

---

---



### R&D Topics in Korea

Challenges	Current	Anticipated
Assessment (Uncertainty)	Digital I&C PSA Seismic PSA (Plant Specific) HRA & Human Performance (OPERA/TACOM) CCF Analysis Other External Events (Shrimp) MPAS (PSA Model for Reg.) Performance Assessment Quantification Algorithm (BDD)	Level 2 PSA: Severe Accident in New NPP Level 3 PSA: Korean Specific Model Passive System Reliability
Consistency	Integration of Internal & External PSA Risk/Performance Measures	Integrated Assessment of Risk & Performance PSA based RI-PP/PR
Convenience	PSA/RIA Tools Tools to enhance Transparency Quantification Algorithm (External)	
Framework	Korean Specific RIPBA Framework RI-Design Framework	Reg. Framework for New Rx. (Ex. Tech. Neutral)

7

---

---

---

---

---

---

---

---

---

---



### R&D Results

- Digital I&C PSA
  - Di&C Induced IE DB
  - Rel. Analysis Methods for HW/SW
  - HRA for Digitalized MCR
    - Based on the trainings at simulator of advanced reactor
- Enhancing Human Performance
  - OPERA DB
    - video taped >100 cases of operator trainings at simulator
  - Complexity Measure: TACOM
- Seismic PSA
  - Korean Specific Hazard Curve
  - Seismic PSA Code
  - Shaking Table Exp. for Digital MCC
- Integration of Internal & External PSA Model
  - A S/W for the Automatic Generation of External PSA Model (AIMS)
    - One Top Internal PSA Model + Fire DB
    - One Top Fire PSA Model
  - New Quantification Algorithm for External PSA Model (JSTAR)
- Integrated Assessment of Risk & Performance
  - Detailed FT Model for BOP
- FREX
  - ZBDD based
  - EPRI R&R: CAFTA + FTREX

8

---

---

---

---

---

---

---

---

---

---



### Future Direction??

9

---

---

---

---

---

---

---

---

---

---