



## KINS Research to Support Regulatory Decision Making

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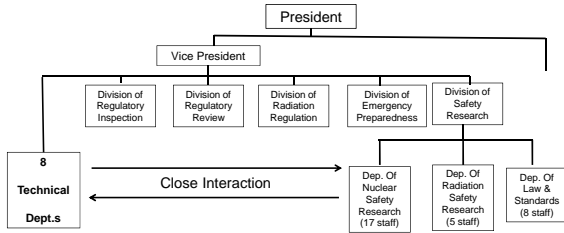
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## I. Status of KINS Research 3

□ R&D Organization



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graph TD
    President --> VP[Vice President]
    President --> Div1[Division of Regulatory Inspection]
    President --> Div2[Division of Regulatory Review]
    President --> Div3[Division of Radiation Regulation]
    President --> Div4[Division of Emergency Preparedness]
    President --> Div5[Division of Safety Research]
    VP --> Div1
    VP --> Div2
    VP --> Div3
    VP --> Div4
    VP --> Div5
    Div5 --> Dept1[Dep. Of Nuclear Safety Research (17 staff)]
    Div5 --> Dept2[Dep. Of Radiation Safety Research (5 staff)]
    Div5 --> Dept3[Dep. Of Law & Standards (8 staff)]
    Dept1 <-->|Close Interaction| Dept2
    Dept1 <-->|Close Interaction| Dept3
  
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## I. Status of KINS Research

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### □ Current R&D Programs

- Development of Regulatory Technology to Assess Countermeasures on NPP Accidents by Extreme Hazards
  - ✓ Regulatory Technology for Safety Evaluation of NPP Structures against External Hazards
  - ✓ Evaluation Methodology for the Safety Issues of Severe Accidents
  - ✓ Simulated Analysis and Performance Evaluation of Power System on Beyond Design Basis Accident
  - ✓ Advancement of Regulatory Infrastructure for Fire Protection in NPPs and Development of Evaluation Technology for Fire Hazard Analysis
- Development of Evaluation Methodology and Regulatory Technology for Safety Systems
  - ✓ Regulatory Evaluation Technology for Thermal-hydraulic Safety
  - ✓ Safety Evaluation Technology for New Design Features and New Safety Criteria
  - ✓ Resolution Technology for Safety Issues of Emergency Core Cooling System

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## I. Status of KINS Research

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### □ Current R&D Programs (continued)

- Development of Regulatory Technology for Safety Assessment of Nuclear Components in Long-term Operation
  - ✓ Regulatory Technology on Aging Management and Assessment of Nuclear Components
  - ✓ Regulatory Technology on Evaluation of Dynamic Effects and Failure Probability of NPP Components
  - ✓ Proof Test Model and Safety Evaluation Technology for the Regulation of Digital I&C Systems used in NPPs
- Development of Safety Issue Evaluation and Audit Calculation Methodology for PHWR
- Regulatory Framework Research for Licensing of Future Reactors
  - ✓ Licensing Framework on Sodium-cooled Fast Reactor
  - ✓ Regulatory Audit Technology on System Safety of Sodium-cooled Fast Reactor
  - ✓ Licensing Technology on Very High Temperature Reactor

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## I. Status of KINS Research

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### □ Remarks on KINS Research

- Titles of the KINS research programs include
  - ✓ "Safety Evaluation", "Regulatory Technology", "Licensing Technology", etc..

⇒ KINS research focuses on securing the capability to evaluate the safety issues for the licensing review

- ✓ Not to develop a "cutting-edge" or an evolutionary technology

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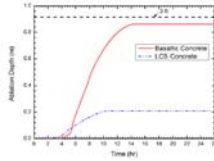


### III. MCCI Mitigation in APR+

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#### □ Contribution to Decision-Making

- Models do not include the recent research results sufficiently
  - ✓ Still, decision needs to be made based on current knowledge
  - ✓ Utility argues that if we take into account the jet breakup, the MCCI terminates early. Considering the high uncertainties in the phenomena, we recommended not to use the jet breakup model in calculating the MCCI, to be conservative
- Probability of liner failure depends highly on concrete type
  - ✓ Effects of concrete components are important. Utility is considering to change the concrete components
    - ⇒ Results of international research like MCCI-1,2, MACE etc. were important in our decision making
    - ⇒ Utility is also considering the design change reactor cavity sump



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### IV. Perspective of KINS Research

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- R&D results are important to regulatory decision-making
  - But conflicts exist because the research results do not come out on time for decision-making, often
  - Detailed R&D planning and selection of regulatory safety issues for future needs are important
- R&D to prepare for the Gen-IV reactor licensing is under way
  - KAERI has a plan to apply the licensing for Prototype Gen-IV SFR, 150 MWe size, by 2017
  - Development of regulatory framework and evaluation technology for SFR and VHTR will play an important role in future licensing review activities
- Two-track approach for R&D might be an efficient process to pursue
  - Long term R&D to develop the basic regulatory technology
  - Short term R&D to resolve impending safety issues using the developed technology
  - Harmonizing the two track R&D processes is important

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