



THE PANEL SESSION ON MUPRA Advances, Issues, Impediments and Promise

Presentation at the
PSA-2017 September 25, 2017

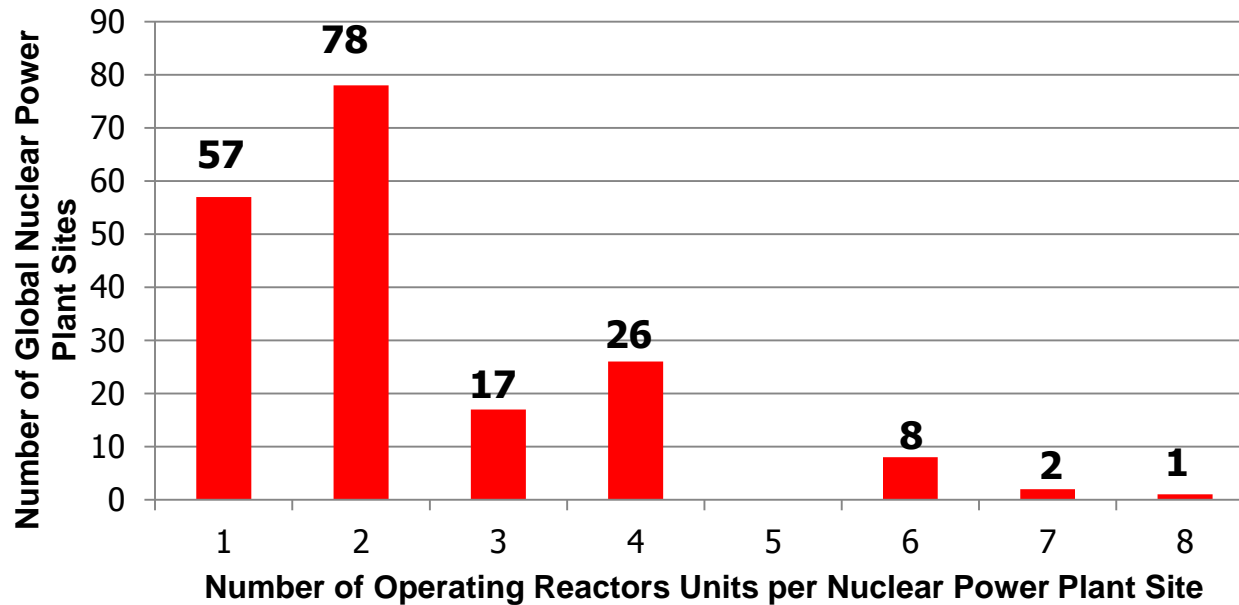
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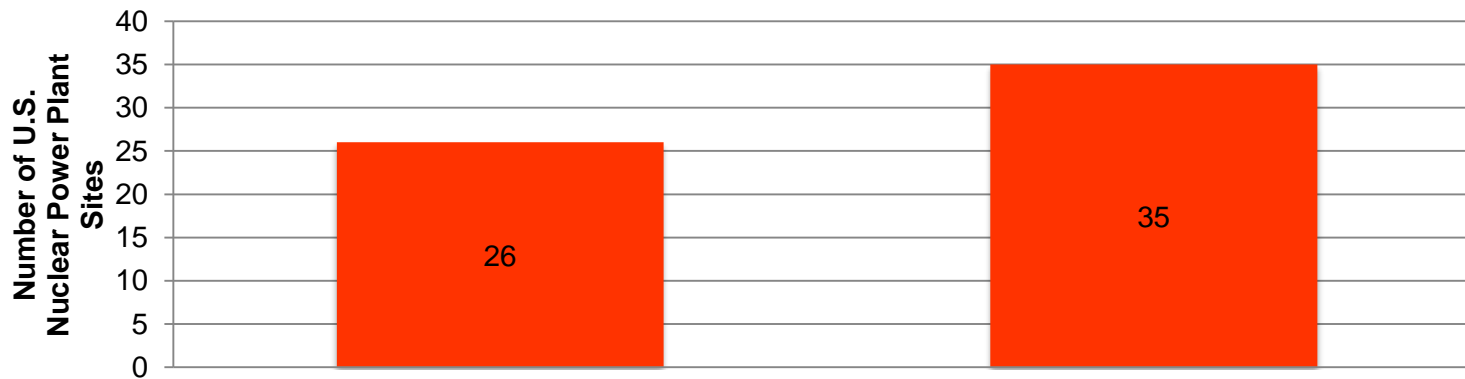
Why this MU-PRA ?

- The Fukushima Daiichi accident in March 2011 highlighted the likelihood of nuclear accidents involving the entire site and possibility of concurrent core damages of otherwise independent reactor units and spent fuel pools
- This led to international recognition of the critical need and initiatives for assessment of integrated site risk involving multiple units and other radiologic hazards

Multi-Unit US and Global NPP Sites



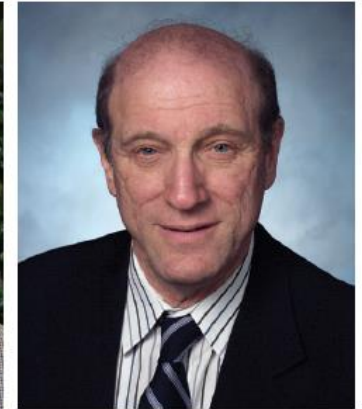
Source: International Atomic Energy Agency (IAEA) Power Reactor Information System (PRIS) as of August 2015



- Discuss issues, developments, experiences and current state of Multi-Unit PRA (MUPRA)
- Understand regulatory, industry and international initiatives and activities
- Review key topics of MUPRA:
 - Risk metrics
 - Risk aggregation
 - Inter-unit dependency and common cause modeling
 - Role, applicability and need for site-level safety goals
 - External hazard treatment
 - Role of site contamination and FLEX
 - Applications in risk-informed decisions



Panelists



1. Mohammad Modarres
(Chair)
2. George Apostolakis
3. Karl Fleming
4. Robert Budnitz
5. Nathan Siu
6. Carlos Lorencez
7. Ovidiu Coman



Key Developments



1. International Workshop on Multi-Unit Probabilistic Safety Assessment

Ottawa, Ontario, Canada, November 17–20, 2014. Sponsored by the Canadian Nuclear Safety Commission (CNSC).

2. IAEA Initiatives:

- I. Safety Reports Series SR 8.5: TECHNICAL APPROACH TO PROBABILISTIC SAFETY ASSESSMENT FOR MULTI-UNITS
- II. IAEA TECDOC – Methodology for Multi-Unit Probabilistic Safety Assessment

3. International PRA efforts: IAEA Case Study, U.S., Canada, S. Korea, France

Some of the Key Conclusions of MUPSA Ottawa Workshop

- Site-based risk metrics are needed to augment reactor-based risk metrics
- Level 3 MUPSAs are important and should consider all sources, timing and modes of release
- Multi-unit risk should be used for identifying important site risk contributors
- Multi-unit risk insights can be used to enhance the implementation of DiD principles and to show whether current regulatory requirements are adequate
- Better understanding of inter- and intra- unit dependency modeling is needed
- Societal disruption as an important safety goal parameter was discussed (no consensus reached, some felt PSAs may not be an appropriate tool for this goal)

