
NUMARK ASSOCIATES, INC.

PILLSBURY-NEI NUCLEAR TRADE
AND INVESTMENT SEMINAR

REGULATORY CAPACITY BUILDING AND THE ROLE OF TSO'S IN EMERGENT NUCLEAR COUNTRIES

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TOPICS ADDRESSED

- Development of regulatory infrastructure in emerging nuclear power countries
- How Technical Support Organizations can be utilized to support major program needs of regulators, based on safety/licensing experience in countries with long-established programs

DEVELOPMENT OF IN-HOUSE REGULATORY STAFF

- Government agencies generally employ domestic nationals. Emerging nuclear countries: such personnel have limited nuclear power experience.
- UAE example: regulator has taken two-track approach:
  - Staffing by senior expat staff from 23 countries, for short-medium term needs
  - Extensively recruiting and training younger Emiratis
  - 158 employees overall, including 86 UAE nationals

RECOMMENDED NPP LIC. APPROACH IN EMERGING NUCLEAR COUNTRIES

- Two-step licensing approach
- Utilize safety evaluations by regulatory body in country of origin of the technology (RBCOO), to share safety assessment information between regulators
  - UAE FANR: using the safety evaluations of reference plant, licensed by Korean regulator. This supported FANR review of CLAs.
  - Beyond that: FANR has conducted independent reviews where 1) UAE requirements couldn't be shown to be met based on RBCOO evaluations; 2) UAE design differed from that approved by RBCOO; 3) unique site characteristics; 4) high risk significance items; 5) new operating experience
  - Review plan identified review categories… graded review approach

NEED FOR TSO's

- Regardless of staffing, new authorities are likely to have limited expertise in house re. reactor technologies; safety reviews; licensing process
- TSO's from experienced nuclear power countries are especially valuable to authorities in early years of program

UTILIZATION OF TSO's

- Regulator may hire TSOs to support/augment in-house staff:
  - To obtain required expertise; support schedules; perform and document technical reviews; train in-house personnel
- FANR example:
  - Contracted with three TSOs located in USA and Europe, based on qualifications in conducting safety evaluations of nuclear facilities for established nuclear regulatory bodies in their home countries
  - Contracts awarded for "work packages" comprising different areas of the PSAR (siting, design, safety analysis, radiation protection…)
  - FANR oversight/direction to TSOs, to ensure consistency across the review. FANR retains responsibility for regulatory decisions.

REGULATOR RETAINS DECISION RESPONSIBILITY

- Safety authority must possess minimum technical capabilities in house. Responsible for all decisions; must be competent to oversee its TSO(s).
- IAEA GSG-4* states:
  - The regulatory body should have, at a minimum, adequate core competence in every core regulatory function, in order to retain the ability both to frame and to manage its requests for advice and to comprehend and act on the advice when it is received.

* IAEA General Safety Guide GSG-4, "Use of External Experts by the Regulatory Body," 2013.

MODELS FOR TSO UTILIZATION

- Variety of models, depending on needs of the agency:
  - Limited scope technical expertise, e.g. structural/seismic analysis
  - Broad scope, for all aspects of safety/environmental review;
  - Management expertise, including regulatory review strategy and implementation of the technical review
- Single or multiple TSOs
- Onsite vs. remote

ADVANTAGES OF USING TSOs

- Extensive range of technical resources
- Global NPP regulatory expertise
- Enables knowledge transfer, and reasonable time to develop internal staff and expertise, without delaying immediate program needs
- Flexibility of short- or long-term support
- Work performed locally or remotely
- Enhances quality/effectiveness of technical review; enhances international institutional acceptance and public confidence

TSO PREREQUISITES

- Technical Capability and Experience
- Safety Culture, Independence
- Export License
- Confidentiality/Non-Disclosure of applicant's information and review results
- No Conflicts of Interest

POTENTIAL TSO SCOPE OF SUPPORT

TSO skill mix and resources can support all phases of reactor licensing:

- Development of regulatory infrastructure
- Licensing review for the Construction and/or Operating License
- Inspection Support
- Oversight of Operation

- Potential scope detailed in next slides

MANAGEMENT SUPPORT

- **Regulatory strategy and implementation plan**
- **Development of regulatory infrastructure**
  - Regulations and guides
  - Regulatory review instructions
  - Process and work instructions
- **Management and organization**
- **Document Control**
- **Advisory support , e.g. in support of enforcement actions, licensing decisions**

TECHNICAL SUPPORT

- **Technical review of license application in various areas:**
  - Electrical, mechanical, civil, structural, seismic, thermal-hydraulics, nuclear fuel, nuclear plant systems, radiation protection, technical specifications, safety analysis, and severe accidents
- **Providing Safety Evaluation Reports**
- **Site and Environmental Reviews**
- **Fukushima Lessons-Learned**
- **Confirmatory Analysis**

TECHNICAL SUPPORT (2)

- **Training and knowledge transfer**
- **Project management, technical review management**
- **Staff augmentation**
- **Audits/inspections of suppliers**
- **On-site inspections during construction and operation**

INTEGRATION SUPPORT

- **Integration of the regulatory review:**
  - Develop RAI and SER templates to ensure consistent review and documentation across all SAR sections
  - Develop processes, instructions and forms to guide the reviewers and ensure consistency in preparing SERs
  - Manage document control system to process SERs, RAIs, and applicant's submittals
- **Systematic approach to licensing process**

CONCLUSIONS

- **Developing nuclear regulatory capacity for effective oversight is a large and complex undertaking**
- **TSOs can be very important to success; resource for expanding the safe worldwide utilization of nuclear power by:**
  - Providing expertise/review assistance to regulators in cost-effective/timely manner;
  - Allowing regulators to utilize worldwide experience and avoid licensing pitfalls;
  - Enhancing local/international acceptance of the regulator's activities, as well as public confidence;
  - Providing knowledge transfer and time for the authority to develop its own internal staffing and expertise.