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Establishment of the Operating Organization

Workshop on Establishing a Nuclear Safety Infrastructure for a National Nuclear Power Programme

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Outline

1. Introduction
2. Key Activities
3. Attributes
4. Interfaces
1. Introduction
Definition

operating organization = operator

Licensing process:

licensee = operating organization

Owner and operator may be different organizations. For safety purposes the organization in charge and responsible for safety is always the operator.
IAEA Safety Fundamentals

- Responsibility for Safety
- Role of Government
- Leadership and Management for Safety
- Justification of Facilities and Activities
- Optimization of Protection
- Limitation of Risks to Individuals
- Protective Actions to Reduce Existing Or Unregulated Radiation Risks
- Emergency Preparedness and Response
- Prevention of Accidents
- Protection of Present and Future Generations
Principle 1: Responsibility for Safety

The prime responsibility for safety must rest with the person or organization responsible for facilities and activities that give rise to radiation risks.

• The person or organization responsible for any facility or activity that gives rise to radiation risks or for carrying out a programme of actions to reduce radiation exposure has the prime responsibility for safety.

• Authorization to operate a facility or conduct an activity may be granted to an operating organization or to an individual, known as the licensee.

• The licensee retains the prime responsibility for safety throughout the lifetime of facilities and activities, and this responsibility cannot be delegated. Other groups, such as designers, manufacturers and constructors, employers, contractors, and consignors and carriers, also have legal, professional or functional responsibilities with regard to safety.
Steps Important to Safety in a Nuclear Power Programme

**Phase 1**
- Knowledgeable decision
- Considerations as whether to embark on nuclear power
- Issuance of the Atomic law
- Requirements needed for bid specification
- Establishing the basic regulatory framework

**Phase 2**
- Issuance of the call for tenders
- Bid result
- Site permit
- Bid preparation
- Preparation of safety documentation
- Application for construction license
- Site preparation
- Assessment by the RB

**Phase 3**
- Issuance of the construction licence
- Ready to commission
- First concrete
- Construction Phase
- Fuel delivery

- ~ 2 years
- ~ 4 years
- ~ 9 years

M1

M2

M3
Three distinct phases in the development of the infrastructure for a NP programme
Resource Requirements

1. NEPIO = 10 --> 50 (Depending on Expert Group Support)
2. REG BODY = 40 --> 150+Tech Support
3. OP ORG = 0 --> 20 to 30 --> 600 to 1200

Years (Indicative only)

No. of people

<-- Phase 1 -->

<-------- Phase 2 -------->

Site Investigation, Bid Preparations

<--Op Training-->

2-3 yrs

<-- Phase 3 -->

Design, Construct, Comm’n

Commissioning

Multi Units
Example Distribution of Disciplines for the Nuclear Workforce

2-year Associate Degree Backgrounds

- Mechanical Engineers
- Electrical Engineers
- Chemical Engineers
- Engineering Technology
- Nuclear Engineers
- Non-licensed Operators
- Maintenance
- Instrumentation & Control
- Rad Protection
- Electrical Systems
- Chemistry

4-year Degrees

Other Engineering Disciplines

Source: Lee Peddicord, TAMU, USA
2. Key Activities (safety and non-safety)
PHASE 1: PRE-PROJECT PHASE

- A good understanding of the national and international obligations and commitments associated with NP programme
- Pre-feasibility Study
- Site Prospection
- HRD considerations
PHASE 2: PROJECT DECISION MAKING

- Develop the capability to manage a NPP project and to achieve the level of organization and safety culture necessary
- Develop an understanding of the different designs and their safety features
- Build relationships with key stakeholders
- Develop an organization capable of providing relevant technical inputs for the choice of the appropriate nuclear technology
- Select the contractual approach for the construction of the first NPP
- Prepare a BIS (Bid Invitation Specification)
- Develop the capability to assess bids, review vendor qualifications and place contracts
PHASE 3: CONSTRUCTION

- Inviting and evaluating bids
- Liaising with the regulatory bodies
- Placing contracts for the supply and construction of the NPP
- Preparing all required documentation to obtain the necessary licenses in accordance with the national regulations
- Managing and supervising the construction of the first NPP in accordance with design bases, regulatory requirements and contractual provision
- Recruiting and training operating personnel, and arranging for them to be licensed where required
- Developing its organization and management system to be suitable for an operating NPP
- Participate actively in the commissioning activities
PHASE 4: OPERATION

Implement programmes to ensure safe operation, including:

- Staffing, qualification and training,
- Commissioning, plant operations, maintenance, in-service inspection, surveillance,
- Fuel management, chemistry,
- Safety analysis and review,
- Physical protection, radiation protection, industrial safety, fire safety,
- Waste management and environmental monitoring,
- Emergency preparedness,
- Quality Management,
- Human factors, feedback of operational experience,
- Plant modifications,
- Document control and records,
- Management of ageing, and decommissioning
3. Attributes
Desirable Attributes

• HAVING A STRONG SAFETY CULTURE WITH AN INTEGRATED MANAGEMENT SYSTEM
  Self-disciplined, inherent in thoughts and actions, enhancement of safety beyond legislation

• STRIVING FOR CONTINUAL PROCESS IMPROVEMENT
  Structured and continual improvement

• ABILITY TO MANAGE GROWTH AND CHANGE
  Ready for rapid change in size and functions

• EMPOWERING EMPLOYEES THROUGHOUT THE ORGANIZATION
  Encourages individuals to take ownership

• SELF AND INDEPENDENT ASSESSMENT OF PERFORMANCE
  Self-independent and reporting

• HAVING GOOD COMMUNICATIONS
  Facilitates good communication, Simple and clear, Internal and external
Desirable Attributes

• LEADS TO EFFECTIVE LEADERSHIP
  Managers influenced by saying and doing
  Organization leadership
  Management system
  Safety culture and ethics

• FACILITATES TECHNICAL COMPETENCE
  Sufficient knowledge and expertise
  Recruit and train sufficient specialist staff

• FACILITATES COMMERCIAL COMPETENCE
  Control costs generates a profit
Summary of the desirable attributes

**Having a strong safety culture with an integrated management system.**
Self-disciplined, inherent in thoughts/actions, enhancement of safety beyond legislation

**Continually improves**
Structured, continual improvement

**Manages growth and change**
Ready for rapid change in size, functions

**Empowers employees**
Encourages individuals to take ownership

**Assesses performance**
Self/independent, reporting

**Facilitates good communication**
Simple and clear, internal and external

**Leads to effective leadership**
Managers influence by saying and doing

**Facilitates technical competence**
Sufficient knowledge and expertise

**Facilitates commercial competence**
Controls costs; generates a profit
4. Interfaces
Typical contract structures for nuclear power plant construction

- **NI**: Nuclear Island
- **NF**: Nuclear Fuel
- **CI**: Conventional Island
- **CW**: Civil Works
- **BOP**: Balance of Plant
- **SSF**: Site and Supporting Facilities

**“Super turnkey”**

**“Normal turnkey”**

**“Split-package”**

Typical for 1st units
Contract Structures

**Super turnkey**
- A single contract covers the whole NPP.
- The prime technical responsibility for the success of the project is placed upon the contractor.
- This approach is particularly suitable for utilities with limitations in manpower resources and/or experience in the nuclear field.

**Normal turnkey**
- The utility supplies peripheral items of the plant (10-20% of the plant costs).
- It is usual for owners with nuclear experience or greater competence in conventional power stations.

**Split-package contracts**
- The term ‘package’ is used to describe a functionally complete part of a power station.
Interfaces with Stakeholders

MAIN STAKEHOLDERS

• INTERNAL STAKEHOLDERS (PARTNERS): Decision-making process or directly involved in the implementation of the NPP project
  (e.g. The public authorities, Regulators, Organizations involved in the construction of the NPP, Organizations involved in emergency arrangements for the nuclear site, Organizations that provide services or support to the NPP, Organizations related to the operation of the national electricity system, etc.)

• EXTERNAL STAKEHOLDERS: A direct interest in the outcomes and impact of the project
  (e.g. Neighboring countries, NGOs, News media, Universities, Electricity customers, etc.)
Interfaces with Stakeholders (cont.)

The different kinds of stakeholders

- Regulatory Body
- Emergency services
- Constructor
- Support services
- Electric grid, market
- Customers
- Education
- News media
- NGOs
- Public

Local, Regional, National, Neighbouring, International
MANAGING INTERFACES WITH STAKEHOLDERS

• The national government:
  e.g. Establishing the legal framework, a regulatory body, implementation of IAEA safeguards, maintaining public support for the NPP project, nuclear fuel cycle policy, policy on management and disposal of radioactive waste, financial policy, policy on industry participation

• Regulatory body:
  a joint responsibility of the owner/operator and the regulator(s)
Interfaces with Stakeholders (cont.)

- **Electricity grid operator**: to maintain a safe and secure electrical grid system that provides reliable electrical supplies to electricity customers.

- **Vendor, main contractor and subcontractors**: responsible for providing the owner/operator with plant design and performance info, safety studies etc.

- **Waste management organization**: to develop the facilities for receiving radioactive wastes and spent fuel from the NPP, and its long term management or disposal.

- **Emergency planning and response organizations**: e.g. central government agencies, local government agencies, fire brigade, police, ambulance and hospital services etc.

- **The public**: an open and honest public communications programmes is recommended.

- **International organizations**: e.g. joining WANO
Safety Standards

Safety Fundamentals

Thematic standards

- Legal and governmental infrastructure
- Emergency preparedness and response
- Management systems
- Assessment and verification
- Site evaluation
- Radiation protection
- Radioactive waste management
- Decommissioning
- Remediation of contaminated areas
- Transport of radioactive material

Facilities specific standards

- Nuclear power plants: design
- Nuclear power plants: operation
- Research reactors
- Fuel cycle facilities
- Radiation related facilities and activities
- Waste treatment and disposal facilities

http://www-ns.iaea.org/standards

General safety (cross-cutting themes)

Safety of nuclear facilities

Radiation protection and safety of radiation sources

Safe management of radioactive waste

Safe transport of radioactive material
Safety Standards
Objective
To provide practical guidance on the main activities, responsibilities and desirable attributes of the designated owner/operator of the first NPP in a country.

Users
Decision makers, managers, advisors in the owner/operator organizations involved in the implementation of a NP project for the first time in a country.
Thank you for your attention