

NUCLEAR SAFETY and LICENSING

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In accordance with IAEA Safety Glossary, 2018 Edition:

Contents Nuclear Safety «The achievement of proper operating conditions, prevention of accidents and mitigation of accident consequences, resulting in protection of workers, the public and the environment from undue radiation risks.»



IAEA Fundamental Safety Principles (SF-1) defines nuclear safety fundamental and objectives:

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• The fundamental safety objective is to protect people and the environment from harmful effects of ionizing radiation.



- From this fundamental safety objective, 10 principles were derived.
- This fundamental safety objective should be fulfilled without unduly limiting the operation of facility or activity.
- This fundamental safety objective applies through entire lifetime of all facilities from planning to decommissioning phase.



- To ensure that the highest standards of safety are achieved, measures have to be taken:
 - To control the radiation exposure of people and the release of radioactive material to the environment,
 - To restrict the likelihood of events that might lead to a loss of control over a nuclear reactor core, nuclear chain reaction, radioactive source or any other source of radiation,
 - To mitigate the consequences of such events if they were to ocur.



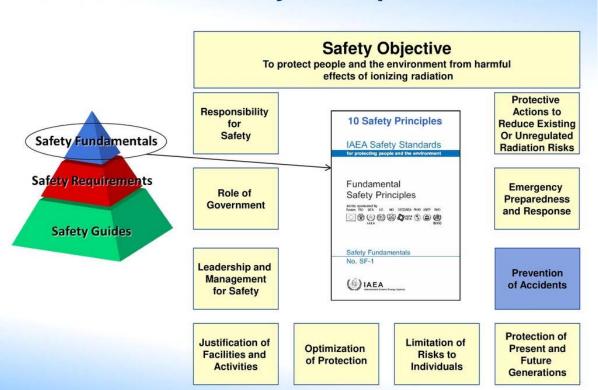
Nuclear Safety-Safety Principles

- 1. Responsibility for Safety
- 2. Role of Government
- 3. Leadership and Management for Safety
- 4. Justification of Facilities and Activities
- 5. Optimization of Protection
- 6. Limitation of Risks to Individuals
- 7. Protection of Present and Future Generations
- 8. Prevention of Accidents
- 9. Emergency Preparedness and Reponse
- 10. Protective Actions to Reduce Existing or Unregulated Radiation Risks



Fundamental Safety Principles







Safety Approach

- Multistep Licensing
 - Under revision based on lessons learned from the Akkuyu NPP licensing
- Determination of Licensing Basis
 - List of regulations, guides, codes and standards to be used during the authorization process
 - Hierarchy defined by a Directive
 - Turkish legislative and regulatory documents
 - IAEA Safety Fundamentals and Requirements
 - Legislative and regulatory documents proposed by applicant
 - Vendor country documents
 - Laws and regulations on issues insufficiently addressed above
 - Codes and standards used in design
 - Third party documents
 - Same hierarchy for the guides, codes and standards

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Safety Approach

Multistep Licensing

Licensing Basis

- List of regulations, guides, codes and standards to be used during the authorization process
- Hierarchy defined by a Directive
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Safety Approach-Reference Plant

- Definition
 - An NPP of similar design, currently operating, or
 - An NPP of similar design, authorized for construction by a competent RB and under construction
- Approval mechanism
 - Submission of a report
 - Rationale of selection, details of reference plant, authorizations received, and comparison with proposed design

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Regulations defining the authorization process

- Decree on Licensing of Nuclear Installations
 - Who will apply
 - Documents for application
 - Authorizing body of TAEK
 - Authorization conditions
 - Main authorizations in stages (licenses), sub-stages (permits) and notifications/recognitions
- Regulation on Equipment Procurement Process and Approval of Manufacturers for Nuclear Installations
 - Procurement permit
 - Approval of manufacturing of long lead items and manufacturers
- Regulation on Clearance and Release of Site from Regulatory Control in Nuclear Installations
 - Decommissioning and Release from Regulatory Control

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OLD PROCESS

Application and **Recognition as Owner**

Notification of RB for commencement of site

Application Document Site Report

Site License

Application Document Site Parameters Report

Approval of Site Parameters

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Safety Approach **Licensing Process**

Preparatory Stage

Letter of Intent

To know potential applicant, installation, site, etc. To know technical and financial capabilities of applicant To initiate early communication with

applicant

Procurement Permit

To authorize commencing the procurement of main services and contract main suppliers (EPC, Vendor, manufacturers, etc) ensuring that the applicant's system in place for control of supply chain Apply with;

 Procurement Management **Documents**

Site Investigations

Site Approval

To approve that site is a suitable candidate for the facility with respect to exclusion criteria Apply with;

Site Report

Manufacturing

Site Preparation Permit

To authorize all site preparation activities, all non-nuclear civil works for the facility Apply with;

PSAR Chps 2 and 3 Physical Protection plan Management Plan of site preparation

NEW PROCESS



Application Documents OLD PROCESS PSAR PSA Level 1 and 2 Construction programme Physical Protection Plan Training and Qualification of Personnel Approval of Site Construction License **Commissioning Permit Limited Work Permit Parameters** Site Construction **Contents Preparation Nuclear Safety Manufacturing** Safety Approach Site Preparation Permit **Licensing Process Construction Permit** To authorize all site preparation To authorize commencing the nuclear civil **Commissioning Permit** activities, all non-nuclear civil works works (first concrete) and all assembly for the facility activities Apply with; Approval or Notification Apply with; GAR Chps 2 and 3 PSAR Physical Protection plan of Manufacturing PSA levels 1 and 2 Management Plan of site · Management Program for Construction preparation To authorize manufacturing of selected Physical Protection Plan equipment · Training and Qualification of Personnel Apply with; • Design info of equipment Manufacturing quality plan

NEW PROCESS



OLD PROCESS

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Fuel loading and trial Commissioning Operating License operations permit **Permit** Construc **Operation** Commissioning **Commissioning Permit** To authorize operation, starting with loading Approval of OLC for **OPERATING LICENSE** the fuel to the core commercial operation Hold points before first criticality, power Fuel loading To authorize cold and hot system uprate, and full power trial operations tests First criticality Commencement of commercial operation if OLC is approved at the end Power increase

NEW PROCESS

Full power operation



Release from

regulatory control

Release from

regulatory control

OLD PROCESS

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<u>To authorize</u> start-up after long term shutdown or after an automatic shutdown because of exceeding OLC

Permit for returning

to operation

..... Operation

Modification permits

Modifications permit

<u>To authorize</u> safety significant modifications to design, OLC or operation procedures or any approved document or activity

Decommissioning Permit

Decommissioning

Decommissioning permit

<u>To authorize</u> safe decommissioning of the facility and/or unit

NEW PROCESS

Application Documents for Construction

- PSAR
- PSA Level 1 (and level 2)
- Construction Program
- QMS for Construction
- Physical Protection Plan
- Conf. MS documents
- Environmental Monitoring Program
- Personnel Training and Qualification Program
- Differences from reference plant and their impact on safety
- Independent safety evaluation



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Application Documents for Operation

- FSAR
- Fuel loading, criticality and test operations program
- Results of commissioning
- QMS for stage
- Operating manuals of the installation
- Emergency Response Plans
- Operating organization and personnel
- · Results of tests performed
- Final version of Operating Limits and Conditions
- Operating procedures



Application Documents for Commissioning

- Commissioning program
- · Commissioning organization and personnel
- Final design and QA of systems and components
- Results of preoperational tests
- Preliminary operational limits and conditions
- Operation manuals of systems and components
- QMS for commissioning

Application Documents 2 (Programs)

- Maintenance
- Fuel and Core Management
- Waste Management
- Ageing Management
- Equipment Qualification
- Fire Protection
- Chemical Control
- Nuclear Material Accounting and Control
- Physical Protection Plan
- Independent tests and inspection reports

Application Documents 2 (Programs)

- Radiation Protection Program
- Operational Experience Program
- Safety Performance Monitoring Program
- Human Factors Program
- Surveillance and In-Service Inspection Program
- All revised procedures, plans and programs



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THE END...

Thank you for your attention.