Licensing process for Nuclear Installations

21-23 April 2010
Prague, Czech Republic

CNRA International Workshop on
“New Reactor Siting, Licensing and Construction Experience”

Stéphan Calpéna

IAEA
International Atomic Energy Agency
New Safety Standard Structure

- Regarding regulatory activities under the REQUIREMENTS DS415
New Safety Standard Structure

• Now on, we think about gathering all in on guide under DS415…
New Safety Standard Structure

- Whatever the future structure will be for DS416 we were focusing on…
New Safety Standard Structure

- Licensing process: DS 416
- Review & Assessment: GS-G-1.2
- Inspection & Enforcement: GS-G-1.3
- Regulations & Guides: GS-G-1.4
- Transparency, Openness and Involvement: ???

- Organisation and Staffing of the RB: GS-G-1.1
- Management Systems for RB: DS 113
FOR THE TIME BEING…

- Licensing process
- Review & Assessment
- Inspection & Enforcement
- Regulations & Guides
- Transparency, Openness and Involvement… ???

DM 416

GS-G-1.2
GS-G-1.3
GS-G-1.4

DS 415

GS-G-1.1
GS-G-1.2
GS-G-1.3
GS-G-1.4
Introduction
- Background
- Objective
- Scope
- Structure

General Guidance for the Licensing Process
- Basic Licensing Principles
- Obligations, Roles and Responsibilities of the Regulatory Body
- Obligations, Roles and Responsibilities of the Applicant or Licensee
- Main contents of a Licence
- Public Participation
- Graded approach

Steps of the Licensing Process
- Siting and site evaluation (including safety assessment and EIA)
- Design
- Construction
- Commissioning
- Operation (including safety review, long term shutdown, alternative regulatory process for combined Licences)
- Decommissioning
- Release from Regulatory Control

APPENDIX with examples of documents
Steps of the Licensing Process

- Siting & Site evaluation
- Design
- Construction
- Commissioning
- Operations
- Decommissioning
- Release
Requirements from DS415

• “Authorization by the regulatory body, including specification of the conditions necessary for safety, shall be a prerequisite for those facilities and activities that are not explicitly exempted or approved by a notification process” (Requirement 23).

• “The applicant shall be required to submit an adequate demonstration of safety in support of an application for authorization” (Requirement 24).

• “Where different authorities have responsibilities in the regulatory framework for safety, the government shall provide for the effective coordination of their regulatory functions, to avoid any omissions or undue duplication and to avoid conflicting requirements being placed on authorized parties” (Requirement 7).
Licensing Process... DS416

- **Definitions** *(licence, licensee, applicant...)*
- **Basic Licensing principles**
  - Clear, transparent, logical order, pre-licensing, possibilities of combining licences, licence validity aspects, all authorisations on a site to be consistent and coherent each other...
  - Licensing allows regulatory control... Regulatory regime to be established and made explicit,
  - The licence may include: conditions, requirements, criteria, commitments...
  - Should be procedures for issuing authorizations including: review and assessment aspects; how to appeal against...
  - Submitted documents to be upgraded during the NPP’s lifetime
  - Categories of conditions: technical limits, procedures and modes of operation, administrative matters, inspection and enforcement aspects, abnormal circumstances.
• **Obligations, Roles and Responsibilities of the Regulatory Body.**
  • Application content, RB guidelines, review & assessment, inspection, compliance and verification phase to grant licences, modification aspects, to keep the operating organization solely responsible for Safety and Security.

• **Obligations, Roles and Responsibilities of the Applicant or the Licensee.**
  • Safety level as high as reasonably achievable, intelligent customer concept (design, process, contractors, assistance coordination), modification process, management system, procedure for controlling that NPP remains within limits, for anticipated operational occurrences for emergency response, etc.
Licensing Process... DS416

- **Main content of a Licence** *(for all stages of the installation lifetime, long list of items to be considered in DS416)*

- **Graded approach** *(...)*
Main Licensing Considerations (DS416)

- **Public involvement during all NPP lifetime. This reinforces the credibility of the Regulatory Body, enhance local public confidence in the regulatory regime and increase the “de facto” independence of the Regulatory Body.**


- **Public credibility may also help the Regulatory body to negotiate its annual budget with the Government and “de jure independence”...**
Steps of the Licensing Process

- Siting & Site evaluation
- Design
- Construction
- Commissioning
- Operations
- Decommissioning
- Release
Authorization Stages

Siting and Site evaluation

- Acceptability of the site & Approval of the site…
- Conditions dealing with the use of the site
- Safety impact (NS-R-3): initial conditions, range of natural hazards, man-made hazards, Emergency impact, site security, control over new building / construction, interactions…
- Environmental impact: flora, fauna, air, soil, discharges, heat dissipation, health, socio-economics… Impact to be reviewed on periodic basis…
Authorization Stages

Turnkey NPP doesn’t exist…
Licence applicant to be an intelligent customer…

To review and assess the applicant’s submission and especially:

- Safety analyses and assumptions;
- Structures, systems and components important to safety;
- Limits and permitted operational states;
- Anticipated operational occurrences;
- postulated initiating events for the safety analyses
Authorization Stages

- List of features, barriers, design requirements, analytical methods and computer codes used in the safety analysis,

- Radioactive releases and radiation exposures in normal operation and fault conditions;

- The applicant’s safety criteria for analyses of operator actions, common cause events, cross-link effects, single failure criterion, redundancy, diversity and separation.
Authorization Stages

- Safety and design analyses should be used to specify:
  - Commissioning requirements.
  - Classification of structures, systems and components (safety, quality, seismic, environmental qualification etc.)
  - Operating limits, conditions, rules and operating procedures,
Authorization Stages

**Site**

**Design**

**REQUIREMENTS** dealing with:

- Maintenance;
- radiation protection;
- waste management;
- emergency preparedness;
- physical protection;
- training and/or certification;
- testing, construction, commissioning aspects…
In addition, the design must consider the following:

- Transport of radioactive materials;

- The replacement of heavy and large components during its operational life (e.g., steam generator, reactor pressure vessel heads, etc). For example, the design should take into account: buried pipes and conduits, openings in structures for equipment access, obstructions,

- Access of components important to safety for: Maintenance, inspection and testing, replacement occupational exposure and how the installation will be decommissioned.
What’s more during the design stage?

The Regulatory Body needs to:

- secure confidence of stakeholders – e.g.: industry and the public;
- Take account of international standardized designs, possibly certified elsewhere;
- Draw on work of overseas regulators;
- Make the RB process more predictable;
- Decide what “standards” to apply;
What’s more during the design stage?

- The RB must have enough staff with the right experience, some good independent TSOs, good cooperation with relevant foreign RB, good benchmarking;
- The RB must establish effective and efficient MoU with all other relevant Regulators: Environment, Health, Labour, safeguard & physical integrity, construction planning, Emergency, Transport, water & food consumption…
- Peer review to be organised including IAEA’s
- Evolutionary design with modern safety philosophies needs to include good international cooperation.
Manufacturing of important safety related SSCs should be under control of the licensee and this process should be reviewed, assessed and inspected, when appropriate, by the regulatory body.

The licensee should also control its cascades of contractors, its suppliers and its vendor under its management system.
Authorization Stages

Adequacy to be reviewed, assessed and inspected by the regulatory body of:

- The framework and schedule for construction and acquisition of SSCs;
- The development of the design of the plant as demonstrated in the Licensee’s safety documentation;
Authorization Stages

Before granting any permit, the RB should review and inspect:

- The management system of the applicant or licensee and vendors as necessary;
- The site evaluation;
- The design features important for safety and security;
- Documentation relating to demonstration of compliance of the selected design with safety objectives and criteria, including validated results from experiments and research programmes;
- Organizational and financial arrangements for decommissioning and for management of radioactive waste and spent fuel.
Authorization Stages

Before granting any permit, the RB should review and inspect:

- The adequacy of the framework and schedule for construction and acquisition of structures, systems and components;
- That the applicant or licensee should have adequate financial capabilities;
- That the nuclear installation should be designed and constructed in accordance with the relevant site parameters identified by the applicant and agreed with the regulatory body and in an adequate manner;
- Planned deviations from the approved design should be fully analyzed in relation to the original design intentions and submitted to the regulatory body for assessment and approval;
- Physical protection measures and fire protection should be put in place;
Authorization Stages

Before granting any permit, the RB should review and inspect:

- Radiological monitoring equipment and devices should be clearly defined, installed and operational prior to radioactive material being brought onto the site;
- The licensee should conduct/upgrade the local radiological study of the region and all the material used in the construction, including samples of construction concrete, prior to the radioactive material being brought onto the site;
- Industrial codes, standards, rules (including health and safety regulations) should be put in place before starting the construction;

There should be regulatory control in place over the licensee’s contractors and subcontractors performing tasks relevant to structures, systems and components important to safety.
Authorization Stages

<table>
<thead>
<tr>
<th>Site</th>
<th>Design</th>
<th>Construction</th>
</tr>
</thead>
</table>

Before granting any permit, the RB should review and inspect:

- Review, assess and inspect on a systematic basis the development of the design of the installation as demonstrated in the safety documentation submitted by the applicant or licensee in accordance with an agreed programme (which may include requirements to improve safety through design optimization);

- Review and assess the progress of research and development programmes relating to demonstration of the design, if applicable;

- Review and assess the potential impact of the construction on the safe operation of any neighbouring nuclear installations or other high hazard industrial installations.
Authorization Stages

Before allowing nuclear and/or radioactive materials to be brought onto the site, an adequate decommissioning and final disposal plan should be submitted to the regulatory body. Such a plan should also include that:

Sufficient funds to decommission the installation will be available at the end of operation. This should include incidental costs such as spent fuel management, waste management and disposal. Funds based on:

- Funds based on reasonable cost estimates;
- Fund estimates should be upgraded and reviewed periodically;
- Mechanisms are implemented for accumulating funds through the anticipated lifetime of the installation.
- In addition, provisions must be made such that appropriate funds could be made available in the event that installation shuts down prior to the end of its planned life.

Furthermore, a legal framework should be provided to secure and protect the decommissioning funds from being depleted for other purposes.
### Other stages and related hold points

<table>
<thead>
<tr>
<th>Site</th>
<th>Design</th>
<th>Construction</th>
<th>Commissioning</th>
</tr>
</thead>
</table>

Introduction of nuclear or certain radioactive material into the NPP

The regulatory body should conduct reviews, assessments and inspections to determine whether:

- The commissioning test programme is complete and contains a set of well defined operational limits, test acceptance criteria, conditions and procedures;
- The commissioning tests can be safely conducted as proposed by the licensee or applicant and their justification is appropriate.
Other stages and related hold points

<table>
<thead>
<tr>
<th>Site</th>
<th>Design</th>
<th>Construction</th>
<th>Commissioning</th>
</tr>
</thead>
</table>

Introduction of nuclear or certain radioactive material into the NPP

- SSCs to be inspected, tested and approved by the licensee as being in accordance with the requirements set out in the design as agreed by the regulatory body

AND RB should REVIEW:

a) The status of the nuclear installation:
- The as-built design of the nuclear installation;
- The results of non-nuclear commissioning tests;
- Storage facilities for nuclear materials;
### Other stages and related hold points

<table>
<thead>
<tr>
<th>Site</th>
<th>Design</th>
<th>Construction</th>
<th>Commissioning</th>
</tr>
</thead>
</table>

Introduction of nuclear or certain radioactive material into the NPP

**b) The RB should review management aspects:**

- The management system and the programme for operation;
- The organizational structure of the licensee, including the arrangements for ensuring training and qualification of personnel, including staffing levels, fitness for duty and licensing of staff for certain positions as specified in the regulations;
- The arrangements for periodic testing, maintenance and inspection;
- Organization and procedures for dealing with modifications;
- The recording and reporting systems including those for operational data, test results, deviations reports, and reporting of incidents and events.
### Other stages and related hold points

<table>
<thead>
<tr>
<th>Site</th>
<th>Design</th>
<th>Construction</th>
<th>Commissioning</th>
</tr>
</thead>
</table>

Introduction of nuclear or certain radioactive material into the NPP

c) The RB should review operational provisions:

- The operational limits and conditions applicable during nuclear commissioning;
- The commissioning programme and its progress;
- The conditions under which discharges will be managed, including radioactive, chemical, thermal and other discharges, as appropriate;
- The provisions for radiation protection;
- The adequacy of operating instructions and procedures, especially the main administrative procedures, operating procedures for normal operation and anticipated operational occurrences and emergency operating procedures;
c) …

- Arrangements for on-site emergency preparedness and off-site liaison;
- Physical protection arrangements important for safety;
- Measures for accounting and control of nuclear and radioactive material;

Introduction of nuclear or certain radioactive material into the NPP
There is some overlap between the construction and commissioning stages in that individual structures, systems and components may already be commissioned before construction of the entire nuclear installation is complete.
Other stages and related hold points

| Site | Desig | Constr | Commissioning |

Introduction of nuclear or certain radioactive material into the NPP

NPP has been constructed, and SSCs manufactured and installed correctly and in accordance with the design specifications

Nuclear testing is a major step in the licensing process carried out to confirm that the performance of the nuclear installation is safe before proceeding to routine operation. Commencement of nuclear testing may require an authorization from the regulatory body
The results of commissioning tests should be subject to:

- Self-assessment and internal audits of the licensee. Appropriate actions and measures should be taken whenever deviations from design parameters are identified. These should be analyzed by the licensee and reported to the regulatory body;

- Review, assessment and inspection by the regulatory body. The aim of these regulatory controls is to assess whether the test results are adequate for confirming the adequacy of all safety related features of the nuclear installation.

More detailed aspects within NS-G-2.9 & NS-G-4.1
Other stages and related hold points

<table>
<thead>
<tr>
<th>Site</th>
<th>Design</th>
<th>Construction</th>
<th>Commissioning</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

See DS416
Other stages and related hold points

<table>
<thead>
<tr>
<th>Site</th>
<th>Design</th>
<th>Construction</th>
<th>Commissioning</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

See DS416
### Other stages and related hold points

<table>
<thead>
<tr>
<th>Site</th>
<th>Design</th>
<th>Construction</th>
<th>Commissioning</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

6. Modifications

See DS416
<table>
<thead>
<tr>
<th>Site</th>
<th>Design</th>
<th>Construction</th>
<th>Commissioning</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

7. PSR or SR aspects in the licensing process…

See DS416
Other stages and related hold points

<table>
<thead>
<tr>
<th>Site</th>
<th>Design</th>
<th>Construction</th>
<th>Commissioning</th>
<th>Operations</th>
<th>Decommissioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4 5 6</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

8. Decommissioning

See DS416
9. Release from Regulatory Control;

See DS416
THANK YOU