Review of Nuclear Power Plant Systems Design

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<table>
<thead>
<tr>
<th>NPP’s OPERATING</th>
<th>CAPACITY (MW)</th>
<th>COMMISSIONING YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-1</td>
<td>125</td>
<td>1972</td>
</tr>
<tr>
<td>C-1</td>
<td>325</td>
<td>2000</td>
</tr>
<tr>
<td>C-2</td>
<td>340</td>
<td>2011</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NPP’s UNDER CONSTRUCTION</th>
<th>CAPACITY (MW)</th>
<th>EXPECTED COMM. YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-3</td>
<td>340</td>
<td>2016</td>
</tr>
<tr>
<td>C-4</td>
<td>340</td>
<td>2017</td>
</tr>
<tr>
<td>K-2</td>
<td>1000</td>
<td>2019</td>
</tr>
<tr>
<td>K-3</td>
<td>1000</td>
<td>2020</td>
</tr>
</tbody>
</table>
Implementation of Nuclear Power Program

- Plants in operation or under-construction completed by foreign contractors on turnkey basis
  - K-1 complete turnkey by AECL
  - C-1, C-2, C-3 and C-4 turnkey by CNNC (except part of civil work)
  - K-2/ K-3 also turnkey by CNNC (except part of civil work)
Goals

- Provide energy security
- Achieve self reliance
- Partnership between PAEC & industry
- Develop design capability
- Provide technical support to NPPs
- Planning, studies & engineering of future NPPs

Responsibilities

- Site selection and evaluation, design, analysis of buildings and structures of NPPs
- Review of Technical Annexure
- Review of design and engineering documents
- Interface with the designers/supplier
- Interface with the regulatory body for licensing
- Participation in basic and detailed design with designer
- Have been involved in the preparation, review, acceptance, approval, implementation, and management of design during design phase
- Design and engineering of systems, components in PAEC scope.
- Technical support to operating NPPs
Review of Nuclear Power Plant System Design

Review Responsibility

CZEC

Coordination Department
Received Documents

Nuclear Power Engineering Directorate

Plant Design Directorate

Reactor Design Directorate

Directorate of Civil and Structure
Review Responsibility (cont..)
Review of Design Documents

Two Stage Review

Basic Design Documents

Detailed Design Documents

Design Inputs

- Commitments in the Technical Annexure at the time of contract
- Reference Plant Relevant documents/parameters
- Relevant Codes and Standards
- Issues raised in the review process of PSAR/FSAR of operating plants
- Feedbacks from the operating plants
- Regulatory requirement if any
Review Process

Coordination Directorate prepare a check list for review

• Responsible engineer review the document and produce comments
• Comments are further reviewed by a senior engineer of the relevant discipline as per check list
• After finalizing the comments at senior engineer level comments are forwarded to Manager of the relevant division
• Comments are reviewed at director level
• Forwarded to coordination Directorate
• Further reviewed and forwarded to CZEC or dropped
Review of Detailed Design Documents

Review inputs:

- Commitments in the Technical Annexure at the time of contract
- Reference Plant Relevant documents/parameters
- Relevant Codes and Standards
- Issues raised in the review process of PSAR/FSAR of operating plants
- Feedbacks from the operating plants
- Regulatory requirement if any
- To ensure the implementation of basic design review comments
Technical Support By Supplier
WHY?

Engineering support is essential to maintain design and configuration so as:

- To ensure the safe operation of NPPs
- To maximize their availability and productivity

AREAS IN WHICH TECHNICAL SUPPORT IS PROVIDED

Responsible Designer support in various areas, including

- Specific research
- Engineering services
- Development of technical improvements
- Analysis and testing

ASSISTANCE TO AN NPP OPERATING ORGANIZATION ON DESIGN DECISIONS

- "R & D" and designer can provide technical support to "services"
- Feedback from the "service" are provided to "R & D" and "designer" to enhance plant safety performance.
Thank You