

# A Study on the Gate Review Framework of Nuclear Power Plant Development Project

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## 1. Introduction

The gate review is a review that determines entry into the next step through review of the project's performance, planning for the next step, and conformity with organizational strategies at a certain point in the project life cycle. In nuclear power plant projects, plan for implementing such gate reviews us required by the owner, but there are very few studies or disclosure cases.

Therefore, in this study, we suggested a gate review framework presented a gate review framework including the types of gate reviews and checklists in each gate review suitable for nuclear power plant development projects. The gate review framework presented in this study should be adjusted and used for each nuclear power plant development project.

## 2. Gate Review Overview

This widely used gate review can be divided into two categories, stage gate review and in-stage gate review, as shown in Fig.1.

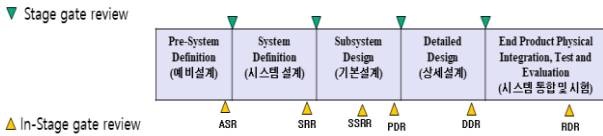


Fig. 1. Categorization of gate review

And various names and purposes used in such gate reviews can be summarized as Table.1.

Table 1: Problem Description

category	Purpose
Stage gate review (Stage gate process, project gate, decision point, milestone decision, acquisition gate review)	- Investment management - Investment decision for next stage
in-stage gate review (Technical review, design review)	- Proactive risk management - Determine whether to proceed to the next step within the stage

## 3. Gate Review Framework Example

Examples of gate review frameworks can be found mainly in the U.S government. And in the U.S is also

using its gate review framework, and Korean Defense Acquisition Program Agency also has its gate review framework as shown in Fig.2.

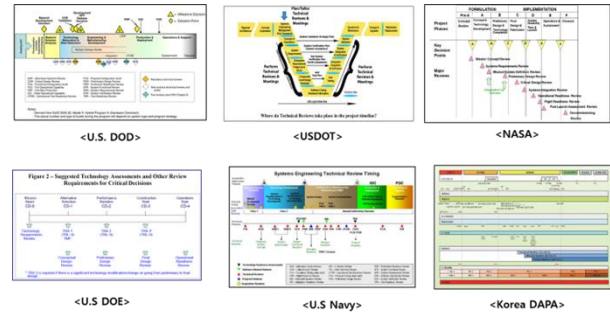


Fig. 2. Examples of Gate Review Framework

In addition, in the industrial field, the contents of the gate review under the name of “technical review” are presented in the systems engineering standards IEEE1220 and EIA 632.

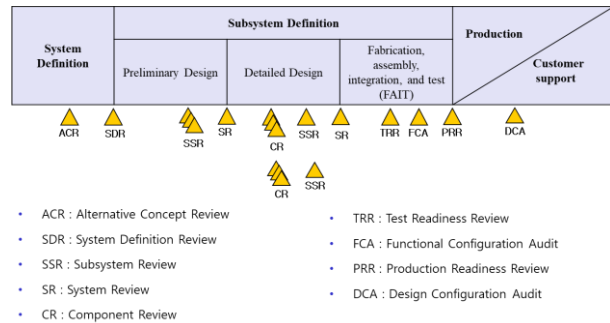


Fig. 3. Gate Review Framework in IEEE 1220

Each gate review framework presents the type of gate review, entry criteria, checklist, and exit criteria. Therefore, it is necessary to define a gate review framework that contains the types of gate reviews, the entry and exit criteria, and a checklist of each gate review.

## 4. Gate Review framework of NPP Development project

### 2.1 Characteristics of Nuclear Power Plant Development Project

This study targets projects that develop nuclear power plants that have already obtained licenses or have experience in development, not new concept power plants. Such nuclear power plant development projects

are divided into pre-project and project implementation stages based on major contract as in Fig.4. In addition, in this study, a framework was constructed for gate reviews performed by a contractor after a major contract, especially for design works.

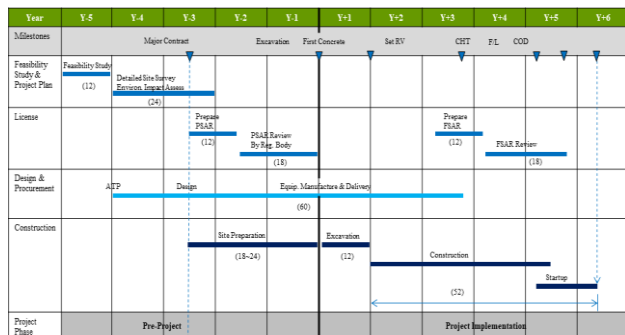


Fig. 4. Major schedule of NPP development project

## 2.2 Framework of NPP Development Project

As shown in Fig.4, there is no investment decision on the project after major contract. Therefore, in this case, there is no stage gate review, and only in-stage gate reviews exist. To construct a gate review framework, we organized the design works into three substages as shown in Fig.5.

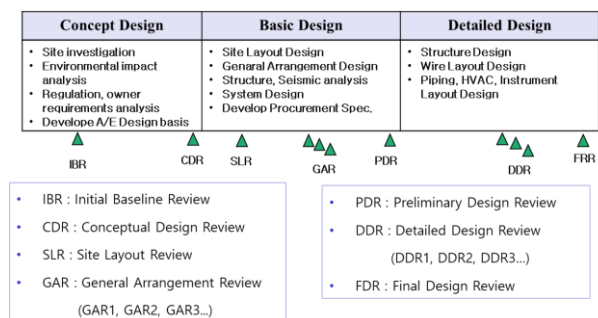


Fig. 5. Framework of NPP development project

In Fig.5, since DDR is performed for each building, it can be performed several times.

The main contents of each review are in Table 2.

Table 2: Main contents of each review

Review	Contents
IBR	Present and agree on issues of requirement needs, clarity, and feasibility
CDR	Review plant conceptual design, site/environmental impact analysis results
SLR	Review each building's layout, size, infrastructure, access road, etc.
GAR	Review component layout, entry path, and related analysis results for each building

PDR	Summarize the results of previous reviews to see if they meet initial requirements
DDR	Review the design results of each building's structure/wireline/piping/HVAC/instrumentation, etc.
FRR	Summarize each DDR result to see if it meets the initial requirements

For each review of the constructed framework, the purpose, timing of review, entry criteria, exit criteria, review documents, and checklists were developed.

For example, the details of SLR (site layout review) are as follows.

Table 3: Main contents of each review

Purpose	Review each building's layout, size, infrastructure, access road, etc.
Timing	The early phase of basic design
Entry criteria	Site layout design completed Action items of CDR are cleared
Exit criteria	All issues concerning site layout design are agreed upon or future countermeasures are agreed. The future work plan is appropriate
Review documents	Site layout drawing Agreements on issues Future work plan

Table 4: SRL Checklist

Category	Checklist
Design results	Is the types and size of each building appropriate?
	Are the interfaces between each building reflected?
	Is the connection with the power grid reflected?
	Is the water conservancy environment for intake and discharge of cooling water reflected?
	Are external hazards such as earthquake, tsunamis, plane crashes considered?
	Are the ground conditions of the site considered?
	Are various analyses related to site layout conducted appropriately?
	Are all top-tier requirements for site layout met?
	Are the changes to the initial requirements appropriate to the overall scope and technical performance of the project?
	Is traceability of all design and analysis results and top tier requirements managed?

Action item	Have all action items presented in the previous gate review been taken?
Licensing	Are the licensing documents prepared as planned?
Future plan	Are future work schedules appropriate?
	Is the manpower supply and demand plan appropriate for future work performance?
	Are risks identified for future works and appropriate countermeasures established?

## **5. Conclusions**

In this study, a gate review framework was presented for the design tasks to be performed by contractors in the nuclear power plant construction project.

The key to gate review is to ensure that the next step of work is performed after the previous step work is clearly completed.

To this end, in this study, the design works were divided into three substages, and a gate review framework was constructed on the bases of important documents developed at each substage.

To efficiently and effectively perform the review the purpose, timing, entry criteria, exit criteria, review documents, and checklist were developed for each gate review.

It is highly recommended to adjust and use this gate review framework presented in this study according to the project situation and customer requirements.

## **Acknowledgment**

This work was supported by Korea Agency for Infrastructure technology Advancement (KAIA) grant funded by the Korea government (MOLIT) (No. RS-2022-00143652).

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