

## Development of Risk Evaluation Program SEIF for Inspection Findings

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### 1. Introduction

The objectives of risk-informed regulation is to focus the regulatory resources to the areas in which the safety significance is high or performance is below the criteria, and to improve safety, effectiveness and efficiency of regulation. To achieve this purpose, supporting tool which can integrated risk information and risk significance with traditional deterministic regulation framework should be developed. KINS has started to develop a framework in which the graded level of regulation by risk and performance bases. As a part of this graded regulation program, Significance Evaluation of Inspection Findings (SEIF) is being developed.

### 2. Significance Evaluation of Inspection Findings (SEIF)

Significance Evaluation of Inspection Findings (SEIF) is designed to support risk significance of inspection findings and events by both qualitative and quantitative methods. SEIF will support detailed risk analysis using interface with PSA analysis station AIMS also for the PSA experts and inspectors who want risk information using PSA models. Relation and interfaces with KINS integrated safety and performance evaluation framework was presented in figure 1 and the overall structure of SEIF was presented in figure 2.

#### 2.1 Significance Determination Methodology for Inspection Findings

Qualitative significance determination methodology for SEIF consists of 2 phases. The issues covered by phase 1 are initiating events, mitigating capability and defense-in-depth barriers. In phase 2, frequencies of initiating events and redundancy or diversity of mitigating trains were concerned.

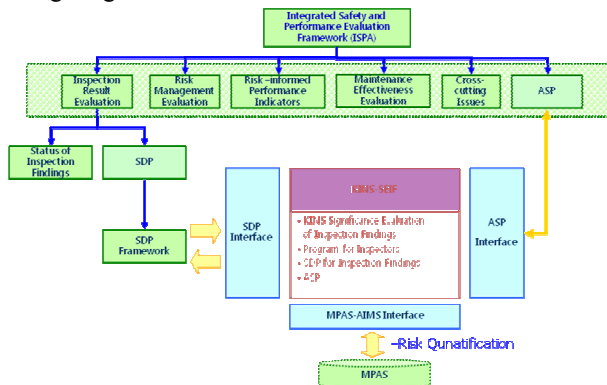


Fig.1 Relation and interfaces with KINS integrated safety and performance evaluation framework

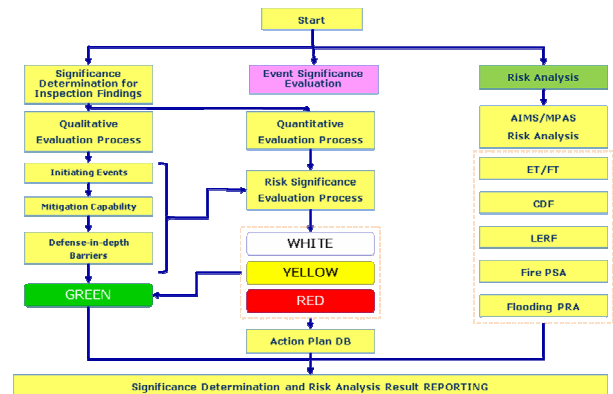


Fig.2 Overall Process Structure of SEIF

The SDP methods by USNRC were referred in this process. Unlike SDP, inspectors or analyzers can skip this qualitative determination process and can go to the detailed quantitative analysis process.

#### 2.2 Initiating Event Evaluation

In initiating event evaluation process, the potential influence on the initiation of events including LOCAs, transients and large secondary side break events should be evaluated qualitatively. Even if one of the questions are concerned, relevant inspection finding should be transferred to the detailed risk analysis process.

#### 2.3 Mitigating Capability

In mitigating capability evaluation process, the impact on the mitigating system or train unavailability from relevant inspection finding should be assessed. In this process, the cause of functional loss or direct function loss, loss of safety function which was not restored within allowed outage time and etc. were considered.

#### 2.4 Defense-In-Depth Barriers

In defense-in-depth barriers evaluation process, the integrity of each barrier should be concerned.

#### 2.5 Initiating Event Frequencies

Depending on the results from phase 1 evaluation process, screened issues would be transferred to phase 2 processes. At first, issues and related initiating events

should be categorized into several groups depending on the frequencies of relevant initiating events. The larger the frequency is, the higher the significance becomes.

### 2.6 Redundancy and Diversity

If the defected train or component has another redundant or diverse trains or components which are functionally equivalent, the significance of inspection finding can be evaluated less important in contrast to the case of no redundancy or diversity. The criteria for this evaluation were adopted from USNRC's SDP Phase 2 criteria.

Through figure 3 to 5, screening and evaluation logics were illustrated as examples.

## REFERENCES

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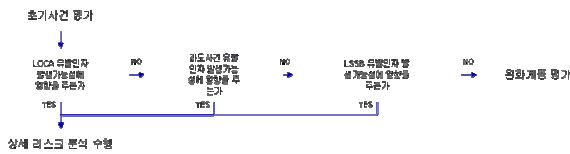


Fig. 3 Evaluation Logic for Initiating Events Issue

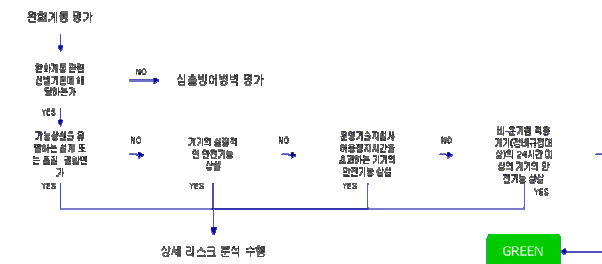


Fig. 4 Evaluation Logic for Mitigating Capability Issue

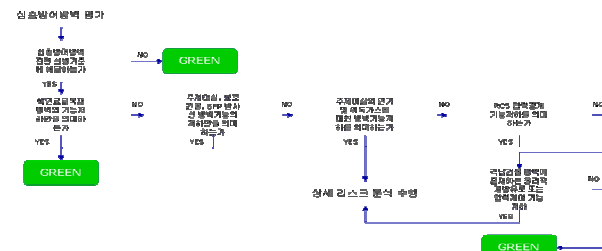


Fig. 5 Evaluation Logic for Defense-in-Depth Barrier Issue

## 3. Conclusions

Significance Evaluation of Inspection Findings(SEIF) is in development status. For significance determination process for inspection findings, it will be finished very soon. The accident sequence precursor analysis module will be developed till the end of this year.

SEIF was planned as integrated and graded regulation framework based on performance and risk. Through widely use of SEIF to real inspection fields, many insights which can contribute to the settlement of risk-informed and performance-based regulation in Korea can be derived.