

A draft of the capable fault criteria for siting and site evaluation of Korean NPPs

H. Lee, C.B. Im, T.M. Shim, M. Noh, H.S. Choi, and J.H., Jeong
Korea Institute of Nuclear Safety, 19 Guseong-dong, Yuseong-Gu, Daejeon, heanu@kins.re.kr

1. Introduction

This paper proposes Korean site-specific criteria based on a review of capable fault criteria used in the United States, Japan, China, and IAEA, and the result of a multi purpose research project to characterize Korean tectonic environment.

2. Capable fault criteria for NPPs used in overseas

Definitions of 'capable fault' applied to NPP siting in the major countries and IAEA are summarized in the Table 1 (Im et al., 2006). Summarizing these regulatory standards, the capable fault criteria are categorized into three elements – latest movement age and recurrence interval, seismic activity, and finally structural & mechanical relationship, apart from the numbers used. This is probably because the concept of the capable fault was first developed in the United States and has been adapted to the rest of the world. Some has modified the criteria to fit into its own tectonic environment like China and Japan and some others have changed the criteria more general and qualitative like IAEA and the majority of the European countries where the tectonic environment is relatively stable, not likely the United States, and hence the geologic and seismic evidences related with a fault movement is not obvious. Korea has used the original form of the criteria and recently been developing a site-specific criteria mainly because of the uncertainty issues when applying the obvious and distinctive criteria to the 'subtle' Korean tectonic environment.

3. Proposed capable fault criteria

Through a multi-disciplinary research project including the study of Korean Neotectonic environment, establishment of geologic DB, review of capable fault criteria used in overseas etc., KINS has developed a draft of capable fault criteria (Table 1; Im et al., 2006).

Ranges of investigation (scale)
• Regional : A radius of 150km from the reactor (1 : 250,000)
• Near regional : A radius of 40km (1 : 50,000)
• Site vicinity : A radius of 5km (1 : 25,000)
• Site : A radius of 1km (1 : 500)
◦ Foundation surface of the nuclear facilities (1 : 100)

The criteria contain the definition for capable fault, site investigation procedures, age dating methodologies, etc..

Definition of Capable Fault : a draft

Fault which describes by more than one of the following characteristics, and which accompanies displacement or displacement and vibratory ground motion as a tectonic nature at surface or near surface:

- A fault which has moved during the Quaternary period
- A reasonable association with one or more moderate to large earthquakes or sustained earthquake activities
- A structural association with a capable fault

※ In case of the seismic design, the faults which have clear evidence of movement within the past 50,000 year shall be considered.

4. Conclusion

The draft of capable fault criteria proposed in this study will be finalized through public hearings, expert reviews, and applicability tests (Figure 1).

REFERENCES

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- [4] National Nuclear Safety Bureau, 1994, Problems on earthquakes in selecting of NPP sites, Nuclear Safety Regulation, HAF 0101(1), p. 26 (in Chinese)
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Table 1. Technical backgrounds of the proposed capable fault criteria for Korean NPPs.

<p>□ Site-specific characteristics</p> <ul style="list-style-type: none"> • Current tectonic regime (σ_1 at ENE-WSW, Quaternary) <ul style="list-style-type: none"> ✓ Conversion of Japan to Korea (σ_1 at ESE-WNW, Miocene) ✓ Opening of the East Sea (σ_1 at NNE-SSW, Oligocene) • Easily separable quaternary units (e.g., marine terraces) • Age ranges of 2nd marine terrace deposits (\approx 50 to 70 ka)
<p>□ Technology availability</p> <ul style="list-style-type: none"> • Applicability of dating techniques (e.g., ESR, OSL, C-14)
<p>□ Criteria used in overseas</p> <ul style="list-style-type: none"> • Review of criteria used in USA, Japan, China, IAEA, etc. • Faults younger than 50 ka considered in the seismic design <ul style="list-style-type: none"> ✓ USA, Japan

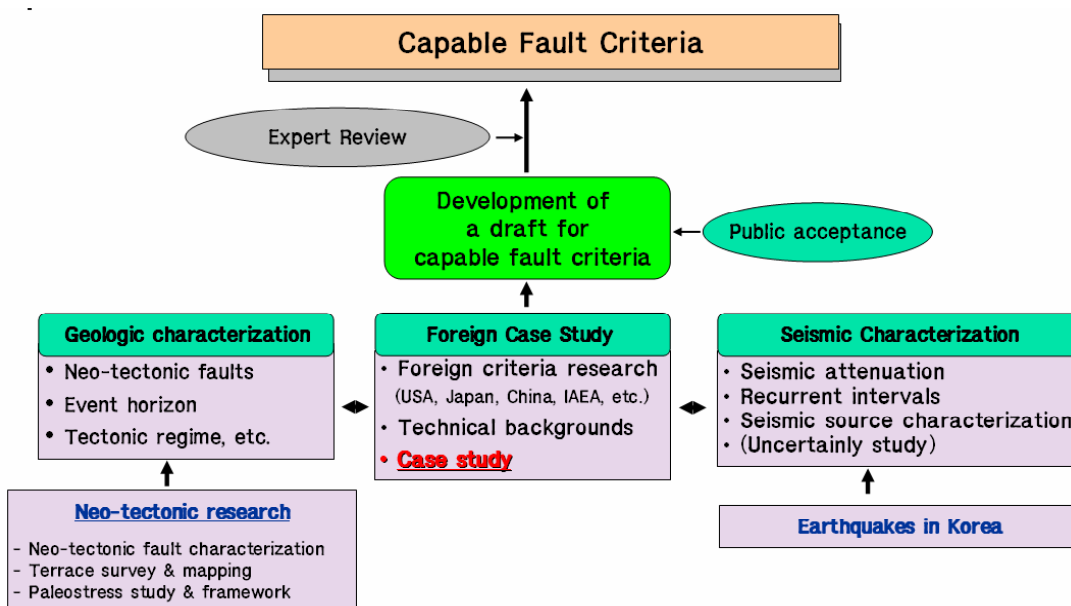


Figure 1. Procedure for the development of the capable fault criteria for Korean NPPs