ON-SITE RESPONSE FOR INDONESIA'S RSG-GAS NUCLEAR FACILITY BASED ON HISTORICAL EARTHQUAKES

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Introduction

An analysis of the seismic hazard in the Indonesian region is done in order to establish precisely the peak ground acceleration at the RSG-GAS nuclear reactor site. Both probabilistic and deterministic strategies are utilized to more fully capture the uncertainties while taking into consideration the surrounding fault systems. A detailed study is carried out based on the most recent seismic structure results and the most recent seismic data catalog upgrade. Location and earthquake epicenter can bee seen in Fig 1. The b-value and maximum magnitude of each seismic source, as well as other source parameters, are reevaluated. For this particular location up to this point, the ground motion prediction equation (GMPE) used is the NGA-west GMPE, which does not account for attenuation. The equations were carefully selected by taking into account the subduction zone, fault mechanism, and data accessibility. The purpose of this study was to obtain the response spectra in the 0s, 0.2s, and 1s periods.

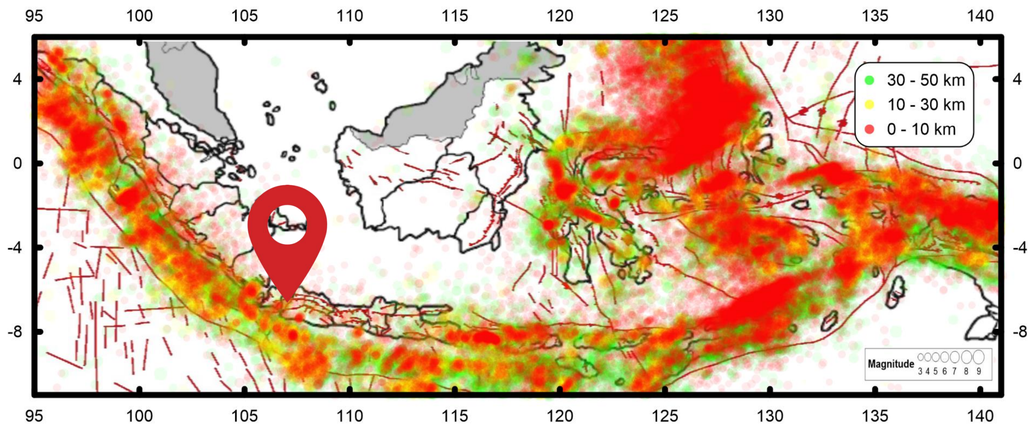

Fig 1. Location of RSG-GAS Facility and Earthquake Epicenter

Methodology and Result

One aspect that must be taken into account in maintaining the safety issue of the nuclear power plant site is the seismic conditions in the surrounding area. To maintain safety, the necessary margin must be high enough above the seismic aspect of the design level to prevent loss of the core safety function and reduce the likelihood of unneeded occurrences. The IAEA establishes regulations, especially with regard to the risk posed by seismic occurrences, which can subsequently serve as a reference for all member countries. The IAEA Specific Safety Guide 9 Rev-1 (SSG-9, Rev-1 2022), an upgrade to the prior specific safety guide, contains the regulations.

A preliminary site response analysis should be part of the seismic hazard assessment carried out as part of the site evaluation process depending on the types of soil at the site region. Later in the design process, using exact data and information on the location of the nuclear installation's buildings, a final site response analysis should be completed.

Fig 1. RSG-GAS Research Reactor

Model uncertainty in a PSHA computation will be included in order to account for all uncertainties in our prediction of future ground shaking at a place. Logic trees are used to account for this uncertainty. Each logic tree has a ground motion curve and a collection of input models. The weights on the branches show the model's level of confidence. It is possible to create a logic tree after choosing ground-motion prediction equations and getting seismicity values for each zone based on historical data. This logic tree's parameters have all been prepared, and statistical analysis will be used to integrate the findings.

Methodology and Result (Continue)

Earthquake data up to that period is not as much as today. Therefore, this study conducted to support more up-to-date approach such as modern GMPEs. The hazard curve of the RSG-GAS reactor located in the city of South Tangerang on Java Island. Fig 3 shows the highest hazard has a period of 0.2 s with a probability of exceedance above one every year, although with a small spectral acceleration. Fig 3 is the hazard curve of the RSG-GAS reactor located in the Serpong area (fig 2). The highest hazard has a period of 0.2 s with a probability of exceedance above 1 every year.

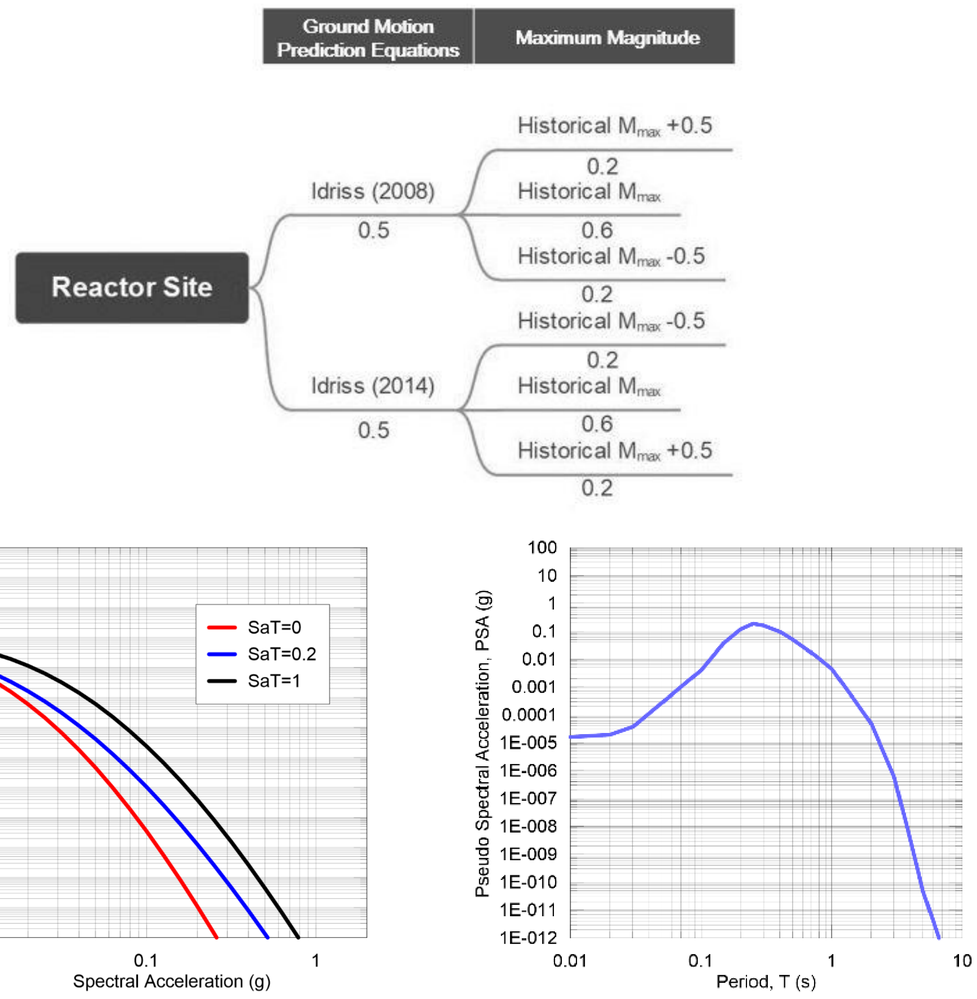

Fig 2. (Top) Tree diagram for hazard analysis, (Bottom Left) Hazard curve for SaT: 0, 0.2, 1 s, (Bottom Right) Hazard Spectra RSG-GAS site

The hazard has the same pattern as the hazard value generated from Octave software w here the 0.2 s period produces the highest hazard. The value for the lowest spectral acceler ation has a lower potential when compared to the value from previous calculations but has a greater value at ground acceleration above the probability of 10-5.

This location is close to the subduction zone in the south of the island of Java which has high seismic activity. From figure 3 below, it can be seen that the largest footprint accelerati on occurs between periods of 0.2s and 0.3s.

Conclusion

In this study, seismic hazard on RSG-GAS nuclear Facility in Indonesia has been conducted. Previous earthquake data is not as much as today. Therefore, this study conducted to support more up-to-date approach such as modern GMPEs and more earthquake record data catalog. These studies include preparing the catalog, develop program source to get PSHA, and generate PSHA for several location. RSG-GAS nuclear site has a potential to experience motion when an earthquake occurs. The ground motion that can be felt based on an earthquake that has occurred (historical earthquake) has been shown.