# On-Site Response for Indonesia's RSG-GAS Nuclear Facility Based on Historical Earthquakes

Ausatha Rabbanny Yanto, Eric Yee*
*Department of NPP Engineering, KEPCO International Nuclear Graduate School,*
*658-91 Haemaji-ro, Seosaeng-myeon, Ulju-gun, Ulsan 45014*
**Corresponding author: eric.yee@kings.ac.kr*

## 1. 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. 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.

## 2. Methods and Results

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.

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.

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. Figure 1 and Figure 2 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. Figure 1 is the hazard curve of the RSG-GAS reactor located in the Serpong area. The highest hazard has a period of 0.2 s with a probability of exceedance above 1 every year.

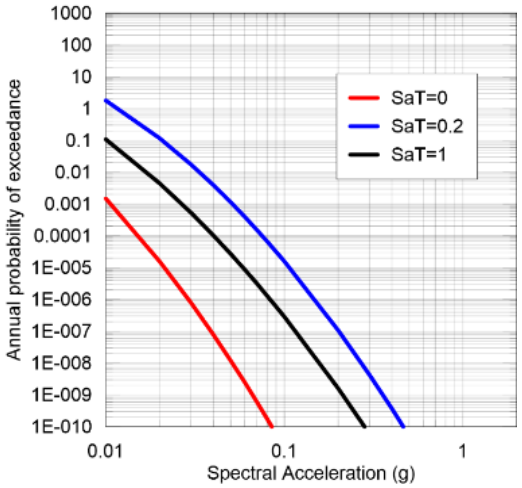


Figure 1. Hazard curve for RSG-GAS reactor site

Figure 2 is the hazard curve of the RSG-GAS generated from OpenSHA software. The hazard has the same pattern as the hazard value generated from Octave software where the 0.2 s period produces the highest hazard. The value for the lowest spectral acceleration has a lower potential when compared to the value from previous calculations but has a greater value at ground acceleration above the probability of $10^{-5}$.

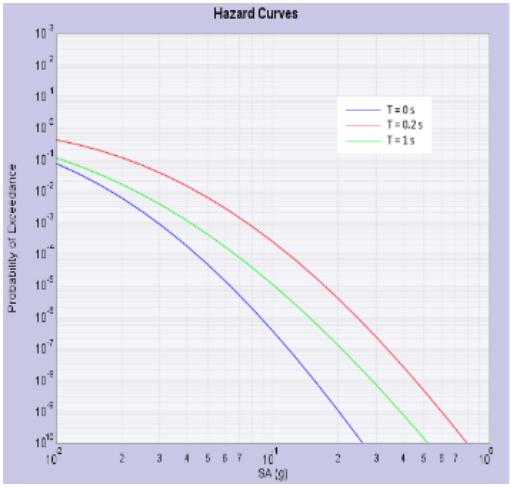


Figure 2. Hazard curves for RSG-GAS using OpenSHA software

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 acceleration occurs between periods of 0.2s and 0.3s.

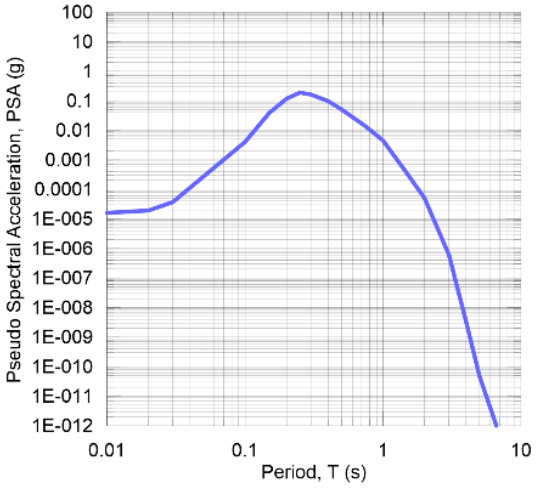


Figure 3. Hazard spectra RSG-GAS site

## 3. Conclusions

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.

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