

Determining Peak Ground Acceleration (PGA) Using the USGS Tool

December 2022



Website for PGA Determination

<https://earthquake.usgs.gov/hazards/interactive/>

- The website looks like this:

The screenshot shows the USGS Earthquake Hazards Program website. The header includes the USGS logo and the text "Earthquake Hazards Program". A navigation menu on the left lists: Home, Earthquakes, Hazards, Science, Monitoring, Education, Data, Maps, Multimedia, Publications, and Web Tools. The main content area is titled "Unified Hazard Tool" and features a yellow warning box: "Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical." Below this is a section for "Earthquake Hazard and Probability Maps" with an "Input" sub-section. The input fields include: Edition (set to "Dynamic: Conterminous U.S. 2014 (update) (v4.2.0)"), Spectral Period (set to "Peak Ground Acceleration"), Latitude (empty), Time Horizon (set to "475"), and Longitude (empty). A "Choose location using a map" button is at the bottom left. On the right, there are three buttons for return periods: "2% in 50 years (2,475 years)", "5% in 50 years (975 years)", and "10% in 50 years (475 years)".

Calculating PGA

- Ensure the appropriate selections are made in the drop-down menus for **Edition** and **Spectral Period** as indicated below:

<p>Edition</p> <div style="border: 2px solid red; padding: 2px;"> Dynamic: Conterminous U.S. 2014 (update) (v4.2.0) ▼ </div>	<p>Spectral Period</p> <div style="border: 2px solid red; padding: 2px;"> Peak Ground Acceleration ▼ </div>				
<p>Latitude</p> <p>Decimal degrees</p> <input type="text"/>	<p>Time Horizon</p> <p>Return period in years</p> <input type="text" value="475"/>				
<p>Longitude</p> <p>Decimal degrees, negative values for western longitudes</p> <input type="text"/>	<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="background-color: #e0e0e0;"> 2% in 50 years (2,475 years) </td> <td style="background-color: #e0e0e0;"> 5% in 50 years (975 years) </td> </tr> <tr> <td style="background-color: #808080;"> 10% in 50 years (475 years) </td> <td></td> </tr> </table>	2% in 50 years (2,475 years)	5% in 50 years (975 years)	10% in 50 years (475 years)	
2% in 50 years (2,475 years)	5% in 50 years (975 years)				
10% in 50 years (475 years)					
<input type="button" value="Choose location using a map"/>					

Calculating PGA

- To determine the location of the property, enter the address by selecting the link for *Choose location using a map*:

Latitude
Decimal degrees

Longitude
Decimal degrees, negative values for western longitudes

Choose location using a map

Specify a Location

- Attempt to automatically locate my current location.
- Search for a location using an address.**
- x,y** Enter coordinates, latitude and longitude.
- Drop pin on the map to specify a location.

Specify a Location

444 South Flower St

- The latitude/longitude will automatically be entered based on the address

Latitude
Decimal degrees

Longitude
Decimal degrees, negative values for western longitudes

Specify a Location

444 South Flower St

Use this Location

Calculating PGA

- The **Time Horizon** field will be automatically populated when you select the **10% in 50 years** button:

<p>Edition</p> <div style="border: 1px solid #ccc; padding: 2px;">Dynamic: Conterminous U.S. 2014 (update) (v4.2.0) ▼</div> <p>Latitude Decimal degrees</p> <div style="border: 1px solid #ccc; padding: 2px;">34.052</div> <p>Longitude Decimal degrees, negative values for western longitudes</p> <div style="border: 1px solid #ccc; padding: 2px;">-118.255</div> <div style="border: 1px solid #ccc; padding: 2px; margin-top: 5px;">Choose location using a map</div>	<p>Spectral Period</p> <div style="border: 1px solid #ccc; padding: 2px;">Peak Ground Acceleration ▼</div> <p>Time Horizon Return period in years</p> <div style="border: 1px solid #ccc; padding: 2px;">475</div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border: 1px solid #ccc; padding: 5px; text-align: center;"> 2% in 50 years <small>(2,475 years)</small> </div> <div style="border: 1px solid #ccc; padding: 5px; text-align: center;"> 5% in 50 years <small>(975 years)</small> </div> </div> <div style="border: 2px solid red; padding: 5px; text-align: center; margin-top: 5px;"> 10% in 50 years <small>(475 years)</small> </div>
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Calculating PGA

- Select the appropriate **Site Class** based on the property's location as indicated below:

Site Class

Please select... ▼

Please select...

180 m/s (D/E boundary)

259 m/s (Site class D)

360 m/s (C/D boundary)

537 m/s (Site class C)

760 m/s (B/C boundary)

1150 m/s (Site class B)

2000 m/s (Site class A)

- **259 m/s (Site class D)** for properties located in California, Nevada, Oregon or Washington
- **760 m/s (B/C boundary)** for properties all other locations

Calculating PGA

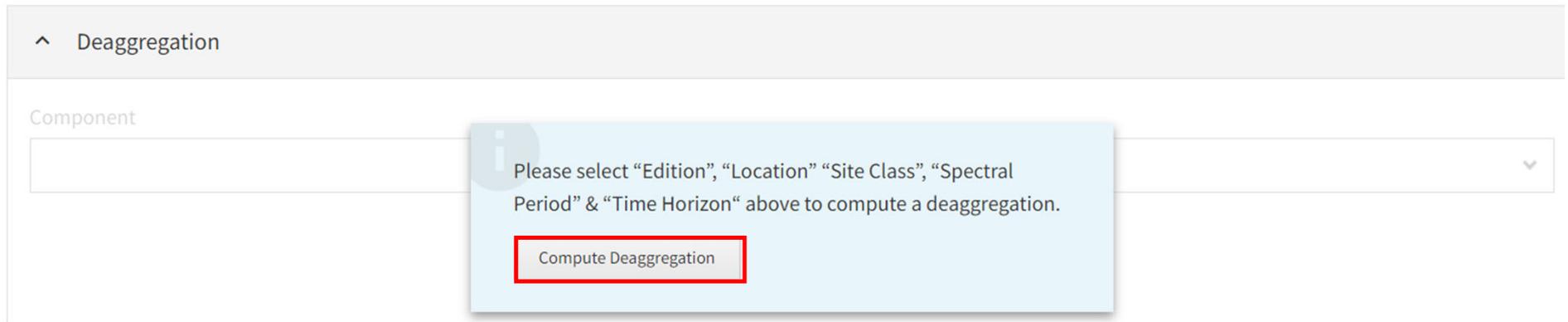
- Scroll down to the **Deaggregation** section and select “Compute Deaggregation”

^ Deaggregation

Component

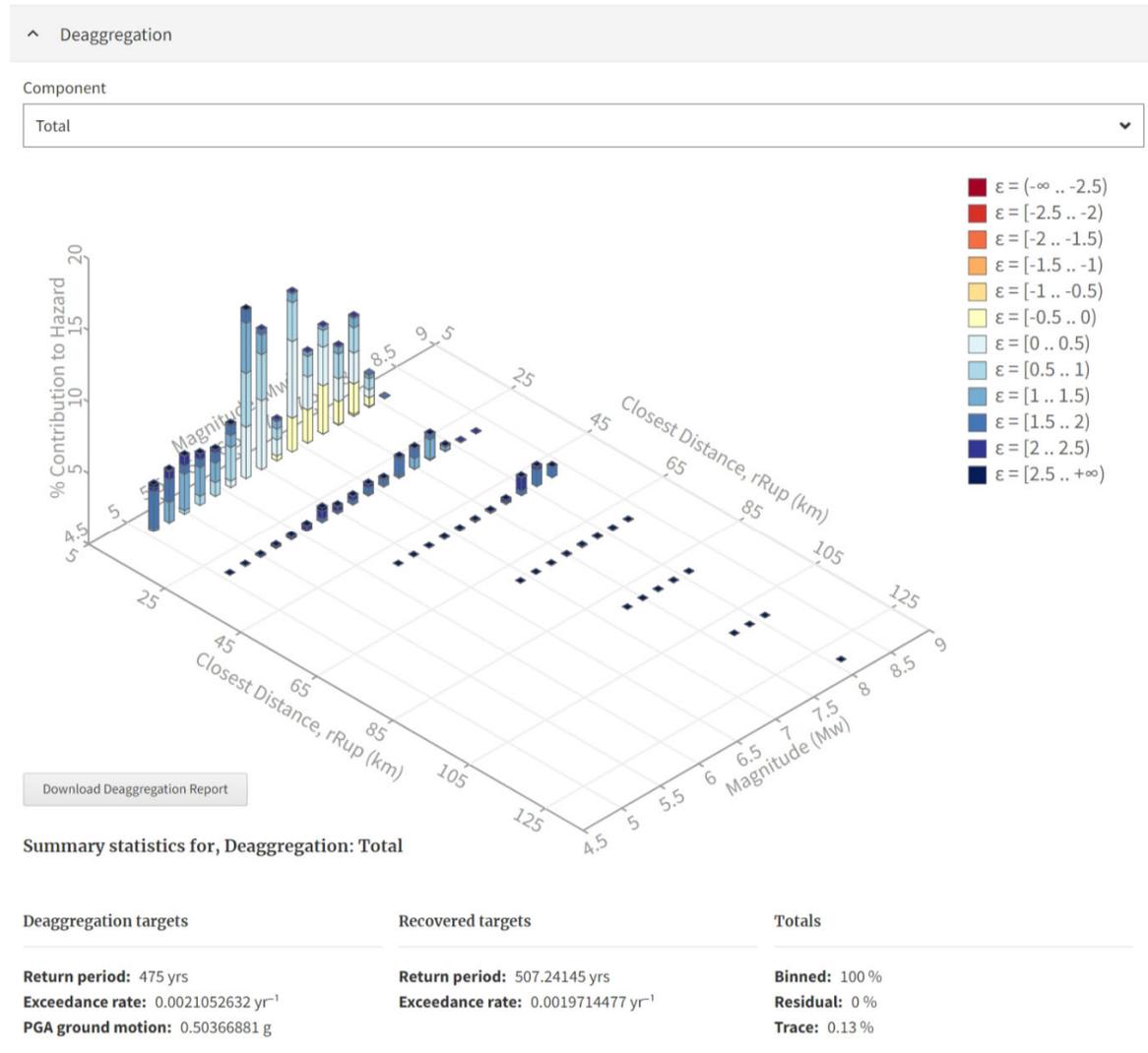
Please select “Edition”, “Location” “Site Class”, “Spectral Period” & “Time Horizon” above to compute a deaggregation.

Compute Deaggregation



Calculating PGA

- The output will look like this:



Calculating PGA

- The PGA is noted as the **PGA ground motion**

Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 475 yrs

Exceedance rate: 0.0021052632 yr⁻¹

PGA ground motion: 0.50366881 g

Recovered targets

Return period: 507.24145 yrs

Exceedance rate: 0.0019714477 yr⁻¹

Totals

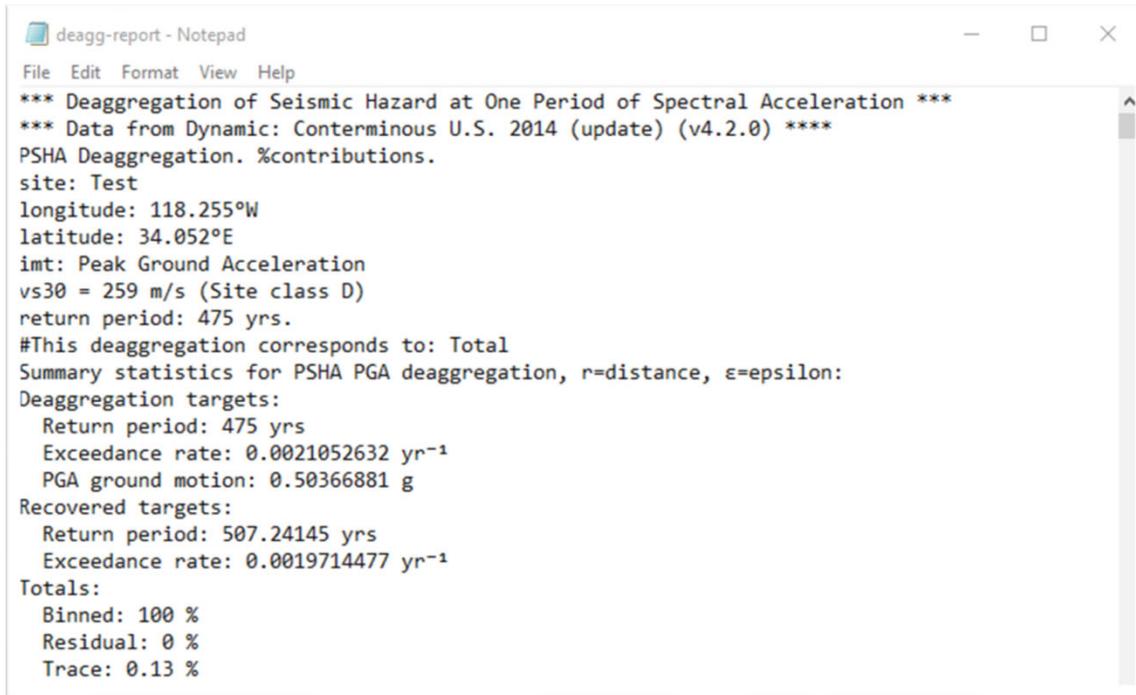
Binned: 100 %

Residual: 0 %

Trace: 0.13 %

Calculating PGA

- Use your browser's print function to print the webpage to PDF for upload to DMS.
- If you use the "Download Deaggregation Report" button, the result is a difficult to read text file:



```
deagg-report - Notepad
File Edit Format View Help
*** Deaggregation of Seismic Hazard at One Period of Spectral Acceleration ***
*** Data from Dynamic: Conterminous U.S. 2014 (update) (v4.2.0) ****
PSHA Deaggregation. %contributions.
site: Test
longitude: 118.255°W
latitude: 34.052°E
imt: Peak Ground Acceleration
vs30 = 259 m/s (Site class D)
return period: 475 yrs.
#This deaggregation corresponds to: Total
Summary statistics for PSHA PGA deaggregation, r=distance, ε=epsilon:
Deaggregation targets:
  Return period: 475 yrs
  Exceedance rate: 0.0021052632 yr-1
  PGA ground motion: 0.50366881 g
Recovered targets:
  Return period: 507.24145 yrs
  Exceedance rate: 0.0019714477 yr-1
Totals:
  Binned: 100 %
  Residual: 0 %
  Trace: 0.13 %
```