# Needs/Issues for Site-Specific Geotechnical Applications of the NSHMP Maps and Tools

John A. Egan, PE, GE Senior Principal Engineer SAGE Engineers, Inc.



### **Issues Addressed**

- Accessing the NSHMP information
- Targeted-risk-free design maps
- Spectral shape
- Site Response Considerations

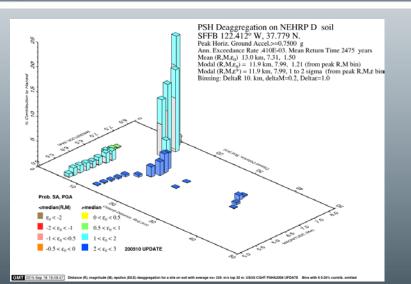


### Accessing the NSHMP information

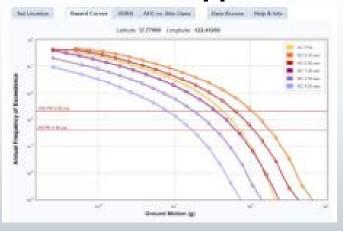
#### **2008 Interactive Deaggregation**

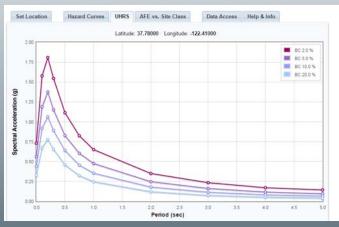
| Site Name               |   |
|-------------------------|---|
|                         | Enter address instead   |
| Latitude                | Longitude   |
| xceedance Probability   | 2% • in 50 years •  |
| Spectral Period         | 0.0 seconds (Peak Ground Acceleration)                          |
| V <sub>s</sub> 30 (m/s) | 760.0 What values can I use at various locations?               |
| Run GMPE Deaggs?        | Yes O No <u>What's this?</u>                                    |
| Additional Output       | Geographic Deagg What's this? O Conditional Mean Spectra O None |

C SHARF



#### Hazard curve application

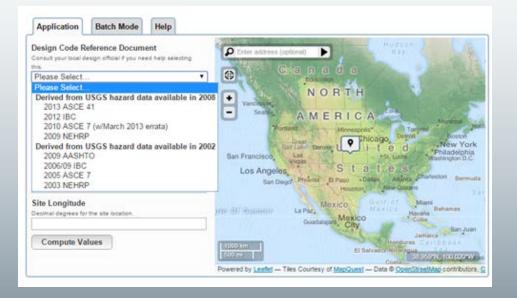






### ...accessing the NSHMP information

#### **U.S. Seismic Design Maps**



#### **Risk Targeted Ground Motion Calculator**

| Edit View Favorites Tools Help<br>Supported Ster. • (2) Official: Raby Doe' id • |  |   |
|--|--|---|
| E Suggested Ster. E Official Taby Doe'd.   |  | 🛕 • 🔯 • 🖾 👼 • Rape - Salay • Tools •      |
| USGS   |  |   |
| arthquake Hazards Program  |  |   |
| Seismic Design Maps & Tools  | Risk Targeted Ground Motion Calculator   |   |
| US Seismic Design Maps   | This web application can be used to cativate risk-largeted ground motion values in accordance with "Method 2" of 2010 ASCE 7 Standard Section 21 2 12. For hep programmatic data access, please read the Documentation.  | using this tool, or for guidance on       |
| Use the Tool   | Curve Title SFF8 - BC @ 1s   | Kay Data Result                           |
| Recent Changes   | SFF8-D @ to (AVCM-060% ATCM-060% AC-020  |   |
| Documentation & help   | SPECTrail Response Acceleration Values  ENDINE 12017 AVGME # CIAGE RC1:SHE ENDINE 12017 AVGME # CIAGE RC1:SHE ENDINE 12017 AVGME # CIAGE   | Ray Data Besuts                           |
| Risk Targeted Ground Motion Calculator   | 144, 216, 354, 400, 730, 169, 164, 2.46  |   |
| Use the Tool<br>Documentation & Help   | Annual Frequency of Exceedance Values  |   |
| Cocumentation a metr   | .03136. 01641, 00901, 004056, 001017, 0005012, 0001362, 00000829   |   |
| Workdwide Seismic Design Tool  | Compute RTCM   |   |
| Use the Tool   |  |   |
| Documentation & Help   | Hazard Curve   |   |
|  | ×++  |   |
| Earthquakes  |  | 2% Probability of Essenciance in 50 Years |
|  |  |   |
|  | E S - All Rendons  | ****                                      |
|  | 5 3 3 13 <sup>2</sup> - All Terstores 13 <sup>2</sup> - 13 | ****                                      |
| Monitoring   | 13** 0.155 0.226 0.355 0.607 1.000 1.648 2.718 4.482<br>Spectral Response Acceleration (g)   | 7.589 12.182                              |
|  | Fragility Curves   |   |
| 2  | 2 100-   | 5-7-8-1 8-1 4-1 4-1                       |



### ...accessing the NSHMP information

#### Interactive Quaternary Fault and Fold Database of the United States



#### **UCERF3** - The Future





# Targeted-risk-free design maps/tool

#### Reasons:

- Don't mix risk into hazard
- Numerous types of structures, other than generic buildings
- Different risk targets and fragility relationships may be appropriate
- Period-dependent risk coefficients
- Site Class-dependent risk coefficients
- Comparison of NSHMP results to site-specific hazard assessments

#### **Suggestions**

- Allow user to choose whether or not hazard results include the risk-targeted factors
- Separate, but parallel map tool



### Targeted-risk-free design maps/tool

/ahoo! Sports Fanta... 👜 Convert Latitude / L... 📙 Professional Develo... 🏢 Conversion Tables 🌌 Custom Mapping an... 🌔 Seismological Soc Please do not use this application to obtain ground motion parameter values for use with the design code reference documents covered by the U.S. Seismic Design Maps web application (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical; please see our documentation and the referenced codes, standards, and guidelines for more information. Set Location Hazard Curves UHRS AFE vs. Site Class Data Access Help & Info Latitude: 37.77935 Longitude: -122.41235 BC PGA BC 0.10 sec BC 0.20 sec BC 0.30 sec BC 0.50 sec BC 0.75 sec BC 1.00 sec ŭ BC 2.00 sec 10% PE in 50 yr đ BC 3.00 sec JCY BC 4.00 sec 2% PE in 50 yrs. BC 5.00 sec ual Fre Å 1e<sup>0</sup> 1e-2 1e-1 Ground Motion (g) **Curve Selection Cursor Values** AFE: 1.750e-2 GM: 6.277e-4 \* \* \* \* \* \* 1 Plot Options

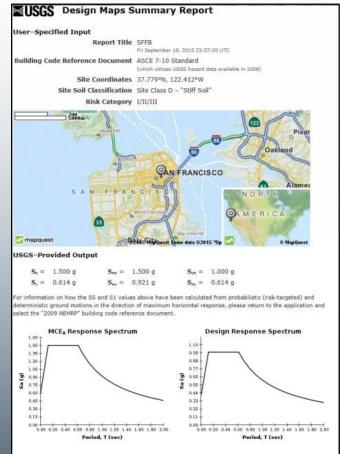


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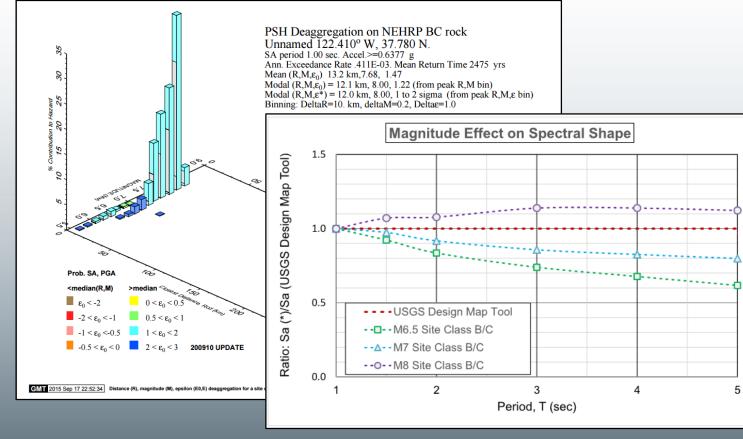
## **Spectral Shape**

### What many geotechnical engineers grab and report



#### For PGA<sub>ir</sub>, T<sub>1</sub>, C<sub>12</sub>, and C<sub>1</sub>, values, please view the detailed report

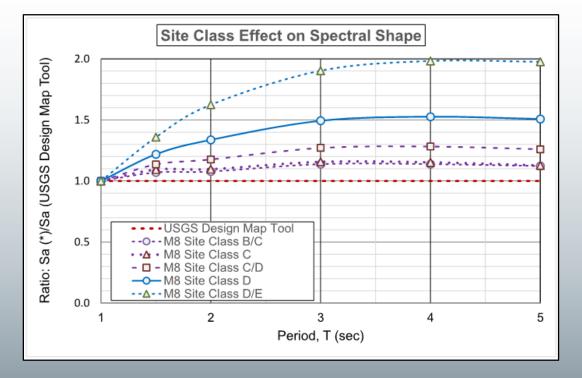
ithough this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the ccuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge. What he/she neglects to consider...

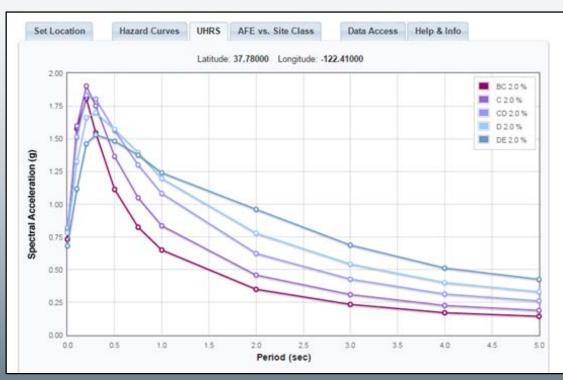




## **Spectral Shape**

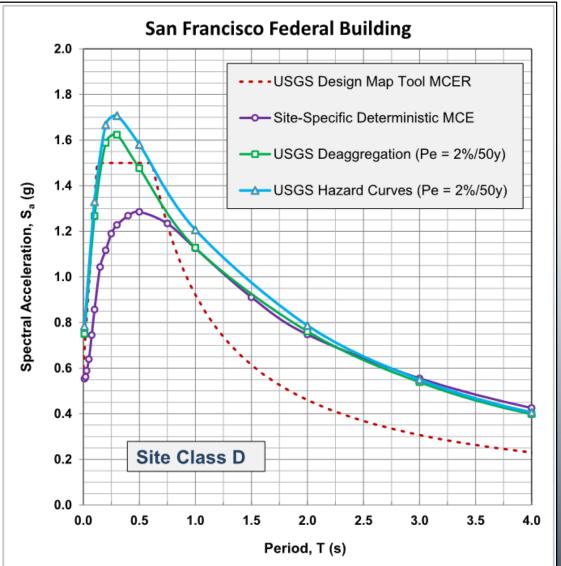
#### ....and







# **Spectral Shape**



Multi-period USGS UHRS & site-specific deterministic spectra

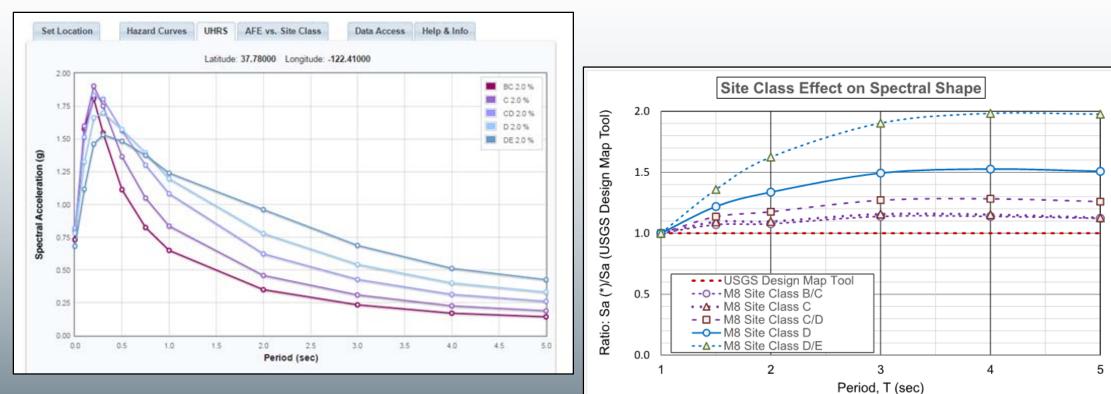
- Longer-period spectral ordinates for SFFB site are substantially higher than MCE<sub>R</sub> spectrum from USGS Design Map Tool
- Results from effects of larger magnitude events dominating hazard and Site Class/V<sub>S30</sub>
- In EUS, converse magnitude effect may occur at many locations

#### Suggestion

 indicator in the U.S. Seismic Design Map tool could be triggered to alert a user that the hazard deaggregation and/or Site Class for the site indicate that such effects are a possibility and should be examined by the user

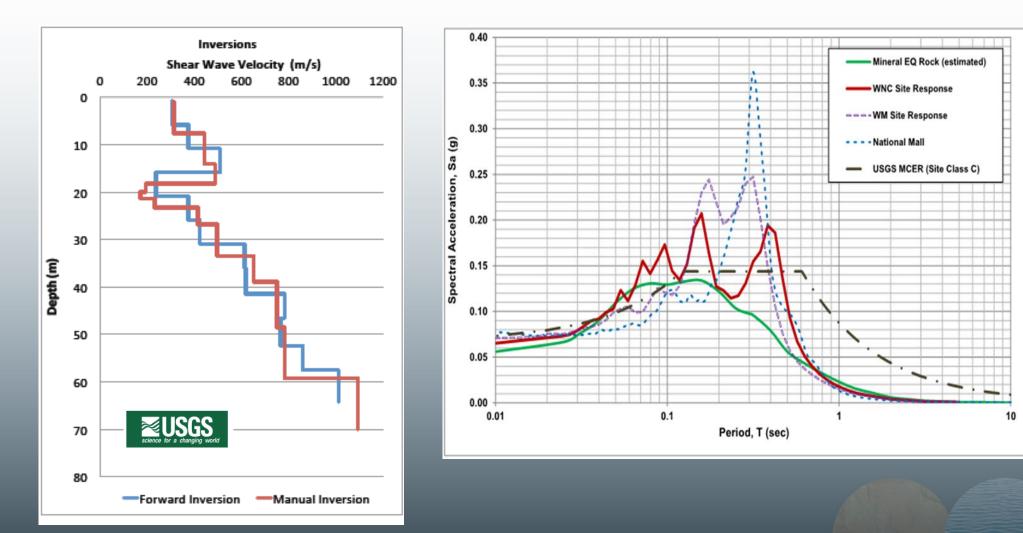
### Site response considerations

### Site Class $F_a \& F_v$ –vs- $V_{S30}$ effects



### Site response considerations

#### Non-standard V<sub>s</sub> profiles – Washington, D.C., National Mall



## Conclusions

- NSHMP provides valuable seismic hazard information
- Useful comparison for site-specific assessments
- USGS Design Map Tool is easy to use
- .....and easy to misuse
- Users need to look deeper than the surface
  - ✓Targeted-risk
  - ✓ Spectral shape
  - ✓ Site Response Considerations

