Abstract for submission to the Natural Phenomena Hazards October 2020 Meeting
https://www.energy.gov/em/natural-phenomena-hazards-october-2020-meeting

Nuclear ShakeCast: A Resource for Rapid Post-Earthquake Assessment of Critical Facilities

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ShakeCast is a tool developed by the U.S. Geological Survey that is widely deployed by public and private emergency responders, lifeline operators, and facility engineers. ShakeCast rapidly and automatically receives and processes ShakeMap products and then reports shaking levels and likely effects on facilities for situational awareness, inspection priorities, or damage assessment. In addition to accessing real-time ShakeMaps, ShakeCast can also access a new collection of scenario and historical ShakeMaps that the USGS makes available for pre-event planning and exercises as well as loss-model calibration. Though many users are in the critical lifeline utilities and private engineering sectors, there are several in the commercial sector as well (e.g., real estate, manufacturing facilities, distribution centers). Additionally, many State and Federal entities have deployed ShakeCast to improve their own situational awareness: Among them are 11 State Departments of Transportation (DOTs; facilitated by a USDOT Transportation Pooled Fund), the U.S. Nuclear Regulatory Commission (USNRC), the International Atomic Energy Agency (IAEA), the U.S. Department of Veterans Affairs (VA), the Federal Energy Regulatory Commission (FERC), and the U.S. Fish and Wildlife Service (FWS). The USNRC and IAEA refer to their ShakeCast instances as "Nuclear ShakeCast," since they also evaluate computed ground motions against Nuclear Power Plant (NPP) design shaking levels and other regulatory criteria, including whether or not shaking was felt at the NPP. Here we provide updates on the capability of Nuclear ShakeCast to improve earthquake analyses and situational awareness for other nuclear facilities beyond NPPs, as well as explore a variety of scenario earthquakes that could affect such nuclear facilities. The scenarios include a magnitude M7.1 event on the Pajarito Fault near Los Alamos National Laboratory, an M9.0 event in the Cascadia Subduction Zone shaking the Hanford Site, and an M7.1 event on the Hayward fault shaking Lawrence Livermore National Laboratory. By examining ShakeCast products for these scenarios and recent earthquakes, we highlight how Nuclear ShakeCast can be a valuable earthquake response tool for a broad array of nuclear facility operators, emergency responders, and nuclear safety oversight regulators.