WSSPC
WESTERN STATES SEISMIC POLICY COUNCIL

We develop seismic policies and share information to promote programs intended to reduce earthquake related losses.

A non-profit earthquake consortium fo

Fall 2020 e-Newsletter

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WSSPC NEWS

- **Call For Nominations for WSSPC 2021 Awards** WSSPC is calling for nominations for our 2021 Awards in Excellence, Lifetime Achievement, and Leadership. Guidelines and templates can be found at: https://www.wsspc.org/awards/call-nominations/ . Submissions are due NLT 8 January 2021.
- **WSSPC's Affiliate Membership drive starts October 1st.** We welcome all members of the professional and university community who share the common goal of reducing losses from earthquakes.
- **WSSPC 2021 Polices are in the process of being reviewed by committees.** Once the initial review s completed, they can be collated and provided to the WSSPC Board of Directors prior to the Fall Board Meeting. Please remember we will assist as the committees as needed.
- **The WSSPC Resources pages are constantly being updated.** Most especially this includes WSSPC Member Earthquake Resources located at https://www.wsspc.org/resources-reports/earthquake-center/eq-resources/ . If you have updated information you would like to be available, please let us know.
- **WSSPC is working in direct support of multiple members with their NEHRP-funded projects.** If you are interested in WSSPC assistance with your projects, please let us know.
- **Please note the new WSSPC mailing address in the left side column of this newsletter!**
- **Don't forget SHAKEOUT on 10-15 at 10:15 AM**

WSSPC Members Recent Earthquakes (4.0 or higher)

• Fern Forest, HI	M4.6	3 July 2020
• Perryville, AK	M7.8	22 July 2020
• Sylmar, CA	M4.2	30 July 2020
• South El Monte, CA	M4.5	19 September 2020

Upcoming Meetings and Conferences
(Note—Based on current conditions and social distancing requirements, WSSPC will not be posting in-person meetings unless we are relatively certain they will be happening.)

- ***November 2020:*** **WSSPC Board Meeting: —**Specific location TBD

- ***February 7 through 10, 2021:*** **San Fernando Earthquake Conference – 50 years of Lifeline Engineering (Lifelines2021)**, focusing on "Understanding, Improving & Operationalizing Hazard Resilience for Lifeline Systems." Location to be at University of California, Los Angeles, California USA. For more information see: https://samueli.ucla.edu/lifelines2021/?utm_campaign=ird-20200325-CFA-Extended-Deadline&utm_medium=email&utm_source=Eloqua

- ***June 15-17, 2021:*** 2021 **National Earthquake Program Manager meeting**.. Memphis, TN

Thank You 2020 WSSPC Affiliate Members

WSSPC welcomes all professional community members who share the common goal of reducing losses from earthquakes.

Government

City of Las Vegas Building and Safety
Clark County Building and Fire Prevention

Non-Profit

Applied Technology Council
California Earthquake Authority

Remember, It's Never Too Late to Join WSSPC as an Affiliate Member

Your benefits will include:

- Recognition of your support with a link on the WSSPC website to your organization
- The opportunity to participate on WSSPC Committees and provide input to policy recommendations
- Quarterly E-Newsletters and Monthly Bulletins
- Opportunities to exhibit and sponsor activities in coordination with any WSSPC events

Your support is always appreciated!

There are so many ways to stay connected!

Online- www.wsspc.org
Twitter- @WSSPC
Facebook- www.facebook.com/WSSPC

NEWS

What's in oilfield wastewater matters for injection-induced earthquakes

"A team of geoscience researchers in the Virginia Tech College of Science has developed a new theory to explain how and why injection-induced earthquakes continue to occur even when injection rates decline."

Per the article, a study published in the 5 August 2020 issue of Energy and Environmental Science, proposes the reasons deep-well injection induced earthquake are getting deeper in Oklahoma is "a combination of geology, natural fluids in the basement rocks, and the wastewater itself."

The study is predicated and modeled on the idea that oil field brine has different viscosities and density than water. These differences make the brine heavier, causing deeper sinking of the well-injected fluids. When the waste fluids sink deeper, they increase the fluid pressure in the basement rocks. This increase leads to a pressure diffusion where the field brine displaces existing water in the geologic formations.

Further study is recommended to look at:

- How the study idea is reflected in regionally expansive injections operations in Oklahoma and Texas
- The development of pre-injection mitigation actions

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For more information on wastewater induced earthquakes see the 2015 journal article: ***Myths and facts on wastewater injection, hydraulic fracturing, enhanced oil recovery, and induced seismicity*** published in the Seismological Research Letters.

In this article, Drs. Rubenstein and Mahani specify:

- Roughly 98% of induced earthquakes are caused by deep well injection, not fracking with the key reasons being the injection operations run longer and use a higher volume of fluid
- Not all deep well injection operations cause felt earthquakes as not all well sites have geologic "pathways" present to transport the fluids to a fault.
- Seismicity can occur at different points and depths depending on where and how the fluids travel

Insurer Must Defend Energy Company's Role In Earthquake Lawsuit: Court

A very recent class action lawsuit involving deep well injection caused earthquake damage was just ruled on in Oklahoma. At the core of the ruling is if the insurance agency's exclusionary language targeting their liability in "accidents" is applicable when the wastewater is deliberately injected into wells.

The ruling was against the insurer.

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Wildfires, coronavirus and an earthquake collided for California's terrible week

The articles considers that multiple events can happen at the same time. Multiple disasters such as these, or the Magna EQ in Utah in combination with COVID-19, remind us of the importance of having partners to assist each of us when needed. And we all know the best time to put partnership processes in place is before they are needed.

When we need assistance states or territories will most likely rely on the Emergency Management Assistance Compact with their functional components of "Mission Ready Packages (MRP). MRPS have been developed/proposed for:

- Geological Specialist
- Geological Survey Teams

EMAC online training is available

What a big Covid-era earthquake would mean for the Bay Area

From the article, "That a major earthquake will come is inevitable. The Bay Area sits atop seven "significant" fault lines, and experts say the region more likely than not will experience a 7.0-magnitude quake within the next three decades.

"A lot of people who are renters or are low income are in the most vulnerable housing, don't have much choice in housing, don't have as much control over it as people who own their home or have the resources to do seismic retrofits," said Dana Brechwald, president of the northern California chapter of the Earthquake Engineering Research Institute."

The article references the number of soft-story structures with the approximate 140,000 rental units and how a significant housing crisis would be created. It discusses how the current pandemic has created a backlog in retrofitting timeliness due to the current COVID influenced economic conditions.

(Note—In California, if you've retrofitted your home you may be eligible for an earthquake insurance discount. How to Qualify for an Earthquake Insurance Premium Discount)

RESILIENCE /RECOVERY

Research May Curb Economic Losses To Power Plants After Earthquakes

Per the article, in a study published in the July issue of the journal Structure and Infrastructure Engineering, titled ***"Probabilistic loss assessment of a seismic retrofit technique for medium- and high-voltage transformer bushing systems in high seismicity regions"*** it was found that reinforcing electrical transformer brushing systems with stainless steel plates reduces earthquake damage.

By reducing damage to the electrical system, this mitigative action can help to reduce the infrastructure downtime, post-event. In addition to increasing the speed for restoration of power, the study indicated the mitigation action would reduce economic losses from between 33-55%. The article and study go on to say the annualized losses for transformers WITHOUT the stainless steel bracing could be "at least 2.5-10 times larger when subjected to different ground motions."

The National Institute of Standards and Technology (NIST) VIRTUAL-2020 NIST Disaster Resilience Symposium was held July 28 and 29, 2020. Recording of the symposium can be found at: https://www.nist.gov/news-events/events/2020/07/virtual-2020-nist-disaster-resilience-symposium.

The ***Comprehensive Economic Development Strategy (CEDS) Content Guidelines: Recommendations for Creating an Impactful CEDS*** has been published by the US Economic Development Administration. This guideline is focused towards regional economic development and building capacity.

Key to the document is the usage of a Strength, Weakness, Opportunities, and Threats (SWOT) analysis process to identify what currently exists internally and externally and what may occur internally and externally. Integral to this type of analysis is creating an inventory of conditions and identifying risks.

The use of this plan can assist both regions and individual partners in developing economic post-event recovery priorities as well as identifying pre-event mitigation opportunities.

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Strong evidence quake faults run through site of Hollywood skyscrapers, state says

This article details a contentious billion dollar construction project in the City of Los Angeles. The developers, who have been working on this project since the early 2010's, claim the California Geologic Survey (CGS) is in error in its determination that a fault lies under the planned project area.

From the article, "Aarons said the Hollywood Center project site "has been the subject of the most extensive geotechnical testing of any property in Hollywood. From 2012 to 2019, seven fault investigations were performed. In each and every case, those studies have come to the conclusion that there is no active fault on the project site."

The City of Los Angeles Department of Building and Safety supported the developer using the concept, that "an earthquake fault was probably located deep beneath the property but that it was too old to be considered active." However, the project was put on hold by the Los Angeles County Superior Court judge.

In May 2020, CGS released updated fault imaging surveys. The report is titled, *"2018 U.S. Geological Survey–California Geological Survey Fault-Imaging Surveys Across the Hollywood and Santa Monica Faults, Los Angeles County, California."*

The updated report, published by USGS, used the fault-finding techniques called "guided wave." Guided wave is basically an echo-location process where faults are identified using sound.

The state's interest in locating fault lines and liquefaction zones is directly associated with the people's safety. The article lays out other instances where construction has occurred where these site considerations were not followed.

More information from CGS on California earthquakes and faults can be found at: https://www.conservation.ca.gov/cgs/earthquakes

WITHOUT WARNING! EARTHQUAKE (CUSEC)

On 16 September 2020, Dark Horse Comics published a comic book in support of the Central US Earthquake Consortia. This comic book was originally conceived of and co-written by Oregon's Earthquake Program Manager Althea Rizzo and published in 2014 to support earthquake awareness and safety State of Oregon. An Idaho edition was published in 2017.

Congratulations to Oregon and Althea for creating an idea which captures the imagination and is easily replicated for others to use!

ADDITIONAL RESOURCES & PUBLICATIONS

A 36-year record of rock avalanches in the Saint Elias Mountains of Alaska, with implications for future hazards

Bessette-Kirton and Coe

Published by Frontiers in Earth Science

From the abstract, "Glacial retreat and mountain-permafrost degradation resulting from rising global temperatures have the potential to impact the frequency and magnitude of landslides in glaciated environments. Several recent events, including the 2015 Taan Fiord rock avalanche, which triggered a tsunami with one of the highest wave runups ever recorded, have called attention to the hazards posed by landslides in regions like southern Alaska."

Sedimentary evidence of prehistoric distant-source tsunamis in the Hawaiian Islands

La Selle, Richmond, Jaffe, Nelson, Grisworld, et al

Published by Sedimentology, The Journal of the International Association of Sedimentologists

From the abstract, "Over the past 200 years of written records, the Hawaiian Islands have experienced tens of tsunamis

continued

generated by earthquakes in the subduction zones of the Pacific "Ring of Fire" (e.g., Alaska-Aleutian, Kuril-Kamchatka, Chile, and Japan). Mapping and dating anomalous beds of sand and silt deposited by tsunamis in low-lying areas along Pacific coasts, even those distant from subduction zones, is critical for assessing tsunami hazard throughout the Pacific basin."

Developing post-alert messaging for ShakeAlert, the earthquake early warning system for the West Coast of the United States of America

McBride, Bostrom, Sutton, de Groot, Baltay, Terbrush, et al

Published in the International Journal of Disaster Risk Reduction, Volume 50, November 2020

From the abstract, "As ShakeAlert, the earthquake early warning system for the West Coast of the U.S., begins its transition to operational public alerting, we explore how post-alert messaging might represent system performance. Planned post-alert messaging can provide timely, crucial information to both emergency managers and ShakeAlert operators as well as calibrate expectations among various publics or public user groups and inform their responses to future alerts. "

Introduction to the Special Section on Observations, Mechanisms, and Hazards of Induced Seismicity

Wang, Weingarten, Langenbruch, and DeShon

Published in Bulletin of the Seismological Society of America (Volume 110, Number Five)

From the introduction, "The collection of articles reveals common threads and persistent untested hypothesis to help define a path forward for physical understanding and reduction of risk associated with induced seismicity."
(Note—this special section includes thirty-three articles.)

A Stress-Similarity Triggering Model for Aftershocks of the Mw 6.4 and 7.1 Ridgecrest Earthquakes

Hardebeck

Published in Bulletin of the Seismological Society of America, (Volume 110, Number 4

From the abstract, " I quantify the similarity between these two stress fields using the tensor dot product of the normalized deviatoric stress tensors. The off-fault aftershocks in the Garlock stepover and the Olancha area fall within lobes of positive stress similarity, whereas the aftershocks near Panamint Valley are partially within a lobe. The cluster in the Garlock fault stepover and the smaller of two clusters near Olancha occur in regions of locally anomalous background stress that results in higher stress similarity."

Are the Stress Drops of Small Earthquakes Good Predictors of the Stress Drops of Moderate-to-Large Earthquakes?

Hardebeck

Published by AGU, Advancing Space and Earth Science

From the abstract, "The stress drops of small earthquakes often exhibit spatial patterns of variability. If moderate and large earthquakes follow the same spatial patterns, the stress drops of possible future damaging earthquakes could be better predicted by considering the stress drops of nearby small events. Better stress drop predictability could reduce ground-motion uncertainty in probabilistic seismic hazard assessment and earthquake early warning."

ARRIVALS AND DEPARTURES

- **Paul Nelson,** Director, Alaska Division of Homeland Security and Emergency Management
- **James Benzschewal**, Earthquake & Tsunami Program Manager, Alaska Division of Homeland Security and Emergency Management

Welcome!