Chimney Performance 2019
Searles Valley Earthquakes

Bruce Maison, S.E.
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Ridgecrest Chimneys

• Housing stock = 13,000 units
  – 75% built after 1970
  – Metal and masonry chimneys popular

• Metal-in-wood-chase
  – Very rugged…no damage

• Masonry
  – Code required reinforcement & strapping

• Some masonry chimneys damaged
  – Due to low quality construction
Ridgecrest Chimneys

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Poor Grouting
Chimney Pull-Away
(Inadequate Strapping Likely)
Trona Chimneys

• Housing stock about 500 units
  – Many built in 1940s
  – Clay brick and concrete block chimneys

• Some chimneys collapsed
  – Rebar sticking out
  – Inadequate (or no) grouting

• Construction quality issue
  – Reinforced chimney should be unscathed
Plain Masonry Fragility

 PGA capacity (median)

 Expected to survive unscathed
 Unless having weak masonry

 Ridgecrest
 Max PGA
 (NP 5419)

 Peak Ground Accel., PGA (g)

 0.0  0.2  0.4  0.6  0.8

 10  20  30  40  50  60

 Weak masonry
 Masonry Tensile Strength (psi)

 Expected

 Chimney Section
 Height = 5 feet

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Reinforced Masonry Fragility

Reinforced chimneys should survive unscathed

Reinforced masonry median PGA capacity

More than 2-times PGA capacity

Plain masonry

Plain

Reinforced

Height = 5 feet

Ridgecrest Max PGA

Questions…?

• Contact Bruce Maison
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