Consortium to Study Trends in Seismicity

Quarterly Report
January 1 to March 31, 2020

Rex Buchanan, Shelby Peterie, Rick Miller, Kansas Geological Survey
Statewide Earthquakes

377 earthquakes

561 first quarter of 2019 (-28%)
Operational Efficiency

97.5%

fixed power and modem issues
CSTS Alerts

Total: 22

$M \geq 2$

within 30 miles
Earthquakes Within 20 miles

Total: 55

31 in the previous quarter
Kiowa County

- Located earthquakes
  - none
- Subnetwork events
  - none
Rice and Ellsworth Counties

- Located earthquakes
  - none

- Subnetwork events
  - RC03: 157 (blasts)
  - RC02: none
McPherson County

- Located earthquakes
  - 3 (M 1.4 to 1.9)
  - >15 miles from wells
  - consistent with MGA

- Subnetwork events
  - MP01: 3
  - MP02: 3
  - M < 0
Reno County

• Located earthquakes
  – 49 increase (double)
  – M 1.2 to M 4.8
  – M 2 or larger
    ▪ this quarter: 6
    ▪ last quarter: 17

• Subnetwork events
  – RN01: 158
    ▪ majority in weeks following M 4.8
    ▪ consistent with the Hutchinson cluster
  – RN03: none
Reno County
Sedgwick and Butler Counties

- Located earthquakes
  - 14 events M 0.8 to M 1.7
  - along known trends

- Subnetwork events
  - BU02: none
  - SG02: nine, M ≤ 0.6
Johnson County

- Located earthquakes: none
- Subnetwork events: none
Seismicity Around the State
Central Kansas Uplift

- Historic earthquakes (1977-2014)
- Recent earthquakes (2015-present)
Salina Basin

pre-2020

Jan 1 to Mar 31, 2020

- historic earthquakes (1977-2014)
- recent earthquakes (2015-present)
Nemaha Ridge and MGA

pre-2020

historic earthquakes (1977-2014)
recent earthquakes (2015-present)

Jan 1 to Mar 31, 2020

Dickinson: 13 (M 1.2 to 3.7)
Marion: 11 (M 1.5 to 3.3)
South-central Kansas

2019

Jan 1 to Mar 31, 2020

recent earthquakes
Discussion
Hutchinson: Daily Disposal within 2 mi
Historic daily disposal near Hutchinson cluster

larger than recent daily volumes

September 2002
Injection and Pressure

It’s possible triggering threshold could have eventually been reached without pressure diffusion from the south.