



May 10, 2021

To: Members of the Seismic Monitoring Advisory Committee,  
Southeast Geysers Effluent Pipeline Project (SEGEP)

Fm: Northern California Power Agency

Re: SEGEP Operation and Seismicity Report for October 1, 2020 through March 31, 2021

#### **A. Pipeline Operations**

The Southeast Geysers Effluent Pipeline (“SEGEP”) has been in operation since 1997 and has delivered 62.7 billion gallons of water at an average rate of 5,070 gpm to the South East Geysers steam field for injection. **Figure 1** illustrates the daily delivery rates since the beginning of the project.

During the six-month period from October 1 through March 31, 2021, the SEGEP Pipeline was in operation 74.7% of the time (**Figure 2**). Pipeline delivery rates have averaged 4.07 million gallons per day (MGD) or 2,826 gpm. This flowrate is a reduction from the previous six month period (April 1 – September 30, 2020) which was 3,924 gpm as NCPA reduced their level of water injection. In addition, there were multiple shutdowns of the SEGEP pipeline for maintenance and PG&E Public Service Power Shut-Off events (PSPS).

#### **B. Observed Seismicity**

##### Seismic Activity in the Southeast Geysers

The USGS recorded 47 seismic events of magnitude 1.5 and greater within the SE Geysers area from October 1, 2020 through March 31, 2021. This is slightly down from 50 seismic events over the previous six-month period. Historical trends and locations of the recent events are shown respectively in **Figures 3 and 4**. There were no magnitude 3.0 or greater seismic events in the Southeast Geysers during this reporting period.

In combination with the seismic activity, steam production for the Southeast Geysers area was 17.75 billion pounds mass for the past six months. This value is down from the previous six-month period where 18.29 billion pounds was produced.

The amount of water injected into the Southeast Geysers reservoir was 7.39 billion pounds. **Figure 5** shows the historical changes in steam production, water injection and recorded seismicity within the Southeast Geysers area.

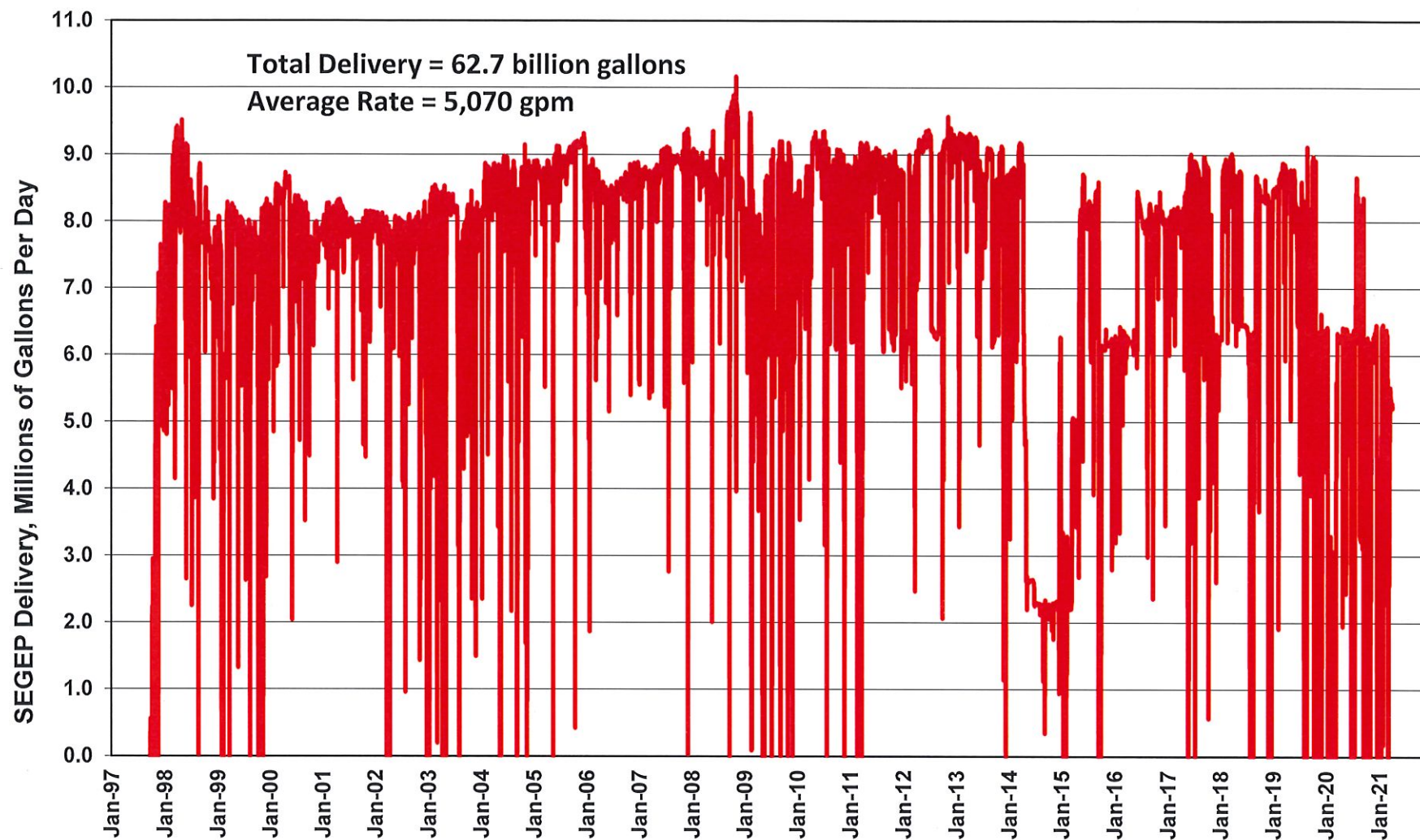
#### Seismic Activity in The Geysers (KGRA)

Within the Geysers geothermal field, there have been 310 events of magnitude 1.5 and greater recorded from October 1, 2020 through March 31, 2021. There were four events of magnitude 3.0 or greater. The largest event was magnitude 3.81 which occurred on February 25, 2021.

**Figure 6** shows the trends of seismic events for the Geysers since 2010 while **Figure 7** shows the location of the events for the last six months.

Ed Voge  
Reservoir Engineer  
NCPA Geothermal Facility

Historical SE Geysers Effluent Pipeline Deliveries to The Geysers  
Figure 1

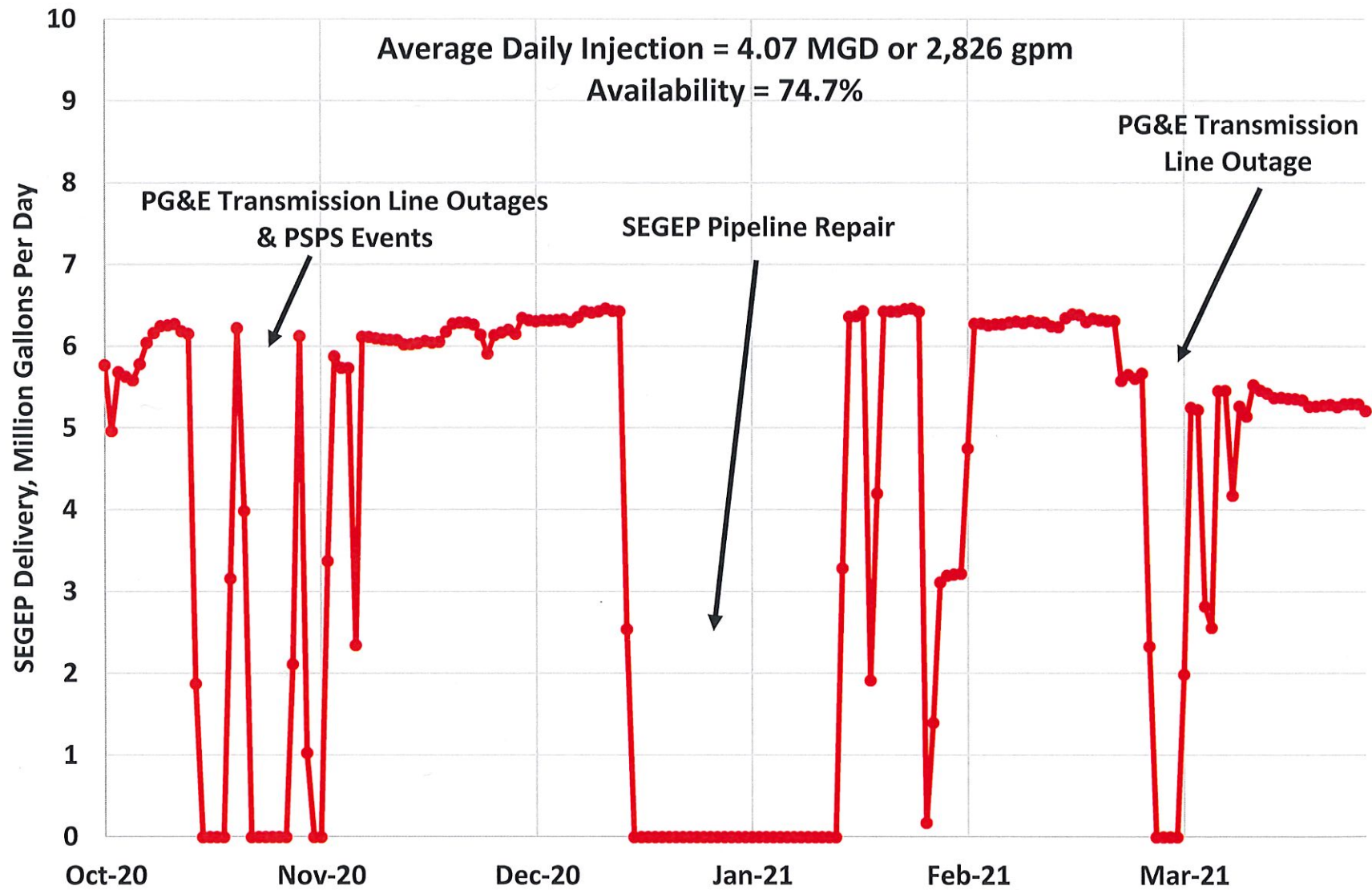




# Southeast Geysers Effluent Pipeline Delivery

October 1, 2020 - March 31, 2021

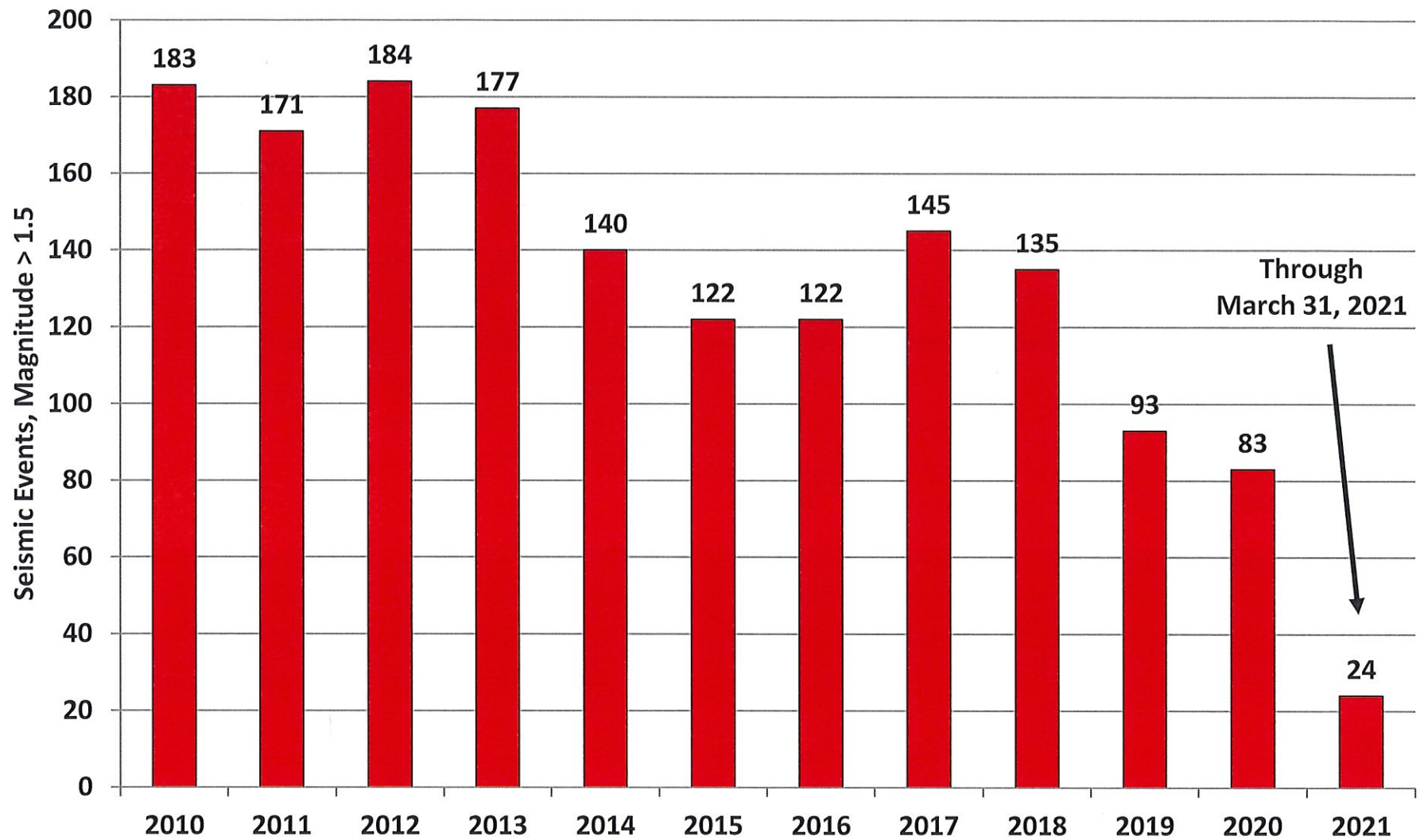
Figure 2



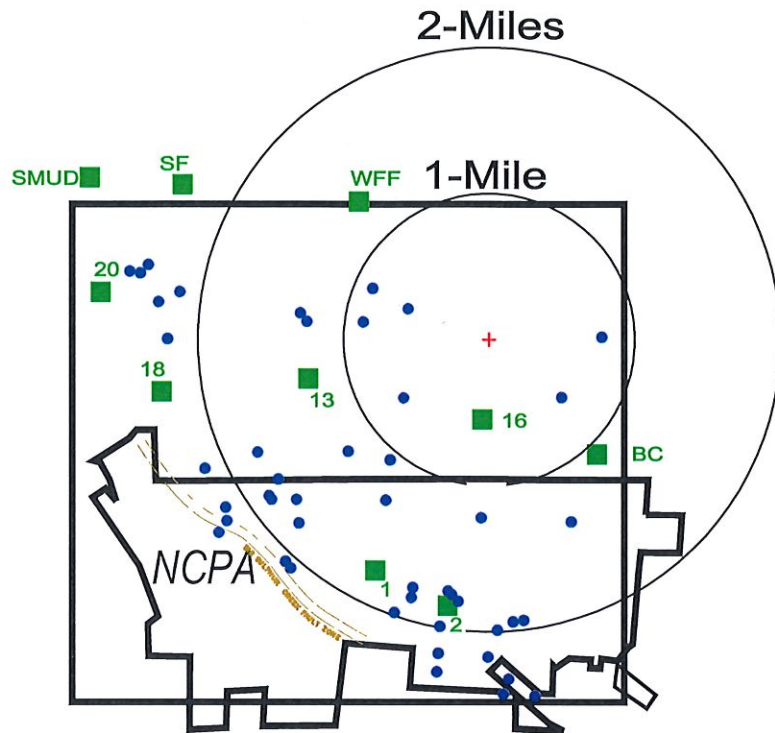
## Southeast Geysers - Historical Seismic Activity

Magnitude > 1.5

Figure 3



# Figure 4



SOUTH EAST  
GEYSERS  
SEISMIC STUDY  
AREA

Radial distances are  
from Anderson Springs  
Strong Motion  
Instrument

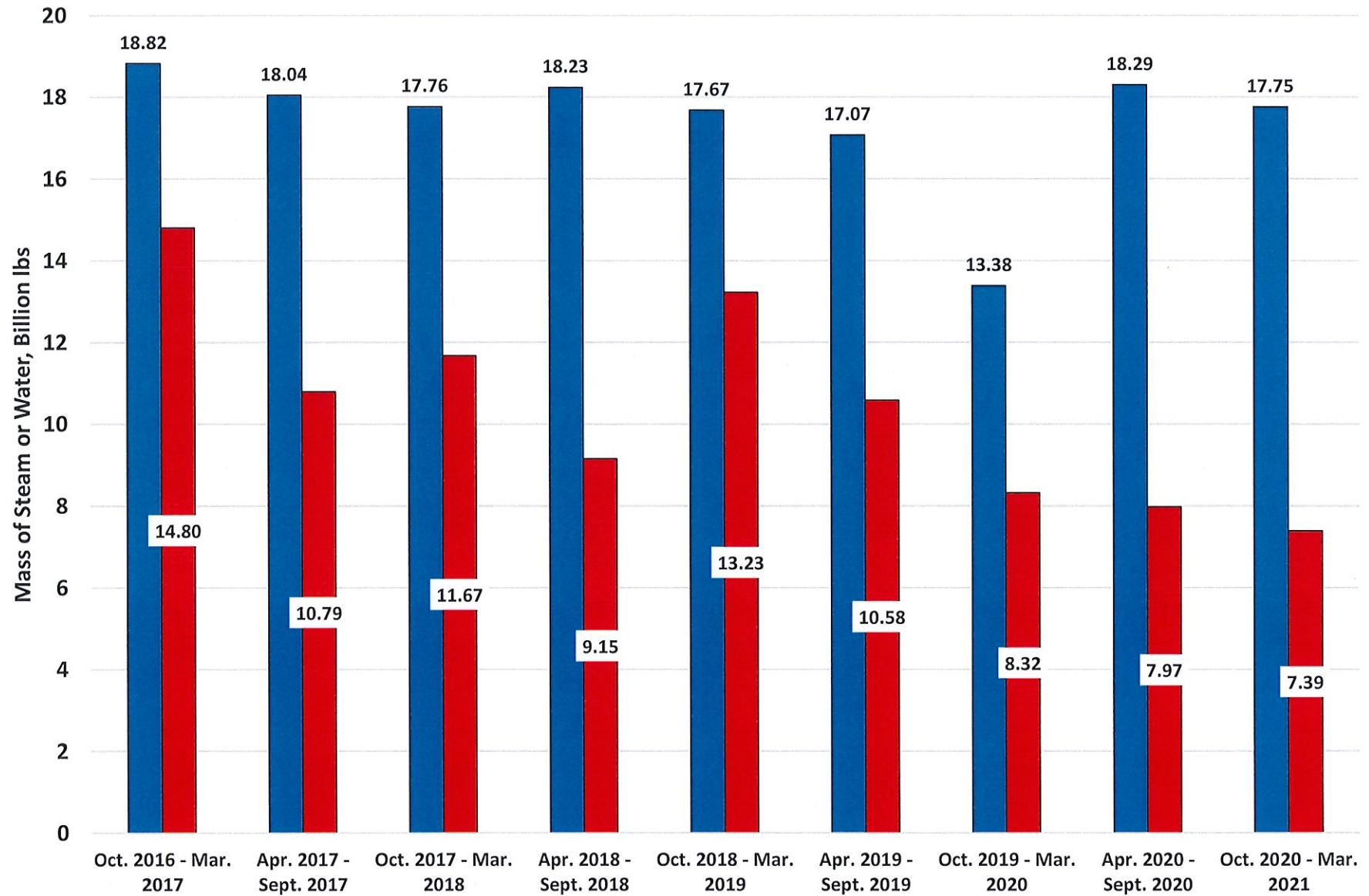
Oct. 1, 2020 - March 31, 2021

Magnitude > 1.5 - 47 Events

Magnitude > 3.0 - No Events

SEISMIC EVENTS  
REPORTED BY THE USGS  
(from U.C. Berkeley Catalog)

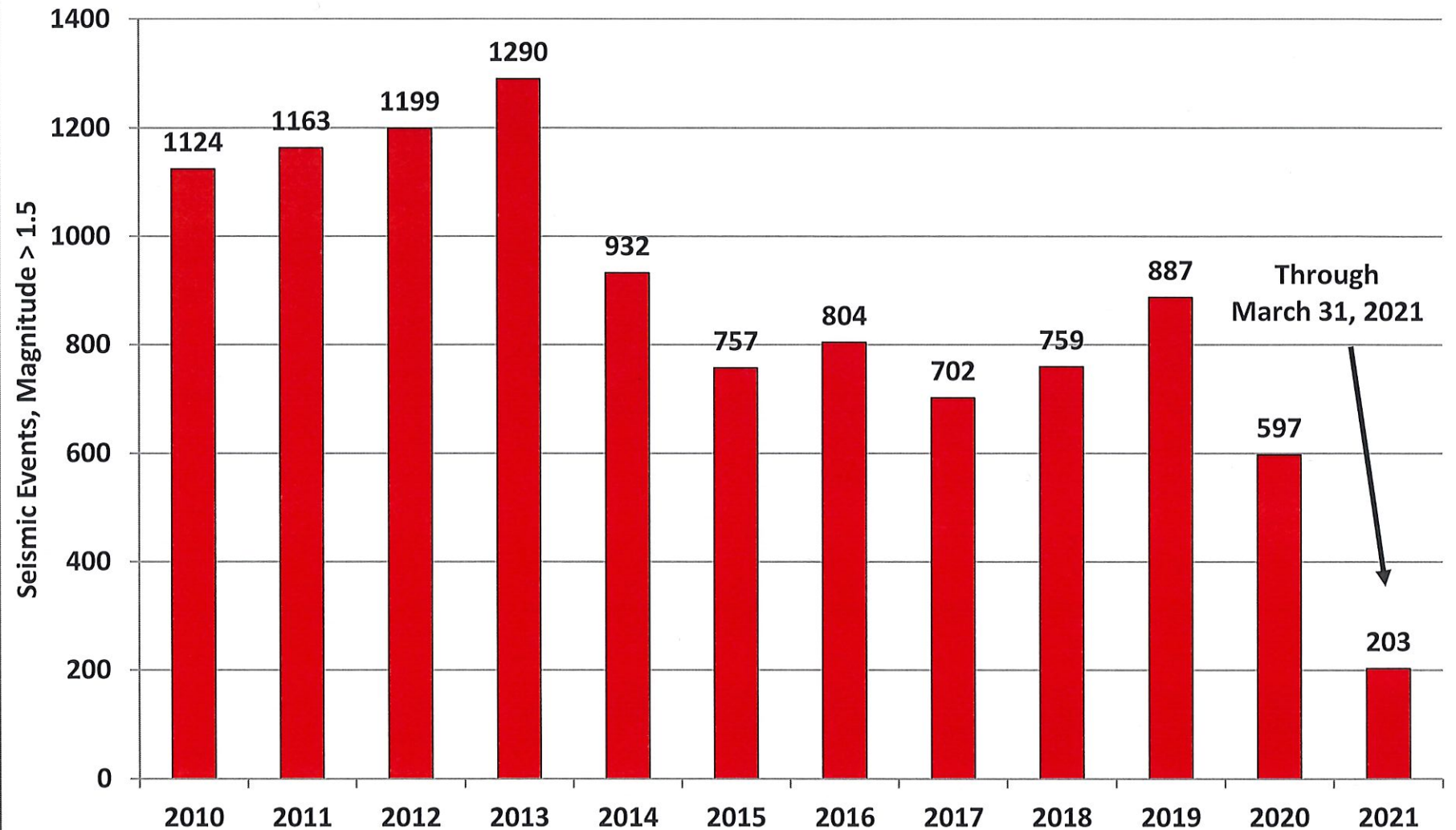
SE Geysers Production and Injection  
Figure 5



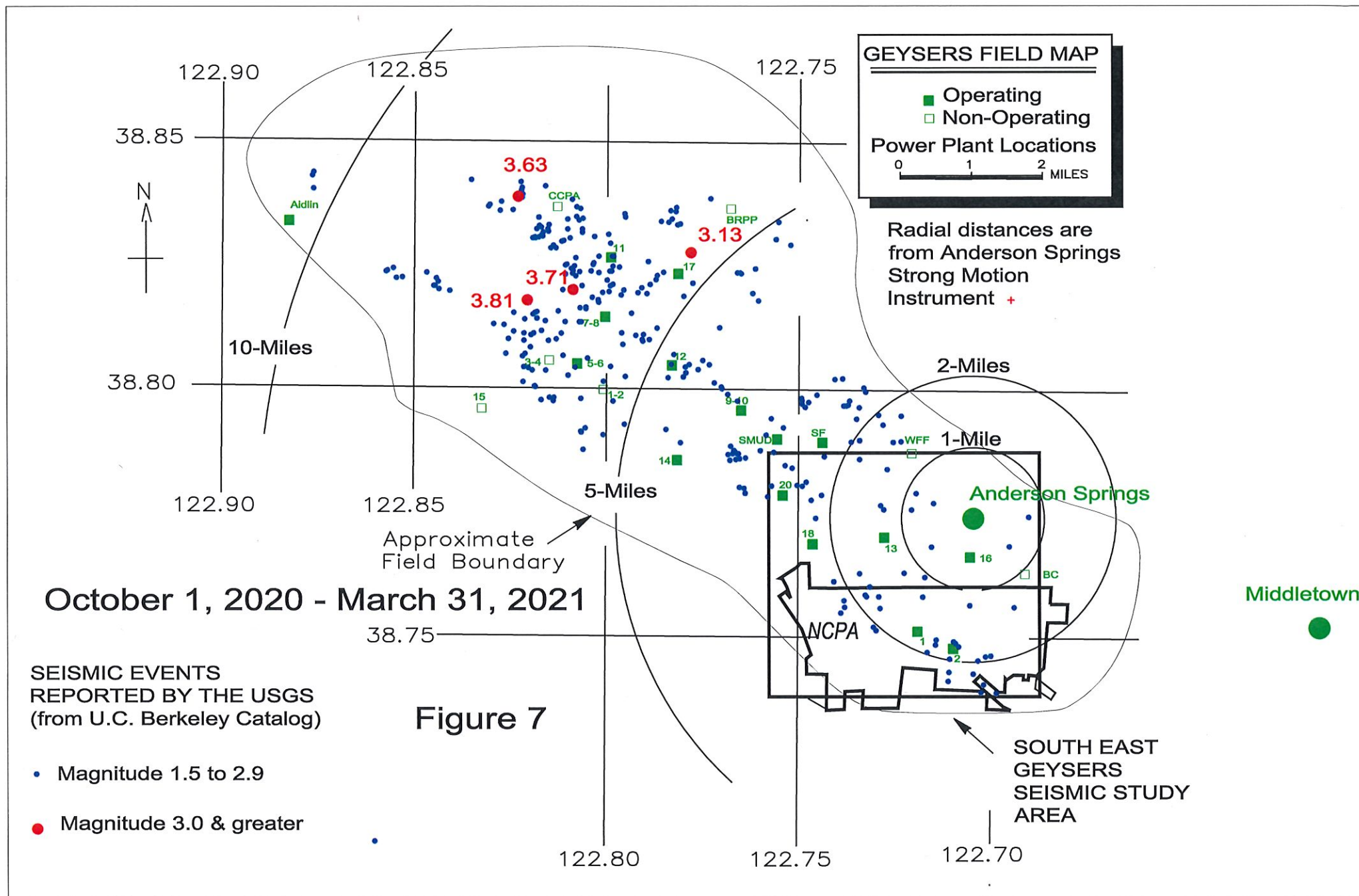


# The Geysers (KGRA) - Historical Seismic Activity Magnitude > 1.5

Figure 6





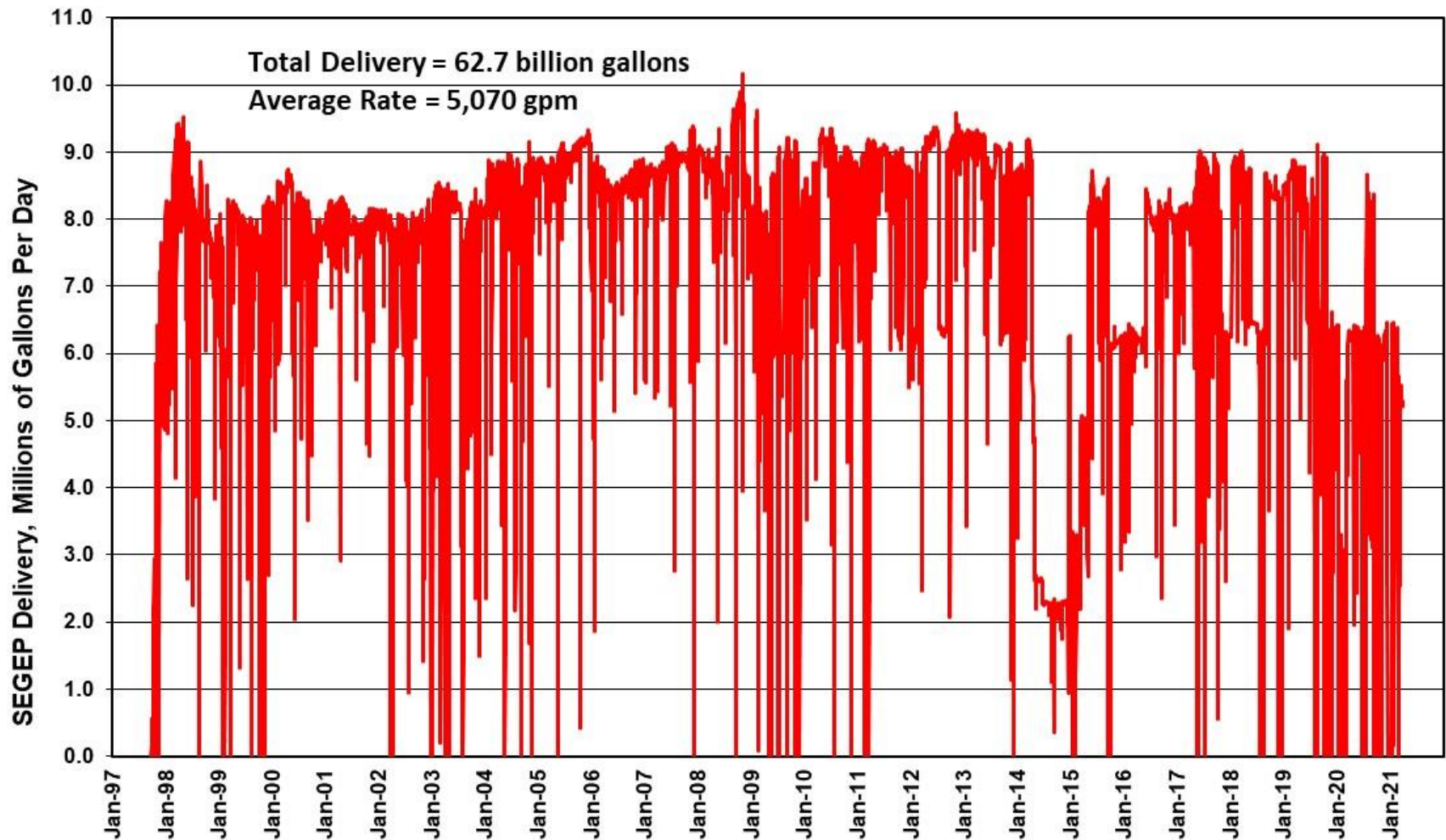




# **SMAC Report – Fall 2020**

**Ed Voge**  
**Reservoir Engineer**  
**May 10, 2021**

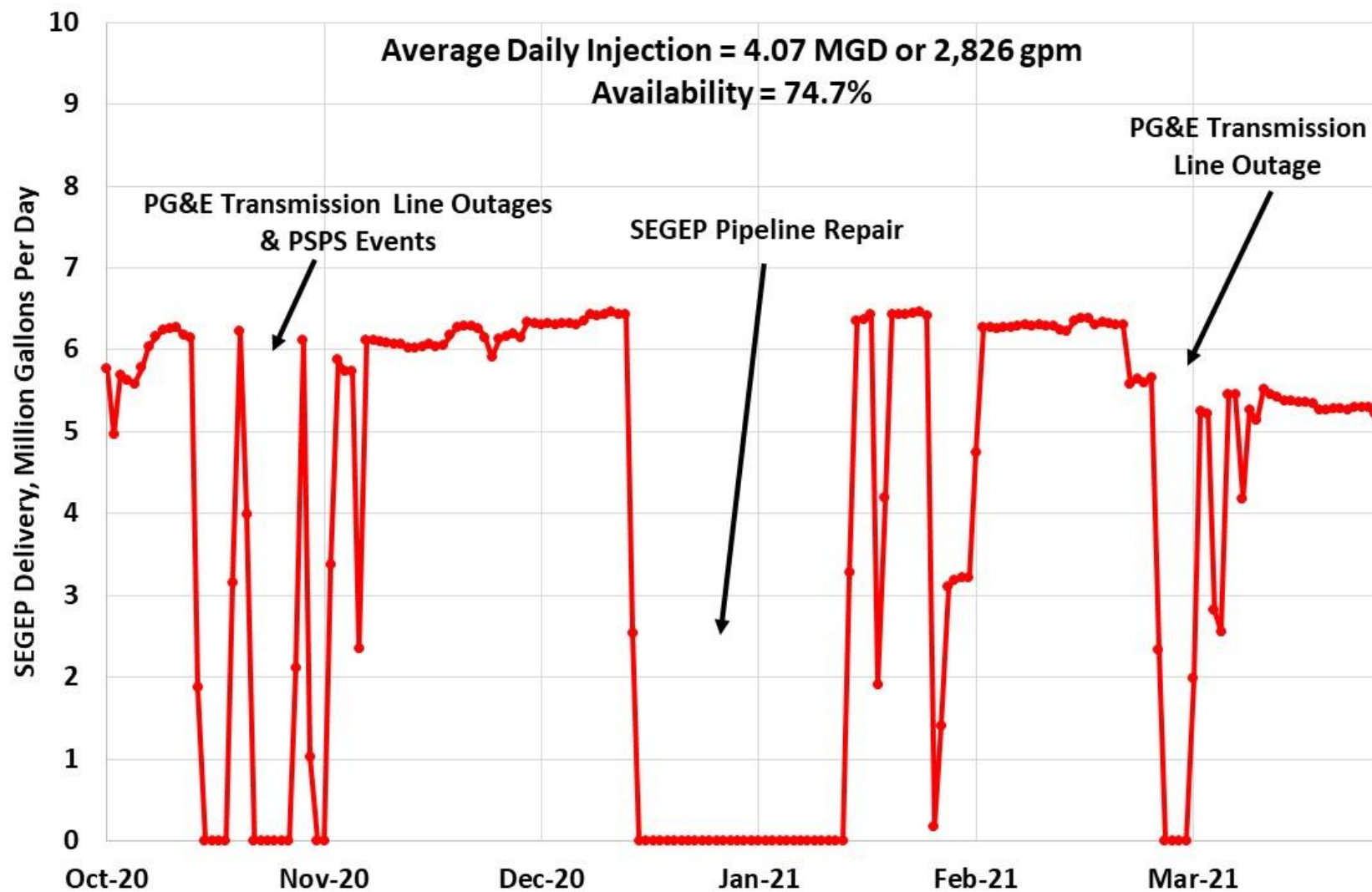
**Historical SE Geysers Effluent Pipeline Deliveries to The Geysers**  
**Figure 1**



## Southeast Geysers Effluent Pipeline Delivery

October 1, 2020 - March 31, 2021

Figure 2





### Southeast Geysers - Historical Seismic Activity

Magnitude > 1.5

Figure 3

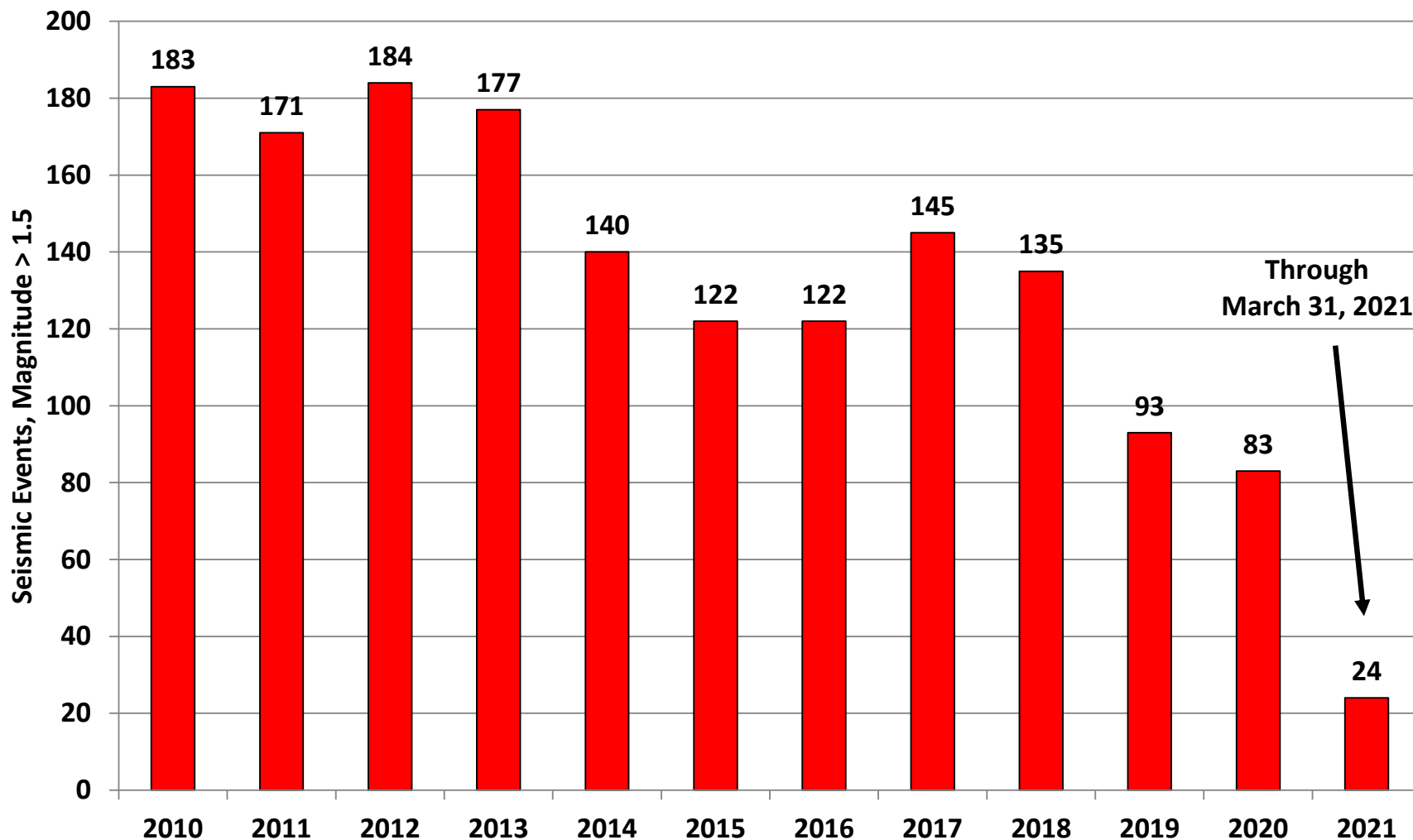
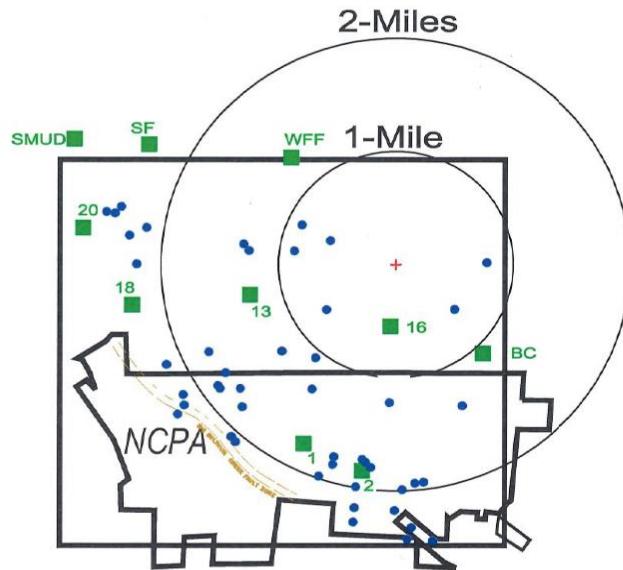


Figure 4



Radial distances are  
from Anderson Springs  
Strong Motion  
Instrument

**Oct. 1, 2020 - March 31, 2021**

**Magnitude > 1.5 - 47 Events**

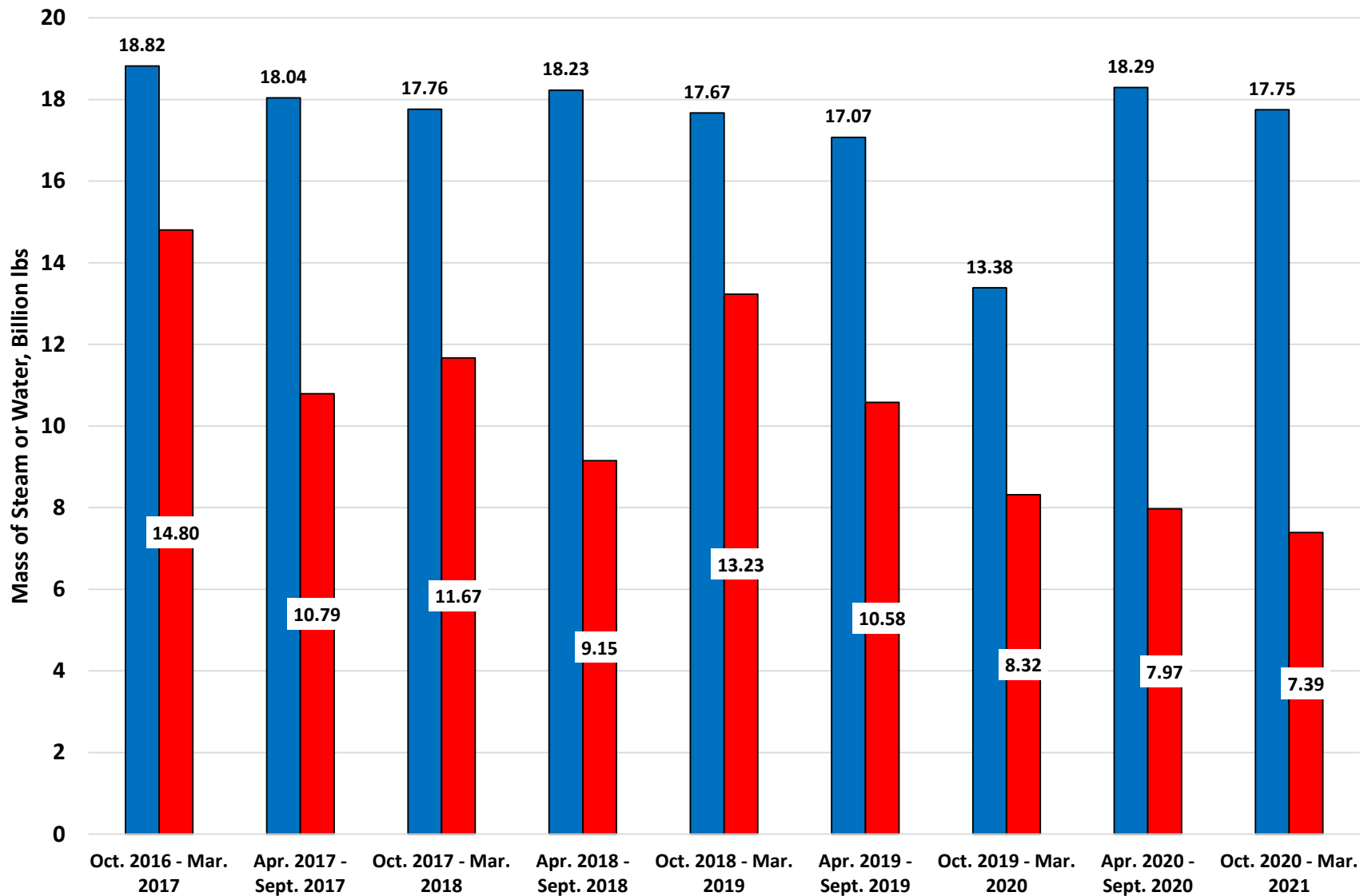
**Magnitude > 3.0 - No Events**

SOUTH EAST  
GEYSERS  
SEISMIC STUDY  
AREA

SEISMIC EVENTS  
REPORTED BY THE USGS  
(from U.C. Berkeley Catalog)

## SE Geysers Production and Injection

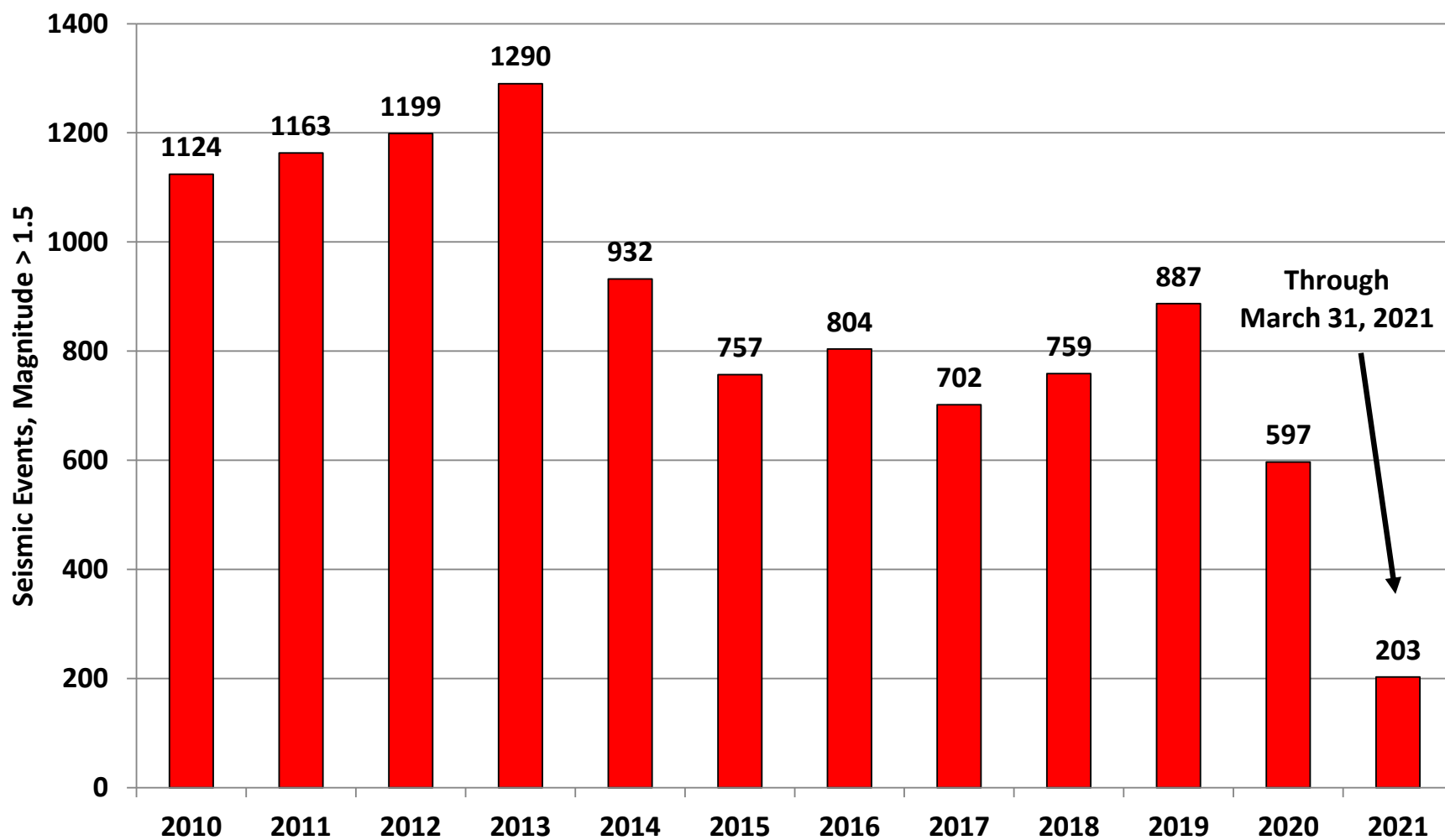
Figure 5



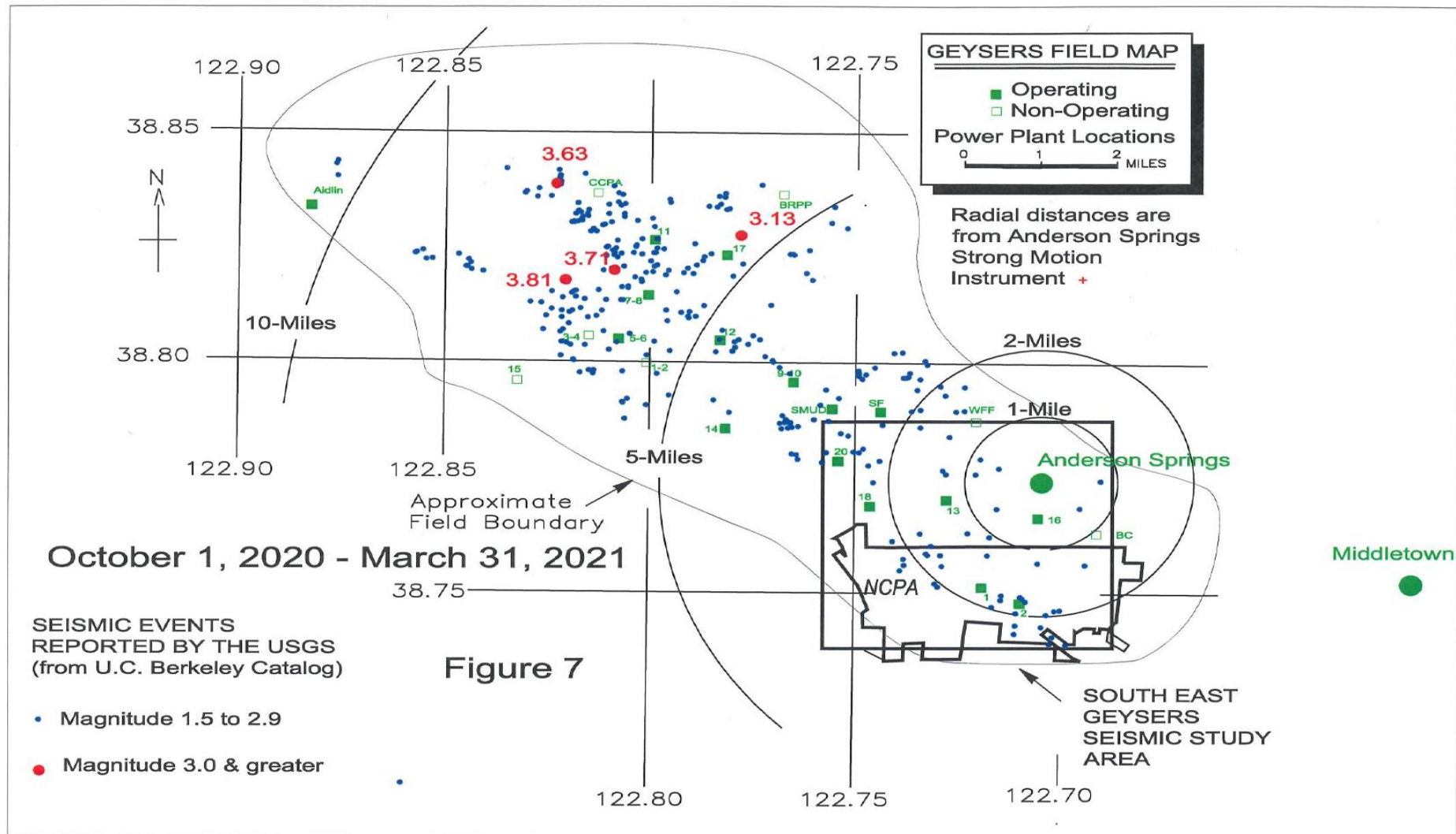
## The Geysers (KGRA) - Historical Seismic Activity

Magnitude > 1.5

Figure 6







## Summary

- **SEGEP Operation**
  - Injection Rate – 2,826 gpm
  - Pipeline availability – 74.7%
  - Reduced injection on NCPA lease, maintenance, & PSPS events
- **Southeast Production & Injection**
  - Production – 17.75 Glbs
  - Injection – 7.39 Glbs
- **Seismic Activity – SE Geysers**
  - 47 Events > Magnitude 1.5
  - No Events > Magnitude 3.0
- **Seismic Activity – Geysers**
  - 310 Events > Magnitude 1.5
  - 4 Events > Magnitude 3.0
  - Highest Event – Magnitude 3.81