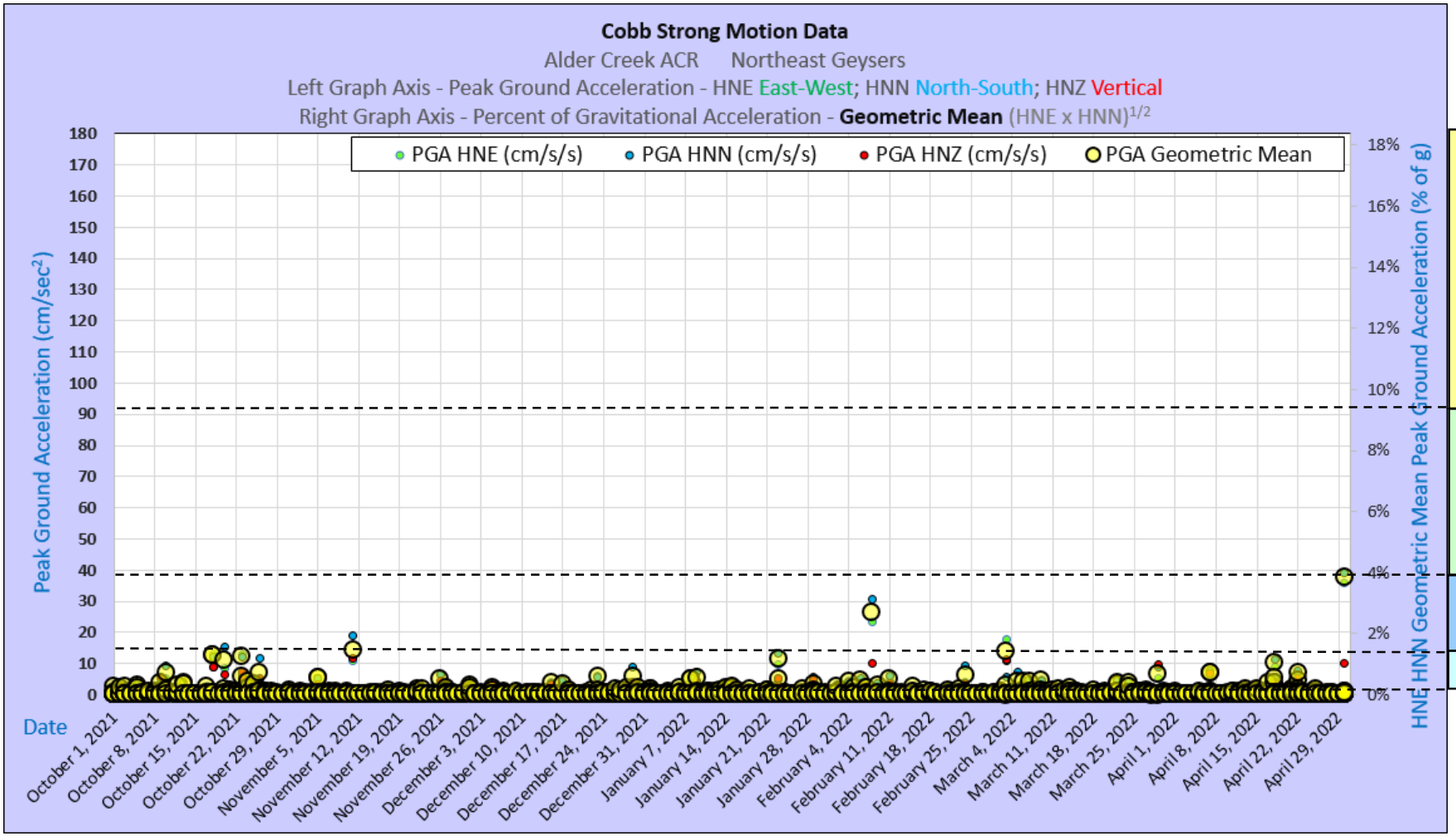
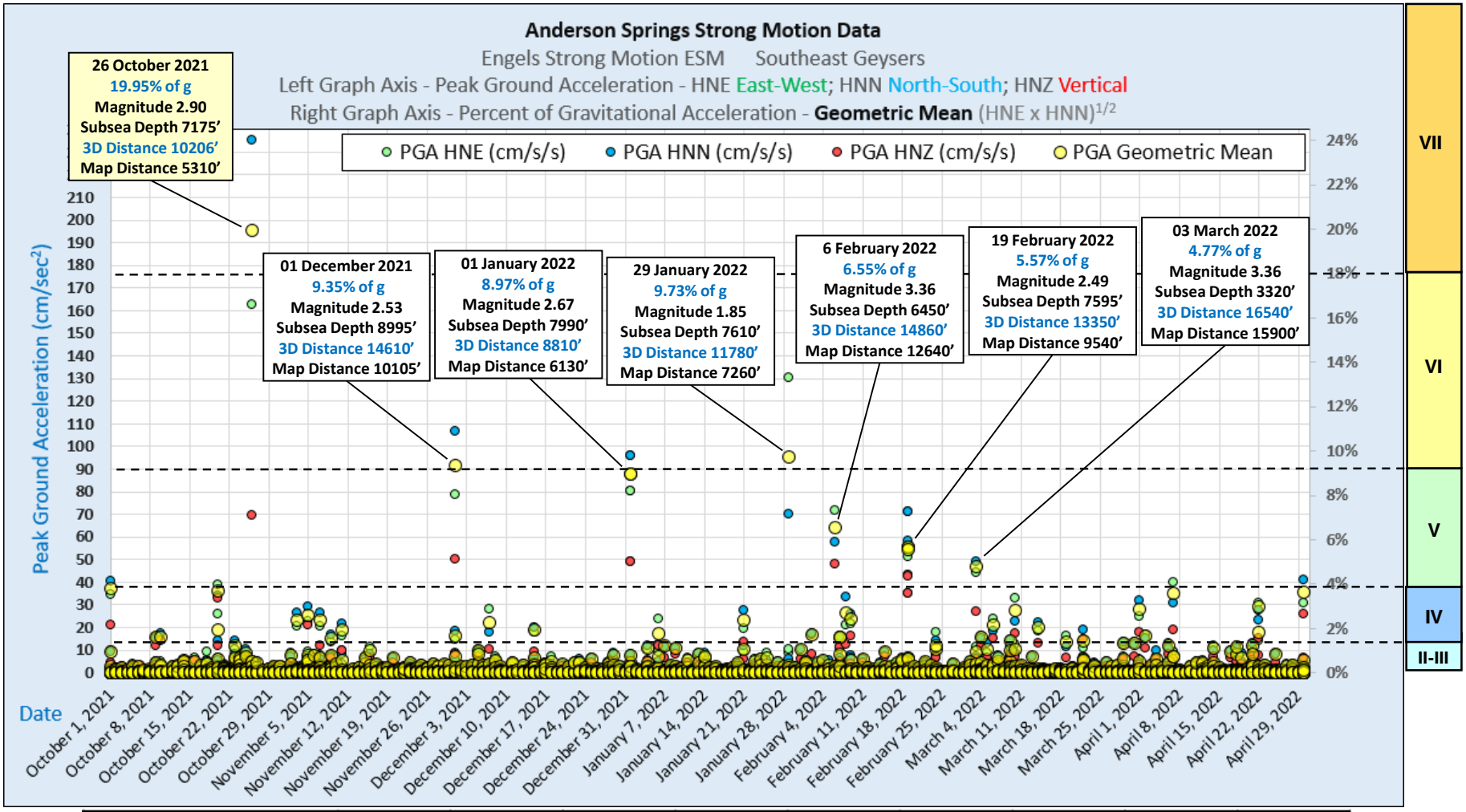
Cobb Area: Strong Motion Determinations At Alder Creek Strong Motion Station



Perceived Shaking	Not Felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
Potential Damage	None	None	None	Very Light	Light	Moderate	Mod/Heavy	Heavy	Very Heavy
Peak Acceleration (% of g)	< 0.17	0.17 - 1.4	1.4 - 3.9	3.9 - 9.2	9.2 - 18.0	18.0 - 34.0	34.0 - 65.0	65.0 - 124.0	> 124.0
Peak Velocity (cm/sec)	< 0.10	0.1 - 1.1	1.1 - 3.4	3.4 - 8.1	8.1 - 16.0	16.0 - 31.0	31.0 - 60.0	60.0 - 116.0	> 116.0
Modified Mercalli Intensity	I	II-III	IV	V	VI	VII	VIII	IX	X

Anderson Springs Area: Strong Motion Determinations At Engels Strong Motion Station

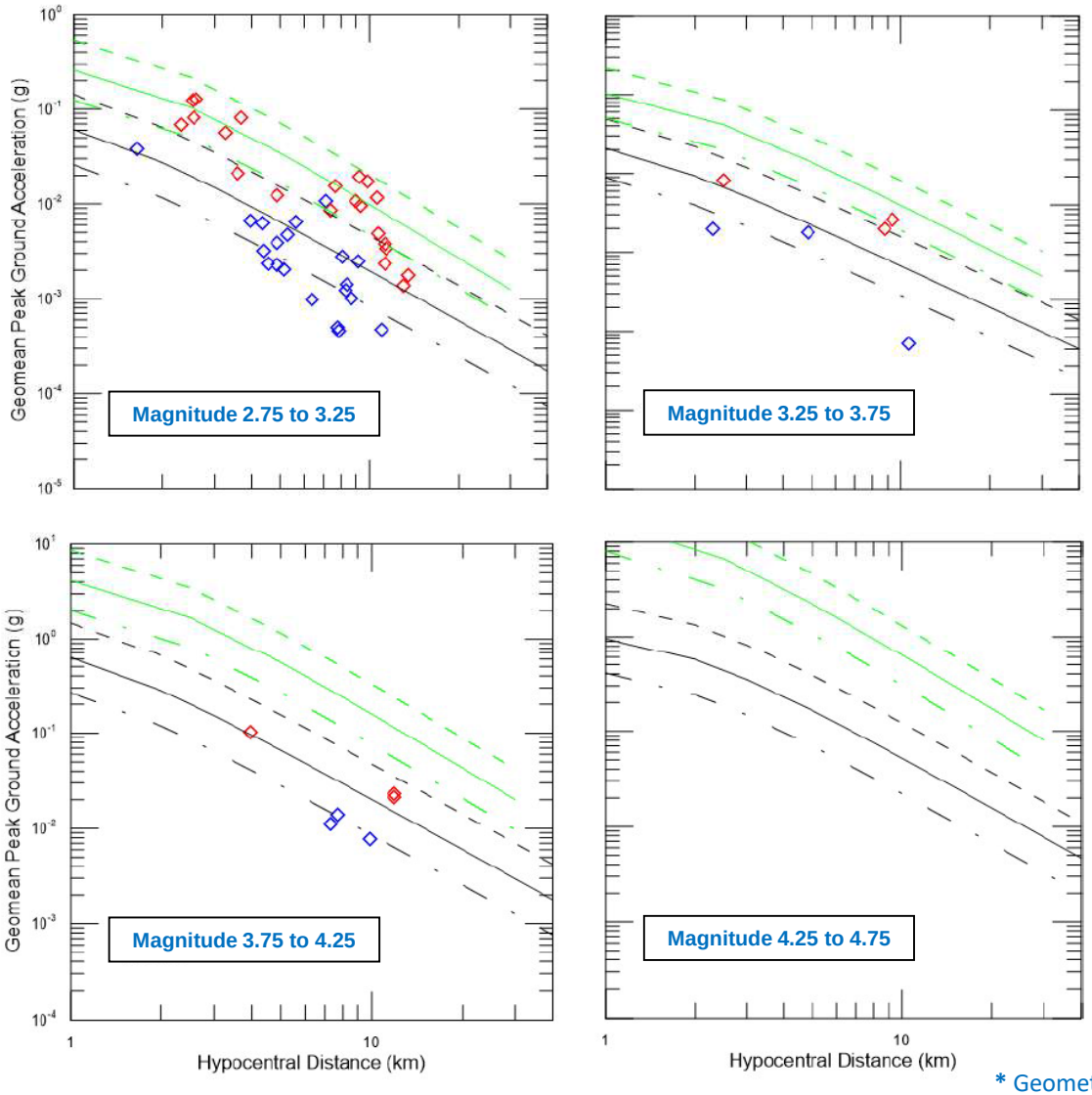


Perceived Shaking	Not Felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
Potential Damage	None	None	None	Very Light	Light	Moderate	Mod/Heavy	Heavy	Very Heavy
Peak Acceleration (% of g)	< 0.17	0.17 - 1.4	1.4 - 3.9	3.9 - 9.2	9.2 - 18.0	18.0 - 34.0	34.0 - 65.0	65.0 - 124.0	> 124.0
Peak Velocity (cm/sec)	< 0.10	0.1 - 1.1	1.1 - 3.4	3.4 - 8.1	8.1 - 16.0	16.0 - 31.0	31.0 - 60.0	60.0 - 116.0	> 116.0
Modified Mercalli Intensity	I	II-III	IV	V	VI	VII	VIII	IX	X

Seismic Monitoring Advisory Committee Meeting

Peak Ground Acceleration vs. Hypocentral Distance Seismic Events Within Magnitude Ranges

NOTE: For A Given Magnitude And Distance, Anderson Springs PGA Values Are Consistently Higher Due To Site Amplification



Symbols

Measured Peak Ground Acceleration* Values
01 March 2021 to 31 August 2021 For:

- Anderson Springs ESM
- Cobb ACR

Lines

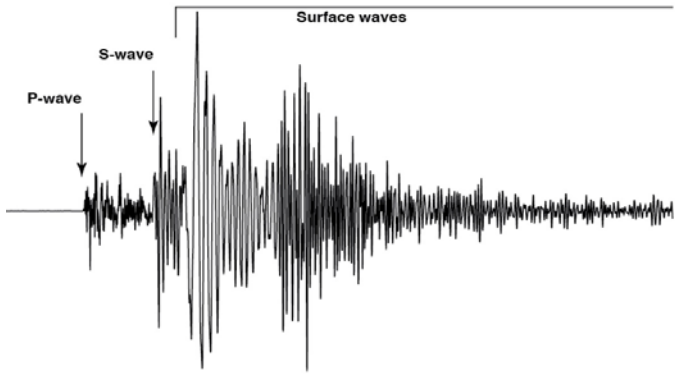
Modeled Peak Ground Acceleration Curves Using:

Atkinson 2015 Model

- *Median*
- *+1 standard deviation*
- *-1 standard deviation*

Sharma and Convertito 2018 Model

- *Median*
- *+1 standard deviation*
- *-1 standard deviation*



* Geometric Mean = $(HNS*HWE)^{1/2}$

Anderson Springs Surface Geology and Hotline Caller Locations

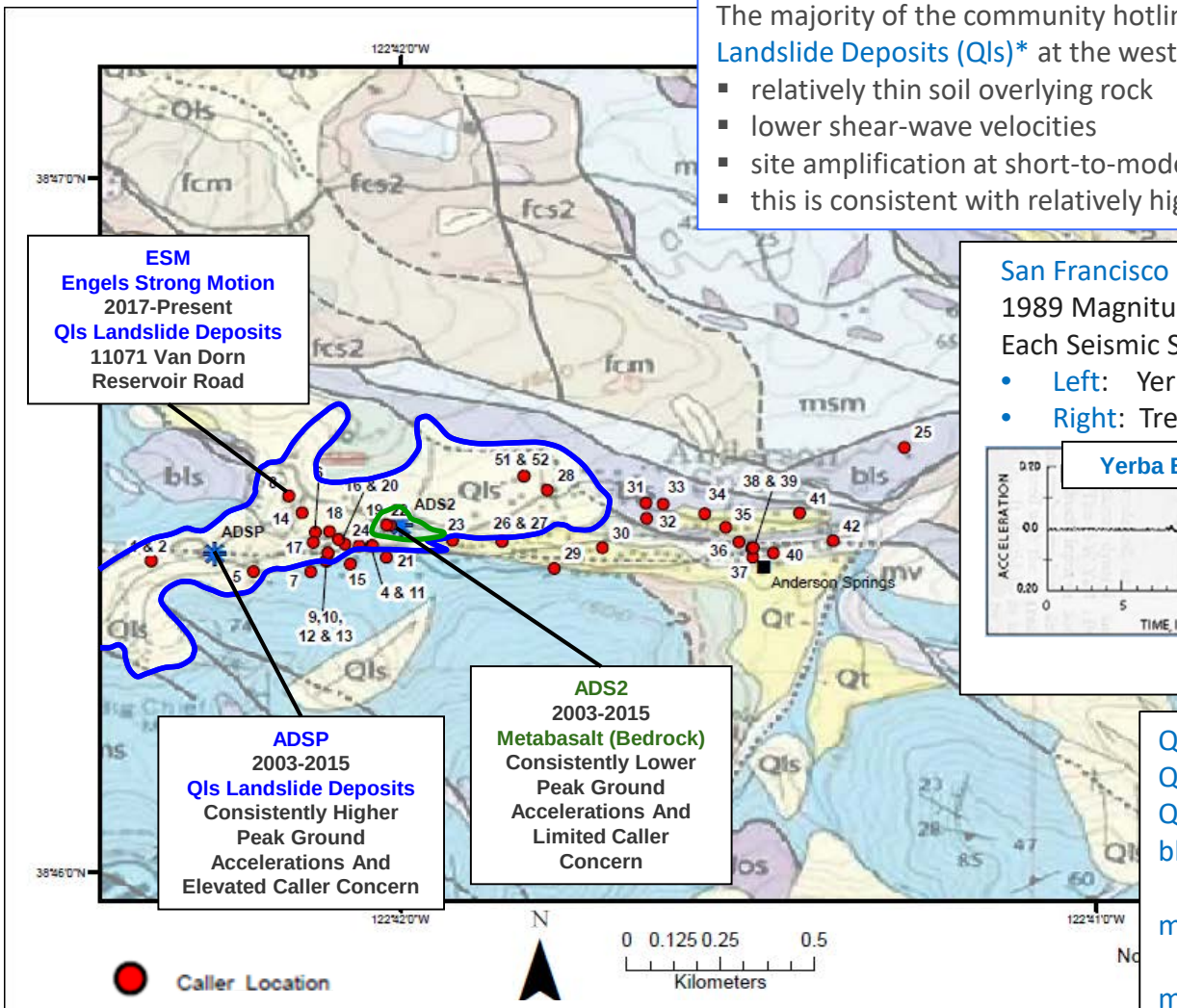
The majority of the community hotline callers have their residences on Quaternary Landslide Deposits (Qls)* at the western end of the community of Anderson Springs.

- relatively thin soil overlying rock
- lower shear-wave velocities
- site amplification at short-to-moderate periods (moderate to high frequencies)
- this is consistent with relatively high peak ground acceleration values at ADSP

ESM
Engels Strong Motion
2017-Present
Qls Landslide Deposits
11071 Van Dorn
Reservoir Road

ADSP
2003-2015
Qls Landslide Deposits
Consistently Higher Peak Ground Accelerations And Elevated Caller Concern

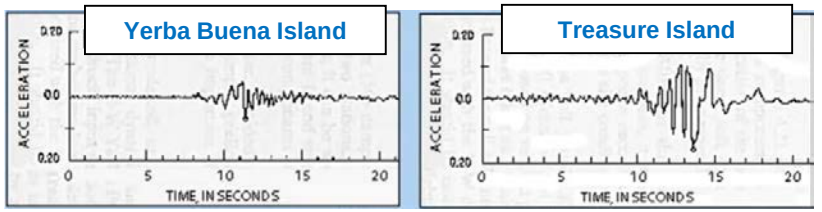
ADS2
2003-2015
Metabasalt (Bedrock)
Consistently Lower Peak Ground Accelerations And Limited Caller Concern



San Francisco Bay Site Amplification

1989 Magnitude 7.0 Loma Prieta Earthquake
Each Seismic Station At 45 Mile Distance

- Left: Yerba Buena Island Bedrock
- Right: Treasure Island Sediment Basin



Qls	Quaternary Landslide Deposits
Qal	Quaternary Alluvium
Qt	Quaternary Terrace Deposits
bls	Franciscan Complex Blueschist and Ecologite Block in Mélange
msm	Franciscan Complex Metamorphosed mélange
ms	Metasandstone
fcs2	Franciscan complex Metasandstone
fcv	Metabasalt Flows and Flow Breccias

Surface Geology Map - McLaughlin (1978)

Geysers Power Company LLC Water Injection Goals

Continued operation of the renewable resource at The Geysers Geothermal Field requires replacement of the steam mass lost by cooling towers during electrical power generation.

On a yearly basis, approximately 75% of the dry steam mass produced from the reservoir is lost to the atmosphere.

A balance between water injection and steam production is required to approach "steady-state" conditions optimal for continued electrical power generation *and* seismicity mitigation.

Minimized steam reservoir temperature and pressure variability decreases stress variations believed responsible for induced seismicity.

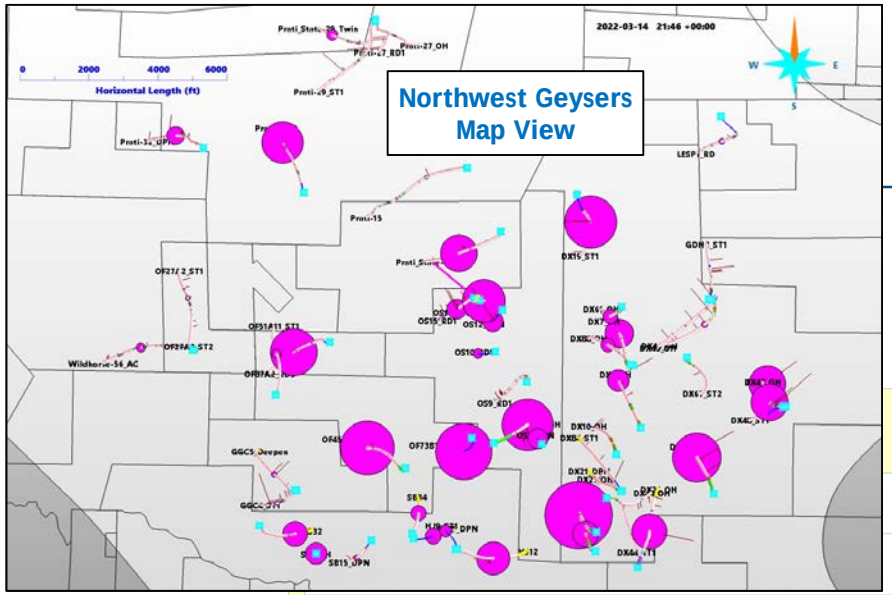
Improve Injection Distribution

- Expansion to northwest and away from communities
- Additional injection wells
- Shallow low-rate injectors (~150 gallons/minute)

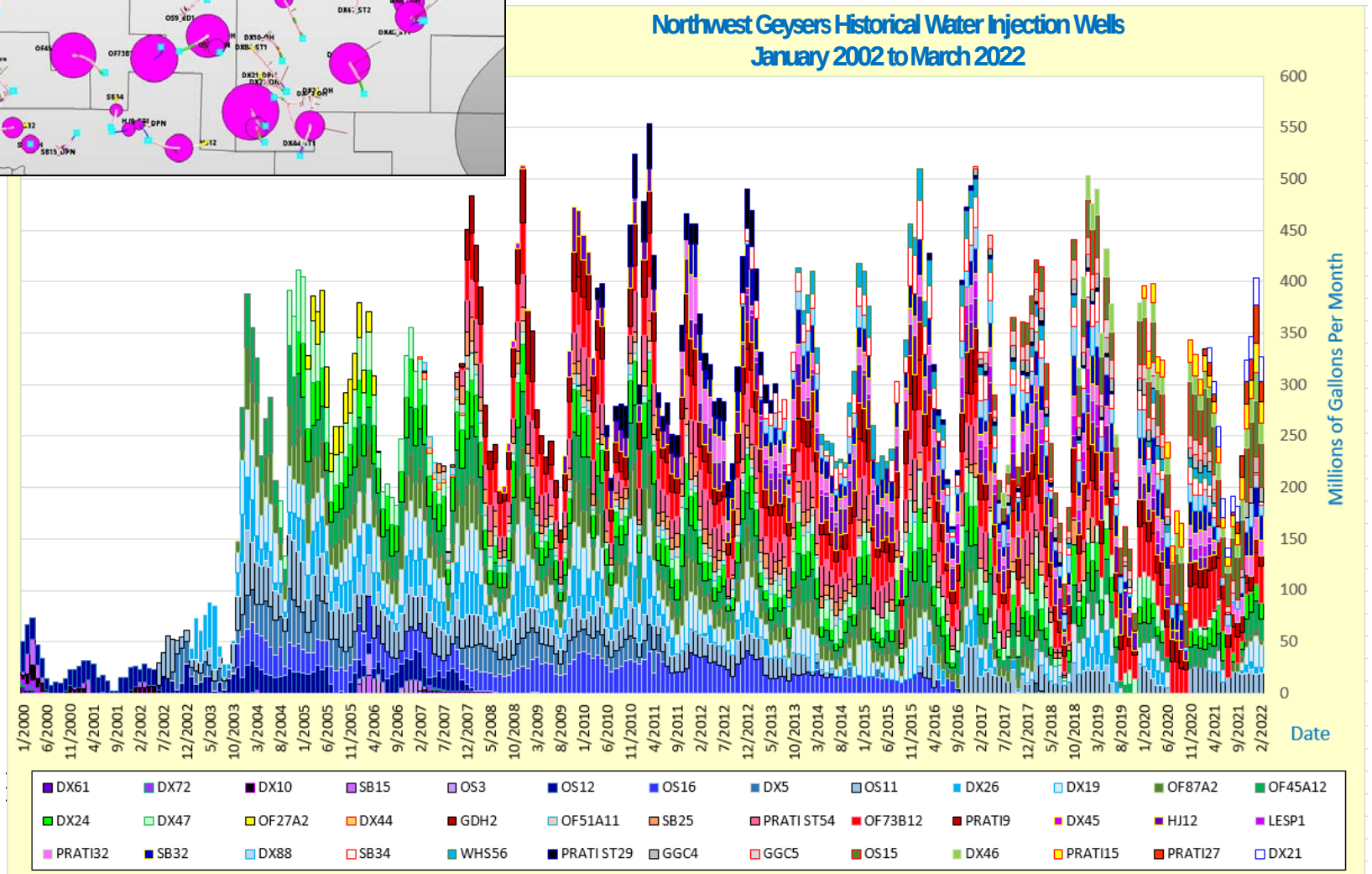
Minimize Injection Rate Variations

- Individual wells and field-wide
- Emphasis on limited variation for wells nearest communities
- Designed any tests concerning injection rate variability far from communities
- Suitable injection rates per well continually evaluated (dependent on local geology)
- More gradual transition of SRGRP* water for injection
- The City of Santa Rosa assists greatly by providing gradual water supply step-ups and step-downs.

Seismic Monitoring Advisory Committee Meeting
Improve Injection Distribution
Expansion To Northwest And Away From Communities



March 2022



CALPINE

Minimize Injection Rate Variations And Improve Injection Distribution

Minimize Injection Rate Variations

- **Automation Of Water Injection Rate Modifications**
  - Calpine Engineers Currently *Developing Software* To Automate Water Injection Rate Changes
  - Designed To Automatically Distribute Rate Changes Throughout Multiple Water Injection Wells
  - Not Specifically Developed For Seismicity Mitigation
  - Pilot Program Will Be Completed At Calistoga Unit 19 Power Plant
  - Potential To Minimize Individual Well Injection Rate Variations

    - **Minimized Injection Rate Variability Should Decrease Stress Variations Responsible For Induced Seismicity.**

Improve Injection Distribution

- **Thirteen Water Injection Wells Added Since 2017**
  - Seven Newly Drilled Wells From Surface
  - Six Existing Wells Conversion-To-Injection

- **Additional Water Injection Wells**
  - Pre-Drilling Project Analyses Completed For Next Drilling Program
    - ✓ Davies Estate-11 Southeast Geysers Improved Distribution Of Water
    - ✓ Prati State-11 North Geysers Expansion Away From Communities

    - **Improved Water Distribution Should Decreases Stress Variations Responsible For Induced Seismicity.**

Davies Estate-11 Well Planning – Replacement For Quicksilver Unit 16 Barrows-7 ST1 – Failing Water Injection Well Induced Seismicity Mitigation A Key Criteria For Well Trajectory Determination