

ATTACHMENT A

USGS Information Regarding Geothermal-Induced Seismicity at Newberry Volcano

2026 Newberry Geothermal Consent to Lease Project #387325

Purpose

This attachment identifies post-2014 information from the U.S. Geological Survey (USGS) and Cascades Volcano Observatory (CVO) that is relevant to induced seismicity from geothermal work at Newberry Volcano. It is submitted to support a request for a current analysis of induced seismicity before additional geothermal leasing decisions are finalized.

USGS December 18, 2024 information statement

USGS reported that private geothermal exploration work by Mazama Energy near Newberry was expected to increase seismicity. USGS stated that, as the work proceeded, "many small magnitude, non-volcanic earthquakes will occur" and would be detected by the Newberry seismic network. USGS also noted that geothermal exploration at Newberry in 2012 and 2014 produced hundreds of small earthquakes of magnitude M2.5 or less.

USGS stated that CVO and the Pacific Northwest Seismic Network would closely monitor the activity and that the geothermal work was not expected to change Newberry's state of volcanic activity or its potential volcanic hazards. The relevance here is induced seismicity associated with geothermal work, not an assertion that geothermal operations will trigger a volcanic eruption.

Key point: The 2024 USGS statement provides federal-agency information developed after the 2014 Consent to Lease EA showing that geothermal operations at Newberry can produce identifiable non-volcanic seismicity and that renewed geothermal work warranted dedicated seismic monitoring.

Primary source

USGS Cascades Volcano Observatory, *Earthquake monitoring at Newberry volcano (December 18, 2024)*.
<https://www.usgs.gov/observatories/cvo/news/earthquake-monitoring-newberry-volcano-december-18-2024>



Scan to open the official USGS/CVO December 18, 2024 notice.

USGS Map Reference - Newberry Earthquakes, 2012-2024

USGS published a public-domain map on December 16, 2024 comparing earthquakes located during periods of geothermal work in 2012 and 2014 with volcanic earthquakes located by the Pacific Northwest Seismic Network since 2011.

What the official map shows

Orange circles: earthquakes located during periods of geothermal work in 2012 and 2014.

Blue circles: volcanic earthquakes located by the Pacific Northwest Seismic Network since 2011.

Red triangles: stations in the Newberry seismic network.

The map is useful because it visually distinguishes the geothermal-associated earthquake cluster from the broader background of volcanic seismicity.



Official USGS map:

<https://www.usgs.gov/media/images/map-earthquakes-located-newberry-volcano-2012-2024>

USGS identifies the map as public domain and credits the Pacific Northwest Seismic Network for the data.

Why this map is relevant to Project #387325

The map does not by itself establish the magnitude of future seismic risk from any particular new lease. It does establish that seismicity associated with geothermal work at Newberry is observable, spatially distinguishable, and important enough to be tracked separately by USGS and PNSN. That makes current induced-seismicity information relevant to a 2026 determination about whether the 2014 analysis remains an adequate basis for additional leasing.

For current conditions and official notices, see the USGS Newberry volcano page and the CVO/PNSN monitoring information referenced in the December 18, 2024 statement.

Relationship to the 2014 and 2026 Administrative Record

Record / date	Relevant information
2014 Final EA printed p. 42	Describes Enhanced Geothermal Systems (EGS) hydroshearing as injection of water under pressure to induce shear slip on existing fractures; states that hydroshearing induces microseismic events; and states that the intensity or number of induced events could not then be predicted without additional subsurface information.
2014 Final EA printed pp. 59-60	Documents the 2012 AltaRock EGS stimulation on the northwest flank of Newberry. The EA reports more than 200 recorded seismic events, including 28 magnitude 1 or greater events, with a largest event of magnitude 2.39. Water injection was stopped and the well was shut in.
2014 Final EA printed p. 107	States that seismic activity could increase if geothermal development includes high-pressure reinjection and that resulting seismicity could induce localized landslides on steep slopes.
USGS/CVO Dec. 18, 2024	Reports that renewed geothermal work near Newberry was expected to produce many small, non-volcanic earthquakes; notes hundreds of M2.5-or-less earthquakes during geothermal work in 2012 and 2014; and states that USGS/CVO and PNSN would closely monitor the activity.
2026 Determination of Analysis Reliance pp. 2-3	States that there are no substantial differences between the 2014 and 2026 projects and that anticipated environmental effects are substantially the same, while deferring post-leasing exploration and development to future site-specific NEPA review.

Relevance to the requested environmental review

The post-2014 USGS information does not, standing alone, prove that future geothermal development will cause a significant adverse impact. It is relevant, however, to whether the 2014 seismicity analysis should be updated before the Forest Service relies on that analysis for a 2026 leasing decision. It also supports evaluating induced seismicity as a reasonably foreseeable effect of geothermal stimulation and injection, including monitoring and enforceable mitigation measures.

Sources

1. USDA Forest Service, *Newberry Geothermal Consent to Lease Project Final Environmental Assessment*, October 2014, especially printed pp. 42, 59-60, and 107.
2. USDA Forest Service, *2026 Newberry Geothermal Consent to Lease - Determination of Analysis Reliance*, August 2026, pp. 2-3.
3. USGS Cascades Volcano Observatory, *Earthquake monitoring at Newberry volcano*, Dec. 18, 2024: <https://www.usgs.gov/observatories/cvo/news/earthquake-monitoring-newberry-volcano-december-18-2024>
4. USGS, *Map of earthquakes located at Newberry volcano from 2012 to 2024*, Dec. 16, 2024: <https://www.usgs.gov/media/images/map-earthquakes-located-newberry-volcano-2012-2024>