



EARTHQUAKE

e-Newsletter about what's movin' and shakin' at the Earth Science Museum

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ESM OUTREACH UPDATE

Mardy Zimmermann Outreach Coordinator

Part III

“What was the Arizona Mining and Mineral Museum?” Its history!

The first Arizona Territorial Fair was held November 10-16, 1884 on an 80-acre tract between 7th Ave. on the west and Central Ave. on the east with Apache St. on the north and Watkins St. on the south.

Pre-Fair publicity in the *Arizona Gazette* stated,

“the mineral display, we believe, will overshadow all else.”

This was the beginning of the collection that became the Arizona Mining and Mineral Museum.

In 1905, the Arizona Territorial Fair Commission was formed to secure permanent fairgrounds and the first Territorial Fair on the present State Fairgrounds site was held.

In 1917, the Legislature authorized \$30,000 for the construction of the Mineral Building.

These funds were not sufficient to complete the structure and construction stopped.

In 1919, J. C. Goodwin and Charles F. Willis asked the mining companies of Arizona to donate funds to “finish” the building. The

funds were raised and the building was completed for use in the 1919 Fair.

No fair was held from 1932 through 1940 due to the economy of the country.

With the outbreak of World War II, the entire Fairgrounds was commandeered by the War Department.

In 1946, the first post-war fair was held.

The Fair commission appointed Arthur L. Flagg as superintendent.

Rehabilitation was started in August and continued up to the opening day.

During that period, members of the Mineralogical Society of Arizona of which Mr. Flagg was founder (in 1935) and member, contributed over six hundred hours of volunteer labor. The specimens were thoroughly cleaned and the interior of the cases refinished.

In 1947, the Legislature passed a law and made an appropriation of \$7,900 permitting the Department of Mineral Resources (established in 1939) to install its offices in the Mineral Building at the State Fairgrounds.

This appropriation was to cover the cost of preparing the space in the Mineral Building and moving the Mineral Resources Department from its downtown offices in the old County Courthouse at 1st Ave. & Washington.

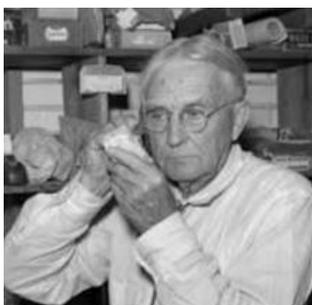
In 1953, a mineral museum was established by six of the state's major mining companies:

American Smelting and Refining Company, Inspiration Consolidated Copper Company, Kennecott Copper Corporation, Magma Copper Company, Miami Copper Company and Phelps Dodge Corporation.

These companies agreed to underwrite the expense of opening the museum and maintaining it on a year-round basis. Details of handling the project were approved by the Arizona State Fair Commission, the State Auditor, and the Attorney General.

The Mineral Building on the State Fairgrounds was selected as the location and management of the museum was given to the Department of Mineral Resources.

In 1953, Arthur L. Flagg who had worked for the Department of Mineral Resources as a field engineer and also served as Superintendent of the Minerals Department of the Arizona State Fair since 1946, was appointed museum curator. He remained the curator until his death in 1961.



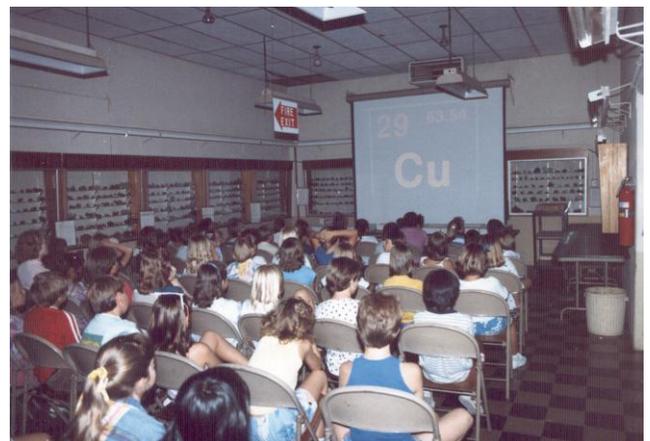
Arthur L. Flagg



Mineral museum at the State Fairgrounds pre-1991.



The Mineral Museum at the Fairgrounds



Students receiving a presentation. A. L. Flagg's mineral collection around the room.

On August 2, 1973, the Arizona Mining Association formally presented the Arizona Department of Mineral Resources with all the material, specimens, furnishings, fixtures and other items they owned in the museum.

In addition, they provided the Department of Mineral Resources the sum of \$48,000 to continue operating the mineral museum for the next two years.

In July of 1991, the Department and the Museum moved from the State Fairgrounds to the renovated El Zaribah Shrine Building at 1502 W. Washington, Phoenix.

During that period, members of the Maricopa Lapidary Society (formed in 1948) contributed hundreds of hours of volunteer labor to clean the specimens and refinish the cases.

The new building was renamed the Polly Rosenbaum Building to honor Representative Polly Rosenbaum of Globe for all the efforts she expended getting the building preserved and put on the Historic Register.

In an article published February 21, 2003, in the *Arizona Capitol Times*, Polly said:

“These new People have a very short view of history. The (Mineral) Museum is about more than minerals; it’s the identity of Arizona.”

“The prospector and burro came hunting for gold and silver, but copper revolutionized the electrical industry and created the modern world. Many people had no idea how dependent we are on minerals, until they came to the Museum.”

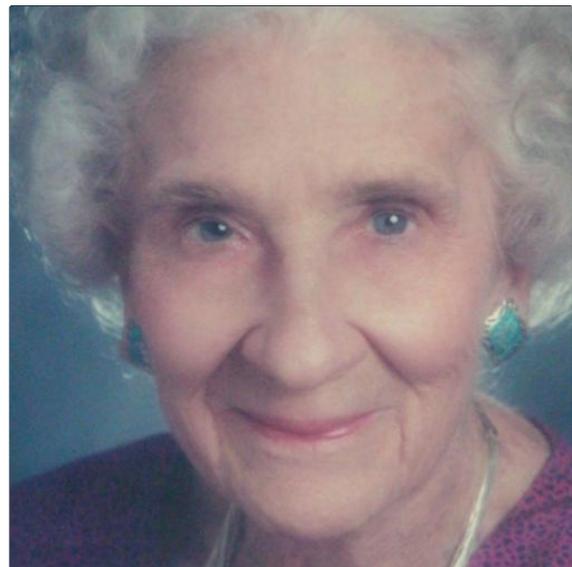
After Polly Rosenbaum’s death in December of 2003 (at 104 years old), the Arizona Legislature passed House Concurrent Resolution 2042 (2004) which shows that both Polly and the Legislature assumed the renovated Polly Rosenbaum building was the “permanent home” for the Arizona Mining and Mineral Museum.

During the last 20 years of its history, thousands upon thousands of volunteer hours and \$\$\$ in private donations made the AZ Mining and Mineral Museum *“#10 of Top 12 Things to do in Phoenix.”*

- *US News and World Report*

Ironically on April 30, 2011, the Arizona Historical Society closed the AZ Mining and Mineral Museum.

On the first Monday in May, school busses full of children showed up for their scheduled tour, only to find the museum CLOSED. No one from the AZ Historical Society had bothered to notify the schools that they had closed the museum a month early.



Rep. “Polly” Rosenbaum’s Legacy

“A permanent home for the Arizona Mining and Mineral Museum”

On July 20, 2010, Dick Zimmerman said in his blog:

“How unfortunate that the current administration plans to celebrate Arizona’s centennial by replacing the “identity of Arizona” with a 5C Centennial Museum. How ironic that the Arizona Historical Society (responsible for the 5C museum) is a participant in erasing the historic “identity of Arizona”.

Fountain-Filled Year at the Kīlauea Volcano

By Harvey Jong

Hawai'i's Kīlauea volcano was in the news throughout 2025, and December 23, 2025 marked a full year of episodic lava fountaining eruptions. A period of such remarkable activity hasn't occurred in nearly 40 years, and some of the lava fountains reached impressive heights of up to 450 m (1,476 ft). This article presents a few highlights of the eruptions as reported by the USGS Hawaiian Volcano Observatory.



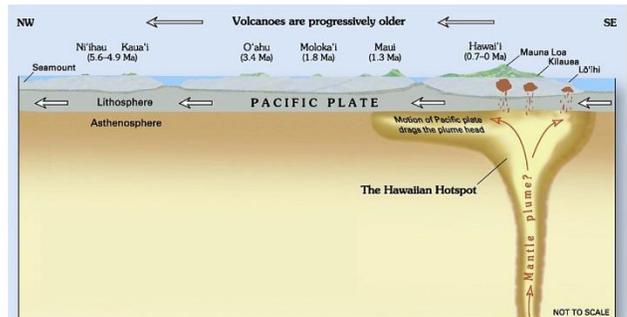
Photo Compilation of Kīlauea's Ongoing Eruptions at the One Year Anniversary - December 23-2024 to December 23, 2025
USGS Hawaiian Volcano Observatory photos, - PD, via usgs.gov

This collage combines webcam images and still photos of the 38 lava fountaining episodes that occurred over the past year. The varied eruptions lasted from 4.5 hours to 8.5 days.

Geology and Features of the Kīlauea Volcano

To better understand the episodic eruptions, we will examine the geology and features of the Kīlauea volcano. Kīlauea is the youngest and most active shield volcano on the island of Hawai'i. About 90 percent of the volcano's surface is covered by lava flows less than 1,500 years old, so samples from drill cores and exposed underwater slopes were needed to build a comprehensive eruption history (Sherrod et al., 2007).

Kīlauea formed as the Pacific tectonic plate moved over a hotspot in the Earth's mantle. Current research indicates that between 210,000 and 280,000 years ago its first basaltic lava flows erupted on the sea floor. As the lava accumulated, the volcano emerged from the sea as an island around 155,000 years ago¹.



Volcanic Activity and Pacific Plate Movement over the Hawaiian Hotspot

Joel E. Robinson/USGS diagram, - PD, via Wikimedia Commons

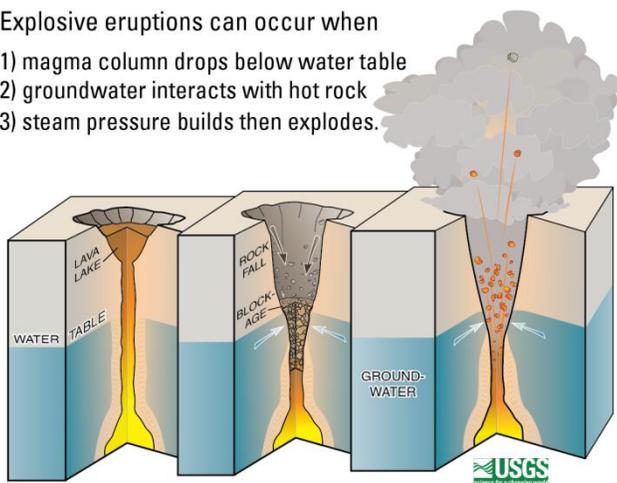
This diagram illustrates the progression of volcanoes that resulted from the movement of the Pacific plate over a stationary hotspot related to a possible mantle plume. Mauna Loa and Kīlauea have emerged as active surface volcanoes, while Lō'ihi is still a submarine volcano.

¹ Geology and History of Kīlauea, November 29, 2023, <https://www.usgs.gov/volcanoes/kilauea/science/geology-and-history-kilauea>

Effusive lava flows represented Kīlauea’s normal style of eruptions until about 2,200 years ago when the Powers caldera formed. This caldera collapsed to a depth around 620 m (2,030 ft) which led to the contact of magma with the water table. This interaction triggered explosive eruptions that occur in cycles alternating between the effusive and explosive styles.

Explosive eruptions can occur when

- 1) magma column drops below water table
- 2) groundwater interacts with hot rock
- 3) steam pressure builds then explodes.



Explosive Eruptions at Kīlauea

USGS diagram, - PD, via USGS.gov

This diagram shows how explosive eruptions at the Kīlauea volcano are initiated by the collapse of a lava column which brings magma in contact with groundwater.

Throughout its history, Kīlauea has erupted from three areas: its summit and two rift zones. The main feature of the present-day summit is Kīlaupēle, a 3 km by 5 km (1.9 mi by 3.1 mi) collapse caldera. A pit crater, called the Halemaūmaū crater, is located inside the caldera and is the site of the current eruptions.

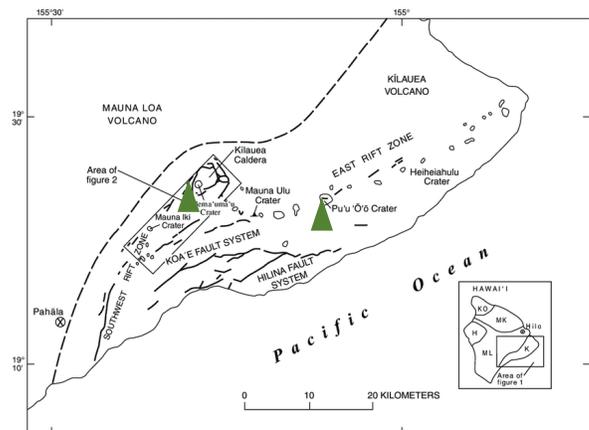


Satellite View of the Kīlauea Summit

NASA Goddard Spaceflight Center image, - PD, via Wikimedia Commons

This image, which was acquired on January 15, 2011 by NASA’s Earth Observing (EO-1) spacecraft, shows the Halemaūmaū crater emitting a plume of sulfur dioxide and steam.

Radiating away from the summit are two linear eruption zones - the East and Southwest Rift Zones. The East Right Zone includes a cinder and spatter cone known as Pu’u’ō’ō crater.



Map of the Kīlauea Volcano

USGS map, - PD, via usgs.gov

This map depicts some of Kīlauea’s named features which include Halema’uma’u and Pu’u’ō’ō craters (indicated by green triangles) where lava fountaining has occurred.

Before the current cycle of explosive eruptions, Kīlauea’s longest and most

voluminous eruption over the past 500 years occurred in East Rift Zone. This activity started on January 3, 1983 and lasted until April 30, 2018. The lava flows covered 144 km² (55.6 mi²), erupted about 4.4 km³ (1.1 mi³) of lava, and added 177 hectares (439 acres) of new land to Kīlauea's southeastern shore². Pu'u'ō'ō crater formed from a series of 44 lava fountains that occurred over 3 years.



Lava Fountain Erupts from Pu'u'ō'ō Crater - March 13, 1985

USGS photo, - PD, via [usgs.gov](https://www.usgs.gov)

This eruption lasted for nearly 23 hours and emitted about 19.4 million cubic meters (25.4 million cubic yards) of lava. The fountaining reached a maximum height of 309 m (1,014 ft).

Halema'uma'u Crater

Halema'uma'u crater is a roughly circular crater that has undergone repeated changes over the past two centuries. According to legends of Hawaiian mythology, the crater is the home of Pele, the goddess of fire and volcanoes. The name translates to the "house of the 'āma'u", a native fern species.

Scientific observations of the crater started in 1820 which noted that a lava lake usually

filled Halema'uma'u along with much of the Kīlauea caldera. In 1924, however, the lava drained suddenly and vaporized the underlying groundwater. A series of violet steam explosions occurred which reshaped and enlarged the crater.



Explosive Eruption at Halema'uma'u Crater - May 18, 1924

K. Maehara/USGS photo, - PD, via [Wikimedia Commons](https://commons.wikimedia.org/)

Lava continued to occasionally fill and drain from Halema'uma'u, but this pattern ended in 2008 when a new pit crater, informally name the Overlook crater, developed along the eastern edge.



Lava Lake in the Overlook Crater

USGS photo, - PD, via [usgs.gov](https://www.usgs.gov)

The Overlook crater was named for its position immediately below a former visitor overlook.

² "The Pu'u'ō'ō Eruption Lasted 35 Years."

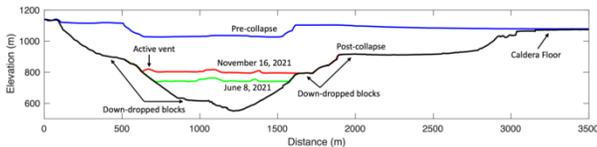
[usgs.gov/volcanoes/kilauea](https://www.usgs.gov/volcanoes/kilauea). November 23, 2023.

Accessed January 5, 2026.

<https://www.usgs.gov/volcanoes/kilauea/science/puu-oo-eruption-lived-35-years>

The above image shows the lava lake that formed in the crater.

In 2018, a major collapse of Kīlauepe, which occurred over a period of three months, nearly doubled the size of Halema'uma'u crater and dropped the bottom 500 m (1,640 ft).



Changing Profile of Halema'uma'u Crater

USGS diagram, - PD, via usgs.gov

This plot shows elevation changes of the crater from west to east. The blue line indicates the relatively shallow depth before the 2018 collapse, while the black line corresponds to the post-collapse change. Red and green lines represent refilling by subsequent eruptions.



Screenshot of Halema'uma'u Crater After the 2018 Kīlauepe Collapse

From USGS video, - PD, via usgs.gov

Click on the image for a video on the collapse and refilling of Kīlauepe.

Halema'uma'u Crater's Water Lake

The 2018 caldera collapse also introduced another major change to Halema'uma'u. Since the bottom of the crater was below the water table, groundwater seepage resulted in a small water pond forming on the crater floor. In July 2019, the pond was only 10 m (33 ft) wide and very shallow. However, by November 2020, the water level

continued to rise leading the first persistent water lake in the last 200 years. The lake was 49 m (160 ft) deep and approximately 131 m (430 ft) wide and 270 m (885 ft).



Water Lake at the Bottom of Halema'uma'u Crater - October 14, 2020

M. Patrick/USGS photo, - PD, via nps.gov

The color of the water varied from brown to yellow due to dissolved minerals and sulfur, and steam rising from the lake indicated that the water was scalding hot.

An eruption in December 2020 completely boiled away the lake water. Subsequent eruptions partially refilled Halema'uma'u crater with lava.



Kīlauepe Before The Start of the Episodic Eruptions - December 20, 2024

USGS photo, - PD, via usgs.gov

Start of the Episodic Fountaining Eruptions

On December 23, 2024 at 2:20 a.m., a lava fountaining eruption began and lasted for 14 hours. This eruption was the first of the 39 episodes that occurred over the past year.

A timeline and selected photo/video highlights are presented below:

Timeline of Eruption Episodes³

Episode Number	Start Date/Time (HST)	Pause Date/Time (HST)	Eruptive Episode Duration	Pause Duration Following Episode	Approximate Maximum Fountain Height (meters)	Approximate volume of lava erupted (million cubic meters)
1	December 23, 2024 - 2:20 a.m.	December 23, 2024 - 4 p.m.	14 hours	16 hours	150	9.3
2	December 24, 2024 - 8 a.m.	December 25, 2024 - 11 a.m.	27 hours	1 day	100	4.7
3	December 26, 2024 - 8 a.m.	January 3, 2025 - 8:30 p.m.	8.5 days	12 days	Less than 100	13.0
4	January 15, 2025 - 9 a.m.	January 18, 2025 - 10:10 a.m.	3 days	4 days	100	6.5
5	January 22, 2025 - 2:30 p.m.	January 23, 2025 - 4:30 a.m.	14 hours	2 days	Less than 50	1.0
6	January 24, 2025 - 11:28 p.m.	January 25, 2025 - 12:36 p.m.	13 hours	2 days	75	1.1
7	January 27, 2025 - 6:41 p.m.	January 28, 2025 - 10:41 a.m.	16 hours	6 days	Less than 100	2.9
8	February 3, 2025 - 9:52 p.m.	February 4, 2025 - 7:23 p.m.	22 hours	6 days	Less than 125	4.6
9	February 11, 2025 - 10:16 a.m.	February 12, 2025 - 8:43 a.m.	22 hours	7 days	Less than 150	5.2
10	February 19, 2025 - 8:22 p.m.	February 20, 2025 - 9:18 a.m.	13 hours	5 days	Less than 150	2.5
11	February 25, 2025 - 6:26 p.m.	February 26, 2025 -	13 hours	6 days	More than 150	4.0

³ From Eruption Information, <https://www.usgs.gov/volcanoes/kilauea/science/eruption-information>, accessed on December 27, 2025.

		7:06 a.m.				
12	March 4, 2025 - 7:30 a.m.	March 5, 2025 - 10:37 a.m.	27 hours	6 days	175	4.4
13	March 11, 2025 - 2:36 a.m.	March 11, 2025 - 3:13 p.m.	13 hours	8 days	More than 200	5.5
14	March 19, 2025 - 9:26 a.m.	March 20, 2025 - 1:49 p.m.	28 hours	5 days	225	2.4
15	March 25, 2025 - 12:04 p.m.	March 26, 2025 - 7:10 p.m.	31 hours	5 days	325	3.6
16	March 31, 2025 - 10:57 p.m.	April 2, 2025 - 12:04 p.m.	37 hours	7 days	325	6.0
17	April 7, 2025 - 10:15 p.m.	April 9, 2025 - 9:45 a.m.	35.5 hours	9 days	75	3.9
18	April 16, 2025 - 10:01 p.m. (precursory low-level activity), April 22, 2025 - 3:30 a.m. (fountaining phase)	April 22, 2025 - 1:28 p.m.	10 hours (fountaining phase)	9 days	More than 250	5.2
19	May 1, 2025 - 11:49 a.m. (precursory low-level activity) May 1, 2025 - 9:28 p.m. (fountaining phase)	May 2, 2025 - 5:20 a.m.	8 hours (fountaining phase)	3 days	125	2.8
20	May 5, 2025 - 10:48 a.m. (precursory low-	May 6, 2025 - 9:28 p.m.	4.5 hours (fountaining phase)	5 days	150	2.4

	level activity) May 6, 2025 - 5:28 p.m. (fountaining phase)					
21	May 11, 2025 - 12:45 p.m. (fountaining phase)	May 11, 2025 - 8:36 p.m.	8 hours (fountaining phase)	5 days	225	3.1
22	May 16, 2025 - 5:13 a.m. (fountaining phase)	May 16, 2025 - 3:29 p.m.	10 hours (fountaining phase)	9 days	275	3.6
23	May 25, 2025 - 4:15 p.m. (fountaining phase)	May 25, 2025 - 10:25 p.m.	6 hours (fountaining phase)	10 days	350	4.6
24	June 4, 2025 - 8:55 p.m. (fountaining phase)	June 5, 2025 - 4:28 a.m.	7.5 hours (fountaining phase)	6 days	365	5.0
25	June 11, 2025 - 11:57 a.m. (fountaining phase)	June 11, 2025 - 8:08 p.m.	8 hours (fountaining phase)	10 days	350	5.3
26	June 20, 2025 - 1:40 a.m. (fountaining phase)	June 20, 2025 - 10:25 a.m.	9 hours (fountaining phase)	9 days	380	6.6
27	June 29, 2025 - 9:05 a.m. (fountaining phase, north and south vents)	June 29, 2025 - 7:54 p.m.	11 hours (fountaining phase)	8 days	340	5.9
28	July 9, 2025 - 4:10 a.m. (fountaining phase, only north vent)	July 9 - 1:20 p.m.	9 hours (fountaining phase)	11 days	320	5.2
29	July 20, 2025 - 5:15 a.m. (fountaining phase)	July 20 - 6:35 p.m.	13 hours (fountaining phase)	16 days	65	6.7
30	August 6, 2025 - 1:20 a.m. (fountaining phase)	August 6, 2025 - 12:55	12 hours (fountaining phase)	16 days	50	7.9

	phase, new vent in south wall)	p.m.				
31	August 22, 2025 - 2:04 p.m. (fountaining phase, inclined and intermediate vents erupted)	August 23, 2025 - 2:52 a.m.	13 hours (fountaining phase)	10 days	100	7.6
32	September 2, 2025 - 6:35 a.m. (fountaining phase, 3 vents, north inclined)	September 2, 2025 - 8:01 p.m.	13.5 hours (fountaining phase)	11 days	100	9.0
33	September 19, 2025 - 3:11 a.m. (fountaining phase, 2 vents)	September 19, 2025 - 12:08 p.m.	9 hours (fountaining phase)	17 days	240	5.7
34	October 1, 2025 - 12:53 a.m. (fountaining phase, 2 vents)	October 1, 2025 - 7:03 a.m.	6 hours (fountaining phase)	13 days	375	9.0
35	October 17, 2025 - 8:05 p.m. (fountaining phase, 2 vents)	October 18, 2025 - 3:32 a.m.	7.5 hours (fountaining phase)	17 days	450	10.2
36	November 9, 2025 - 11:15 a.m. (fountaining phase, 2 vents)	November 9, 2025 - 4:16 p.m.	5 hours (fountaining phase)	22 days	375	8.1
37	November 25, 2025 - 2:30 p.m. HST (fountaining phase, north vent early)	November 25, 2025 - 11:39 p.m.	9 hours (fountaining phase)	16 days	tbd	6.0
38	December 6, 2025 - 8:45 a.m. (fountaining phase, south vent dominant)	December 6, 2025 - 8:52 p.m. HST	12 hours (fountaining phase)	17 days	tbd	12.1
39	December 23, 2025 - 8:10 p.m. (fountaining phase)	December 24, 2025 - 2:13 a.m. HST	6 hours (fountaining phase)	tbd	tbd	tbd

Some Eruption Highlights

Episode 13



Episode 13 Eruption - March 11, 2025
USGS Hawaiian Volcano Observatory photo, - PD, via usgs.gov
Lava fountains erupted from the north and south vents. The maximum height was 215 m (700 ft) as measured by the north vent.



Episode 13 Eruption - March 11, 2025
M. Patrick/USGS Hawaiian Volcano Observatory photo, - PD, via usgs.gov
A close-up of the north vent shows lava sloshing around in the vent's spatter cone.

Episode 24



Episode 24 Eruption - June 4-5, 2025
USGS Hawaiian Volcano Observatory photo, - PD, via usgs.gov
A plume-shaped fountain erupted from the north vent and reached a maximum height of 364 m (1,193 ft).



Screenshot of Time-lapse Video of Episode 24 Eruption
USGS Hawaiian Volcano Observatory video, - PD, via usgs.gov
Click on the image to view video

Episode 28



Episode 28 Eruption - July 9, 2025

USGS Hawaiian Volcano Observatory photo, - PD, via usgs.gov

The north vent produced a fan-shaped fountain that reached a maximum height of 321 m (1,053 ft).

**Glassy "Bomb" Episode 28 Eruption - July 9, 2025**

K. Wall/USGS Hawaiian Volcano Observatory photo, - PD, via usgs.gov

A molten clast ejected from the lava fountain was quickly cooled in the air to form this glassy tephra "bomb".

**Screenshot of Video of Episode 28 Eruption**

USGS Hawaiian Volcano Observatory video, - PD, via usgs.gov

Click on the image to view video

Episode 29**Episode 29 Eruption - July 20, 2025**

M. Benage/USGS Hawaiian Volcano Observatory photo, - PD, via usgs.gov

This image, which was taken during episode 29, shows lava flowing eastward from the north vent. The lava flow extended 2.5 km (1.5 mi), while the fountaining reached 30 m (100 ft) high.

Episode 34**Episode 34 Eruption - October 1, 2025**

USGS Hawaiian Volcano Observatory photo, - PD, via usgs.gov

A dawn eruption of the north and south vents sent a column of lava 383 m (1,256 ft) high that filled the crater floor.



Screenshot of Time-lapse Video of Episode 34-36 Eruptions

USGS Hawaiian Volcano Observatory video, - PD, via usgs.gov

Click on image to view video

This video presents time-lapse sequences from both a near and far camera perspectives of the episode 34 to 36 eruptions.

Episode 38



Episode 38 Eruption - December 6, 2025

USGS Hawaiian Volcano Observatory photo, - PD, via usgs.gov

An arc of lava erupted from the south vent. While the maximum height was only 384 m (1,260 ft), the fountain extended laterally by 600 m (1,970ft), the furthest distance away from a vent so far.



Screenshot of Video of Episode 38 Eruption

USGS Hawaiian Volcano Observatory video, - PD, via usgs.gov

Click on image to view video

Episodes 39, 40, and Beyond

Eruptive activity continues at Kīlauea, and episode 39 occurred on December 23-24, 2025 for six hours. Both north and south vents were involved, and the maximum height was approximately 425 m (1,400 ft).



Episode 39 Eruption - December 23, 2025

USGS Hawaiian Volcano Observatory photo, - PD, via usgs.gov

The re-inflation of the summit led to the episode 40 eruption on January 12, 2026.



Episode 40 Eruption - January 12, 2026

USGS Hawaiian Volcano Observatory photo, - PD, via usgs.gov

The lava fountains were primarily from the north vent and lasted just under 10 hours. The maximum fountain height was about 250 m (800 ft).

Earthquake swarms continue around Kīlauea, and the next lava fountaining episode is forecasted to occur between January 21 and 25, 2026 based on current inflation models. This on-going activity can be viewed at the following live webcams:

South Halema'uma'u crater

<https://www.youtube.com/watch?v=gXKuUyKt8mc>

West Halema'uma'u crater

<https://www.youtube.com/watch?v=tk0tfYDxrUA>

East Halema'uma'u crater

<https://www.youtube.com/watch?v=fiyttmA7YkA>

References:

Sherrod, D.R., J.M. Sinton, S.E. Watkins, and K.M. Brunt (2007) Geologic map of the state of Hawai'i. *U.S. Geological Survey Open-File Report 2007-1089*: 83 p.



Update on the Axial Seamount Underwater Volcano

In the January 2025 newsletter, we reported on the Axial Seamount submarine volcano located off the coast of Oregon. Geoscientists studying patterns of magma inflation and deflation at the volcano had made a bold forecast that it was to likely erupt in 2025. Such an eruption, however, did not occur, and the pattern recognition method for long-term forecasting is now considered unreliable since the pattern can change with highly variable rates of inflation⁴. The researchers are now experimenting with more physical-based methods that go beyond simple pattern recognition. Evaluating the relationship of uplift and seismicity, they now expect that the volcano will reach the threshold for an eruption before the end of 2026.



Axial Seamount - Google Maps

⁴ B. Chadwick and S. Nooner, December 31, 2025, Blog to chronicle eruption forecasts at Axial Seamount, https://axial.ceoas.oregonstate.edu/axial_blog.html Accessed January 20, 2026.



Arizona Rocks 152

Text and photos by Ray Grant

Peridot Mesa on the San Carlos Apache Reservations is a very important geological location in Arizona. Peridot is the gem name for the mineral group olivine which occurs there as green granular masses in basalt. There is an amazing amount of olivine at Peridot Mesa and it is mined for the peridot by tribal members. The San Carlos, Arizona deposits have supplied most of the commercially sold peridot. For example, the peridot sold in Hawaii as a local mineral came from Arizona. Peridot does occur elsewhere in Arizona, but only in small amounts. The volcanic eruptions of basalt that form Peridot Mesa and contain the olivine happened one million years ago. To geologists this locality is important because it give them information about the earth's mantle. It is estimated that these nodules came from the mantle at a depth from 50 to 100 miles beneath the earth's surface. They were carried up with the basalt that resulted from partial melting of the mantle.

Collecting is not allowed on the reservation and for many years no visitors were allowed on Peridot Mesa. Now it is possible collect there, the contact is Steve Joey, his website with lots of photographs is peridotdreams.com and phone (480)249-5838. He will take 4 people or less at a time to his mine. The cost is \$50 per person. There is also a permit needed to enter the reservation and it costs \$15. I went several years ago and it was worth the money.



Peridot nodules in basalt at Peridot Mesa, hammer handle on left for scale.



Close up of peridot nodule from Peridot Mesa



Largest gem peridot found at Peridot Mesa



Pinal Geology & Mineral Museum

Pinal Museum and Society News

351 N. Arizona Blvd., Coolidge, AZ

Pinal Geology and Mineral Society next meeting

February 18, 2026

Meetings are the third Wednesday at 7pm, doors open at 6:00

www.pinalgeologymuseum.org

Ray Grant ray@pinalgeologymuseum.org

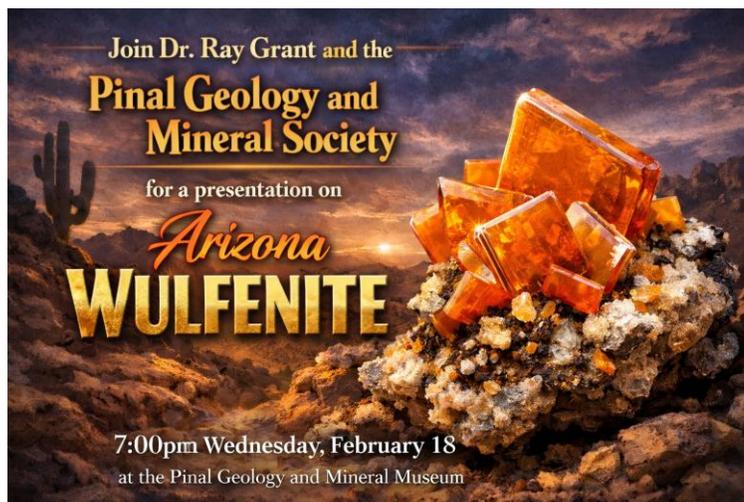
Pinal Geology and Mineral Museum
museum open Fridays & Saturdays from 10 - 4
 admission is free.

Groups can arrange special visits please call 520-723-3009.

As usual, our doors will be open at 6pm so stop in early to have a look around and see what is new--we have added new displays and will have new loaned specimens on display!

Searching for Wulfenite in Arizona the official State Mineral of Arizona.

Dr. Grant will discuss and show specimens of Arizona wulfenite from Arizona's most notable localities in his program and will recount his many field collecting trips over a half century in Arizona! Doors open at 6pm and join us for our usual raffle, silent auction, and refreshments and see what is new at the Pinal Geology and Mineral Museum--the only geology museum in Pinal County!



Red Cloud wulfenite in the Museum thumbnail case.
 (photo by Mark Fleischer)



AZ Mining, Mineral & Natural Resources Education Museum Update January 2026

<https://ammnre.arizona.edu/>

Catie Carter Sandoval
 cscarter@email.arizona.edu
 703.577.6449

Help support the museum at:

<http://tinyurl.com/SupportMM-NREMuseum>

Happy New Year! We've got some exciting things on the horizon this year, including exhibiting at the upcoming Tucson Gem and Mineral Show at the Tucson Convention Center in February. This year's theme is "Red, White & Blue - Celebrate the Spirit of Minerals!" Like last year, we'll be doing an educational twist on the theme, this time highlighting the importance of museums as American treasures. There are many reasons why museums are important to our country, but we've narrowed it down to three points: museums preserve history, promote informal learning, and encourage dialogue and community-building. Our display at the show will expand on this sentiment while showcasing various specimens from the collection.

On the development note, some may be wondering about the state of the historic Polly Rosenbaum (formerly El Zaribah Shrine) building at 1502 W. Washington St. The building, constructed in 1921, housed the Arizona Mining and Mineral Museum from 1991 to 2011 but has been largely vacant since then. A few years ago, our design-build team assessed the major building systems and made a plan for renovations, but

determined that we still need several million dollars in additional funds. The delay was compounded by the University of Arizona's 2024 financial crisis and the 2025 freeze on federal research funding, which both further limited the University's ability to finance various capital projects. Our Advisory Council continues to explore possibilities for how to proceed, including renovating on a smaller scale, and piloting exhibits at a different location while we fundraise or begin renovations. We are still committed to outreach, education, collaboration with other museums and organizations. We are always open to new partnerships so please let us know if you have any ideas.



Our building, as seen from across 15th street. Pictured mining equipment includes the Boras headframe from Bisbee, the 1882 baby gauge locomotive from Morenci, and the Swallow Mine 5-stamp mill.

◇ ◇ ◇

**Sun City Rockhound Mineral Museum
Sundial Recreation Center
14801 N. 103rd Ave.
Sun City, AZ 85351**

The museum offers private party tours for schools, clubs and individuals. We'd love to show off our museum to your club or private group. If you are interested, please contact the museum at scrockmuseum@gmail.com.

Please take a minute to check out our new website at scrockmuseum.com.

**Sun City Rockhound Club and Mineral Museum Outreach January 2026
By Carol Bankert-George**

January was an exciting and productive month for the Sun City Rockhound Club and Mineral Museum. Our community outreach efforts brought geology to life for people of all ages, and we're thrilled to share some of the month's highlights with you.

Flagg Mineral Show Success

We kicked off the year at the 2026 Flagg Mineral Show, where our booth was open on Saturday and Sunday, January 10th and 11th. The annual mineral egg carton activity, always a crowd favorite, delighted both young and old visitors. We were pleased to see so many new faces engaging with our hands-on exhibits.

Educational Outreach

Our education team participated in two special events for students this month. We hosted a private museum tour for a home-schooled group, providing an up-close look at our collection. Additionally, we took part in



Winter Hours

October - April

10 am to 1 pm

Closed Thurs., & Sunday

Summer Hours

May-September 10am-1pm

Saturdays only

a STEAM event at Desert Harbor Elementary School, where our new portable fluorescent rock interactive display was a big hit with students, sparking curiosity and excitement about geology.

Community Connections

We were honored to welcome the Sun City Rockhound Club West for a private museum tour and a presentation about our club's origins and evolution. Sharing our story and the museum's journey over the years fostered a sense of community and inspired new connections.

Looking Ahead

Our outreach programs and events continue to share the wonders of geology with audiences of all ages.

Members of the Rock Hounds West club on tour at Mineral Museum.



2026 Flagg Mineral show egg carton activity.



Sun City Rockhound Club A Future Geologist Shares His Story By Carol Ann Hewett Sun City Rockhounds

While volunteering at the Flagg Rock and Mineral Show on January 10th, my colleague and I were trying to keep warm while waiting for our first customer of the day. We were staffing the ever-famous rock carton booth. Our club, the Sun City Rockhounds, proudly took this over when Mardy and Dick Zimmermann decided to retire after starting this tradition over 30 years ago while members of the AZ Leaverite Rock and Gem Society. For those of you who do not know what the egg carton is, it is an egg carton filled with twelve mineral specimens hand-picked by the individual who is purchasing it for one dollar. A bargain in today's world! Children and adults flock to our booth. It is a wonderful outreach opportunity to share a mutual love of rocks and promote our club's Mineral Museum and STEAM outreach in schools.

After about 15 minutes of standing in the cold and wondering where everybody was our first customers showed up. Two brothers aged 14 and 16. The excitement on their faces was visible. Charlie the older boy said "We would like to purchase a rock carton please, we come and do this every year at this show." We asked about how long they have been doing an egg carton. The younger brother Orson pondered the question, "I think we have been coming here for 6 or 7 years. Our parents brought us. Today we got to come on our own because my brother can drive now." The boys told us they lived in Mesa, and they loved Rock and Mineral shows. Carefully the two chose their

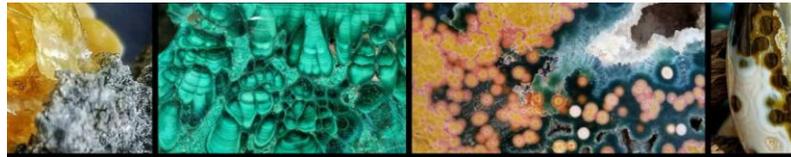
specimens and paid us two dollars, and we said our goodbyes. Ten minutes later, the two were back again. Orson said "We talked to our parents, and we have been coming here much longer than we said. My parents sent me a picture to show you." There was a picture of two boys aged 3 and 5 with huge smiles on their faces clutching their egg cartons. Charlie went on to say "I forgot to tell you that I plan to study Geology at ASU when I graduate. My love of geology started with my first egg carton. I want to thank you for doing this." We said goodbye again. My colleague and I knew exactly why we were standing in the cold early on a Saturday morning waiting for the kids to show up!

The Sun City Rockhounds would like to give a special thank you to Shirley Coté, Doug Duffy, Dick and Mardy Zimmermann of the Earth Science Museum for their generous mineral donations to this cause. The Sun City Rockhounds are honored to continue this legacy.



My colleague Connie Johnson waiting for our first customer of the morning at the Flagg Gem and Mineral Show.

Arizona Rock and Gem Shows



**DESERT GARDENS ANNUAL INTERNATIONAL
ROCK, GEM AND MINERAL SHOW**

January 1 - February 28
9:00 am - 5:00 pm (Seven Days Weekly)

1055 Kuehn Street
Quartzsite, AZ 85346

The Tucson Gem and Mineral Society Proudly Presents:

**THE 71ST ANNUAL
TUCSON GEM & MINERAL SHOW[®]**

**RED,
WHITE
& BLUE**

CELEBRATE THE
Spirit of Minerals



**FEBRUARY 12 - 15, 2026
TUCSON CONVENTION CENTER**

 for more information, visit:
www.tgms.org

 Scan code for information about our Tucson Gem & Mineral Show[®]

Red Fluorite - Spessart, Germany - White Aquamarine & Quartz on Kalsdorf - Germany - Blue Aquamarine/Brazil - Photo by Ken Don

Thursday, February 12 - 10:00 am to 5:00 pm

Friday, February 13 - 10:00 am to 5:00 pm

Saturday, February 14 - 10:00 am to 5:00 pm

Sunday, February 15 - 10:00 am to 4:00 pm

Admission is \$15.00 (\$14 with \$1 TCC ticket tax), Children 14 and under FREE with a paying adult

Friday, February 13, 2026 is Military (active & retired) & Senior Citizens Day (62+), receive \$2.00 off the regularly priced ticket*



Annual Clarkdale Gem and Mineral Show and Sale

Mingus Gem & Mineral Club

Clark Memorial Clubhouse Auditorium

19 N. Ninth Street in Clarkdale, Arizona

February 20th - 22nd, 2026

Friday and Saturday, 9:00 AM until 5:00 PM

Sunday 9:00 AM until 4:00 PM



**THE PINAL GEOLOGY AND MINERAL MUSEUM
AND JOHN CHRISTIAN PRESENT**

**ARIZONA
FOSSIL FEST
2026**

SATURDAY, MAY 9
351 N. ARIZONA BLVD, COOLIDGE, AZ
10AM-4PM

**HAVE YOUR FOSSILS IDENTIFIED BY EXPERTS
FREE EVENT!**

Arizona Rock and Gem Clubs



Apache Junction Rock & Gem Club

Meetings are on the 2nd Thursday
 Next Meeting: February 12, 2026, 6:30 pm
www.ajrockclub.com
 @ Club Lapidary Shop
 2151 W. Superstition Blvd., Apache Jct.



Daisy Mountain Rock & Mineral Club

Meetings are on the 1st Tuesday
 (unless a Holiday then 2nd Tuesday)
 Next Meeting: February 3, 2026, 6:30 p.m.
www.dmrmc.com
 @ Anthem Civic Building
 3701 W. Anthem Way, Anthem, AZ



Maricopa Lapidary Society, Inc

Meetings are on the 3rd Tuesday
 Next Meeting: February 17, 2026, 7:00 pm
www.maricopalapidarysociety.com
 @ North Mountain Visitor Center
 12950 N. 7th St., Phoenix, AZ



Mineralogical Society of Arizona

Meetings are usually on the 3rd Thursday
 (Except June & December)
 February 19, 2026, 6:30 pm
 @ Franciscan Renewal Center, (Piper Hall),
 5802 E. Lincoln Drive, Scottsdale, AZ
www.msaz.org



Pinal Geology & Mineral Society

Meetings are on the 3rd Wednesday
 Next Meeting: February 18, 2026, 7:00 pm
www.pinalgeologymuseum.org
 351 N. Arizona Blvd., Coolidge



West Valley Rock & Mineral Club

Meetings are on the 2nd Tuesday
 Next Meeting: February 10, 2026, 6:30 pm
www.westvalleyrockandmineralclub.com
 Buckeye Community Veterans Service Center
 402 E. Narramore Avenue, Buckeye, AZ



Gila County Gem & Mineral Society

Meetings are on the 1st Thursday
 (unless a Holiday then the next Thursday)
 Next Meeting: February 5, 2026, 6:30 pm
www.gilagem.org
 Club Building
 413 Live Oak St, Miami, AZ



Wickenburg Gem & Mineral Society

Meetings are on the 2nd Friday
 (February & December on the 1st Friday)
 Next Meeting: February 6, 2026, 7:00 pm
www.wickenburggms.org
 @ Coffinger Park Banquet Room
 175 E. Swilling St., Wickenburg, AZ

ESM's Meeting Notice

ESM's next meeting will be at North Mountain Visitor Center, 12950 N. 7th St., Phoenix, on Tuesday, TBA 2026, at 6:30 p.m.

BECOME A MEMBER!
Join the Earth Science Museum's



IS IT TIME TO RENEW YOUR MEMBERSHIP?
Please renew today! 😊😊😊

----- cut here -----
**ESM Earth Science Investigation
 Team Membership Form**
 _____ **New Member** _____ **Renewal**

Membership levels:

_____ **ESI Family \$20**

_____ **ESI Individual \$10**

Membership benefits:

- ◆ Monthly e-newsletter *Earthquake*
- ◆ Official team membership card
- ◆ Knowledge that your contribution is making a difference in earth science education.

MANY THANKS TO OUR MAJOR DONORS!

AZ Leaverite Rock & Gem Society

Flagg Mineral Foundation

www.flaggmineralfoundation.org

Friends of the AZ Mining & Mineral Museum

Maricopa Lapidary Society

<http://maricopalapidarysociety.com/>

Mineralogical Society of AZ

www.msaaaz.org

Payson Rimstones Rock Club

<https://www.rimstonesrockclub.org/>

Sossaman Middle School

White Mountain Gem & Mineral Club

www.whitemountain-azrockclub.org

Sun City Rockhound Club & Mineral Museum

<https://suncityaz.org/recreation/clubs/rockhound-club-mineral-museums/>

Wickenburg Gem & Mineral Society

<http://www.wickenburggms.org>

www.facebook.com/pages/Wickenburg-Gem-and-Mineral-Society/111216602326438

West Valley Rock and Mineral Club

<http://www.westvalleyrockandmineralclub.com/>

Staples Foundation

www.staplesfoundation.org

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Russ Hart	Dennis & Georgia Zeutenhorst

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Editor E-Mail:
 scote@earthsciencemuseum.org

Mission
 Our Mission is to excite and inspire all generations about earth sciences through educational outreach.

Vision
 We envision a community where students and the general public have curiosity about, passion for, and understanding of the underlying principles of earth sciences.

For more information about the ESM, how to become a member or how to arrange for a school visit or Community function, go to:
www.earthsciencemuseum.org.

We're on the Web!

Visit us at:

www.earthsciencemuseum.org

NOTICE:
 ESM's next meeting will be at North Mountain Visitor Center, 12950 N 7th St, Phoenix, on Tuesday, TBA 2026, at 6:30 p.m.

THANK YOU FOR YOUR CONTINUING INTEREST & SUPPORT!!!

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