Iconic Fritz Peak Observatory research lab

Shooting green laser beams into Gilpin's night skies - Part 1 of 2

by Don Ireland

If you've driven along Route 119 between Rollinsville and Black Hawk, you've passed by the Fitz Peak Observatory (FPO). The building has been part of local folklore since the era when green laser beams emanated from the roof into the night skies above Gilpin County.

After decades of full-time use, the National Oceanic and Atmospheric Administration (NOAA) is no longer occupying the facility for observations and research. A caretaker and fully operational security system are protecting the property while NOAA completes the required steps for the government to find a new owner for the site. *(After reading this article, if you are interested in seeing the site, feel free to drive by. However, be aware that any other entry or trespassing on the property is subject to federal enforcement.)*

The Fritz Peak Observatory, which is on the east side of the highway, is at an elevation of about 8,790 feet. It is part of two buildings on a 5.8-acre site that also includes Dutch Peak, which is at an elevation of 8,954 feet.

Many Gilpin County residents are unaware of the substantial role FPO played during several decades of research on the site, primarily by the National Oceanic and Atmospheric Administration (NOAA) and its predecessor organization, the Environmental Science Service Administration (ESSA).

The elevation of FPO and Dutch Peak were attractive to researchers because they could get away from light pollution and atmospheric pollution from larger communities, including Denver and Boulder. Around 1958, scientists from the University of Colorado began using the site to study the aurora borealis.

According to Dr. Eric Williams, a Deputy Director (Planning) at the Chemical Sciences Laboratory and Earth Systems Research Laboratories at NOAA's Boulder division, most upper atmospheric observations occurred during the wintertime. After a few winters, the scientists realized they needed a "base camp" due to the arduous conditions. The Commerce Department's National Bureau of Standards purchased the nearby three-story building – now known as the Fritz Peak Observatory – in 1965. The building enabled scientists to have a full-time research and staging area while enabling them to lodge overnight. No dome or large telescope was ever installed atop the building.

FPO was primarily used as a laboratory to conduct scientific research on the Earth's atmosphere in an effort to better understand and predict its behavior. Today, NOAA's Chemical Sciences Laboratory (previously the Aeronomy Laboratory) research focuses primarily on several issues related to atmospheric chemical composition: climate, air quality, radiation and clouds.

NOAA established a program at Fritz Peak Observatory to observe and study a little-known but mighty molecule, the hydroxyl radical (often represented as OH), which cleans up the atmosphere, according to Dr. Williams. The hydroxyl radical is a short-lived, highly reactive molecule that's a primary driver of oxidizing reactions in the free atmosphere. It reacts with many pollutions, decomposing them, often acting as the first step of converting them into other chemicals. Williams noted that it's an important subject for today's climate scientists because the hydroxyl radical breaks down greenhouse gasses, including methane and ozone.

Upper atmospheric observations continued at Fritz Peak until around 1970. However, other types of scientific research also continued there for decades. Among the notable history moments at FPO:

• The Aeronomy Laboratory used spectroscopic methods in the 1980s and 1990s to examine tropospheric chemistry related to air pollution. Although some scientific instruments could be purchased, wood and metal shops were installed in FPO, so researchers could make or adjust their equipment.

• In the early 1990s, Dr. Williams led a research study near the Caribou Mine, which is outside of Nederland. The mine area – now considered a ghost town – was operated by businessman Tom Hendricks, who worked the mine site that once contained gold, silver, and lead.

Instruments installed at the Fritz Peak Observatory would shine light beams to a shed at the Caribou Mine. The shed contained an array of mirrors that would reflect the light back to FPO, so that the instruments there could measure the concentration of pollutants along the path of the beam.

"It helped us understand pollution up here and where it comes from. Most of it was from Denver, basically," Dr. Williams said. "Upslope flow that brings polluted air from the Front Range peaks in the early afternoon in the summer. Then, the

The late Dr. Clyde Burnett, a professor from Florida Atlantic University, conducted daily research at Fritz Peak Observatory from 1977 to 2019.

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The Fritz Peak Observatory is at an elevation of 8,790 feet along Hwy 119 in mid-Gilpin County, owned by the US government and is off-limits to visitors. Wonder if they ever found signs of other life forms in space?

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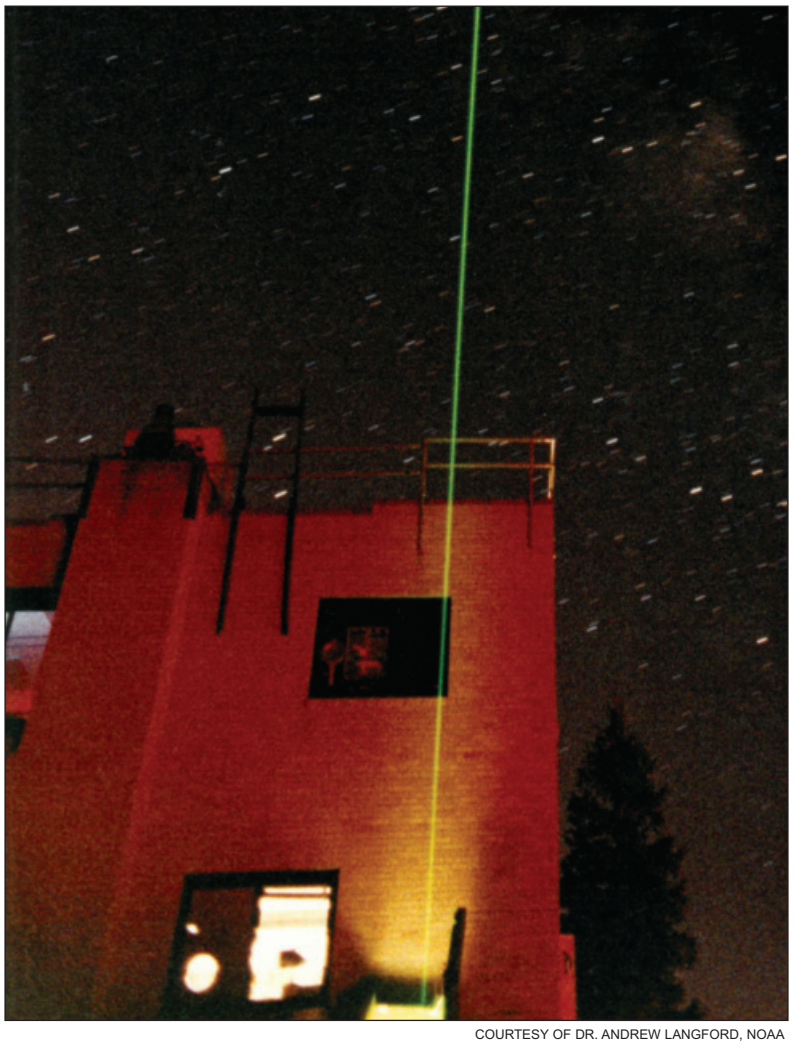
downslope winds arrive (from the mountains) and all of this dissipates. We didn't do much research about greenhouse gasses up here, although ozone is technically a greenhouse gas. We were mostly interested in studying air quality. Some of the best air in the entire world occurs in this area when the west winds come over the Continental Divide. Around here, over time, we observed more and more pollution was local."



COURTESY OF DR. ANDREW LANGFORD, NOAA

Green or orange laser beams emanating from Fritz Peak Observatory could be seen at night in Gilpin County.

• Gilpinites also reported seeing unusual rays of green (and sometimes orange) laser beams shining up from the roof of the building during that era. "The visible beams could only be seen at night. I know some local residents took pictures of them," said Dr. Williams. The laser beams, generated by instruments – called LIDARs (Light Detection and Ranging) – mapped the distribution of particles from the Mt. Pinatubo volcano, which emerged in the Philippines in the summer of 1991. These particles drifted over Colorado between 10 and 20 miles above the ground and created some spectacular sunsets.

• Dr. Andrew Langford, of NOAA's Earth System Research Laboratories in the Chemical Sciences Laboratory in Boulder, recalls: "I was the last Aeronomy Laboratory employee to work at Fritz Peak (Dr. Clyde Burnett was an independent visitor). I went up there several days a week from 1990 through the summer of 1999 and owned a cabin across the road where I could stay when I worked nights. My task was to build and run a LIDAR that used invisible ultraviolet beams to measure ozone. That work mostly took place during the day. After the eruption of Mt. Pinatubo in the summer of 1991, I used the green (and sometimes orange) beams to track the appearance and decay of aerosol particles injected into the stratosphere by the eruption. This work had to be done at night and lasted a couple of years.

• The LIDAR also used invisible ultraviolet beams to measure ozone concentrations in the lower atmosphere, which helped researchers understand pollution transport from the Denver-Boulder region up into the mountains. Dr. Williams noted that pollution came up from those flatland areas during the day but subsided at night, when businesses and industries were closed and fewer people were driving."

• In the late 1990s, NOAA research projects at Fritz Peak Observatory were discontinued because researchers moved away from obtaining ground-based measurements. Instead, they began relying heavily on data obtained by airplanes and ship-based atmospheric chemistry research. "By 1999, we pretty much discontinued our use of FPO," Dr. Williams noted.

• The Fritz Peak Observatory researcher best-known by locals was Dr. Clyde Burnett, who – along with his wife, Betsy – lived near the observatory site, took daily measurements and interpreted observations to understand hypochlorous and hypobromous acids (Hox) in the upper atmosphere.

Dr. Burnett, a professor at Florida Atlantic University, recognized Florida's thick atmosphere didn't provide optimum conditions for his research. In 1977, he obtained permission from the NOAA's Aeronomy Lab to install one of his instruments on Fritz Peak. The National Science Foundation supported his research for 33 years, during which he personally recorded his observations and maintained the same instrument.

In addition to being a researcher, Dr. Burnett, who left Fritz Peak in 2019 and passed away the following year, wrote newspaper stories about climate change issues for more than a decade. He also authored seven books, sometimes using the pseudonym Alex Cook. Most of his books were fiction, but involved climate change.

(Next week: The early days of Fritz Peak Observatory…and more on the property's future.)

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