Great Pockets:

The Carlsbad Halite Caves

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Enormous, golden halite cubes to more than a meter on edge, and large colorless sylvite crystals are remarkable enough. But this incredible discovery from the 1960's may still exist underground, preserved intact but hidden from outsiders.

INTRODUCTION

I was a young Mining Engineer in 1964, working for U.S. Borax at the Boron Open Pit in Boron, California. U.S. Borax also owned a large potash mine east of Carlsbad, New Mexico. They had need of a mining engineer, and as the mine was nearly played out it was hard to find a short-term outsider. Consequently, I was transferred to Carlsbad for fifteen months in 1964–65.

Collecting was in my blood, but Carlsbad was not a crystal collector's heaven. I did manage to find a partially caved, once flooded section of the mine with secondary halite and sylvite on red potash ore. Collecting this helped to preserve my sanity. But it was not quite enough for me, so I began asking if crystals were ever found in the other mines of the district.

Rumors finally reached me of a natural halite pocket in the adjacent Potash Corporation of America (PCA) mine. I tracked this down to a delightful individual, Mr. Armando Perrini. Mr. Perrini was the General Mine Foreman for PCA. After several visits to his home, I was rewarded with this tale, several color pictures taken of the crystal cave, and a fine, golden, 12-cm halite cube.

Unfortunately, I was never able to finagle a trip into the pocket. The PCA people said the section was caving, and it was too

Figure 1. Location map.

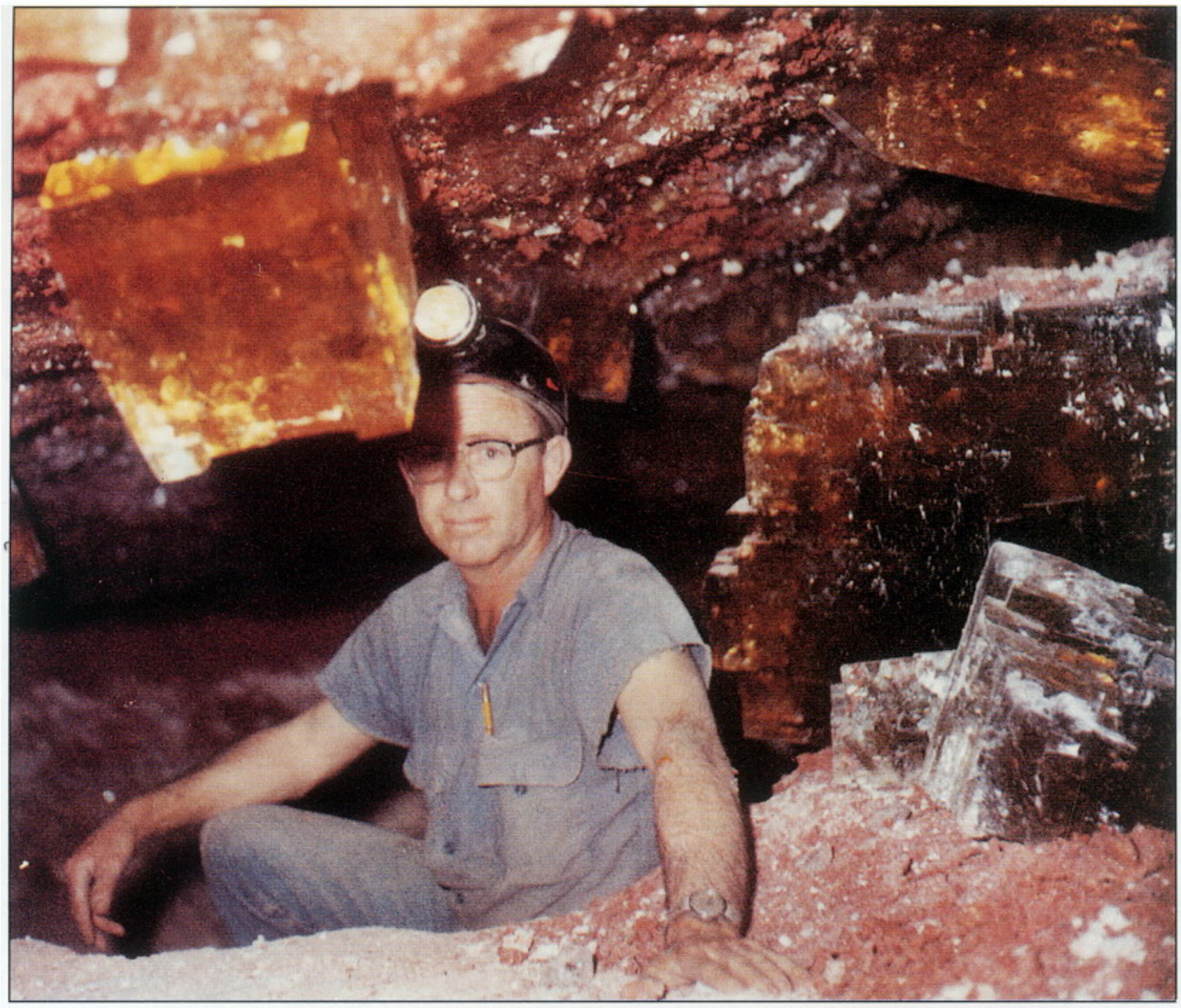

Figure 2. **An unidentified mine foreman sits among the halite crystals in the first cave that was found 15–30 feet above the orebody at the PCA mine, Carlsbad, New Mexico. April 10, 1962.**

Figure 3. **Armando Perrini, General Mine Foreman, looks at a halite crystal, April 10, 1962.**

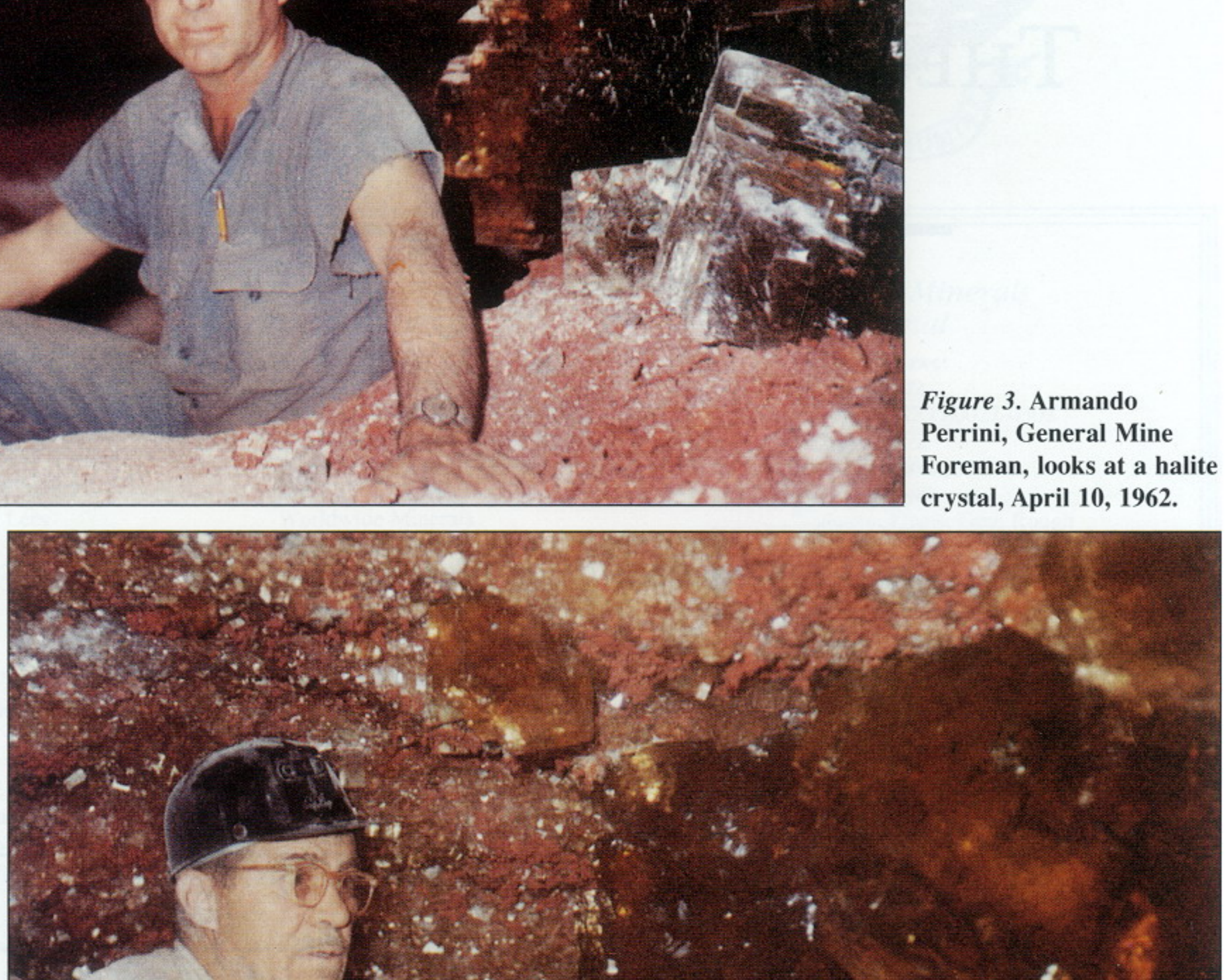

Figure 4. **Bill Baumann, Mine Foreman, observes a ceiling-to-floor mass of golden halite. The reddish material on the floor is polyhalite. April 10, 1962.**

Figure 5. **Bill Baumann with some of the big halite crystals, April 10, 1962.**

dangerous. Later experience indicated the real reason was corporate competition. PCA, at the time, was an unusually "closed" mine to outsiders, particularly direct competitors, and my employer, U.S. Borax, fit that description well.

GEOLOGY

The potash* deposits of New Mexico were formed in the great saline deposits of the Permian Basin. This basin, a dried embayment of ancient Permian seas, has a total salt bed thickness of 1000 to 3500 meters. It is composed of alternating layers of halite, clay, anhydrite, gypsum, sylvite, polyhalite, and locally abundant carnallite, langbeinite, and lesser salts. Repeated sequences attest to continued desiccation of seas with numerous fluctuations and interruptions.

The richest potash beds occur toward the bottom of subbasins on the edge of the main basin. The richest deposit was termed #1 Bed, now lying at roughly 330 meters depth. It was a series of large pods, separated from one another but stratigraphically equivalent. A typical pod was 1 to 5 kilometers across and 1 to 5 meters thick. There was little faulting and folding of the beds, only gentle undulations. One or more mines worked each pod. As the high-grade #1 Bed was depleted, new mines were developed on overlying beds of lower grade sylvite and langbeinite.

Typical ore ran about one-third potassium chloride (sylvite), two thirds sodium chloride (halite), and roughly 1% clay, hematite and other insolubles. Ubiquitous hematite gave the ore a brick-red color. Radiation from the radioactive K^{40} isotope caused nearby halite to turn blue, so the red ore was speckled with small blue halite crystals. On rare occasions, near the fringe of an orebody, massive halite crystals formed, yielding beautiful large blue cleavages. These were much rarer than in similar, more folded European potash deposits.

THE CARLSBAD POCKETS

The mines at Carlsbad are worked by room-and-pillar or longwall mining methods. One aspect of mining was the presence of low-volume, but highly pressurized gas in thin seams a few meters above #1 Bed. This gas, a combination of air and carbon dioxide, exerted a strong downward pressure on mine openings, particularly at intersections and large open rooms formed by longwall mining. This gas pressure was believed to contribute to roof falls. All the mines in the district working #1 Bed routinely drilled small-diameter holes into the ceiling to a depth of 10 meters or so to vent this gas and relieve the pressure.

Armando Perrini described how one of these holes exposed a remarkable crystal pocket in the northwest corner of the PCA mine in April 1962. About 6 meters above the ceiling, the drill hit a thin polyhalite bed, then broke into a large cavity, and brine rushed out. The flow stopped after a few hours.

Mr. Perrini, in his capacity of General Mine Foreman, had a raise driven to see what was there. The raise broke into the first of two large crystal pockets. The pocket covered an area roughly 100 meters across, although most of that was merely a crack. The open portion was up to a meter high, and could be crawled into for roughly 20 meters.

The ceiling of this pocket was covered with polyhalite and huge, clear, sharp cubes of golden yellow halite. Many crystals reached down to the floor. The crystal size ranged from 1 to 100 cm on an edge! The floor was covered with a crystalline polyhalite crust and a few halite crystals. Perrini and his assistants took a series of color photographs in the pocket (shown here). A few, mostly smaller crystals were removed from the pocket and have been preserved in museums and collections. These photos may be all that remains to document the huge crystals, though they cannot capture their true beauty and transparency. The crystals, glowing in the light from the miners' head lamps, must have been a lovely sight.

Shortly afterward, a second crystal cave was found 40 meters north of the first. The floor of this cave was covered with drying mud. The ceiling was covered with even *larger* cubes, some estimated to weight 3 or 4 tons! There were also three large sylvite cubes 12 to 15 cm in size in this pocket. They were clear and colorless, as opposed to the golden yellow halite crystals. Perrini had at least one of the sylvites in his collection. I do not know if anything other than the sylvite crystals were collected, or if photos of these huge halites were taken.

Only a few people, mostly PCA personnel, were allowed into the caves. I transferred back to Boron in 1965, and Mr. Perrini died a year or so later. Do the caves still exist, and are they accessible? I do not know. However, I did talk to a young geologist from New Mexico about a year ago, and I told him this tale. He said he had been on a field trip to the mine, and he thought the caves were still there. But he could be referring to some later caves. Perhaps this article will trigger some interest in pursuing the matter. As can be seen from the photographs, the crystal groups are huge but wonderful—worth saving in some museum.

ACKNOWLEDGMENTS

Thanks go to the late Armando Perrini for his efforts to expose these caves, and save for posterity the photos and a few crystals from a remarkable find. Mr. Perrini was not a serious collector, but had a true miner's love of the beauty of nature. We should never forget that most of the mineral specimens now existing came from miners such as he.

*"Potash," strictly speaking, refers only to potassium carbonate, but potassium *ore* of any kind is generally referred to as "potash."