



The Anaconda Research Collection

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August 2026

<https://doi.org/10.59691/JPZD5532>

Introduction

The Anaconda Research Collection (ARC) preserves an irreplaceable record of geologic samples and data from one of the world's most famous mining districts—Butte, Montana. The collection comprises more than 80,000 documented specimens, including drill core, polished slabs, hand samples, thin sections, and paper reports compiled by the Anaconda Copper Mining Company (ACM) between 1940 and 1981. Salvaged from potential destruction following the closure of Butte's historic mining operations, the collection is now housed at the Montana Bureau of Mines and Geology (MBMG). Recognized by the International Union of Geological Sciences (IUGS) as a Geologic Heritage Collection, the ARC continues to support contemporary research and education by providing access to geologic materials and records from mines that are now flooded, collapsed, or otherwise inaccessible.

The Anaconda Copper Mining Company

The Anaconda Copper Mining Company (ACM) was founded by Marcus Daly, an Irish immigrant, who gained practical mining experience in California, Nevada, and Utah before arriving in Butte in 1871. As an agent for the Walker brothers, he helped secure the Alice silver mine before investing in the Anaconda Mine, launching what became one of the world's largest mining enterprises (Glasscock, 1966; Hoffman, 2001; Marcossan, 1957).



Drawer of drill core and rock slabs from the Anaconda Research Collection after processing by the MBMG Data Preservation Program. Photo by Steve Quane.

Butte's initial underground mining targeted silver; however, the collapse of silver prices following the Panic of 1893 undermined the region's silver mining economy. At the same time, copper demand increased with the emergence of technologies such as electric lighting and the telegraph. Daly recognized the potential of Butte's vast copper deposits; however, shipping ore to the only large-scale smelters in Wales reduced profitability. To control the production process, he constructed the Anaconda smelter, established the town of Anaconda, and developed an integrated network of railroads, coal mines, and timber operations to support ACM's growing mining enterprise. Daly sold ACM in 1899 for \$39 million and died the following year at age 58 (Glasscock, 1966; Hoffman, 2001; Marcossan, 1957). The company that Daly created not only transformed copper mining but also fostered a strong culture of scientific research that became central to ACM's success.

ACM as a Mining and Scientific Pioneer

ACM maximized production by scaling operations, improving transportation, and pioneering innovative methods. Daly drove mining shafts deeper into Butte granite than ever before, and as high-quality ores depleted, ACM transitioned to open-pit mining. The company supplemented its rail network with an aerial tramway and implemented a novel sulfuric acid process to extract copper from ore (Glasscock, 1966; Hoffman, 2001; Marcossan, 1957). To map complex underground vein systems thousands of feet below the surface, ACM developed the color-coded "Anaconda Method," an innovative mapping system that streamlined underground field documentation without exhaustive written notes (Brimhall and others, 2005).



Photo from the ARC of ACM scientists assaying samples in the lab.



Data Preservation staff Emily Routen and Chelsea Pincock wearing personal protective equipment to prepare ARC boxes of samples for photographing.

The Anaconda Research Collection

The scientific reputation of ACM's Geologic Research Laboratory attracted contributions from more than 250 geologists, including researchers not employed by ACM, to contribute samples. Rather than gathering aesthetic specimens, they built a working repository of data-rich samples, drill core, and thin sections designed to characterize Butte's underground mineralization (USGS, 2024).

The Atlantic Richfield Company (ARCO) acquired ACM in 1977, closed the Anaconda Smelter in 1980, and ended Butte underground mining by 1982. ARCO turned off the underground pumps, causing the mines to flood and become permanently inaccessible. While many company records were dispersed, discarded, or lost, geologist Lester Zeihen recognized the scientific value of the sample collection and ensured its preservation. He secured the materials for the MBMG and eventually funded a storage facility near Montana Tech.

The Collection's Research Value

The ARC includes more than 80,000 documented specimens, including drill core, polished slabs, hand samples, thin sections, and paper records. Each specimen is accompanied by detailed documentation, including the mine name, mine level, sample type, collector, and date of collection, preserving the geologic context that makes the collection an exceptional research resource.

Because many of the original underground workings have since flooded or been removed by open-pit mining, the ARC provides irreplaceable source material for studying the geology, geochemistry, ore deposits, and hydrothermal alteration of locations that researchers can no longer access. The collection continues to support research in economic geology, mineral exploration, and the geologic

evolution of the Butte mining district and other historic mining areas throughout Montana.

IUGS Geological Heritage Collection Designation

In 2025, the IUGS designated the ARC as a Geological Heritage Collection in recognition of its exceptional scientific value, historical significance, and ongoing accessibility for research and education (IUGS, 2025).

How to View the ARC

Students, educators, and researchers may view the ARC by appointment. Subsampling is allowed for qualifying specimens. Contact the MBMG Data Preservation program to schedule your visit and/or coordinate subsampling.

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About the MBMG

Established in 1919, the Montana Bureau of Mines and Geology (MBMG) continues to fulfill its mandate to collect and publish information on Montana's geology to promote orderly and responsible development of the energy, groundwater, and mineral resources of the State. A non-regulatory state agency, the MBMG provides extensive advisory, technical, and informational services on the State's geologic, mineral, energy, and water resources. The MBMG is increasingly involved in studies of the environmental impacts to land and water caused either by past practices in hard-rock mining or by current activities in agriculture and industry. The Montana Bureau of Mines and Geology is the principal source of Earth science information for the citizens of Montana. More information is available at mbmg.mtech.edu.