



**First Annual**  
**American**  
**Mining Hall of Fame**  
**Awards Presentation**  
**and Banquet**

**December 3, 1983**

# Program

No Host Reception	6:30 P.M.
Banquet Dinner	7:30 P.M.
Ceremony	9:00 P.M.

Welcoming Remarks

Introduction of Head Table

Presentation of Charter Members

Presentation of 1983 Member

Remarks — George E. Atwood, 1983 Inductee

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**Mining Club of the Southwest Foundation**



## **GEORGE ELLIOTT ATWOOD** **1983 Recipient**

George Elliott Atwood was born in Savannah, Georgia on July 21, 1918. He attended New Mexico Institute of Mining and Technology, receiving a B.S. Degree in Metallurgical Engineering in 1939. In 1950, he joined the Duval Texas Sulphur Company as Refinery Superintendent and Assistant Resident Manager of its Potash Division in Carlsbad, New Mexico.

Later Duval diversified into copper, and in 1957, Atwood became Resident Manager of the Copper Division in Tucson. This division acquired the Esperanza property south of Tucson and the Mineral Park property near Kingman. These properties along with the Sierrita mine near Tucson, became significant copper and molybdenum producers.

Mr. Atwood subsequently became Vice President, Executive Vice President, President and in 1977, the Chairman of the Board of Duval Corporation, the office from which he retired on August 1, 1983. Under his leadership, Duval became notable for developing new and proprietary technologies. The CLEAR PROCESS and the Duval Portable Crusher are two of his most significant contributions.

## **MAXIE L. ANDERSON** **1934-1983** **Charter Member**

Maxie Anderson was born in Sayre, Oklahoma on September 10, 1934. He graduated from Missouri Military Academy and then received his B.S. in Industrial Engineering from the University of North Dakota in 1956. In 1953 he prospected for uranium properties in the Ambrosia Lake area of New Mexico for Anderson Development Company.

Anderson was elected to the Board of Directors of Ranchers Exploration and Development Corporation in 1957, became the Manager of the company in 1962, moved Ranchers from a royalty company to an operating company with interests in uranium, copper, gold, silver, and other minerals. Under his guidance, some of the pioneering firsts achieved by Ranchers were: the first solvent extraction-electro-winning plant for copper refining, the first explosive-fracture and in-place leach of an entire copper deposit, and the first uranium project involving large scale leaching of uranium mill tailings.

**JAMES DOUGLAS**  
**1837-1918**  
**Charter Member**

James Douglas was born in Quebec, Canada, in 1837. He studied medicine, but because of his interest in chemistry, he became involved in metallurgy with Thomas Henry Hunt. Douglas and Hunt are credited with developing the first commercial electrolytic copper refining process.

As a consultant to the Phelps, Dodge and Company, Douglas was sent to Arizona to investigate the property of the Detroit Copper Company in Morenci. Upon his return, he reported in favor of the Detroit Copper Company and Phelps Dodge agreed to finance the development of the Morenci Mine. At the same time he presented the company an option to purchase the Atlanta claim in Bisbee. Two years later the Copper Queen Mine was purchased, and on August 10, 1885, the Copper Queen Consolidated Mining Company was formed. From this beginning Phelps Dodge moved from an import-export company to a major mining company. Douglas served as Manager and Director of the Copper Queen until the company changed its name to Phelps Dodge Corporation in 1917. He then became President and later, Chairman of the Board.

**CHARLES F. FOGARTY**  
**1921-1981**  
**Charter Member**

Dr. Fogarty, an orphan at age 9, received a degree in Mining Engineering at the Colorado School of Mines in 1942. In 1952, he completed his Doctor of Science Degree in Geology from the same institution. He began his career in Columbia, South America in 1946 and joined Texasgulf, Inc. in 1952 as a geologist. He held a variety of managerial and executive positions at Texasgulf until 1973, when he became Chairman of the Board. For a number of years, he was on the Boards of Trustees of the College of Santa Fe and the Colorado School of Mines and was a Director of numerous mineral resource companies.

Texasgulf greatly expanded its operations under Fogarty's guidance, becoming a major producer of chemical and fertilizer raw materials, oil and natural gas, ferrous and nonferrous metals, and coal. Two of his last major projects were the Kidd Creek Mine at Timmins, Ontario, and the Aurora phosphate mine in North Carolina. The Kidd Creek mine, mill, and smelter complex is a major producer of zinc, copper, silver, and lead.



**ANTOINE M. GAUDIN**  
**1896-1974**  
**Charter Member**

Antoine Gaudin was born in Smyrna, Turkey in 1896. He received a degree from the University of Paris in 1916 and enrolled at Columbia School of Mines in 1917, where he received an Engineer of Mines degree. After lecturing at Columbia University and the University of Utah, Professor Gaudin was appointed, in 1929, to the position of Research Professor of Mineral Dressing at the Montana School of Mines. Consulting work during his years at Butte enabled Gaudin to put his concepts into practice, and in 1939, he became Professor of Mineral Engineering at the Massachusetts Institute of Technology.

During World War II, Gaudin was asked to investigate the recovery of uranium from low grade ores on behalf of the Manhattan District of the U.S. Army Corps of Engineers. This led to the acid leach-ion exchange recovery process for uranium which was one of Gaudin's great accomplishments. Gaudin was elected Professor Emeritus when he reached scheduled retirement at M.I.T. in 1966. His text books on flotation are widely used by both academia and industry.

**HAL WILLIAMS HARDINGE**  
**1855-1943**  
**Charter Member**

Hal Hardinge graduated from high school in Philadelphia, Pennsylvania. He enrolled at the Colorado School of Mines and began prospecting part-time to pay expenses. During his college years, he continued to work as a prospector, and upon graduation, he founded a consulting practice which took him to virtually every mining area in the western United States and Canada. This vast amount of exposure to mining and milling operations enabled Hardinge to develop new devices to improve the industry. The final results of his efforts are manifested in over 60 patents covering a countless variety of these devices.

During World War I, Hardinge worked without remuneration for the U.S. Bureau of Mines. It was during this period that he conceived the idea of his most famous invention, the conical mill. For nine years, he spent his time overcoming skepticism and opposition to the Hardinge Mill. He later founded the Hardinge Company and was active in the operation and management of that company until he was 84.

**DANIEL COWAN JACKLING**  
**1869-1956**  
**Charter Member**

Daniel Jackling was born on a farm in Missouri in 1869. He graduated in 1892 from the Missouri School of Mines with a degree in metallurgy and started his career in an assay office in Cripple Creek, Colorado.

Working in an experimental mill with Charles MacNeill, Jackling solved the milling problems of the Cripple Creek ore. While working at the Mercur Mine in Utah, he began investigating the low grade ore from Bingham Canyon. Based on his tests of the ore and the development of improved methods of concentration, Jackling proposed to open-pit mine Bingham Canyon using steam shovels and railroads. Working with Seely Mudd and the Guggenheim Exploration Company consultants, Jackling finally proved 50,000,000 tons of ore grading 1.93% Copper, and the Guggenheim Company agreed to finance the development of Utah Copper Company. Jackling served as General Manager, Managing Director, and President of Utah Copper Company - the first large-scale open pit mine, concentrator, and smelter complex in the United States. Jackling later applied these same principles to develop the Chino and Ray mines in the Southwest.

**HENRY KRUMB**  
**1875-1958**  
**Charter Member**

Henry Krumb was born in Brooklyn, New York. One year after graduating from the Columbia School of Mines in 1897, he went to British Columbia where he worked for several companies. In 1904, he was hired by Seeley Mudd to work as a consultant to Guggenheim Exploration Company. He spent most of 1905 directing extensive underground development and diamond drilling to confirm the extent of Daniel Jackling's Bingham Canyon porphyry copper deposit. Krumb started his own consulting firm in Salt Lake City two years later and retained his good relations with his old associates. These associates were convinced by Krumb to finance the development of the Copper River property in Alaska, and this was the beginning of Kennecott Mines Company.

In 1915, Krumb discovered an orebody in Alaska that averaged 70% copper. Kennecott used the earnings from this mine to absorb all of the Utah Copper, Nevada Consolidated, Ray and Chino companies, plus properties in South America. At his death, he left \$20 million to Columbia University, establishing the Henry Krumb School of Mines.



**WALDEMAR LINDGREN**  
**1860-1939**  
**Charter Member**

Waldemar Lindgren was born February 14, 1860, at Kolmar, Sweden. Lindgren graduated from the Royal Mining Academy in 1882 with a degree in Mining Engineering and later took graduate work in metallurgy and chemistry. In June, 1883, Lindgren began his career in the United States with the Northern Transcontinental Survey for the Northern Pacific Railroad. In 1884, he began designing smelter furnaces for Marcus Daly and The Anaconda Company.

Lindgren's real interest was in geology. He joined Dr. George G. Becker's staff at the United States Geological Survey in November, 1884. In 1905, when the Division of Mineral Resources of the Survey was reorganized, Lindgren was chosen to head the Section devoted to precious and semi-precious metals. In 1908, he became Chief of the Division of Metalliferous Geology, and in 1911, he was appointed Chief Geologist.

The Massachusetts Institute of Technology invited Lindgren to lecture in 1908, and in 1912, he became Professor of Geology and Head of the Department of Geology at M.I.T. He remained in this position until 1933 when he became Professor Emeritus.

**SEELEY WINTERSMITH MUDD**  
**1861-1926**  
**Charter Member**

Seeley Mudd was born in Kirkwood, Missouri on August 16, 1861. He graduated from Washington University with a degree in engineering in 1883 and after two years, decided his interest was in producing ore, not processing it. In 1885 he moved to Leadville, Colorado, where he began his mining career in earnest at the Small Hope Mine.

In 1904 Mudd became the Pacific Coast engineer for Guggenheim Exploration Company. In 1905 he hired a young engineer, Henry Krumb, and one of their first projects was to check on Daniel C. Jackling's plan to mine the vast Bingham Canyon copper deposit by open pit methods. Based on Mudd's recommendation the Guggenheim Company financed the development of the Utah Copper Company. In 1909, he became involved in sulfur mining which eventually led to the formation of Texas Gulf Sulfur, with Mudd as its first executive officer. His last undertaking was the development of the copper deposits on the Island of Cyprus and the formation of Cyprus Mines Corporation.

**ARTHUR FAY TAGGART**  
**1884-1959**  
**Charter Member**

Arthur Fay Taggart was born in New York City in 1884 and received his early education there. He continued his training at Stanford University, receiving an Engineer of Mines degree in 1910. After one year in Bolivia, he joined the faculty in mining at Yale University, and in 1919, he became Professor of Mineral Dressing at Columbia University. At Columbia, he started work on his first edition of the "Handbook of Ore Dressing," which was published in 1927. Due to rapid changes in the field of ore dressing in the mid thirties, Taggart began work on his revised "Handbook" which sought the useful empirical relations and tabulations summarizing practice. This represented the first stage in the transition of engineering from an art to a science. The "Handbook" is still widely used in the mineral industry, and Taggart is well known and respected throughout the world.

Taggart retired from Columbia University in 1951 as Vinton Professor Mining, thereafter serving frequently as an advisor to industry, and particularly as an expert in the field of patent litigation.

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