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Memorial of George E. Ericksen 1920–1996

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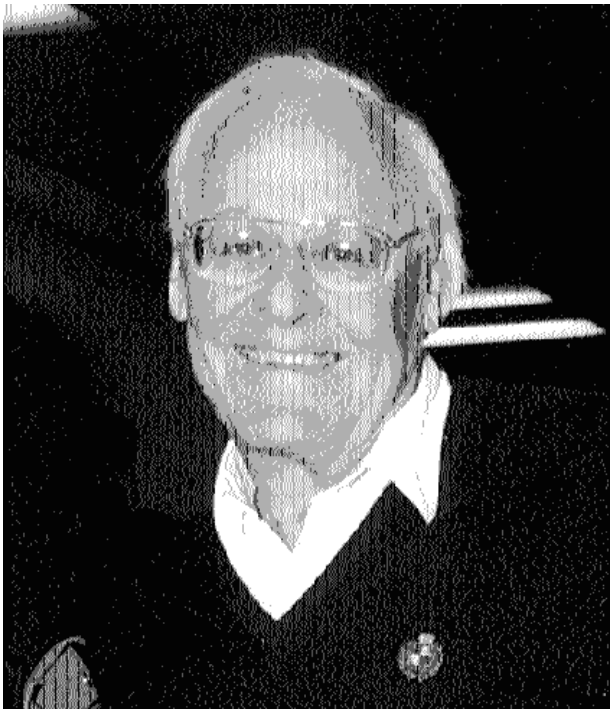

George Edward Ericksen had a career that spanned 50 years with the U.S. Geological Survey. During that period he rendered distinguished service to our country, and to several South American countries. In addition to his outstanding scientific contributions, he served as a highly respected and influential emissary to South American countries, especially Chile.

George Ericksen was born in Butte, Montana on March 17, 1920, and grew up on a ranch in Deer Lodge Valley, about 40 miles northwest of Butte. He vividly described his boyhood experiences on a sheep ranch in days when the only source of mechanical power was a one-cylinder gasoline engine and a large steam-driven tractor used for reaping alfalfa and grass for winter fodder. He grew up in a house where the only heat was a wood-burning stove in the kitchen, water was obtained from a shallow well pump, and other services were provided by a small outhouse in the yard—it is hard for us now to imagine the rigors of winters of deep snow and intense cold on a ranch in such times. His best memories as a boy were hunting and fishing, and his own 1925 Chevrolet coupe that he bought at age 14 for $10. It was an existence of hard labor, cleaning chicken coops, shearing sheep, and farming hay and vegetables. It was enough to convince George that he was not cut out for ranch work.

George became interested in geology first by panning for sapphires in a gravel bed he discovered along a small stream on the ranch, and also by a lecture he heard by the President of the Montana School of Mines about geologic explorations in the Andes. Thus oriented, George entered the University of Montana in 1938 to study geology. He was employed by the U.S. Geological Survey in 1942 as a field assistant for strategic mineral surveys. These continued until 1945, in search of dolomite and magnesite deposits, in support of the production of magnesium metal for wartime equipment, especially aircraft and bombs. In these studies at Sloan and at Gabbs, Nevada, and at Marble, Washington, George acquired thorough training in plane-table mapping, field assay testing, and geologic interpretation, as well as economic geology. In the war time he could travel long distances by car (impossible for ordinary citizens), live on a salary that in 1943 was increased to $2400 annually, and a per diem that rose from $4.00 to $6.00. In 1944 he was assigned to the study of phosphate deposits near Montpelier, Idaho. Vincent McKelvey (later Director of the Geological Survey) directed the study, indicating where channels should be cut, how samples were collected and prepared for shipment to Washington, D.C. for analysis. George never suspected the reason for such intense exploration—uranium! George has acknowledged the valuable training and friendship during this period from his superior, Charles F. Deiss, Chairman of the Department of Geology at the University of Montana, who had a profound influence on his future career as a geologist.

George obtained his Bachelor of Science degree from the University of Montana in 1946, and began his graduate studies at the University of Indiana, where Charles Deiss was now Chairman of the Geology Department. He received his Master's degree in 1949, and in the same year was sent by the Geological Survey to Peru, thus beginning his life-long career in South American geology.

George moved to Peru with his new wife, Mary Frances Kelly, locating in Lima in 1949. He was involved in exploration for metallic mineral deposits (such as lead, zinc, and silver) in the Andes of northern Peru. His geologic investigations were on the slopes of the Cordillera Blanca, where mining was active on a small and primitive scale for centuries by the Spaniards and the local populations before them. It was his first experience in a foreign

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country, in which he was greatly attracted not only by the geology but also by the superimposed Spanish and precolumbian cultures. In his work he encountered the hardships and adventures of travel in the remote regions of the Andes at high elevations (>15000 feet).

Of greater interest was the Hualgayoc mining district in northern Peru. This region was famous for rich silver deposits, and was an active source of copper, lead, zinc, silver, and gold. George's team in 1950 prepared base maps of the area, examined all prospects and mines, and mapped underground workings of the major historic and present day mines. His report on the district became the basis of his thesis at Columbia University, where he received his Ph.D. degree in 1956.

In 1970 George returned to Peru to study the effects of the disastrous earthquake of May 31, 1970. This event precipitated large mudslides on the slopes of the Cordilleras Blanca and Negra, one of which buried the small city of Yungay with a loss of 20000 lives; the total death toll was over 50000. During the summer months, with a joint Peruvian-USGS team, George studied the geologic aspects of the quake, the nature and location of adobe structures, and made recommendations for the reconstruction and relocation of the remaining settlements.

During both 1970 and 1973 George was involved in a study of landforms of coastal Peru. This region is extremely arid, but frequently subject to heavy fog and cloud cover. The formation of windblown sculptures, sand dunes (barchans and yardangs) and other erosional phenomena were considered to be a model for similar activity on the surface of Mars.

The most significant portion of George Ericksen's career, both for himself and for international relations, was his work in Chile and with Chilean geologists. After finishing his studies at Columbia University, George arrived in Chile in 1954 as Chief of a Geological Survey mission to build a national institute of geology in Santiago. At the time there were few geologists and no training facilities for geologists, an unusual situation for Chile, whose economy is based largely on its mining industry. George played a major role in the establishment of such agencies and facilities in Chile: the Instituto de Investigaciones Geologicas, the Servicio de Minas, and the School of Geology at the University of Chile. In the early 1980s the two governmental agencies were combined into the present day Servicio Nacional de Geología y Minería. These institutions have since grown in stature to become among the world's leaders in geology. The success of these developments was enhanced by a great sense of cooperation and friendship among the Chilean geologists and officials and foreign scientists involved in the program, not the least of which were scientists from the Geological Survey, especially George himself.

George Ericksen's interest in and several studies of the evaporites in the salars of northern Chile, from the 1960s until his death, revealed the nature of these vast and unique deposits. From the early 1800s until the 1920s these deposits provided all of the world's demand for soda niter, for fertilizer and explosives. His detailed study of the geologic structure, history, mineralogy, and geochemistry of the salars greatly clarified their nature. He concluded that their origin must be volcanic (through leaching of tuffs over a period of more than 10 million years), although he has admitted that the question of origin is still somewhat controversial. One intriguing problem is the role of iodine in the deposits, which for a time comprised an important byproduct in Chile's mineral economy. George's mineralogical studies showed how this element is intimately associated with the common sodium sulfate component of the caliche beds. He found and described several new iodate minerals, which he named after his Chilean colleagues: brüggenite, hectorfloresite, fuenzalidaite, and carlosruizite. George's study of salars was extended into Bolivia in the late 1970s, after the Salar de Uyuni was found to be rich in lithium, like the Salar de Atacama in Chile. This metal was at that time coming into great demand for high-technology applications in battery accumulators, semiconductors, and nuclear energy.

With other USGS and Bolivian scientists George Ericksen was led to the study and development of geologic understanding of the fabulously rich tin and silver deposits in the Bolivian volcanic provinces. They were drawn by the possibility that the Andean highlands would contain still-undiscovered treasure in gold, silver, and other metals, a prospect that becomes more apparent as time goes on. Therefore, George undertook to organize a joint effort with Bolivia, Chile, and Peru (Argentina declined) to continue these studies and explorations. Financial support was provided by the Interamerican Development Bank, and with the technical and training assistance of the Geological Survey there was thus achieved a degree of cooperation and accord among the three South American countries that had never been seen hitherto. Much of this success was due to the diplomatic efforts of George Ericksen through his close and long-standing knowledge of South American bureaucracy and his personal bonds of friendship with many key officials and scientific individuals.

During the postwar years, the contributions that George made to geologic studies in the United States, especially in proposed wilderness areas, should not be neglected. These included the Black Range in New Mexico, Cloud Peak in Wyoming, Flint Creek in Montana, and Caney Creek in Arkansas. George also played a major role in a study of the mineral resources of the Appalachian region that was requested by President John F. Kennedy. He not only contributed several sections to, but served as principle editor of a major report on this study in 1968.

George Ericksen has been decorated with many high awards: the Knight Commander of the Order of Bernardo O'Higgins, the highest civilian decoration of the Government of Chile; the Herbert Thomas Award of the Geological Society of Chile; the Government of Bolivia Award for Meritorious Service to Mining; 80th Anniversary Award of the Geological and Mining Institute of

Peru; the 1993 Honors Award by the College of Engineers of Peru; the Richard Owen Award from Indiana University; the Distinguished Alumnus Award from the University of Montana; and both the Meritorious and Distinguished Service Awards from the U.S. Department of the Interior. He has left a bibliography of nearly 100 publications.

Much of the material for this memorial has been drawn from George Ericksen's autobiography, which he poured into his word processor during his last months. He died of cancer at age 75 on January 14, 1996, at his home in Reston, Virginia. He has left an indelible and illuminating impression on all areas of his interest, established permanent bonds of international relations among American nations, and unforgettably inspiring memories among all who knew him.

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