

A History of the Geological Survey of Wyoming

by
William Bryans

Bulletin 65



Gary B. Glass,
State Geologist
Laramie, Wyoming
1986

THE GEOLOGICAL SURVEY OF WYOMING

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Cover photographs: The history of the Geological Survey of Wyoming is inseparable from the history of development of the State's geological resources. On the left, is a steam shovel operating at a Wyoming placer mine in 1905 (photograph courtesy of American Heritage Center (AHC), S.H. Knight collection). The men in the upper right are capping a gusher in Salt Creek oil field (no date, photograph courtesy of AHC, Harry Bossart collection). The dragline in the lower left is typical of those used in modern coal mining in the Hanna Basin (1974, photograph by Gary B. Glass).

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Preface

This book is a history of the Geological Survey of Wyoming and its predecessor agencies through June, 1983. When this history was first discussed in the Spring of 1983, it was envisioned as an article-length study that would serve as a keynote to the Agency's Fiftieth Anniversary that summer. Obviously the magnitude of the project quickly, but profitably, grew beyond these initial expectations, as did the time required to complete it.

First, locating the primary sources that would yield the Survey's history proved elusive. Not all of the annual and biennial reports have survived, and none could be found for the entire period between 1933 and 1951. Obtaining biographical information on the Territorial and State Geologists was equally difficult. Despite their status as state officials, they usually escaped mention in the standard historical works, and repositories within the State had information on only a few. Because of this dearth of primary sources, the summer of 1983 — originally intended as the time frame for the entire study — was spent ferreting out and compiling research materials.

The absence of a concise mining history of Wyoming also caused delay. The popular image of Wyoming as the "Cowboy State" has tended to frustrate concentrated studies of the State's minerals industry by historians. It soon became apparent, however, that the Survey's past would be comprehensible only within the historical context of mining in Wyoming. Therefore, it was necessary to piece together, albeit in a general way, an overall picture of the State's rich mining history.

No doubt, the author's desire to produce something more than the typical administrative history slowed progress the most. Histories of state geological surveys generally either trace the legislative evolution of the agency or chronicle its most notable achievements. While I have tried to do both of these, I have also attempted to place the Geological Survey and its predecessors within the general history of Wyoming. Also, I have endeavored to assess the degree to which the background of the Territorial and State Geologists shaped their respective administrations. Hopefully, the result of these sometimes trying efforts is a history that not only tells what happened, but also explains why.

Of course, a project such as this could never have been completed without the help of many kind persons. The Geological Survey of Wyoming did the most by underwriting my research during the

Summer of 1983 and opening its records and resources to me. Gary Glass was especially encouraging, even though the many delays surely taxed his patience at times. Also at the Survey, editors David Copeland, and later Sheila Roberts, supervised many details of preparing the entire work for publication. The staff at the American Heritage Center at the University of Wyoming aided the effort by providing photographs and helping to locate some of the missing sources. The personnel of the Wyoming Archives, Museums and Historical Department in Cheyenne was equally helpful. Biographical information and photographs for some of the Territorial and State Geologists were provided by the Colorado Historical Society, the Nebraska State Historical Society and libraries at the University of Nebraska-Lincoln, the University of Missouri-Rolla, the University of Southern California and Columbia University. Special thanks too are due to Mrs. Hermina Marzel Schwanz and Mrs. D.D. Thomas, daughters of John G. Marzel, who provided a photograph of their father. Last but certainly not least, my wife Mary and son Grant deserve a great deal of credit for putting up with the habits of an historian, and giving me the understanding needed to pursue this and other studies.

A confession and disclaimer closes this preface. The author is an historian with an interest in the history of both Wyoming and mining in the American West. I am not a geologist. Therefore, any mistakes, omissions or misinterpretations pertaining to either geological matters or historical interpretation are solely my own.

Chronology of Territorial Assayer, Territorial Geologists and State Geologists

Territorial period (1877-1890)

John G. Murphy	Territorial Assayer	1878-1880
Frederick J. Stanton	Territorial Geologist	1881-1882
Gilbert E. Bailey	Territorial Geologist	1882-1884
Samuel Aughey	Territorial Geologist	1884-1887
Louis D. Ricketts	Territorial Geologist	1887-1890

Early Statehood period (1890-1901)*

Vacant	State Geologist*	1890-1896
Wilbur C. Knight	State Geologist**	1897-1901

Office of the State Geologist (1901-1933)

Henry C. Beeler	State Geologist	1901-1908
Edwin Hall	State Geologist	1909-1910
Claude E. Jamison	State Geologist	1911-1913
Loyal W. Trumbull	State Geologist	1913-1919
Glenn B. Morgan	State Geologist	1919-1923
Albert B. Bartlett	State Geologist	1923-1927
John G. Marzel	State Geologist	1927-1933

Geological Survey of Wyoming (1933-present)

Samuel H. Knight	State Geologist	1933-1941
Horace D. Thomas	State Geologist	1941-1967
Donald L. Blackstone, Jr.	State Geologist	1967-1969
Daniel N. Miller, Jr.	State Geologist	1969-1981
Gary B. Glass	State Geologist	1981-Present

*The Wyoming Constitution in 1890 authorized a State Geologist, but his duties, salary and supporting appropriations were not established until 1901.

**This was apparently an honorary appointment by the Governor without any financial remuneration.

Introduction

In 1983, the Geological Survey of Wyoming completed fifty years of service to the State. Yet, 1983 marked the Golden Anniversary of the Geological Survey only in a very formal sense, for its history dates back much farther than the depression year of 1933. In fact, it stretches back to the period in which Wyoming was a struggling young territory.

The history of what is now the Geological Survey of Wyoming divides into three distinct eras. These include the Territorial period (1877-1890), the Office of the State Geologist (1901-1933) and the Geological Survey of Wyoming (1933-present).

The Territorial period begins with the creation of the Territorial Assay Office in 1877. Two years later, lawmakers established the position of Territorial Geologist and Mining Engineer, which supplanted the Assay Office. The Territorial era culminated with statehood and the adoption of the Wyoming State Constitution, and the new plan for State government that provided for a State Geologist.

Although the Constitution empowered the position of State Geologist, the Legislature left the position vacant and unfunded until 1901. However, evidence suggests that between 1897 and 1901, University of Wyoming geology professor Wilbur C. Knight served as *de facto* State Geologist. Once formally established in 1901, the Office of the State Geologist worked to advance Wyoming's mineral industry for thirty-two years from its Cheyenne headquarters.

During the budget-cutting year of 1933, the Wyoming Legislature reorganized the State Geologist's office and renamed it the Geological Survey of Wyoming. In order to save money, the head of the University of Wyoming's geology department was named State Geologist. Then all the Legislature needed to do was appropriate a modest contingency fund. This tie between the University and the Geological Survey continues to the present. The formal bond between them no longer exists, but the pooling of resources and talents, allowed by their physical proximity on the University campus, has benefited both institutions.

Whether under the guise of Territorial Assayer, Territorial Geologist and Mining Engineer, State Geologist or Geological Survey, the Agency's primary mission has remained virtually unchanged since 1877 — to collect, compile and disseminate reliable information on Wyoming's geology and mineral resources. In essence, this has required the Geological Survey and its predecessors to play the dual

role of practical scientist and promoter of the mineral industry. At times, especially during its infancy, the Agency placed a bit more attention on promotion. But on the whole, it has done an admirable job of providing sound geological knowledge to all parties concerned with Wyoming's vast mineral wealth — from the Governor, to the average citizen, to the representative of private industry.

A note on sources

At the outset of this project, the Geological Survey and the author agreed that only material needing clarification or directly quoted from sources would be footnoted. This was done primarily to make the text appealing to the general reader. It is this audience, after all, which both the Survey and the author hope to reach. Still, a review of the kind of sources used in this history is in order.

As may be expected in what is essentially an administrative history, the annual and biennial reports of the Territorial Assayer, Territorial Geologist, State Geologist and Geological Survey formed the foundation of this study. Finding all of these reports, however, proved difficult and not always successful. Where gaps existed, especially during the period from 1933 to 1951, the papers of the governors of Wyoming and the presidents of the University of Wyoming were consulted, but only with mixed results.

The legal evolution of the Geological Survey came from the session laws of Territorial and State Legislatures and the various editions of compiled statutes. Fleshing out the motivation behind laws affecting the Survey often came from two sources: the reports of the Territorial Governor to the Secretary of the Interior; and the messages of the Governor to the Legislature for both the Territorial and Statehood periods. The use of other contemporary sources, such as newspapers, is noted in the text.

Biographical information on Territorial and State Geologists most often came from multi-volume histories such as I.S. Bartlett's *History of Wyoming* (Chicago: S.J. Clarke Publishing Company, 1918) and Frances B. Beard (editor), *Wyoming from Territorial Days to the Present* (Chicago: American Historical Society, 1933). The Colorado Historical Society, The Nebraska State Historical Society, the University of Nebraska — Lincoln, the library at the University of Missouri — Rolla, the Special Collections Department of the University of Southern California library and the Low Memorial Library at Columbia University also provided biographical information on the elusive lives of Wyoming's Territorial and State Geologists. Marie H. Erwin's *Wyoming Historical Blue Book: A Legal and Political History of Wyoming, 1868-1943* (Denver: Bradford — Robson Printing Company, 1946) lists the Territorial and State

Geologists, but, as noted in the text, she omits Wilbur C. Knight on the list, and the dates she gives for terms of office are not always accurate.

Evaluating how the Geological Survey and its predecessors fit into the general history of the State was made possible primarily by the second edition of T.A. Larson's seminal *History of Wyoming* (Lincoln: University of Nebraska Press, 1978) and the same author's equally insightful *Wyoming: A Bicentennial History* (New York: W.W. Norton and Company, Inc., 1977). Robert H. Brown's *Wyoming: A Geography* (Boulder: Westview Press, 1980) was also helpful. Unfortunately, no concise history of mining in Wyoming exists, but its basic outline can be drawn from the three works noted above.

Finally, anyone seeking more information on the sources used in writing this history may contact the Geological Survey of Wyoming office on the University of Wyoming campus in Laramie. All research notes and materials generated by this project have been deposited there.

The Territorial Period

The Territorial Assayer — John G. Murphy

Noted Wyoming historian T.A. Larson calls the 1870s "a troubled decade".¹ The building of the Union Pacific Railroad brought Wyoming Territory into existence in 1868, and its economy boomed. But once the golden spike completing the transcontinental railroad was driven at Promontory, Utah, on May 10, 1869, Wyoming faced the arduous task of creating a populous and prosperous commonwealth. This became the primary objective of Territorial officials throughout the decade. The task proved formidable. This was an extremely difficult time for the young Territory; so much so that in 1872 President Grant proposed abolishing the Wyoming Territory and dividing it between Utah, Montana, Idaho and Colorado.

Many looked toward mining to help put the Territory on a sound economic footing. The future of mining certainly appeared bright with the rush of gold prospectors to South Pass in 1868 and 1869. The Sweetwater mines, however, failed to produce another California

¹ T.A. Larson, *History of Wyoming*, second edition (Lincoln: University of Nebraska Press, 1978), p. 95-132.

or Pike's Peak gold rush. Almost as soon as the boom began, it ended. The area settled down with steady, although unspectacular, production of gold that lasted into the Twentieth Century. Wyoming could look only with envy upon the mining bonanzas enjoyed by its neighboring territories.

The short-lived South Pass gold rush set the pattern for Wyoming's mining frontier. Precious and base metals were known to exist throughout the Territory. News of a strike of one mineral or another, ranging from gold to asbestos, resulted in a flurry of activity and excitement. Yet no mining boom lasted very long. Contemporaries soon realized that Wyoming's discovered mineral deposits were only marginally commercial and required large infusions of development capital. They increasingly looked to the Territorial government to promote mining.

In 1875, Territorial Governor John M. Thayer offered a proposal to bolster the mineral industry, and with it Wyoming's sagging economy. In his message to the Fourth Legislative Assembly, Thayer lectured the lawmakers on what should be done.

Aside from stock raising and grazing, the leading industry in our territory must be mining. It is, therefore, important for us to encourage and assist the hardy prospectors by every reasonable effort in our power to make. I recommend for this purpose, the establishment of a Territorial Assay Office, to be located at a convenient point, and partly sustained by the public funds, where an accurate assay can be cheaply and quickly obtained, and one that shall command the public confidence from the high character of the officer in charge.²

Unfortunately, the recommendation fell upon deaf ears, and the Legislature chose not to create the new office of Territorial Assayer in 1875. Nevertheless, this was the seed from which grew what is now the Geological Survey of Wyoming.

When the Legislature convened in Cheyenne two years later, Thayer's proposal met with a more favorable response. W.H. Holliday, pioneer Laramie merchant and a member of the Council (the upper house of the Legislature), introduced a bill in November, 1877, to place a Territorial Assay Office in his hometown. The act was finally approved just three days before the Legislature adjourned on December 15.

² John M. Thayer, *Message of Governor Thayer to the Fourth Legislative Assembly of Wyoming Territory, November 2, 1875* (Cheyenne: H. Glafcke, Printer, 1875), p. 8.

The legislation stipulated that the assay office be located in Rawlins rather than Laramie. The Territorial Assayer was to be appointed by the Governor with consent of the Council. The term of office was indefinite, the appointee holding office "during good behavior". In case of misconduct or neglect of duty, the Governor could remove the Assayer and name the successor.³

The act also outlined the duties of the new office. It required the Territorial Assayer to make requested assays on minerals from any portion of the Territory. Those wanting an assay had to present, along with their ore sample, an affidavit stating the location of the deposit and the depth and length of any shaft or tunnel. Assays of gold and silver cost one dollar, those of any other metal three dollars.⁴ The act further charged the Assayer with keeping a record of all transactions, which was to include the name of the party desiring the assay, the name and location of the lode from which the sample came, the kind of mineral tested and the assay results expressed in yield of metal per tons of ore. These records were to be open to the public as well. Lawmakers apparently hoped that making assay results known would pinpoint promising mineral locations and thus speed mineral development. The final duty of the Assayer was to make an annual report of the Office's activities to the Territorial Governor. For all this, the Assayer was to receive \$600 per year, but only after posting a \$2,000 bond before taking office.

A nationwide search culminated with Thayer naming John G. Murphy of New York as the first, and only, Territorial Assayer. Murphy graduated in 1877 from the Columbia School of Mines, then the leading mining school in the United States, with degrees in both civil and mining engineering. Before arriving in Wyoming, he was superintendent of a number of mines near Caracas, Venezuela. The new Territorial Assayer received his commission on September 9, 1878, and shortly thereafter was setting up the Office with the help of Columbia classmate, C.E. Blydenburg.

Unable to find a suitable building within Rawlins, Murphy rented a stable half a mile outside of town. A delay in the arrival of materials and supplies ordered from New York also prevented any assaying until mid-November. Thus began the new office of Territorial Assayer, an agency intended to stimulate Wyoming mining.

³ The act is published in *Session Laws of Wyoming, Fifth Legislative Assembly, 1877* (Cheyenne: H. Glafcke, Public Printer, Daily Leader Office, 1878), p. 8-10.

⁴ In 1879, the cost of all assays was made a uniform one dollar. See *Session Laws of Wyoming Territory, Sixth Legislative Assembly, 1879* (Cheyenne: Leader Steam Book and Job Printer, 1879), p. 12.

Besides the early difficulty with locating a place to put the office, several other problems soon surfaced. First, the mandated \$300 fine on samples sent for evaluation without the required affidavit inhibited business. Many who came to Rawlins seeking assays were given their ore samples by other parties, so they could not fill out the affidavit. Always a secretive fraternity, prospectors also disliked the fact that assay records were open to the public. While officials perceived public disclosure as a means of hastening mineral development, wary prospectors feared it would attract unwanted rival claims.

The other problem, a rather common one, concerned money. When the Legislature established the Territorial Assay Office, it appropriated \$1,000 to buy the necessary equipment and meet operating expenses for two years. By the time Murphy made his first report in October, 1879, the entire amount was gone, and he was seeking reimbursement of \$315.91 of his own money spent in the performance of his duties. Despite these inherent handicaps, the Office completed 253 assays the first year.

Neither Murphy nor the Office of Territorial Assayer lasted very long. The 1879 Legislature appropriated \$1,200 to pay the Assayer's salary for the ensuing two years, along with a contingency fund of \$500. However, Murphy resigned in 1880. The position remained vacant until the next Legislature abolished the Territorial Assay Office altogether in 1882. During the same session, lawmakers also made a special appropriation of \$200 to pay the Office's back rent in Rawlins and ship all the assay equipment to Cheyenne for storage.⁵

A central reason behind the demise of the Territorial Assayer was the fact that after 1879 the Office's primary mission — bolstering the Territory's fledgling mineral industry — was passed on to a new agency. The new Territorial Governor, John W. Hoyt, recommended to the 1879 Legislature that it expand the office of Territorial Assayer to include a combined economic geologist and mining engineer. Ultimately, the Legislature chose not to expand the existing agency, but to create a new one.

The Territorial Geologist and Mining Engineer

Slightly altering Hoyt's recommendation, the Sixth Legislative Assembly created the Office of the Territorial Geologist and Mining Engineer. Much of the act's language copied the earlier legislation regarding the Territorial Assayer. Yet, the Legislature clearly intended the Territorial Geologist to be a more active promoter of mining than his predecessor.

⁵ See *Session Laws of Wyoming Territory Passed by the Seventh Legislative Assembly, 1882* (Cheyenne: Sun Steam and Job Print, 1882), p. 17.

The bill specified that the Territorial Geologist and Mining Engineer be a citizen of Wyoming, and live and maintain his office in the Territory. Like the Assayer, the new official was to be appointed by the Governor with the Council's consent and serve during good behavior. The Territorial Geologist and Mining Engineer also could be removed by the Governor for misconduct or neglect of duty, in which case the executive would name the successor.⁶

In outlining the duties of the Office, the Legislature in effect wed science with economic promotion. The primary duty of the Territorial Geologist and Mining Engineer consisted of making reports on potential and existing mining properties. Moreover, the law required that:

*Such reports shall be such that they may be presented to the New York and San Francisco, or other stock boards, for the purpose of obtaining working capital. Provided, that such property shall be deemed by the Territorial Geologist of sufficient value to warrant a favorable report, and that the Territorial Geologist and Mining Engineer shall charge fifty dollars for every report (going on the stock boards), said sum to be turned into the Territorial treasury and placed to the credit of the Territory.*⁷

Reports also had to give the names of the mine owners and their mines, where they were located and the kinds of mining being done. Finally, all reports and examinations made during the year were to be included in an annual report to the Governor. In order to accomplish this new, aggressive promotion of Wyoming mining, the Legislature allotted \$1,500 per year to pay the Territorial Geologist's salary plus all expenses.

Clearly, Wyoming officials held fast to the belief that their mountains would yield the same riches that were being unearthed by their neighbors during the 1870s. Only a lack of knowledge as to where the best deposits were located, and the want of capital, seemed to stand in the way of Wyoming hosting its own Leadville, Deadwood or Comstock. The heady enterprise of realizing this optimistic vision fell to the newly created Office of the Territorial Geologist and Mining Engineer.

⁶Session Laws of Wyoming Territory, Sixth Legislative Assembly, 1879 (Cheyenne: Leader Steam Book and Job Print, 1879), p. 99-100.

⁷Session Laws of Wyoming Territory, Sixth Legislative Assembly, 1879 (Cheyenne: Leader Steam Book and Job Print, 1879), p. 100.

Yet, by the time Wyoming became a state in 1890, this dream was at best only partially fulfilled. It probably could not have been otherwise since four men of contrasting background, capabilities and ideas of what should be done served as Territorial Geologist and Mining Engineer.

Frederick J. Stanton, the beginnings

The first Territorial Geologist, Frederick J. Stanton, did not receive his commission until March 7, 1881, nearly sixteen months after the Legislature established the Office. The ever-present problem of money caused the delay. Governor Hoyt complained that the meager appropriation for salary and expenses made finding someone to fill the position next to impossible. He even went so far as to declare publicly that he could not be held responsible if the new Office he had recommended failed to succeed. Events ultimately proved Hoyt's fears premature.

Stanton brought a wealth of experience — not all of it in mining — to his new job. He received private instruction in geology while still in his native England. After arriving in the United States during 1851, Stanton lived in Des Moines, Iowa, and Denver, Colorado, before reaching Wyoming. Up to the time of his appointment, his various occupations included Indian fighter, banker, newspaper publisher and surveyor. While in Denver, Stanton also ran a private school of mines, an endeavor that he continued while Territorial Geologist, operating schools in Cheyenne and Laramie. The first Territorial Geologist was probably not the best qualified person for the position, but then the slight appropriation did not attract more qualified persons.

During his first year in office, Stanton vigorously promoted Wyoming's mineral industry by exhibiting resource collections at the Nebraska and Illinois state fairs. At Nebraska, the collection even won the premium for best mineral exhibit. After the Illinois fair, Stanton also carried the display on to Milwaukee, Chicago and Omaha. Although the expense for this prolonged publicity trip mostly came out of his own pocket, Stanton obviously took his duty to promote outside interest in Wyoming mining very seriously. The Midwest tour constituted the highlight of his brief tenure in office.

When Stanton made his first, and only, report in 1882, almost the entire text was devoted to Wyoming's copper prospects. This was hardly surprising since he had made copper an object of special study over the previous twenty years. With an eye toward the contemporary developments at Copperopolis (on top of Casper



Frederick J. Stanton in 1890, Territorial Geologist, 1881 to 1882. (Photograph courtesy of University of Wyoming American Heritage Center [AHC].)

Mountain) and Hartville, the Territorial Geologist predicted that “the mining of copper was destined to be the great speciality of Wyoming in the near future”.⁸ The accuracy of this prognostication depends upon how one defines “the near future”. Wyoming indeed became

⁸ Stanton’s report is in *Message of John W. Hoyt, Governor of Wyoming, to the Seventh Legislative Assembly, January 12, 1882* (Cheyenne: Leader Steam Book and Job Print, 1882), p. 100-112. The quotation is found on p. 101.

one of the Nation's leading copper producers during the Encampment boom of 1897-1908. Nevertheless, by the time his prophecy came true, Stanton was long out of office and back in Denver.

Exactly when Stanton ceased being the Territorial Geologist and Mining Engineer remains unclear. In 1882, the Legislature changed the term of office from "during good behavior" to two years, in order to coincide with the biennial meeting of the Assembly. At the time, the Legislature also designated that the incumbent's term would expire March 31, 1881.⁹ Therefore, it seems likely that this is when Stanton vacated the post.

Gilbert E. Bailey

It was not until August that a successor took office. The *Wyoming Blue Book*, a compendium of legal and political history, indicates that Samuel Aughey held the position from April 21 to August 11, 1882.¹⁰ This seems doubtful. The Territorial Governor never reported such a commission to the Secretary of the Interior, and an obituary for Aughey indicates that while he was appointed in 1882, he refused the position.¹¹ Two years later, however, he would accept.

In the meantime, Hoyt named Gilbert E. Bailey Territorial Geologist and Mining Engineer on August 10, 1882. Bailey graduated from Chicago University and the University of Michigan with degrees in civil and mining engineering. Before assuming office, he also helped survey the western boundary of Wyoming and made a number of geological reconnaissances in the northern half of the Territory. From 1874 to 1880, he served as a professor of natural sciences at the University of Nebraska, and for part of this period also served as the Nebraska State Chemist. Immediately prior to his appointment, Bailey worked as a mining consultant as well. Clearly, here was someone eminently qualified to serve the still-struggling Wyoming mineral industry.

Bailey approached his new job with great enthusiasm. He committed as much time as possible to field work. From the time

⁹ *Session Laws of Wyoming Territory, Passed by the Seventh Legislative Assembly, 1882* (Cheyenne: Sun Steam and Job Print, 1882), p. 17.

¹⁰ Marie H. Erwin, *Wyoming Historical Blue Book: A Legal and Political History of Wyoming, 1868-1943* (Denver: Bradford-Robinson Printing Company, 1946), p. 969-970.

¹¹ *State Journal* (Lincoln, Nebraska), 18 February, 1912.



Gilbert E. Bailey, Territorial Geologist, 1882 to 1884. (Photograph courtesy of University Archives, University of Southern California.)

he took office to when he published his first report on December 1, 1883, Bailey spent an astonishing total of 231 days traveling in the Territory, familiarizing himself with the resources and making reports. Paper work in the Cheyenne office was handled at night, as time allowed.

Unfortunately, the Territorial Geologist's budget hardly matched Bailey's zeal. Once again, fiscal constraint became an obstacle to the effective operation of the Office. The \$1,500 per year for salary and expenses appropriated in 1882 proved woefully inadequate. When Bailey dutifully itemized the Office's expenses up to December 1, 1883, the total reached a little over \$1,700. This did not even include his salary. He, therefore, found it necessary to use an additional \$1,700 of his own, plus \$500 advanced by others to maintain both his office and his Cheyenne household. Understandably, Bailey took the opportunity afforded by his 1882-1883 report to recommend an annual appropriation of between \$2,500 and \$3,000 to cover field, laboratory and other non-salary expenses. The 1884 Legislature provided a separate contingency fund for the first time,

but the \$1,000 was to last two years. Furthermore, part of the money was earmarked to maintain the Cheyenne office, which was to include a display of mineral and geological specimens. Throughout the Territorial period, the contingency fund never exceeded \$1,250 per year.

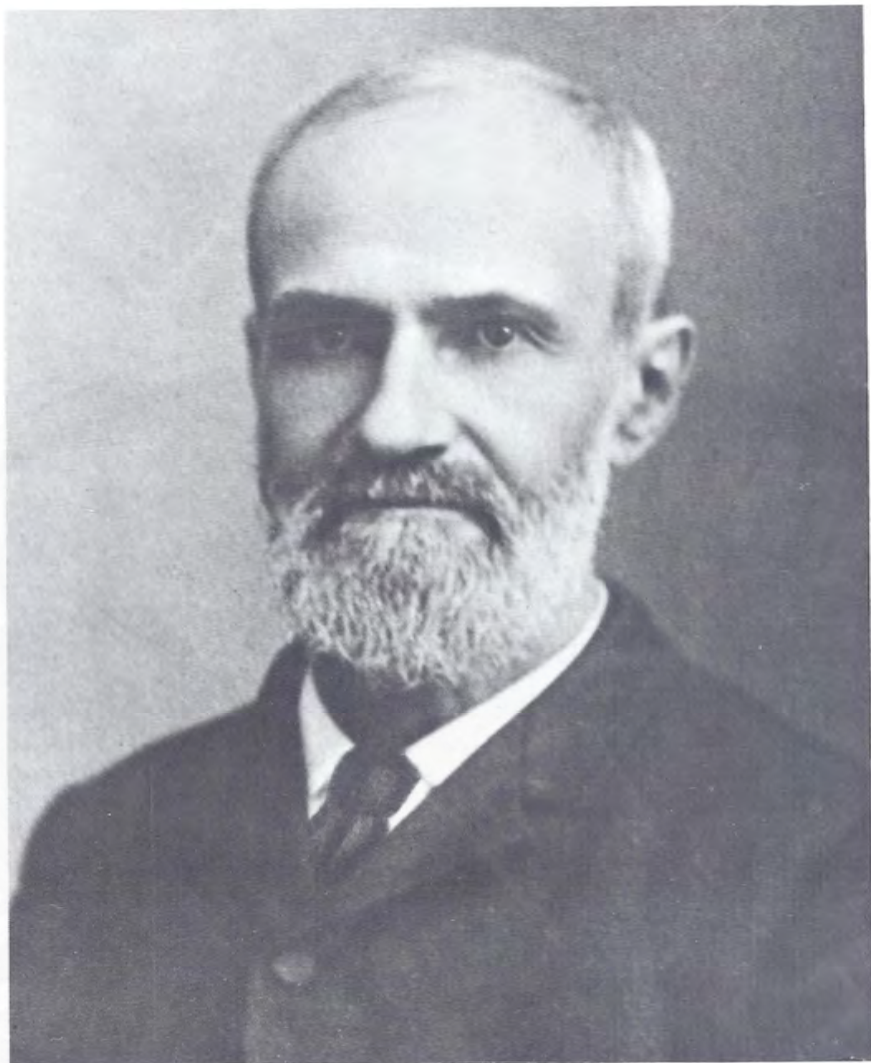
Bailey served just a single two-year term as Territorial Geologist and Mining Engineer. Whether his removal was voluntary is uncertain, but he probably welcomed it given the financial strain this Office had put on his personal finances. Precisely when Bailey left office also remains unclear. Nevertheless, it is certain that Samuel Aughey, who two years earlier had declined the post, was named Territorial Geologist on October 15, 1884.

Samuel Aughey

Once again the *Wyoming Blue Book* provides incorrect dates for the Office of the Territorial Geologist and Mining Engineer. It states that Bailey served until March 31, 1886, after which Aughey assumed office. However, the United States Department of the Interior's territorial papers for Wyoming show that Aughey was appointed October 15, 1884.¹² The two Cheyenne newspapers of the period — the *Daily Sun* and *Democratic Leader* — also announced the appointment to their readers on October 16. Presumably, Bailey stayed in office only until his term expired at the end of March, 1885.

Aughey came to the Territorial Geologist's office with a well-established reputation in the natural sciences. He graduated from Pennsylvania College in 1856, and shortly thereafter earned a theology degree. He served with Ferdinand V. Hayden's Geological Survey of the Territories in the 1860s. The original University of Nebraska regents named the scientist-preacher the school's first chair of natural science in 1871. After a notable career at Nebraska, he resigned from the University in 1884. That same year he accepted appointment as Wyoming's Territorial Geologist and Mining Engineer. Without doubt, Samuel Aughey's tenure of office was the most colorful and controversial of the Territorial period. The attention he paid to paleontology and Wyoming's infant petroleum industry was remarkably foresighted. But a still unresolved disagreement with Wilbur C. Knight over the authenticity of an assay shrouds the end of Aughey's tenure in mystery.

¹² United States Department of the Interior, *Territorial Papers of Wyoming, 1870-1890* (Washington, D.C., The National Archives, n.d.), Microfilm roll no. 1, Microcopy 204. This can be found at the Historical Research Division of the Wyoming State Archives, Museum and History Department in Cheyenne.



Samuel Aughey, Territorial Geologist, 1884 to 1887. (Photograph courtesy of AHC.)

Aughey ranks among Wyoming's pioneer oil men. Acting as the agent for a group of oil investors known as the Wyoming Central Association, he made an inspection trip of the Salt Creek area just before being named Territorial Geologist. This field, which became the most famous in Wyoming history, was then in the prospecting stage. Still, the various geological structures in the region suggested to Aughey that Salt Creek would one day become a great oil field, though he doubted it would happen in his lifetime.



Salt Creek oil field, Shannon Well No. 1. This well was the first standard rig used in the area (1889). Aughey was early to recognize the potential of this great field. (Photograph courtesy of AHC, Dan W. Greenburg collection.)

Petroleum received Aughey's official, as well as private, attention. The bulk of his 100-page report for 1886 is devoted to the pioneer oil industry. In preparation of this report, the Territorial Geologist studied all the known oil basins in Wyoming. Only the Shoshone Basin, near Lander was developed beyond the prospecting stage. Nevertheless, Aughey predicted that *when transportation is once provided, and any one of these oil basins are worked on business principles, they will develop into magnificently paying properties.*¹³ In time, this prophecy proved uncannily accurate.

Wyoming's unusually rich fossil beds also attracted the Territorial Geologist's consideration. During the 1870s and 1880s, Wyoming enjoyed a worldwide reputation as a fertile collection ground for paleontologists. Unfortunately, most paleontological expeditions carried off their finds to distant museums or the Smithsonian Insti-

¹³ Samuel Aughey, *Annual Report of the Territorial Geologist to the Governor of Wyoming, January 1886* (Laramie: Boomerang Printing House, 1886), p. 174. The pagination of this report, published separately, reflects its position in the Territorial Governor's report to the Legislature that year.

tute. It greatly annoyed Aughey that Wyoming had no sizable collection of its own fossils, so he resolved to do something about it. Therefore, a fossil collecting expedition was organized during the summer of 1885.

To help in this endeavor, Aughey hired, at his own expense, a former student of his at the University of Nebraska named Wilbur C. Knight. As will be explained below, bringing Knight to Wyoming later provided an element of controversy to Aughey's tenure. In August, 1885, the professor and his former student left Cheyenne for the fossil beds near Como Bluff. Duty required Aughey to return to Cheyenne within a week, but Knight remained in the field collecting specimens through early September. Later that fall, Knight resumed his studies at Nebraska, but it would not be long before he returned to Wyoming. The success of the expedition prompted Aughey to recommend that a museum be established for the public display of the resulting mineral and fossil collections. But only a modest display case, located in the Capitol Building quarters of the Territorial Geologist, was ever erected.

Certainly, Aughey's foresight in recognizing Wyoming's oil potential and his attempt to preserve some of the Territory's significant fossils are laudable. However, interest in Aughey is often diverted



The Silver Crown mining district as it appeared in 1974, long after the "salting" controversy.

from these accomplishments to a conflict late in Aughey's days at Wyoming over allegations of mine "salting". "Salting" involves tampering with the ore to make it appear richer than it actually is.

Since 1870, the Silver Crown mining district northwest of Cheyenne had provided a great deal of excitement with the discovery of gold and copper. One mine in particular, the Carbonate Belle, promised great wealth. At least this was Aughey's opinion. He maintained that this mine's ore contained no less than \$200 in gold per ton. Obviously, so rich a find, carrying the endorsement of the Territorial Geologist, had little difficulty attracting investors. Most prominent of these were the Swan brothers, famous cattlemen.

Alexander H. Swan, general manager of the Swan Land and Cattle Company, demonstrated good business sense in having outside assayers evaluate Carbonate Belle ore. Samples were even sent East and to Europe. These assays all found only a trace of gold in the ore. Aughey accounted for the discrepancy by explaining he had devised a special method for treating the ore. This claim induced the Swans and other investors to send both Aughey and the ore to a Kentucky smelter for further testing. Here, favorable results were indeed obtained. Aughey returned to Cheyenne vindicated, but ill from antimony and arsenic poisoning contracted while in Kentucky. The Carbonate Belle owners, wishing to protect what appeared to be an extremely valuable investment, then sent Aughey to the resort at Hot Springs, Arkansas, late in 1886 to recover his health.

The Territorial Geologist returned to Cheyenne early in the new year, and the investors decided to settle the issue of the ore's true value once and for all. Aughey agreed to have the ore assayed under the provision that it be done by a scientific man. A committee of investors chose Wilbur C. Knight, who had returned to Wyoming after graduating from Nebraska. Knight agreed to test the "Aughey process", but under his own conditions. He was to have sole charge of the experiment, and no one else could be present in the assay room at the time. Aughey was to instruct Knight through the door of an adjoining room.

The test commenced January 4, 1887, following Aughey's instructions. The ore sample now produced five ounces of gold, an assay value of \$105 per ton. Witnesses N.R. Davis and George Morgan, representing the Carbonate Belle investors, pronounced their satisfaction with the results. The good news quickly spread through the streets of Cheyenne.

Exactly what happened during and right after this assay remains a mystery. Twelve years later, the *Wyoming Industrial Journal* accused Aughey of salting the sample. According to this account, Aughey slipped into the laboratory, to use the faucet to take some medicine, while Knight was absent retrieving fire clay. Aughey allegedly shaved some filings from a gold coin onto the sample. When Knight returned, he finished the experiment and was amazed by the results — so much so that he apparently refused to sign the certificate of verification. Knight then voiced his suspicions to Davis, who recalled Aughey excusing himself to take the medication. This, as the story goes, prompted Knight to redo the assay, and within two hours he was convinced that the first specimen had indeed been salted. The *Industrial Journal* states that Davis searched out Aughey and forced his immediate resignation. That account also claims that the Territorial Geologist owned stock in a mine near the Carbonate Bell, which he planned to sell for a profit.

At least part of this account is inaccurate. The day after the experiment Cheyenne newspapers reported that Davis remained pleased with the test results. Also, Aughey did not resign until expiration of his term on March 31, 1887, three months after the episode, citing ill health as the reason. Furthermore, the *Cheyenne Daily Leader* on October 30, 1887, published an Interview with Aughey by a Dr. Garrad, who visited the former Territorial Geologist at Hot Springs, Arkansas, where he had retired to recover his health. In this exchange, Aughey continued to laud the prospects of the Silver Crown District and the paper concluded that *The opinion of such a man as Professor Aughey is not to be considered lightly. He is recognized as an authority upon all questions pertaining to mining.* All this indicates that Aughey did not suddenly leave Wyoming in disgrace. Finally, the *Wyoming Industrial Journal* erroneously stated that Aughey was dead in 1899; he actually lived until 1912.

Still other evidence, on the other hand, suggests that something might indeed have been amiss. Within a week of conducting the Carbonate Belle test Knight resigned his unofficial post as Assistant Territorial Geologist. Nine years later he cited as his reason for this action the *crookedness of my superior, S. Aughey.*¹⁴

¹⁴ Letterpress Book I, p. 132, Wilbur C. Knight Collection, AHC. The account accusing Aughey of salting the ore appears in the *Wyoming Industrial Journal* (October, 1899), p. 98-99. The Writers Program of the WPA, *Wyoming: A Guide to its History, Highways and People* (New York: Oxford University Press, 1941), p. 251, also briefly repeats this account.

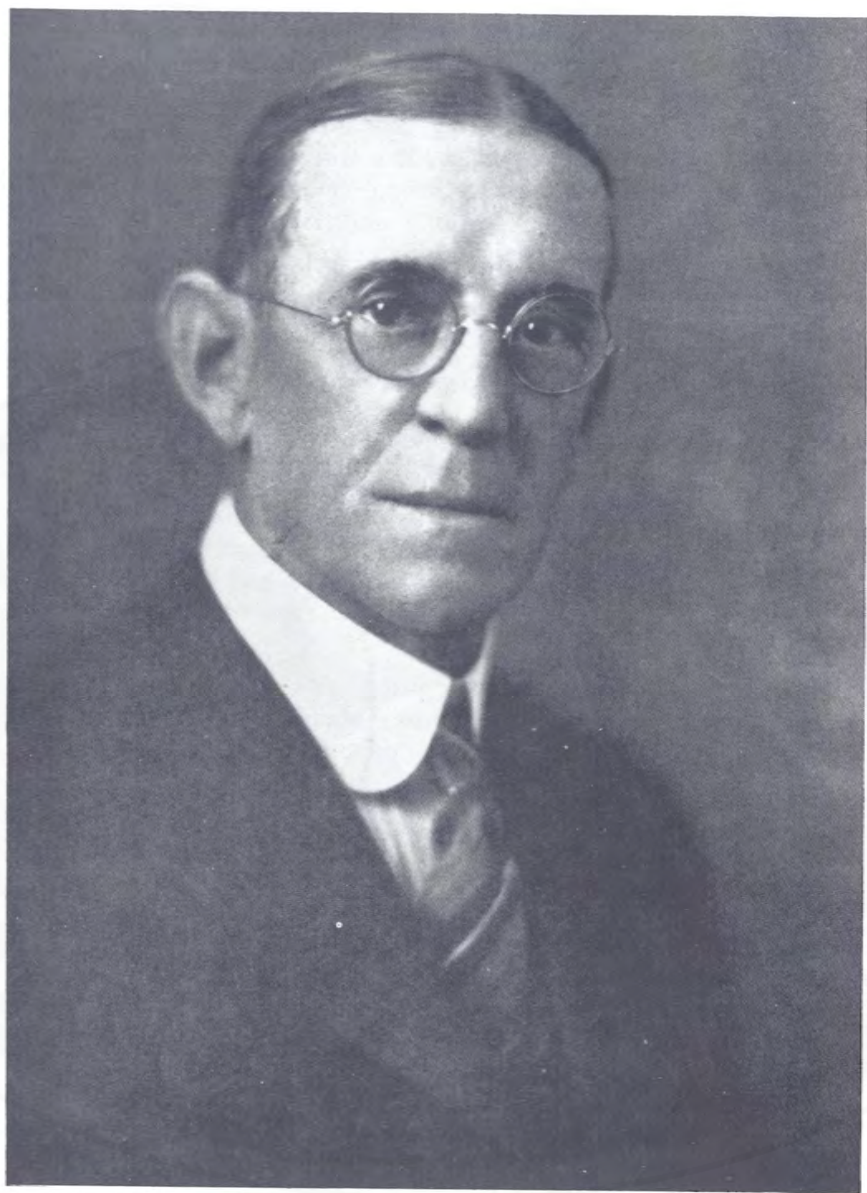
Given this puzzle, two scenarios seem possible. First, Aughey may have salted the sample. Rather than exposing the fraud, and thereby shattering all hope that the Silver Crown District would become Wyoming's long-awaited bonanza, the investors might have kept quiet. Subsequent assays, after all, did reveal a higher gold content than initially believed, although nowhere near the magnitude that the *Industrial Journal* reported for Aughey's assay. Frontier optimism, especially when connected with mining, always died hard.

Second, the entire incident may have been a sincere difference of opinion between the young scientist and his mentor. Certainly, each carried the credentials to substantiate his respective findings. Moreover, the processing of ores was hardly an exact science at this time. Different assays of the same ores often yielded conflicting results. Knight's skepticism toward the Aughey process is understandable in light of previously unsuccessful experiments with Carbonate Bell ore. Perhaps fraud was the only way Knight could justify the results in his own mind.

Little is known about Aughey after he left Wyoming. He apparently spent five years in Arkansas recovering his health, and then moved to the Pacific northwest where the scant record indicates that he remained professionally active as a mining engineer until his death in 1912. Nothing in the record of Aughey's later years indicates he was a dishonest man. As for Knight, he went on to a distinguished public career in Wyoming, as will be detailed below. Until the historical record on this episode is more complete, it remains a fascinating puzzle. Interpretation is complicated by the fact that the Silver Crown District remained an area of mining activity for many years, but never emerged as the significant gold region that Aughey and the others envisioned.

Louis D. Ricketts, the last Territorial Geologist

On April 20, 1887, Louis D. Ricketts became the last Wyoming Territorial Geologist and Mining Engineer. He was the best trained and most professional man to hold the post. Ricketts graduated from Princeton University in 1881 with a degree in economic geology. A prestigious W.S. Ward Fellowship enabled him to complete a doctorate two years later. Rather than join the Princeton



Louis D. Ricketts, Territorial Geologist, 1887 to 1890. (Photograph courtesy of AHC.)

faculty, he came West and was a successful superintendent of mines in both Leadville and Silverton, Colorado. No less a person than the Governor of Colorado recommended Ricketts for the position of Territorial Geologist.

Ricketts hoped to achieve a great deal while in office, but the ever-present problem of money often frustrated his plans. Within a year of taking office, he was complaining that the funds appropriated by the Legislature barely met the cost of traveling, fuel, office rent and necessary supplies. The frugal budget also precluded the hiring of much needed additional help, and thus slowed the Office's work considerably. Should additional funds be provided, Ricketts planned to collect data for a geological map, gather mineral and fossil specimens into a museum and conduct experiments in coking Wyoming coal. The 1888 Legislative Assembly responded to the plea with a contingency appropriation of \$2,500 for the biennium, but this represented an increase of only \$300 over the previous budget. Like his predecessors, Ricketts would just have to make due with limited resources.

Of the special projects the Territorial Geologist envisioned, only the geological map appears to have progressed to any degree. By 1890, data from much of Carbon County — together with portions of Laramie, Crook and Johnson Counties — had been collected in preparation for the map. Unfortunately, the map was not completed before Ricketts left office.

Budget constraints also prevented implementation of another program conceived by Ricketts. In his report of 1890, the Territorial Geologist recommended arrangements be made for the periodical publication of bulletins devoted to special minerals. Keeping in mind the Office's primary mission to promote Wyoming mining through geological information, he even suggested how they should be written:

*Such reports should not be technical expositions of interest merely to the scientific world, but practical and concise descriptions of developed mineral deposits, and as complete descriptions of newly discovered and undeveloped localities that are capable of being made producers as the collectable data will admit. They should be of such a nature that the prospector may use them as a guide in making discoveries, the capitalist as a guide in selecting special fields for a careful inspection necessary to sound investments in mineral lands.*¹⁵

This idea of issuing bulletins, in addition to the regular reports, was ahead of its time. Not until after the Office of the State Geologist was formally established in 1901 did they become a reality. Yet, Ricketts' suggestion showed great foresight.

¹⁵ Louis D. Ricketts, "Report to the Governor, October 22, 1890," p. 2. A copy of this report is in the possession of the Geological Survey of Wyoming, University of Wyoming Campus, Laramie.

Unfortunately, at the time of this valuable recommendation, the entire future of the Office rested in limbo. With Wyoming standing on the brink of statehood, the 1890 Legislature chose not to appropriate funds for any Territorial office. Therefore, Ricketts, like nearly all of his predecessors, found it necessary to delve into his own pocket to meet the Territorial Geologist's expenses. By October, 1890, he had spent nearly \$700 of his own and was due another \$900 in back salary. Caught in the transition from Territory to State, he appears to have left office that November. When the First State Legislature met in 1891, it appropriated \$1,200 to cover his salary, and \$652.16 for contingent expenses, up to November 30, 1890.¹⁶

The Territorial period essentially came to an end when President Benjamin Harrison signed the Wyoming Statehood Bill on July 10, 1890. During the Territorial era, five different men served either as Territorial Assayer or Territorial Geologist and Mining Engineer. Their qualifications for the office were as varied as their personal backgrounds. All thought the Legislature needed to appropriate more money in order to do their jobs as intended. And each, in his own way, sought to promote Wyoming mining through his geological knowledge, as had been meant from the very beginning.

Were the offices of Territorial Assayer and Territorial Geologist and Mining Engineer successful? In reality, Wyoming's mining industry was in little better condition in 1890 than it had been in 1879. Mining booms erupted throughout the Territorial period, but for one reason or another they ended about as quickly as they began. In 1890, then, Wyoming was still searching for its bonanza mining strike.

Yet, the offices of Territorial Assayer and Territorial Geologist and Mining Engineer did succeed in two ways. First, they provided a base of scientific knowledge regarding Wyoming's geology and mineral resources. While this seldom resulted in the establishment of paying mines at the time, it did lay the foundation for future mineral development. Aughey's 1886 report on oil basins and Stanton's prophecy for copper serve as prime examples of this. Second, the Offices managed to maintain interest in Wyoming mining, a formidable task indeed given its mercurial nature. The Territory enjoyed few true mining success stories, but new discoveries were made

¹⁶ *Session Laws of the State of Wyoming, First State Legislature* (Cheyenne: The Daily Sun Publishing House, 1891), p. 218.

often enough to keep the Territorial Geologist busy and his reports in demand from those seeking riches from Wyoming's mineral resources. For example, the 1888 Legislature funded the publication of 2,500 copies of the Territorial Geologist's report, and interested parties wasted little time exhausting this supply. Perhaps it can even be argued that in a sparsely populated territory such as Wyoming, and one with a struggling mining industry, the Territorial Geologist played a vital role in keeping potential investors enthused about the prospect of mineral development.

Certainly, most people in the Territory thought the Office a success, or at least worth keeping. The Constitutional Convention that met in September, 1889, to draft a plan for State Government, provided for continuation of the Office.

The Office of the State Geologist

The Wyoming Constitution and the State Geologist

Inclusion of a State Geologist among the officials authorized by the Wyoming Constitution originally met with some resistance. George W. Fox, a Laramie merchant who had earlier delved in some Montana mining ventures, led the opposition. His past experience convinced him that such an office was expensive and, given his attitude toward geologists in general, unnecessary. He explained his opposition to his fellow delegates in this manner:

I made this motion to strike out [the Office of the State Geologist] because I think we will have all the expense we can bear in this State, and my experience is that geologists have been a useless expense. I have yet to have the first geologist tell me anything beyond the expression of an opinion. I do not think he can tell us anything but what we know at the present time. And I think we can dispense with it.¹⁷

Two other delegates quickly rose from their chairs to challenge Fox. Henry G. Hay, a Cheyenne cattleman and banker, argued that a State Geologist would greatly aid in the needed development of Wyoming's mineral resources. He also went so far as to assert that the State Geologist in this respect was as important to Wyoming's economic future as the already agreed upon State Engineer, who was charged with overseeing water development. The other proponent of a State Geologist was Sheridan merchant, Henry A. Coffeen. He, too, based his support on the promotional value of

¹⁷ Wyoming Constitutional Convention, *Journal and Debates of the Constitutional Convention of the State of Wyoming* (Cheyenne: The Daily Sun, Book and Job Printing, 1893), p. 767-769.

the Office. Coffeen had seen mineral exhibits prepared by the Territorial Geologist for the various state fairs, and believed that such displays provided the best possible advertisement and promotion for Wyoming mining. When the convention voted on the motion to omit the Office of the State Geologist, it was defeated. Hay and Coffeen had prevailed.

Article IX (Mines and Mining), Section 6, of the Wyoming Constitution empowers the Office of the State Geologist. It gives the Governor the authority to name the State Geologist, with the advice and consent of the Senate. The Constitution also specifies the term of office as six years. The convention delegates believed that the two-year term of the Territorial Geologist was too short; just as the appointee finally became familiar with his duties, his term expired. The document further states that the State Geologist's duties and compensation shall be prescribed by law, and that he will also serve as *ex officio* Inspector of Mines unless otherwise provided by law. The most interesting clause within the provision stipulates the kind of person who should fill the office. It states that "no person shall be appointed [State Geologist] unless he has such theoretical knowledge and such practical experience and skill as shall fit him for the position". Obviously, the combined role of scientist and promoter would continue.

Thus, when Wyoming entered the Union as a state in 1890, its Constitution authorized a State Geologist. To give meaning to this provision, however, the State Legislature would have to outline the duties of the Office, set the salary and make the necessary supporting appropriations. It took the Legislature eleven years to do this.

Wilbur C. Knight: *De Facto* State Geologist

Most sources, including the *Wyoming Blue Book*, assert that in the hiatus between the adoption of the Constitution and the Legislature's formal creation of the Office of the State Geologist in 1901, the position went unoccupied. Evidence exists, however, that the post was filled from 1897 to 1901, at least unofficially, by Wilbur C. Knight.

After the Carbonate Belle incident and Knight's subsequent resignation as Assistant Territorial Geologist, Knight worked as an assayer in Cheyenne and Laramie. From 1887 to 1893, he was also the superintendent of several mines in Colorado and Wyoming. Then, in 1893, he was named professor of geology and mining engineering at the University of Wyoming. While at the University, he not only taught in the School of Mines, but he also acted as geologist for its Agricultural Experiment Station. In this capacity, he labored with other University scientists to promote the economic



Wilbur C. Knight, de facto State Geologist, 1897 to 1901. (Photograph from Geological Association of America Bulletin, volume 15, plate 54, 1903.)

development of Wyoming's agricultural and mineral resources. Thus, Knight was in essence already fulfilling the promotional role which the Office of the Territorial Geologist had performed earlier.

On February 1, 1895, University of Wyoming President A.A. Johnson wrote Governor William A. Richards regarding the vacant position of State Geologist. He suggested that Wilbur C. Knight be appointed without pay. Knight had already expressed to Johnson his willingness to fill the post under these circumstances. In the 1895 Legislative Session, which was meeting at the time, the House of Representatives passed a bill authorizing the appointment of a State Geologist and allotted a \$500 contingency fund. The Senate, however, rejected the bill. Johnson informed the Governor that should Knight be appointed, he would attempt to secure funds

(apparently from the University budget) to meet office expenses. Even without an appropriation, Johnson advised Governor Richards that Knight could be appointed to the post "without any specific act of the Legislature".¹⁸

Initially at least, Johnson's suggestion went unheeded. So, Knight finally decided to take matters into his own hands. Governor Richards once again put the matter of a State Geologist before the Legislature in 1897, and once again the lawmakers failed to appropriate any money for the Office. This prompted Knight to write the influential Judge John W. Lacey of Cheyenne regarding his interest in serving as Wyoming's State Geologist. He informed Lacey that:

*Since 1893 I have done all the [geological] work that has been done in the State and have also attended to a great deal of work for the Gov[ernor] of our State. Would it be out of place for the Gov[ernor] to appoint me to the place [of State Geologist], it being understood that it is purely honorary? But that I will use the title to further our mineral interests to the best of my ability.*¹⁹

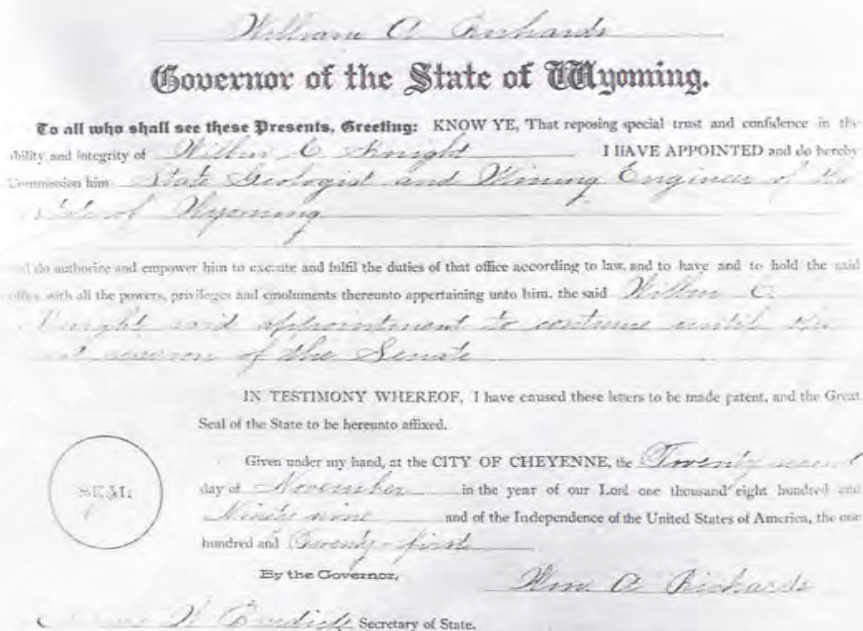
Since he was already performing what had been the duties of the Office during the Territorial period, the University of Wyoming geology professor concluded he might as well have the title, too. Lacey agreed and forwarded Knight's letter to Governor William A. Richards along with his endorsement of Knight's application.

Wilbur C. Knight's persistence was finally rewarded. On November 22, 1897, the geology professor received a commission as State Geologist and Mining Engineer, effective until the next session of the legislature. Without any contingent funds, and without Senate confirmation, the appointment was indeed strictly honorary. Still, this failed to dampen the new State Geologist's enthusiasm. In a letter of thanks, he assured Governor Richards: "I realize that there

¹⁸ A.A. Johnson to W.A. Richards, February 9, 1895, Governor's Correspondence, De Forest Richards, MA346, Box 2, Wyoming Department of Archives, Museums and History, Cheyenne (hereafter cited as Wyoming Archives). Since the Constitution specifically states that the State Geologist is to be appointed by the Governor, with consent of the Senate, Johnson's exact reasoning on this point is unclear.

¹⁹ Wilbur C. Knight to Judge J.W. Lacey, October 18, 1897, Governor's Correspondence, De Forest Richards, MA346, Box 10, Wyoming Archives. This box also includes the letter from Lacey to Richards, dated November 11, 1897, endorsing Knight's application.

are no funds for me to work with, but I will ply my pen and do what I can to interest men in our resources."²⁰



1899(?) document appointing Wilbur C. Knight as de facto State Geologist.

²⁰ The commission appears in Wyoming Secretary of State, Record of Commissions, Volume IV, p. 542. The document is apparently misdated, as evidence clearly indicates that it was issued in 1897. By November 1899, both Governor William A. Richards and Secretary of State Charles Burdick no longer held office. Also, a badly stained letter in Knight's letterpress books contains the handwritten postscript: "I received the appointment of State Geologist on the 22nd of Nov." Legible correspondence preceding and following the page for this letter suggests the postscript was written in very late November or December 1897. See Letterpress Book I, p. 593, Wilbur C. Knight Collection, American Heritage Center, University of Wyoming. Also, the Wilbur C. Knight biographical file at the same repository contains Knight to William A. Richards, December 1, 1897, in which Knight acknowledges receipt of the commission.

Like his predecessors, therefore, Knight sought to promote Wyoming's mineral resources. He did so primarily by writing on what he knew about Wyoming geology. What exactly he did in each of his various, and simultaneous, positions of geology professor, geologist for the Agricultural Experiment Station and *de facto* State Geologist, is virtually impossible to differentiate. Nevertheless, he published a wide variety of works during the 1890s and early-1900s on Wyoming metal mining, coal mining, petroleum, paleontology and many other facets of geology. Some appeared in the leading scientific journals of the day, and others as bulletins of either the University's School of Mines or the Agricultural Experiment Station. A few bulletins were even issued under the auspices of the University Geological Survey of Wyoming, an impressive sounding, although apparently unofficial, entity. In these various publications, Knight often expressed his firm belief that Wyoming's future economic prosperity rested largely on a healthy mining industry. Certainly, a prosperous minerals industry would itself produce revenue, but Knight's argument went much deeper. He also contended that if agriculture truly was to be successful, it needed a home market. Mine laborers would provide this market. Unfortunately, mining bonanzas continued to evade Wyoming during this period. Still, Wilbur C. Knight made an immense contribution to the knowledge of the State's geology through his various positions, numerous writings and teachings at the University. He also published the first geologic map of Wyoming (at a scale of one inch equals 12 miles).²¹ In the process, he became well known not only in Wyoming, but throughout the geological profession.

Knight's admirable efforts, however, failed to impress the Legislature. When the lawmakers met in 1899, they again declined to appropriate funds for the State Geologist. The 1890s were an economically difficult time for both Wyoming and the Nation, and the Legislature sought to keep State expenditures at a minimum. No evidence exists that the new Governor, DeForest Richards, followed his predecessor's example of waiting for the legislature to adjourn and then issuing Knight another commission. Still, it is clear that Knight continued to promote the development of Wyoming's mineral resources. Primarily through his duties at the University, he conducted assays on samples submitted by the public, answered inquiries, collected data and made infrequent field examinations. Thus, the geology professor effectively remained the *de facto* State Geologist until 1901, even without a formal commission.

²¹ *A Preliminary Report on the Artesian Basins of Wyoming* (Laramie: W.C. Knight, University of Wyoming Agricultural Experiment Station Bulletin 45, 1900), foldout map.

The Legislature formally establishes the Office of the State Geologist

What finally prompted the Legislature in 1901, after eleven years, to put substance into the Constitutional provision for a State Geologist? Perhaps it was partially due to the exceptional efforts of Wilbur C. Knight while he filled the post in an unofficial capacity. More likely, the resurgence of mining activity at the turn of the century changed the lawmakers' minds.



Grand Encampment smelter in Carbon County, early 1900s. (Photograph courtesy of AHC, J.E. Stimson collection.)

Most significant to the renewed interest in the State's mining industry was the Encampment copper boom, which was in full stride by 1901. Other promising copper deposits throughout the southern and central regions further reinforced hope that Wyoming would become the Nation's leading copper producer. In addition to copper, Colorado Fuel and Iron began iron ore shipments from its Sunrise mine near Hartville during 1897. Although the oil industry was still in its infancy, the continued development of the Salt Creek Field, and the completion of a refinery in Casper during 1895, led many to predict it would quickly mature. Add to all this the typically short-lived metal strikes that occurred in the Medicine Bow and Bighorn Mountains, and it is easy to comprehend why

many thought Wyoming was on the brink of a general mining boom in 1901.

Therefore, the Sixth State Legislature followed Governor DeForest Richards'²² recommendation to formally establish the Office of the State Geologist. In accordance with the Wyoming Constitution, the bill creating the Office prescribed that the State Geologist be appointed for a six-year term by the Governor, with the consent of the Senate. The Governor could remove the State Geologist "for cause", but the reason for dismissal had to be given in writing and filed with the Secretary of State. The salary for the position was set at \$2,400 per year, and the Legislators disqualified anyone with a pecuniary interest in any Wyoming mining property from holding the Office.

The duties of the State Geologist remained essentially the same as they had been during the Territorial period — to promote capital investment in Wyoming and its mineral resources. Specifically, the law establishing the Office stated that:

*It shall be the duty of the state geologist to make reports on mining property where a proper certificate has been presented showing sufficient development and upon the payment of fees hereinafter prescribed, and his reports shall be in such form as is usually required by mining exchanges, for the purpose of obtaining a working capital, provided that such property shall be deemed by the state geologist of sufficient value to warrant a favorable report. It shall be the duty of the state geologist to collect official information relating to the various mines and mining projects of the state, and to publish and circulate such information as he may deem advisable for advertising the mineral wealth of the state and also to take any steps which would be likely to advance the development of the mining industry.*²³

The bill also required the State Geologist to examine, classify and return — free of charge — all rock and mineral specimens submitted to him for evaluation. Finally, the State Geologist was to serve as *ex officio* Inspector of Mines "until otherwise provided by law".

The status of development of each mining property determined the fee charged for a report on it. Prospects, defined as having less

²² Although they shared the same surname and De Forest followed William A. in the Governor's chair, the two men were not related.

²³ *Session Laws of the State of Wyoming, 1901* (Laramie: Chaplin, Spafford and Mathison, Printers, 1901), p. 42-43.

that 200 feet of development work, were to be charged \$25. Reports on workings between 200 and 500 feet cost \$50, and those on mines with more than 500 feet of workings were to be charged \$100. The law also required the State Geologist to keep an indexed record of all reports, complete with the owner's name, name of the mine and type of mine. Interestingly, the law made no specific provision to make this record public. It did, however, mandate that a summary of all reports and examinations, together with any other official activities, be included in an annual report to the Governor.²⁴

During the thirty-two years in which the Office of the State Geologist sought to encourage Wyoming's mineral industry under this law, seven men occupied the post. Each brought with him his own unique background, and this often affected how he perceived his duties as State Geologist. Only simple math is necessary to realize that fulfilling the six-year term proved more the exception than the rule. Just three — Beeler, Trumbull and Marzel — survived their full tenure. The others lasted anywhere from two to four years. A change in the political party holding the Governor's chair accounted for most of the turnover although the Office of the State Geologist itself appears to have been apolitical. Democratic State Geologists served in Republican administrations and vice versa. Apparently, the changes that coincided with the ascendancy of a new party (1911, 1919, 1923 and 1927) stemmed more from the desire of the new administration to appoint its own officials than partisan politics.



The State Capitol in Cheyenne in the early 1900s. This building housed the Office of the State Geologist through its 32 years of existence.

²⁴ More often biennial reports were made just prior to the convening of the Legislature during odd-numbered years.

Clearly, those who served as State Geologist were, as a whole, more qualified than had been their Territorial counterparts. All except Edwin Hall, about whom no biographical information is available, had at least some academic training in the mining and petroleum sciences. Most also came to the Office of the State Geologist with practical field experience. This combination of education and experience was undoubtedly very beneficial, for the duties of the State Geologist changed along with Wyoming's mineral industry during the first three decades of the Twentieth Century.

Henry C. Beeler, Wyoming State Geologist

Governor DeForest Richards appointed Henry C. Beeler as Wyoming's first official State Geologist on May 31, 1901. Beeler graduated from Colorado School of Mines in 1896. After completing his studies, he was employed as a mining engineer for the firm Kilpatrick Brothers and Collins of Beatrice, Nebraska. In this capacity, he examined and reported upon numerous mining properties in the Black Hills, Idaho and Utah. In Wyoming, his work took him to the Grand Encampment copper district, the Bighorn Basin and Bighorn Mountains and the coal fields adjacent to the Union Pacific Railroad. Immediately prior to his appointment, Beeler was employed as an engineer and chemist for the firm's Cambria Mining Company, which mined coal near Newcastle.

Beeler's tenure was noteworthy not only because he lasted nearly eight years, which was longer than anyone else during this era, but also for the expansion of the State Geologist's responsibilities.



*Henry C. Beeler, State Geologist,
1901 to 1908.*

The Legislature enlarged the Office's authority at least six times during Beeler's term, and almost always it did so upon his recommendation. The first State Geologist took his charges very seriously. These responsibilities included collecting information on the State's various mining projects, and taking any steps that were likely to advance development of the mineral industry.

Immediately after taking office, the new State Geologist made examinations and reports on Wyoming mining properties his primary responsibility. Virtually none of the Territorial Geologist's records could be found, so in essence Beeler had to start from scratch. By the time of the first report to the Governor in 1902, twenty-two comprehensive reports were completed, mostly on copper prospects in Carbon and Albany Counties. Informal visits were made to another 138 properties throughout the State. Matters were well underway, but there would be much more than examinations and reports required after the Legislature met again in 1903.



Cambria coal mines in the early 1900s. From Coal and Oil of Wyoming, 1911, The Wyoming State Board of Immigration, Bulletin 3.

When the lawmakers convened in Cheyenne early that year, they augmented the duties of the State Geologist by clarifying his authority as Inspector of Mines. Two separate bills accomplished this task. One officially made the State Geologist the *ex officio* inspector of all mines other than coal mines.²⁵ This law gave the

²⁵ Responsibility for the coal mines fell to a Coal Mine Inspector during both the Territorial Period and Statehood. The Territorial and State Geologists, however, sometimes included information on the geology of coal in reports, as does the Geological Survey of Wyoming today.

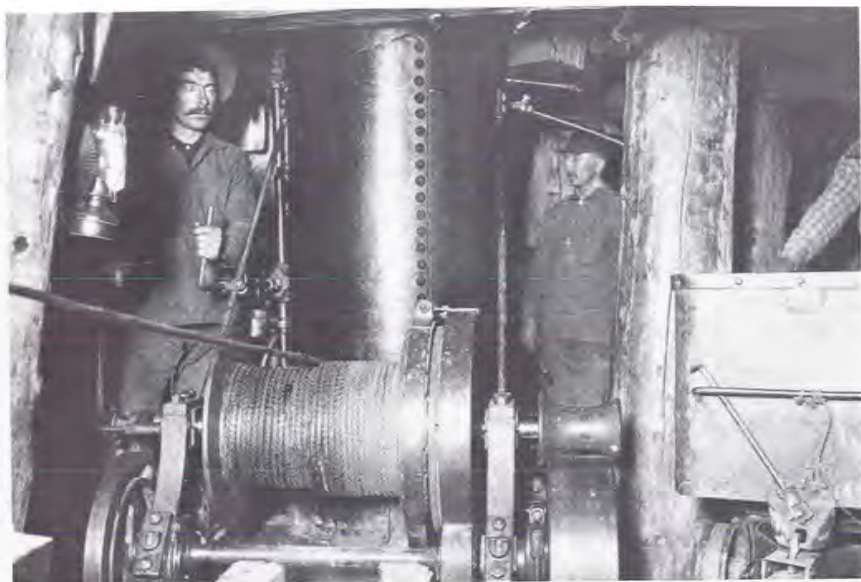
State Geologist the power to make examinations of or inquiries into any mine or mill in regard to worker safety. It also allowed him to examine and test the hoisting machinery used in metal mining operations. Accidents reported by mine owners were to be investigated, and the State Geologist was to appear at all coroner's inquests resulting from fatal mishaps. Finally, the bill also established a uniform code of bell signals for use in the mines.

The other piece of legislation concerned the sale, storage and use of explosives. As Inspector of Mines, the State Geologist could regulate and limit the amount of explosives kept in mining camps and towns having no municipal law governing these dangerous tools of the mining trade. All nitroglycerine, powder and other high explosives sold in the State had to be marked with its date of manufacture, and the sale of explosives over a year old was forbidden. Storage magazines were to be structurally sound enough to remain intact should their contents explode. In addition, the magazines were to be located a safe distance from the mine mouth, and only enough explosives for one shift's work were to be removed from them. Another important safety measure prohibited the use of steel and iron tamping bars, notorious for causing sparks and prematurely setting off a charge.



Paulson Copper and Iron Mining, Rawlins, was typical of small mines that produced metals in the State at the turn of the century. (Photograph courtesy of AHC, S.H. Knight collection.)

This legislation regarding the State Geologist as *ex officio* mine inspector was passed upon Beeler's recommendation. His concern for mine safety, however, did not end with these two laws. The next Legislature, again acting on Beeler's advice, outlawed the use of intoxicating liquor in or near a mine. A 1904 accident at Carbon County's Doane-Rambler Mine, in which a drunken miner barely escaped serious injury when he set fire to powder in a car at the mouth of the shaft, prompted the State Geologist to champion the new law.



Penn mine hoist about 1900. The State Geologist as ex officio inspector of mines conducted inspections of mine hoisting machinery such as this. (Photograph courtesy of AHC, S.H. Knight collection.)

Beeler knew that mine safety played an important role in the development of Wyoming's mineral resources. If the State acquired a bad reputation for mine safety, it would be all the more difficult to attract capital. No one would put money into a mining operation if it was likely an explosion would ruin the workings, and with it the investment. Yet, Beeler also recognized that blaming accidents on the mine owners was equally discouraging. Thus, a pattern emerged in his accident reports which usually absolved the proprietor from any blame. In this policy, Beeler merely reflected the common attitude of the day that, while workers' safety must be secured, government must not discourage private business by passing excessively burdensome regulations.



Snapshot of General Manager Minnium, State Geologist Beeler (center) and Judge McClure of Kansas City, Missouri, taken during their inspection of the property at the McConnell shaft. (From H.C. Beeler, 1908, Report on the North American Asbestos Property on Casper Mountain, Natrona County, Wyoming.)

To Beeler, the compilation of accurate statistical information was even more important than mine safety in promoting Wyoming's mining industry. In his first annual report of 1902, the State Geologist asked for the creation of an agency that would collect and disseminate mining statistics. The request, however, failed to evoke an immediate response. The Legislature did not act until 1905.

The Eighth State Legislature empowered the State Geologist to establish a Bureau of Mining Statistics "wherein information relative to the mineral industry of Wyoming may be filed for reference and distribution..." Yet, the provisions of the bill rendered the Bureau almost entirely ineffectual. It only authorized the State Geologist to provide forms to mine owners for the compilation of certain information on their operations. This information included: the name of the owner(s); the address of the company officers; the location of the property; the amount of stock issued and sold; an account of all expenditures; a statement of the work completed and an estimate of the work proposed for the coming year; record of shipments made and their value; and other information that would be of interest to potential investors. The filing of these forms with the Office of the State Geologist remained strictly voluntary. Those owners choosing to file paid a one dollar fee, and certified copies of the statement for a particular property were made available to interested parties at

the same cost. The legislation became commonly known as the "Voluntary Publicity Law". Its legal force lay in the fact that mine owners who knowingly gave false information would be guilty of felony perjury.²⁶

Beeler justified the Bureau of Mining Statistics on three grounds. First and foremost, it would concisely advertise the State's mineral wealth and thereby attract capital to legitimate mining enterprises — in other words, those filing forms. This the Bureau accomplished only partially, at best, due to its voluntary nature. In fact, Beeler soon realized this weakness in the law and for the remainder of his term unsuccessfully advocated a compulsory publicity law. Second, the filing and copy fees would add to the revenue generated by the State Geologist's office. Again, the law only partially fulfilled this goal. Third, the Bureau would assist small, undercapitalized owners in attracting needed investors, while at the same time protecting small investors by pointing to what were presumably sound ventures. This last justification assumed great importance, as incidences of mine fraud were becoming more numerous.

Indeed, Beeler devoted much of his time after 1905 to investigating mine swindles. During the Encampment copper boom especially, Wyoming emerged as a haven for stock manipulators thanks to its lax corporation laws. Dishonest stock schemes only tarnished the image of the State and its mineral industry, so Beeler expended a great deal of time and effort exposing the "fakirs", as he called them.

Beeler, acting as the State Geologist, intervened in cases of mining fraud on at least three separate occasions. He testified in the case of *Moore v. Pusey*, heard in a Pennsylvania court during 1905. Pusey was accused of fraudulently promoting Wyoming mining stocks, and the State Geologist's testimony was so damaging that it took the jury just a few minutes to find Pusey guilty. The next year, Beeler traveled to New York and Boston to testify against the North Platte Copper Mining and Smelter Company, which had made false claims to its investors about the richness of their Converse County prospects. Ultimately, the company's mining engineer was convicted of fraud and obtaining money under false pretenses. Finally, Beeler also investigated charges that a placer claim at Red Canyon, near Lander, had been salted. The inquiry began in October, 1907, and consumed nearly all of Beeler's remaining time in office. In fact, Beeler complained at the end of his term that too much of the State Geologist's time was spent as an expert witness in such trials. He contended that either the litigants should hire their own

²⁶ The full provisions of the act are in *Session Laws of Wyoming, 1905* (Sheridan: Sheridan Post Company, Printers, 1905), p. 143-144.

experts, or compensate the State Geologist for his time at the rate of \$25 per day.

Thus, Beeler envisioned the advocacy of mine safety, the compiling of data through the Bureau of Mining Statistics and the suppression of fraudulent mining schemes as the primary means of fulfilling his responsibility to encourage Wyoming's mineral industry. When the opportunity presented itself, he set about this task in other ways as well.

For example, Beeler persuaded the 1907 Legislature to restructure the fees charged by the State Geologist for reports. He argued that the original method of setting fees according to completed work tended to discriminate against the small prospector while at the same time favoring the large operator. Many times a location had to be developed 500 feet or more before it showed much promise, but the law required the State Geologist to charge \$100 for making the report prospectors needed to attract investors. On the other hand, preparing a report for a large-scale operation might take several days and cost the owners the same amount. Therefore, Beeler suggested that the fees be set at a \$25 minimum, with an additional charge of \$25 per day if the examination and report required more than a single day. Given the numerous marginal deposits scattered throughout Wyoming, Beeler believed that the small prospector deserved greater consideration. The lawmakers agreed.

The 1907 Legislature also made the State Geologist a participant in the development of state-owned lands. A law was passed that year that provided for prospecting and development of State mineral lands. This law required the State Geologist to visit and make reports, free of charge, on any State lands under mineral leases when requested to do so by a member of the State Board of Land Commissioners.

Another piece of 1907 legislation further involved the State Geologist in promoting Wyoming and its resources outside his Office. In that year, the Legislature created a Department of Immigration, which was given "jurisdiction over all matters pertaining to the advertisement of Wyoming and the attraction of settlers and investors through the exploitation of the resources of the State". The new agency consisted of the State Geologist, the Commissioner of Public Lands and the State Engineer.²⁷ As a

²⁷ *Session Laws of the State of Wyoming, Passed by the Ninth Legislature* (Laramie: Laramie Republican Company, 1907), p. 125. The Department of Immigration continued to exist until the 1913 Legislative Session, so Edwin Hall and Claude E. Jamison also served as members.

member of the Department of Immigration, Beeler authored such promotional tracts as "Wyoming — why not?" and "Some views of Wyoming".

The Office of the State Geologist also issued its own publications, designed to increase awareness of the State's mineral resources. By 1904, a total of 12,500 copies of such works were printed. They covered a variety of subjects including the mining laws of Wyoming and the United States, the South Pass gold district, several copper districts and a directory of Wyoming mines and minerals. Some 7,000 of these publications circulated at the 1904 Louisiana Purchase Exposition in St. Louis, and many of the rest were placed in libraries, industrial exchanges and technical societies throughout the world. In addition, Beeler wrote numerous articles for journals and magazines.

The highlight of the publication effort, however, came in 1907 when the Denver-based Clason Map Company produced an industrial map of Wyoming. The State Geologist assisted the firm by providing the necessary data. Beeler proudly reported to the Governor that this was the only cost to the State for the map.

As the above account of Beeler's administration indicates, his tenure as State Geologist was marked by many notable accomplishments. Nevertheless, he failed to escape the financial problems that had plagued his Territorial predecessors. As early as 1902, Beeler was already complaining about insufficient funds. He requested that the next Legislature provide the Office with a \$2,000 contingency fund in order to hire clerical help. This would release him from his mundane duties and allow him to devote more time to the more meaningful responsibilities. Much to Beeler's delight, the 1902 Legislature responded favorably to his request. Unfortunately, the contingency fund remained at this level until 1911. By 1908, Beeler was again protesting the lack of funds and claiming that it greatly reduced the Office's efficiency.

Monetary problems even led to a bleak prediction for the future of the State Geologist. The dearth of funds prevented extensive field work, and the hiring of support personnel was all but impossible. Beeler asserted in his last report to the Governor that either the Office should be funded appropriately, or it would be in the best interest of all simply to disband it. Actually, he had a more constructive suggestion to make. The persistent money problems might be remedied by creating a Department of Mines that would combine the offices of State Geologist and Coal Mine Inspector. The Department of Mines would consist of a commissioner appointed by the Governor, who would serve as both State Geologist and Coal Mine Inspector. The staff would include

two field coal mine inspectors, a field assistant and a stenographer. Beeler estimated that a combined Department of Mines would save at least \$200 annually. Governor B.B. Brooks presented Beeler's proposal to the 1909 Legislature but to no avail.

By September, 1908, Henry C. Beeler had retired as Wyoming's first State Geologist.²⁸ Exactly what led to his retirement is uncertain. Perhaps he just became frustrated over the monetary problems. Another contributing factor no doubt was the depression that hit Wyoming's metal mining industry after 1907. The Encampment copper bubble burst in that year as the price of copper plummeted. With it went the heart of Wyoming's hard-rock mining industry. In fact, this also represented a turning point in the history of the State Geologist's office. Beeler, like his Territorial predecessors, devoted most of his promotional effort toward precious and base metals. Yet, in many respects the Encampment copper boom was the last hurrah for the steadfast hope that Wyoming would experience a traditional, Nineteenth Century mining bonanza. The bonanza would eventually come, but not in the form of gold, silver, copper or iron. After 1908, oil and gas increasingly rose in importance to Wyoming's mineral industry. As a result, the Office of the State Geologist would likewise find itself increasingly involved in petroleum-related matters.

The Brief Tenure of Edwin Hall

Edwin Hall succeeded Henry Beeler as State Geologist. Both Hall and his term in office are something of an enigma. Virtually nothing is known of his life. Also, he served as State Geologist for only two years, hardly enough time to acquaint himself fully with his duties, let alone accomplish much. Still, he tried.

Hall took office following confirmation by the 1909 Legislature. He set as his first priority an extensive tour of the mining camps north of the Union Pacific tracks, an area of growing importance to the State's mineral industry. The three-month, 7,000-mile jaunt took him to an asbestos operation atop Casper Mountain, the Sunrise iron mine, the scattered gold workings around South Pass, a sulfur mine near Thermopolis, the Bear Lodge gold district and the porphyritic rocks around Kirwin and the Sunlight Basin. Also visited were the Salt Creek, Dallas Dome, Newcastle and Greybull oil fields. Once back in Cheyenne and writing his annual report, Hall concluded that in his judgment, "the undeveloped mineral resources of the State are probably of equal value with any similar area of the

²⁸ The *Wyoming Blue Book*, p. 970, gives Beeler's date of retirement as February 20, 1909. An article in *The Wyoming Industrial Journal* 10 (September, 1908): p. 19, however, announced his retirement at that time.



View of steam shovel operation, Sunrise iron mine, Platte County, Wyoming. This mine was visited by Hall in 1909 or 1910. (Photograph courtesy of AHC, J.E. Stimson collection.)

West”.²⁹ The new State Geologist also predicted that the oil industry, which was only then beginning to flex its muscle, was destined to become a leading source of revenue for Wyoming. Inadequate transportation and the absorption of capital by the livestock interests were two major reasons why the mining industry failed to live up to its potential, according to Hall.

Another factor that frustrated mineral development, was mining fraud. Once again, the State Geologist found himself embroiled in a case of deceptive stock promotion. In 1909 Hall investigated a scheme promoted by two easterners named Denoon and Tranter. The two “mining sharks”, as Hall called them, located about 400 iron claims and a similar number of bentonite claims near Moorcroft. Notice of the claims was posted, but no substantial development work was ever done. This, however, did not stop Denoon and Tranter from selling the worthless claims to unsuspecting investors for an estimated \$30,000. Once the scheme was uncovered, the State refused to prosecute the two men since a 1909 law designed to

²⁹ Edwin Hall, *Report of the State Geologist, March 1, 1910* (n.p., 1910), unpagged. A copy of this report is in the possession of the Geological Survey of Wyoming in Laramie.

prevent such frauds was not in effect at the time of the crime. The Federal Government also chose not to pursue the case once it found out that a private express company, and not the Post Office, was used by the con artists to conduct their business. It greatly annoyed Hall that Denoon and Tranter escaped prosecution, but more galling was the bad publicity that the incident brought to Wyoming mining.

Hall, of course, did not spend all his time making tours and investigating fraud; he also had some ideas about how to improve the Office of the State Geologist. Hall's 1910 report recommended that the laws relative to the State Geologist be repealed and the Legislature create instead an Economic and Geological Survey. The primary responsibility of the Survey would be to identify all resources of economic importance and encourage their exploitation by publicizing their location in a bulletin. The State Geologist would be the Survey's Director and would be helped by a geological assistant, a chemist at the University and a stenographer clerk. In many respects, the suggestion foreshadowed the Geological Survey of Wyoming that came into existence twenty-three years later. Hall estimated that such an agency would require a \$15,000 annual appropriation. He also suggested that the State Geologist's annual salary be raised to \$3,600. Hall argued that unless this reorganization and increased financial support were forthcoming, the Office of the State Geologist should be abandoned altogether.

The Office of the State Geologist was not dismantled, but shortly after making this proposal Hall was gone. On November 30, 1910, Hall tendered his resignation effective at the end of the year. Two days later, Governor Brooks accepted Hall's resignation and thanked him on behalf of the State for "endeavoring to promote mineral development in so many different sections and along so many different lines during the past year".³⁰ The General Election, three weeks earlier, probably prompted Hall's action. After the new year, the Democratic victor, Joseph M. Carey, would assume the Governor's chair, and the new administration undoubtedly would want to appoint its own officials. Ironically, Carey put Hall's plan for an Economic and Geological Survey before the 1911 Legislature, but it refused to act on the recommendation.

The stormy term of Claude E. Jamison

The new administration selected Claude E. Jamison to be the State Geologist, and he took office February 1, 1911. A graduate

³⁰ B.B. Brooks to Edwin Hall, December 2, 1910, Governor's Correspondence, B.B. Brooks, Box 37, Wyoming Archives.

of the Missouri School of Mines and Metallurgy in his hometown of Rolla, Jamison was employed as a field superintendent for two Lander oil companies at the time of his appointment. His educational background and experience in the oil industry certainly made Jamison well qualified for the position, but his willingness to challenge the man who appointed him led to his removal two years later.

Like so many other appointees, the new State Geologist began his term by touring some of the State's major mining areas. Jamison spent most of May in central Wyoming examining major oil fields, a Fremont County coal field, the South Pass region and several copper prospects in northern Albany and Converse Counties. Later in the year, Jamison also studied iron ore deposits along the Laramie River, Hahn's Peak and the Pacific Railroad in southern Albany County. He never said exactly what he thought of these mining properties, but his field work did result in the geologic mapping of portions of Fremont, Converse, Carbon and Natrona Counties.

When he was not out in the field, correspondence consumed much of Jamison's time. He reported in 1912 that the Office had received over 1,800 letters during the year, seventy percent of which were out-of-state inquiries about Wyoming's mineral resources. Most of them requested maps, reports and other literature. Many others sought information on the State's oil fields. At the time of the next annual report, over 1,400 more letters had been received, nearly two thirds of them dealing with Wyoming's rapidly developing petroleum industry.

Jamison attributed the avalanche of mail to the Office's revitalized publication program. In fact, it was at this time that the State Geologist began issuing numbered bulletins. During Jamison's short tenure, bulletins appeared on State and Federal mining laws, the geology and resources of a portion of Fremont County and the Douglas, Muddy Creek and Salt Creek oil fields. Because these publications publicized the State's natural resources, they were sometimes referred to as published by the "State Geological Survey". Jamison believed wholeheartedly in the value of publishing such information and complained that meager appropriations adversely limited the use of this important promotional tool. Hoping the right people would hear, he wrote in this 1912 report: "If Wyoming is to attain the rank [of mineral development] to which she is entitled, it will be necessary not only that she realize more fully the extent of her resources and the possibilities of their use, but that she publish these facts to the world".³¹

³¹ C.E. Jamison, *Biennial Report of the State Geologist of the State of Wyoming, 1912* (Cheyenne: The S.A. Bristol Company, Printers and Binders, 1912), p. 13.

These words indeed fell on the right ears. When the Legislature met in 1913, it granted the State Geologist a \$15,000 contingency fund. This represented a spectacular three-fold increase over the previous biennium's appropriation. Governor Carey, however, reduced this to \$10,000 before signing the general appropriation bill.

Infuriated, Jamison brought suit against the Governor in order to determine the legality of the cut. As a result, the Governor refused to authorize expenditures by the State Geologist. By June 1, 1913, vouchers issued by the State Geologist in April for instruments and furniture, plus the salaries of assistants, went unpaid. When the Wyoming Supreme Court upheld Carey's budget-cutting on June 16, Jamison had already resigned his post. He no doubt knew that such a challenge to the Governor's authority would ultimately end with his removal.

The busy term of Loyal W. Trumbull

Two days after the court's decision, Loyal W. Trumbull replaced Jamison as State Geologist. Trumbull, a graduate of the Colorado School of Mines, taught geology and mining engineering at the University of Wyoming from 1904 to 1908. Before receiving his appointment as State Geologist, he worked for a number of California mining operations and as a construction manager for Frank C. Bosler in Rock River.

Trumbull's tenure is noteworthy in several respects. First, he managed to complete his full term of office, not vacating the post until the Republicans regained the Governor's chair in 1919. Also, Trumbull's promotion of the State's mineral industry actually included discouraging development of questionable properties. This represented a new and more realistic form of "boosterism" than that previously practiced by the State Geologist. Finally, the rapidly growing petroleum industry commanded an increasing amount of the State Geologist's time and effort during this period. To these exceptional characteristics of Trumbull's term can be added the usual report-making, publication and promotional endeavors, thus making it one of the busiest and most productive administrations of the Office.

Following the usual pattern, Trumbull initially spent most of his time in the field acquainting himself with the State and its mineral resources. Unlike his predecessors, however, these expeditions did not always result in a wholesale optimistic prediction for future mineral development. Trumbull believed that the duties of his Office included advising against drilling and prospecting in areas unlikely to yield profitable results. Understandably, this stance often drew the scorn of residents in the area receiving such an



Loyal W. Trumbull in 1907, State Geologist, 1913 to 1919.

unfavorable report. Sounding like the typical progressive of the era, who urged efficiency in all things, Trumbull justified his unpopular position by replying: "It seems as clearly the duty of the Geologist to prevent useless waste [of capital] as it is to promote the mineral industry of the State, for money wasted is so much money lost from possible development uses".³²

³² L.W. Trumbull, *The State of Wyoming Geologist's Office Biennial Report, 1913-1914* (Cheyenne: The S.A. Bristol Company, Printers and Binders, 1914), p. 156.

Not all the results of this early field work were negative. Given the lateness of Trumbull's appointment, very little could actually be accomplished. Nevertheless, he did find time to map the area around Upton and Buck Creek north of Lusk. In the fall, the Atlantic City region also was studied. These efforts prompted Trumbull to seek funds for the compilation of a state geologic map. Previously published bulletins provided most of the needed data, but gaps would have to be filled. The request, made first in 1914, was finally honored three years later when the Legislature appropriated \$4,000 for the printing of a state geologic map. Unfortunately, a cut in the Office's contingency fund, coupled with the unexpected high cost of map making, stalled the project. In 1917, Trumbull was able to publish his geologic map at a reduced scale (1 inch equals approximately 18 miles) in a report titled, *Petroleum geology of Wyoming*. This was the first geologic map of Wyoming published in color.

During his tenure, Trumbull also urged State participation in a U.S. Geological Survey program for producing topographic maps. Under the program, states designated areas they wanted mapped, and the U.S. Geological Survey furnished the men and apparatus to do the actual work. The Federal agency even printed the finished product. In order to participate, a state had to contribute half of the cost. For Wyoming, Trumbull estimated it would cost, \$3,000. The Legislature, however, chose not to grant the funds. Yet, the Office of the State Geologist did publish a general topographic map of Wyoming during the 1914-1916 biennium, which depicted elevation using a contour interval of one thousand feet. This 1:500,000-scale map was published in color.

While these mapping projects met with limited success, the publication of bulletins flourished. Twelve additions to the series appeared during the six years in which Trumbull served as the State Geologist. Nearly all dealt in one way or another with the burgeoning oil industry. Some discussed the petroleum geology of the State, and others gave detailed descriptions of specific oil fields. Trumbull also began collecting publications on Wyoming geology for an office library. This gargantuan task resulted in the publication of a bibliography of such works shortly before Trumbull left office.

The surging petroleum industry not only stimulated publication, but also most of the other work performed by the Office during this period. Corporate geologists and wildcatters alike searched throughout the State for new oil fields. Although production would not be great until the advent of the automobile age after World War I, the flurry of activity at this time was significant. Moreover, Trumbull strove to make the State Geologist influential in how the

Wyoming petroleum industry operated. Besides, other elements of the mining industry were in such a depression that they demanded very little official attention. In fact, Trumbull even suggested that the Voluntary Publicity Law be repealed since no one used it anymore.

Within a year of assuming office, Trumbull was recommending legislation that would actively involve the Office in petroleum development. For example, it was proposed that drillers file well logs with the State Geologist. Trumbull also advocated a law requiring anyone plugging a well to file a certificate stating that fact with the Office. He further endorsed the creation of a Commission of Oil Well Operation. Such measures, Trumbull argued, would keep the State Geologist abreast of petroleum development and help the State shut off escaping gas and water in abandoned wells. For the time being at least, lawmakers decided not to act on these suggestions. Nevertheless, these legislative proposals demonstrate that Trumbull was a pioneer in the crusade against oil and gas waste, a cause that would become much more popular shortly after he left office.

In addition to recommending legislation, the State Geologist further advanced the petroleum industry by publicizing new fields. As a matter of fact, he credited the Office with the emergence of the Pilot Butte oil field and the Rock Springs gas field. After all, it was the State Geologist who brought these structures to the public's attention and urged their development. Also, Trumbull continued to take pride in the fact that he discouraged investment in fields of little promise.

A third way in which Trumbull used his Office in an effort to foster the petroleum industry was his outspoken criticism of the Federal Government's policy of withdrawing mineral lands within the public domain from entry. Beginning in 1910, the President had the power to withdraw public mineral lands from homesteading and commercial exploitation. The Withdrawal Act of 1910 was designed to conserve natural resources and prevent corporations from using the liberal provisions of the various homesteading laws to obtain valuable resources at a price far below their true value. Wyomingites, and most other westerners, however, viewed the policy as an inordinate obstacle to economic development. The way in which the Federal Government implemented the act especially annoyed Trumbull. For example, he vehemently opposed the withdrawal of the Moorcroft oil field as a petroleum reserve. An earlier examination of the field had convinced him that it had little potential of becoming a major producer. Trumbull traveled to Washington, D.C., in 1914 in order to argue his point and eventually convinced officials to reopen the area to homesteading.

Trumbull contended that withdrawals such as the one at Moorcroft caused several hardships for the State. Homesteaders who had not proved-up before the reserve was declared could not secure patents. Those who had already patented their land sometimes leased it to fraudulent oil companies. These fake oil enterprises then sold stock under the premise that the land *must* be rich in oil or else the Government would not have withdrawn it. Finally, the indiscriminate creation of mineral reserves encouraged a cadre of secrecy among the legitimate oil companies. News of a promising new field was suppressed, lest the Federal Government learn of it and withdraw it from entry. Even Trumbull admitted to some trepidation in publishing bulletins on new oil fields and other mineral finds for the very same reason.

The State Geologist also resented the fact that the Federal Government played such a large role in mineral development. Certainly, the Withdrawal Act angered most westerners, but by 1918 Congress was working toward a compromise. The result of this compromise was the Mineral Leasing Act of 1920. This law still serves as the foundation for the mineral leasing of public lands, and divides royalties from production between the states and the Federal treasury. As Trumbull's term neared completion, the Mineral Leasing Act was being debated by Congress. To him, it was no compromise. In his final biennial report, Trumbull launched a diatribe against what he perceived as a Federal conspiracy against Wyoming's mineral industry. In words born of the earliest stages of the so-called Sagebrush Rebellion, the State Geologist thundered:

Federal withdrawals of oil lands have taken place from time to time. Always after much money and effort had been expended by individuals and corporations in prospecting. Such withdrawals are being used as a club in the hands of the Federal Bureaus to compel passage of a law by Congress, which will allow the Bureaus to administer the public domain.

Were the proposed law to apply to withdrawn lands, Wyoming in general would not so strenuously object, but to have all our remaining public domain, non-withdrawn as well as withdrawn, handed over to the incompetent, as well as possibly questionable, management of the Federal Bureaus seems almost unbearable. We do not doubt that petroleum development in Wyoming is farther advanced today than it would have been had the lease law passed and become a law two years ago.³³

³³L.W. Trumbull, *Biennial Report of the State Geologist, 1916-1918* (u.p., 1918) unpaginated. A copy of this report is in the possession of the Geological Survey of Wyoming in Laramie.

Besides being critical of the impending Mineral Leasing Act, Trumbull's final report also offered several suggestions on how to improve the Office's operation. The oil industry, Trumbull argued, was well-established, and companies had their own corps of geologists in the field. Certainly, they could map and publicize the new fields much quicker than the State Geologist. Therefore, Trumbull proposed that the Office merely concentrate on gathering and distributing petroleum statistics.

Even though this recommendation would have decreased the workload somewhat, Trumbull also requested that the State Geologist's salary be raised. By statute, the State Geologist had been receiving \$2,400 a year since 1901. No specific new salary was suggested, but Trumbull did point out that geologists in the private sector commanded between \$5,000 and \$6,000 a year. The outgoing State Geologist himself had turned down several lucrative job offers during his tenure and warned that if the salary was not raised, it would be difficult to attract a competent geologist to serve the State.

Trumbull's ideas nearly proved fatal to the future of the Office of the State Geologist. In November, 1919, Robert D. Carey regained the Governor's chair for the Republicans, and when the new executive addressed the Legislature early the next year, Trumbull's suggestions were very much on his mind. Carey told the members of the House and Senate that the Office of State Geologist, as it then existed, should be disbanded altogether. The Governor agreed that most companies hired their own geologists, so there was little need for such a State official. He also reiterated Trumbull's point that fraudulent mining companies sometimes used favorable reports issued by the State Geologist to perpetrate their schemes. Finally, the new administration did not believe that the cost of the office — \$2,400 a year for the State Geologist's salary and \$4,250 a year for expenses — justified the return to the State. Carey claimed that the State needed instead an official specifically charged with overseeing development work and drilling in the oil fields, especially those on State lands. What little supervision the rest of the mining industry required could also be assigned to this official. The lawmakers failed to adopt Carey's recommendation, however.

Glenn Beckley Morgan and regulation of the oil and gas industry

After Carey's reorganization plan was rejected, Glenn Beckley Morgan became Wyoming's next State Geologist. Morgan graduated from the Missouri School of Mines at Rolla in 1904, and before accepting his post in Wyoming worked as a mineral and oil expert for the Department of the Interior. The choice of Morgan was a



Glenn B. Morgan, State Geologist, 1919 to 1923.

wise one, because during his term the oil and gas industry demanded more of the State Geologist's attention than ever before.

The 1919 Legislature, while vetoing reorganization, did amend the duties of the State Geologist. New legislation stated in more specific terms the duty of the State Geologist to examine and report on State and school lands upon request by the State Land Board or the State School Land Board. The law also required reports on any other lands in which the State was interested. These reports were to be filed with the Commissioner of Public Lands. With petroleum production increasing markedly, State officials looked to their lands as a significant source of revenue. Indeed, Morgan devoted much of his time to this duty during his first year in office. The State Geologist was now also charged with enforcing the few laws that existed relating to the oil industry. Furthermore, the lawmakers raised the State Geologist's annual salary to \$3,600.

Very little outside of oil and gas matters consumed Morgan's attention during his nearly four years in office. The State Geologist republished Trumbull's geologic map of Wyoming on December 1, 1919, incidentally without crediting Trumbull. Like his predecessors, Morgan annually supervised the mines and mineral exhibit at the

State Fair. In 1921, Morgan also sought a \$6,800 appropriation for conducting extensive field work for two summers. The Governor, however, successfully opposed the extra aid, saying nothing should be done until sufficient funds became available for a complete geological survey of the State. This prompted Morgan, one year later, to suggest (not formally recommend) a less extensive mineral survey of just state lands. The program, if approved, would have put at least two crews in the field each summer with the purpose of identifying the potential of State lands for mineral leasing. Morgan estimated that the survey would take a decade to complete, but believed it would ultimately greatly increase the \$1 million annual income the State already received from mineral production on its lands. Nothing came of the suggestion at the time, but elements of it were later adapted by the Geological Survey of Wyoming. These projects aside, Morgan spent most of his remaining time dealing with various aspects of the petroleum industry.

Understandably the new State Geologist brought to the Office a much different attitude toward the Federal Government than his predecessor. In his first report to the Governor, Morgan urged passage of a State oil and gas conservation law modeled after the recently passed Mineral Leasing Act, which gave the Department of the Interior supervision over oil and gas development on Federal lands. He also suggested that should the State pass its own law, it should cooperate with Federal officials on conservation. Morgan believed a comprehensive State oil and gas conservation law necessary, because he, like many others at the time, thought the United States petroleum supply would be exhausted within twenty years.

The State Geologist also proposed that the Office be reorganized to meet the new demands placed upon it by the rapidly growing petroleum industry. Declaring that the State's total mineral production carried an annual gross value of \$68,250,000, he asserted that the Office "should receive consideration from the Legislative bodies commensurate with its important relationship to the development and conservation of the State's mineral resources".³⁴ Toward this end, an office of Assistant State Geologist would be created and additional funds provided for expanded field research. Morgan also advocated the appointment of an oil and gas supervisor to enforce all laws related to petroleum development. If appointment of an oil and gas supervisor was not possible, then the new Assistant State Geologist should be someone familiar with the industry, preferably a petroleum geologist.

³⁴ G.B. Morgan, *Biennial Report of the State Geologist for the Period Ending September 30, 1920* (n.p., 1920), p. 9. A copy of this report is in the possession of the Geological Survey of Wyoming in Laramie.

The 1921 Legislature responded favorably to Morgan's recommendations although he did not receive an assistant. It passed legislation empowering the State Geologist to prescribe and enforce rules and regulations governing the drilling, casing and abandonment of wells and the waste of oil and gas on all non-federal lands in Wyoming. The bill also specified that State rules be the same as those applied by the Federal Government to its land, as Morgan had proposed. Basically, the new regulations required operators on State and patented lands to file well logs, and any other reports requested, with the State Geologist. All well logs and reports remained confidential unless needed as evidence for litigation. Drillers were also to case, control and plug all wells when asked to do so.

More significantly, the State Geologist could now appoint, with the Governor's approval, two oil and gas inspectors. These inspectors were to be petroleum engineers or practical drillers with no less than three years field experience. The lawmakers set the inspectors' salary at \$250 per month plus traveling expenses. If necessary, the State Geologist could also delegate authority to supervise the abandonment of a well or extinguishment of a fire to a Bureau of Mines inspector, or the field superintendent of any operator in the same field. This special representative was to receive no compensation, and the appointment had to have the consent of the well owner.

The new oil and gas inspectors began work on April 1, 1921, with an \$8,000 appropriation to help meet the provisions of the new conservation law. Morgan appointed C.G. Staley of Lander and O.W. White of Casper to the positions. Staley's area of jurisdiction included the Lander district and the southern half of the State. White supervised operations around Casper and in the northern half. Thus began the State Geologist's official concern with oil and gas conservation, an interest still maintained through his *ex officio* membership on the Oil and Gas Conservation Commission. The 1921 Legislation also marked an important event in the Agency's evolution. To its promotional and educational functions were added significant regulatory powers.

At the same time in which Morgan sought to regulate the petroleum industry, he also promoted it. This was accomplished primarily through a series of press bulletins, which represented the bulk of the publication effort during Morgan's tenure. Fifteen of these press bulletins appeared between 1919 and 1924. Nearly all discussed either developed or undeveloped oil fields. Morgan contributed only one bulletin to the regular series, and this was merely an update of State and Federal mining laws.

As the November, 1922, elections approached, Morgan could certainly be proud of all the Office of the State Geologist had accom-

plished to that point. However, the voters in that election ousted the Republicans and returned the Democrats to the Governor's chair. Therefore, it was all but inevitable that Morgan would be replaced once the new administration took office in 1923. Morgan quietly finished his term.

Oil, gas and money: Albert B. Bartlett's term as State Geologist

Governor William B. Ross chose Albert Babbitt Bartlett to be the new State Geologist. The son of Wyoming historian I.S. Bartlett, he was the first State Geologist born in Wyoming. He received a Bachelor of Science Degree from the Missouri School of Mines in 1907, and three years later earned a mining engineering degree from the same institution. Before his appointment at the relatively young age of thirty eight, Bartlett acquired a wide variety of experience both as a general engineer and oil geologist. He also served as deputy State Engineer from 1915 to 1917.

The person occupying the post had changed, but not the primary business of the Office. Oil and gas development continued to demand much of the State Geologist's attention, thanks to the new laws giving him regulatory powers over drilling. From 1922 to 1924, the number of oil and gas inspections skyrocketed to 266, a 177 percent increase over the limited number conducted before the new law's passage. Reports on State lands correspondingly increased as various State Land Commissioners sought to evaluate the mineral wealth of lands under their jurisdiction. Of the 249 reports on State lands completed during the same two-year period, only eighteen did not concern oil and gas potential. All this was accomplished even though the 1923-1924 budget provided for just one full-time and one half-time inspector.

The tremendous amount of work now required of the oil and gas inspectors prompted Bartlett to use his 1924 report to propose some changes. As usual, he wanted more money. He urged the upcoming Legislature to appropriate funds for two full-time inspectors and to provide an ample contingency to meet the Office's greatly expanded travel expenses. Bartlett also asked that the State establish a separate office for the oil and gas inspectors. Casper seemed the logical location for such an office since it had by then emerged as the capitol of Wyoming's petroleum industry. The Legislature denied Bartlett's request for additional funds, but an office for the inspectors was opened in the Producers and Refiners Building in Casper.

With the inspectors tending to oil and gas matters from their new quarters, Bartlett turned his attention to other things. As his predecessors had done, he supervised the mineral exhibit at the State



Well fire at Salt Creek oil field in 1922. (Photograph courtesy of AHC, H. Bossart collection.)



Albert B. Bartlett, State Geologist, 1923 to 1927. Photograph from I.S. Bartlett, History of Wyoming (Chicago: S.J. Clarke Publishing Company, 1910), p. 575.

Fair. Yet, Bartlett approached this task with a bit more relish than the others. Mining companies from throughout the State were solicited to submit mineral specimens weighing no less than one-hundred pounds. These samples were to be incorporated into an awe-inspiring exhibit. Bartlett also sought State funds to erect a mineral display as part of his Capitol Building office in Cheyenne. The State Geologist had occupied the same quarters since the Office's inception, so naturally such an exhibit — together with the laboratory Bartlett hoped to erect — required more space. Bartlett reasoned that since the responsibilities of the Office had grown since 1901, so should its work space. The Legislature, nevertheless, disagreed and no funds for office expansion were forthcoming.

Bartlett also continued the publication program, albeit in a modest way. During his four-year term, only two new reports were added to the regular series of bulletins. One pertained to Wyoming's mineral hot springs, and the other updated activity in the South Pass gold district. Bartlett also hoped to publish an annual bulletin on Wyoming mineral resources, but the overtaxed budget never allowed the ambitious and worthwhile project to materialize.

Bartlett had very little to do as *ex officio* mine inspector. Wyoming's metal mining industry still suffered from the general mining depression that followed World War I. An oversupply of iron, copper and other minerals existed throughout the Nation. Wyoming's particular problems, Bartlett pointed out, seemed especially acute due to the absence of earlier large-scale precious metal development. Often, it was gold and silver that first attracted investment in a region's mineral industry and brought with it necessary lines of transportation. Thus, while Wyoming had perhaps the greatest reserve of undeveloped minerals, the potential of its resources was not being realized. During Bartlett's term, the State Geologist endeavored to assist the mining industry in finding markets for its products, but with little success.

Bartlett blamed the failures of the Office on the lack of financial support. His final report to the Governor included the standard plea for more funding. He used the usual argument that the increase in mineral exploitation, which would inevitably result from more support, would also lead to greater prosperity in general. Bartlett had also collected information from other states with similar agencies that clearly demonstrated, to him at least, that the Office of the State Geologist was poorly supported. This, too, was incorporated into his argument for more funds. Finally, he reminded the Legislature that by 1926 Wyoming ranked fourth nationally in oil production and sixth in natural gas. These two resources alone, Bartlett maintained, helped keep Wyoming moderately prosperous

at a time in which the agricultural sector of the economy was severely depressed.

Albert Bartlett did not remain in office long enough to care very much how the Legislature responded to his request, although it did modestly increase the contingency funds. For when the 1927 Legislature convened, the Republican party had regained the governorship and control of both the House and Senate. Once again, a new administration would name its own State Geologist.

John G. Marzel and the demise of the Office of the State Geologist

John G. Marzel became Wyoming's new State Geologist on March 1, 1927. Marzel graduated from the Case School of Applied Science at Cleveland in 1905, specializing in mining and civil engineering. From the time of his graduation until 1919, he worked mostly with the United States Reclamation Service, supervising irrigation projects throughout the West. Then, Marzel and his family settled down in Torrington, where he conducted a private civil engineering practice. The future State Geologist also served as Goshen County's surveyor and Torrington's city engineer.

Had Marzel been given his choice, he would have been Wyoming's new State Engineer in 1927 instead of its State Geologist. He wrote Governor-elect Emerson in December, 1926, expressing his interest in both appointments. Given his long experience with the Reclamation Service, however, Marzel preferred the State Engineer post. Emerson ultimately named John A. Whiting his appointee for that position, so Marzel instead became the State Geologist. That it was his second choice appears not to have diminished his enthusiasm for the job at a time in which the Office grappled with a number of problems brought by a growing economic depression.

The duties of the State Geologist, in fact, were enlarged just as Marzel took office. In addition to his traditional responsibilities, the State Geologist now exercised the authority to supervise mining operations on State and school lands "in the interest of economic development". The 1927 law also allowed the Office to cooperate with the United States Government, other departments of the State, the University or private corporations "in the matter of geological, topographical, soil and mineral surveys, also industrial investigations and examinations that may bring about further economic development of the mineral resources of the State . . ." The financial contribution of the State in such cooperative ventures was limited by law to fifty percent of the total cost. Finally, the legislation empowered the State Geologist to hire a deputy at an annual salary not exceeding \$3,000. Furthermore, the Deputy

State Geologist was to have "the theoretical and practical knowledge and experience sufficient to fit him for the office."³⁵

Marzel favored naming C.S. Dietz as the new Deputy State Geologist, and Governor Emerson concurred. Prior to assuming his State post, Dietz had served for nine years as a mineral inspector for the Federal Land Office in Wyoming. He entered into his duties on June 15, 1927.

The State Geologist could not help but be pleased with the additional help of a deputy, yet he wanted even more assistance. Since the time Marzel assumed office, there had been only one oil and gas inspector. Surely, he reasoned, the estimated \$405 per capita revenue produced by the State's mineral industry in 1928 justified the expense of another full-time inspector. Marzel also proudly pointed out that under the provisions of the Mineral Leasing Act (which paid the State 37.5 percent of the royalties on production from Federal lands within its borders) Wyoming received four times more money than any other state. Still, Marzel warned that his small budget and lone inspector allowed only skeletal custodianship over Wyoming's mineral resources. Although he repeated this plea throughout his tenure, the Legislature never appropriated the funds for another full-time inspector. It did provide a salary for a half-time inspector, but the meager contingency for the Oil and Gas Division, as it was now called, made filling the position all but a moot point.

Some help did arrive in 1929 when the State Supervisor of Mineral Production, Cyrus O. Wertz, was transferred from the State Land Office to the State Geologist's staff. Wertz's primary responsibility was to monitor oil and gas production from State lands. Since the new duties, established two years earlier, obligated the State Geologist to supervise mineral production on State and school lands, the transfer made sense.

The new duties assigned the Office also prompted a 1931 request for a field geologist. If the State provided a salary for the position, this new addition to the Office would make mineral inspections requested by private individuals, corporations and agencies such as local Chambers of Commerce. The party desiring the investigation would pay the field geologist's expenses. Despite the economy of the proposal, the Legislature chose not to allot funds for a field geologist — hardly surprising given the hard times.

With the additional assistance of neither another oil and gas inspector nor a field geologist forthcoming, Marzel employed another

³⁵ A.M. Clark, compiler, *Session Laws of the State of Wyoming Passed by the Nineteenth Legislature* (Casper: The Casper Printing and Stationery Company, 1927), p. 109-110.



John G. Marzel, State Geologist, 1927 to 1933. (Photograph courtesy of Mrs. D.D. Thomas.)

tact in his attempt to stimulate mineral development. Drawing on the new legislation, he recommended in 1931 that \$5,000 be appropriated for a cooperative project that would allow the U.S. Geological Survey to conduct much-needed field work in Wyoming. The result would be new bulletins published by the Federal agency. This eventually would create a better understanding of the State's mineral wealth and, thereby, encourage production. In his request, Marzel mentioned that mineral production in Wyoming had declined by thirty percent since 1926, and this was one way of revitalizing the slumping industry. Another method would be to appropriate an additional \$2,500 for a survey of the Bighorn Basin by Princeton University graduate students. The financially strapped 1931 Legislature, however, subsidized neither cooperative project.

Much of the thirty percent decline in mineral production was attributable to a decline in oil prices, and Marzel sought to remedy this situation as well. By 1931, overproduction and depression drove the price of Salt Creek crude down to nineteen cents a barrel. As the value of production plummeted, so did the State's royalties. Whereas his colleagues just a few years earlier had warned against an impending oil shortage, Marzel now had to contend with an oil glut. Interestingly, he proposed the same solution as had his predecessor faced with a much different dilemma, namely the prevention of waste.

Marzel recommended to the 1931 Legislature that the pumping of crude from the ground when no market for it existed be made illegal. He also wanted the oil and gas inspectors empowered to scrutinize refining facilities for waste. The final leg of this three-prong attack would have defined waste as oil lost by evaporation, leakage or fire, as well as oil stored in excess of the amount needed to meet current demand. Once again, the Legislature failed to adopt the State Geologist's recommendation, but the Office did enjoy a victory that year when the Mineral Supervisor helped defeat a bill that would have greatly reduced the royalty from mineral production on State lands.

It may appear that Marzel's tenure consisted of little more than failed attempts to get the Legislature to approve new staff positions, cooperative projects and proposed legislation. However, it must be kept in mind that he served during especially difficult times. The two main pillars of Wyoming's economy, agriculture and coal mining, suffered greatly throughout the 1920s, and certainly the metal mining industry fared no better. When the petroleum industry began to falter late in the decade, matters only grew worse. In effect, Wyoming was already in the throes of the Great Depression when Marzel presided over the Office of the State Geologist.



Flowing oil from this Bairoil Company well at Lost Soldier Field was an example of the waste that Marzel hoped to curtail with his newly proposed regulations. (Photograph courtesy of AHC, T.E. Swigart collection.)

Despite the hard times, the State Geologist energetically promoted the State's mineral industry, and if the sheer number of activities is any measure, the effort was largely successful. As usual, the State Geologist increased public awareness of Wyoming's resources by supervising the mineral exhibit at the State Fair. Marzel also took his educational role one step further by compiling a list of geology texts and reference books for libraries in the State. He also encouraged the teaching of geology in high schools and, as a result, schools in Lander, Lovell, Lusk, Rock Springs and Sheridan adopted the subject. In order to promote the mineral industry economically, Marzel cooperated with the Board of Commerce and Industry in conducting annual mining congresses throughout the State. Mining was further encouraged by exhibits at important regional expositions and fairs outside of Wyoming.

The promotional effort of the State Geologist, of course, also included publications. Marzel did not author any bulletins himself, but he did oversee three works. Dietz wrote two of them. One was a general treatise on Wyoming's developed and undeveloped resources, and the other was a discussion of electrometallurgical resources of the North Platte Basin. Marzel credited the former with encouraging the use of phosphate fertilizers on the State's sugar beet crops. The third bulletin made Roy Lee Moodie's popular

dissertation on the dinosaurs of Wyoming widely available for the first time.

In addition to all these promotional activities, the State Geologist also successfully met some of the unique demands placed on the Office by the depression. For instance, Marzel spent a great deal of time toward the end of his term examining dam and reservoir sites. Combining his experience in the Reclamation Service with his duties as State Geologist, he sought to determine the geological fitness of these projects designed to bolster agriculture. The State Geologist at this time also received numerous requests for information on placer mining methods and laws. Therefore, the Office prepared a mimeograph pamphlet on the subject for the growing number of unemployed who combated the hard times by panning for gold.

Perhaps Marzel attempted to do all he could to adapt the Office of the State Geologist to the depression because he realized that sooner or later it too would fall victim to the slumping economy. Clearly, reason existed to believe that the Office was facing some major changes in the 1933 Legislative Session. For instance, in 1931, the Governor approved the Deputy State Geologist's salary for only one year. After that, the position was eliminated completely. The 1932 gubernatorial election was another harbinger of things to come, as both parties campaigned on a platform favoring sharp reductions in State expenditures. Also, serious discussion began that it would save money to locate the Office at the University of Wyoming and have the head of the geology department serve as State Geologist, just as Wilbur Knight had done in the 1890s. Even though his own term was about to expire, Marzel vocally opposed such a move. He argued that:

*The duties of the State Geologist's office are primarily of an economic nature dealing almost wholly with practical problems. It would be entirely unfeasible to combine this department with an academic department where theories only are preponderant and where practical experience and requirements are not predominant.*³⁶

Faced with the dire need to cut State expenditures, the 1933 Legislature chose not to heed Marzel's argument. Therefore, the Office of the State Geologist underwent an extensive reorganization.

³⁶ A Resume of the History of the State Geologist's Office (n.p., n.d.), "Geology" Vertical File, Historical Research and Publications Division, Wyoming Archives. The stamp of receipt on this publication carried the date October 13, 1932. Therefore, it probably was prepared shortly before Marzel's term expired.

The result was both the demise of the Office of the State Geologist at the completion of Marzel's term, and the formal creation of the Geological Survey of Wyoming. In essence, the change reflected the entire thirty-two year history of the State Geologist's office. Since its inception in 1901, the Office constantly adapted to new conditions in Wyoming's mineral industry. For example, as the production of oil and gas became increasingly important, the State Geologist assumed a regulatory role, in addition to his traditional promotional duties. Now, faced with the challenge of the greatest economic depression ever endured by this country, the agency simply would adapt once again.

The Geological Survey of Wyoming

The creation of the Geological Survey of Wyoming

The idea of having the head of the University's geology department also serve as State Geologist was hardly new in 1933. Otto Gramm, Laramie pioneer and long-time president of the University Board of Trustees, recommended such a move to Governor B.B. Brooks in 1910. Also, Samuel H. Knight, son of Wilbur C. Knight and Head of the Geology Department, was offered the position during Robert D. Carey's governorship (January, 1919-January, 1923). This prompted Knight to conduct an exhaustive study of various state geological surveys, which resulted in his recommendation that the head of the geology department should also be the State Geologist. He gave three reasons for reaching this conclusion. First, a command of Wyoming's complex geology required years of study, something the short tenure of the State Geologist made impossible. Second, locating the office at the University would provide valuable training for students majoring in geology. These students could conduct field work at minimal expense to the State. Finally, solving geological-related problems required familiarity with local conditions, and the State Geologists seldom had much experience in Wyoming. Oddly enough, Knight declined Carey's offer even though he had proposed merging the two positions. The professor claimed that even he still had much to learn about the State's geology.

The notion resurfaced once more shortly before Governor Frank C. Emerson named Marzel State Geologist. Late in 1926, A.J. Hazlett, publisher of the Casper-based *Inland Oil Index*, wrote the Governor-elect again suggesting that Samuel Knight be appointed State Geologist. The publisher believed Knight could continue his work in Laramie and still supervise the Office of the State Geologist in



Fossil quarry camp, Wagon Hound Creek, 1912. From left to right Mrs. William Harlow Reed, unidentified woman, S.H. Knight, Miss Bushman and Dolly Reed. (Photograph courtesy of AHC, S.H. Knight collection.)

Cheyenne, although he failed to say how Knight would manage this feat. In making his case, Hazlett also renewed the arguments that most states based their geologist at the state university and that such an arrangement would allow the economical use of geology students on field crews. Knight, while honored by Hazlett's high recommendation, wrote the publisher saying he was not interested in accepting the post as it was then organized, even though it paid more than his University salary. However, he also asserted that "should this Office be incorporated with the Department of Geology the situation would be very different."³⁷

The economic depression of the 1930s succeeded where these earlier attempts had failed. Governor Leslie A. Miller's message to the 1933 Legislature included a section titled "Recommended Eliminations," and in it he endorsed the dissolution of the State Geologist's Office. He also urged that the position of Supervisor of Mineral Production be eliminated and that the lone oil and gas inspector be transferred to the State Land Board. To take the place of the State Geologist's Office, it was proposed that the Head of the Geology Department at the University of Wyoming be made *ex*

³⁷ S.H. Knight to A.J. Hazlett, December 18, 1926, Governor's Correspondence, Frank C. Emerson, File 25, Wyoming Archives.

officio State Geologist, with no salary in addition to that received from his teaching duties. Obviously, all of these suggestions would save the financially-strapped state a great deal of money, since the State Geologist would require only a small contingency fund.

The lawmakers wholeheartedly embraced Miller's recommendations and passed legislation that formally created the Geological Survey of Wyoming. They did make the head of the University's geology department eligible for appointment as State Geologist, with no salary except that already received from the University. Obviously, the statutes providing for the salaries of the State Geologist and his deputy were also repealed. However, the State Geologist could, under the new law, appoint an assistant with the Governor's approval. The assistant was to be paid no more than a per diem of eight dollars for each day he actually worked for the Survey.

Much of the bill dealt with the Geological Survey's organization. For instance, it mandated that the revamped agency be headquartered within the geology department at the University. To help supervise Survey activities, an Advisory Board consisting of the Governor, the University President and the State Geologist was established. The required annual report of the State Geologist was to be submitted to this Board, which also had to approve any cooperative projects entered into by the Survey.

The Geological Survey likewise obtained certain powers designed to facilitate field work. For example, all employees had the right to enter and cross lands within the State, as long as private property was not damaged. The State Geologist was also authorized to organize field expeditions among the advanced geology students at the University.

The heart of the legislation creating the Geological Survey, however, lay in the section outlining its purpose. Here a change in the Agency's traditional promotional function, together with its more recent regulatory role, became evident. The Legislature clearly intended the Geological Survey to be just what its name implied — a governmental department that would examine, study, map and publish reports on various aspects of Wyoming geology. In other words, its main objective was to increase knowledge about the State's geology. Certainly, the Survey would play an indirect promotional role in the mineral industry by making the State's mineral resources better known, but the emphasis now would be more on science than boosterism. Specifically, the law fixed as the purposes of the Geological Survey of Wyoming:

1. *Studies of the geological formations and rocks of the State with special reference to its metallic and nonmetallic resources.*

2. *Examinations of the topography and physical features of the State with reference to their practical bearing upon the occupations of the people.*

3. *General studies leading to a comprehensive understanding of the geology and fossil life of the State.*

4. *The preparation and publication, from time to time, of reports and maps descriptive of the mineral resources of the State.*

5. *The preparation and publication, from time to time, of reports and maps descriptive of the topography and physical features of the State.*

6. *The preparation and publication of special reports, with necessary illustrations and maps, descriptive of the geology and fossil life of the State.*

7. *The preparation and publication of comprehensive summaries or digests, together with a completed bibliography and maps, of all literature and reports heretofore published on the geology and mineral resources of Wyoming.*

8. *The distribution of all publications and maps to the public upon request, either free or at prices determined by the Survey. All money realized from the sale of said publications shall be paid into the treasury of the State as a part of the funds of this Survey.*³⁸

In order to help fulfill these goals, the Legislature appropriated a \$7,500 contingency fund. This represented the only direct expense to the State for the Agency since the Supervisor of Mineral Production was eliminated and the Oil and Gas Inspector transferred.

Although structured primarily to cut State expenditures, the creation of the Geological Survey proved advantageous in several respects. Locating the Survey at the University, for instance, allowed greater interaction with the scientific community. Also, using geology students enabled the Survey to conduct a great deal more field work than would otherwise have been possible. Many times this field work was done towards a Master's degree, and the resulting thesis appeared as a bulletin. Thus, the publication program virtually exploded thanks to this mutually beneficial arrangement. Finally, the establishment of the Survey completely divorced the State Geologist from politics. Undoubtedly, whoever held the post needed to be on good terms with the Governor, but the ascendancy of a new party to the Executive's chair no longer meant the appointment of a new State

³⁸ A.M. Clark, compiler, *Session Laws of the State of Wyoming Passed by the Twenty-second State Legislature* (Sheridan: The Mills Company, 1933), p. 26.

Geologist was all but inevitable. The turnover that characterized the Office of the State Geologist disappeared. The 1933 legislation set no specific term for the position, and there have been only six different State Geologists since the Survey's inception.

Samuel H. Knight, the Geological Survey and the Depression

The formal creation of the Geological Survey of Wyoming, of course, meant that Samuel H. Knight would finally become the State Geologist, some ten years after the position had first been offered him. With the State Geologist's post now merged with that of the Chairman of the University's geology department, he no doubt felt comfortable with his new joint responsibilities.

In a sense, Samuel H. Knight was destined to be the State Geologist. Had he known he would someday assume the office, he could not have prepared himself better. The son of Wilbur C. Knight, the *de facto* State Geologist at the turn of the century, he was raised in the Laramie area. The future geologist often passed his boyhood summers hunting fossils with William C. Reed, Curator of the University Museum. Naturally, he attended the University of Wyoming and in 1913 earned a Bachelor of Arts degree. Three years later, Knight completed the residency requirements for a Doctorate in Geology from Columbia University, where he also wrote a Master's thesis on the Moorcroft oil field with the help of State Geologist, Loyal W. Trumbull. The University of Wyoming named him an Assistant Professor of Geology and Curator of the University Museum in 1916. One year later, Knight was promoted to Professor and Chairman of the Department of Geology, a position in which he served with great distinction until his retirement from teaching in 1963. In the meantime, "Doc" Knight, as he affectionately was called, received his Ph.D. in the 1920s, after coining the phrase "festoon cross-lamination" in his dissertation describing the sedimentation of the Fountain and Casper Formations of the Laramie Basin. By 1933, Samuel Knight's experience and teaching clearly made him the leading authority on Wyoming's complex geology.

Unfortunately, only the barest details of Knight's seven-year tenure as State Geologist are known. Even though the law creating the Geological Survey required annual reports to be made to the Advisory Board, only a few from the 1933 to 1951 period survive.³⁹ Enough evidence exists, however, to indicate clearly that problems related to the Great Depression continued to consume

³⁹ A search for these reports was made in the various Governor's records retained by the Wyoming Archives, the papers of the University of Wyoming Presidents and the files of the Geological Survey of Wyoming.



Samuel H. Knight, State Geologist, 1933 to 1941. (Photograph courtesy of AHC.)

much of the Survey's attention, just as it had when Marzel officiated over the Office of the State Geologist. Unlike his predecessor, however, Knight could now draw upon the expert assistance of fellow geology department members R.H. Beckwith and Horace Thomas, and use advanced geology students for making field trips and conducting surveys.

Governor Leslie Miller certainly looked to the newly created Geological Survey to help combat the Depression by stimulating development of the State's mineral and water resources. His personal



"Doc" Knight (in front of group) presents his views on the geology of a site during a field trip.

vision of the Survey included the establishment of an accurate and reliable fact-finding agency that would guide both promoters and investors in the State's slumping mineral industry. The often neglected economic potential of nonmetallic resources such as clay, cement materials, fertilizers, stone and building materials was also to be studied. Governor Miller wanted the examination of reservoir and dam sites continued, and the development of Wyoming's groundwater resources became another concern of the Geological Survey. Knight especially welcomed this latter task, for he firmly believed most basins in the State also doubled as artesian basins, the water of which could significantly relieve the demand on the precious supplies of surface water.

The years 1933, 1934 and 1936 were particularly dry in Wyoming, so it is hardly surprising that the new Agency soon became very involved in drought relief and water-development projects. The entire resources of the Geological Survey, in fact, were dedicated in this important task from June through September, 1934.

The Geological Survey of Wyoming fought the severe droughts of the 1930s by providing various parties with the sound scientific information that water development requires. Much of this work was done in cooperation with New Deal agencies such as the Works Progress Administration and the Federal Emergency Relief Administration. During 1934, for instance, the Chief Engineer of the State Emergency

Relief Administration received some 140 reports on drought relief projects from the Geological Survey. Studies and reports also were made on the water supplies of several communities including Cheyenne, Laramie, Sheridan, Lusk, Newcastle and Lovell. Regional ground-water studies were conducted in the Crow Creek, Lodgepole Creek and Niobrara River valleys. In addition, the Geological Survey advised farmers and ranchers drilling water wells on where to locate a particular well, at what depth water was likely to be reached and what yield and quality of water could be expected. Of course, the Agency still provided detailed maps and reports on proposed dam, reservoir and diversion sites.

Drought relief so taxed the Geological Survey's time and effort during this period that in 1937 Knight asked that the \$9,000 contingency fund be raised to \$14,000. Despite all the good work the Geological Survey had accomplished already, hard times forced the Legislature to deny the increase. Still, Knight, and his faculty and student assistants, continued to aid the development of Wyoming's water resources in any way they could.

While conditions necessitated that drought relief receive the bulk of attention, the Geological Survey of Wyoming certainly did not neglect mineral resources during Knight's tenure. Indeed, the mineral-related activities of this period illustrate just how well the Agency operated now that it was located on the University of Wyoming campus, for nearly all of the work in this area was done by graduate students in the Department of Geology.

Of the seven numbered bulletins issued during Knight's term, five were completed as Master's theses by geology students. One of the five dealt with water resources. John David Love, who went on to an illustrious career with the United States Geological Survey, studied the geology of a portion of the Owl Creek Mountains. Joseph Neely conducted a similar regional geological study on the northern end of the Medicine Bow Mountains. The Late Cretaceous and early Tertiary stratigraphy of Wyoming served as Raymond Nance's topic and Jack H. Heathman reported on bentonite in Wyoming. Of course, these theses bulletins did not represent the entire publication effort of the Geological Survey at this time. Other bulletins were issued, and Knight compiled bibliographies on various minerals found in Wyoming for in-house use, including listings for nonmetallic resources such as asbestos, bentonite and phosphate. Nevertheless, the work of the graduate students contributed significantly to the Geological Survey's ability to meet its mandate to further the understanding of Wyoming's geology and minerals at a time when it would otherwise have been very difficult to do.



John David Love's Wyoming Geological Survey field camp, Cooper Basin, southeastern Wyoming, 1933. Vehicle was a four-cylinder Model B Ford. Love was paid \$30.00 per month.

Samuel Knight, acting as State Geologist, played yet another role in attempting to bolster the State's minerals industry. In 1938, seventeen private citizens and six Legislators joined to form the Natural Resources Committee. This committee was to draft recommendations for upcoming legislation that would help solve what it considered an economic breakdown of industry in Wyoming. Interestingly, former State Geologist, Albert Bartlett, was one of the twenty-three members of the Natural Resources Committee. On December 9, 1938, Knight submitted a report to the subcommittee on mineral resources other than oil and coal, which outlined in detail the State's mineral reserves and production. He also testified that while Wyoming abounded in mineral resources, more factual knowledge of them was needed before the minerals industry could reach its true economic potential. Increasing this factual knowledge, of course, was the explicit mission of the Geological Survey of Wyoming.

The actual administration of the Geological Survey apparently went smoothly during Knight's term, with one notable exception. In February, 1938, the State Planning Board recommended that the



Science Hall (renamed S.H. Knight Geology Building), University of Wyoming Campus, in 1935. This building housed the Geological Survey of Wyoming from 1933 to 1976, during its long association with the Geology Department. (Photograph courtesy of AHC, J.E. Mowen collection.)

Office of the State Geologist be reestablished in the Capitol Building at Cheyenne. The Planning Board's exact reasoning for the proposed move remains unclear. However, it may have been part of a general effort to economize by consolidating and centralizing all State offices in one location. This, it was believed, would prevent duplication of services among various State agencies and would also promote better cooperation between State and Federal offices with related interests.

Obviously, Knight opposed relocating the Geological Survey and, in the process, he resurrected the argument that more could be done at the least possible expense by keeping the Agency at the University. The members of the geology department faculty were readily accessible and had already devoted time to the Geological Survey without compensation. There, too, were the graduate students who conducted the needed field work in an economic fashion by combining Survey studies with their theses. Knight further noted that the field workers often used University vehicles, thereby saving the Agency even that expense. Above all, he truly believed that the Geological Survey of Wyoming was performing a valuable service to the State, and Knight took great pride in that fact. Prompted by the Planning Board's recommendation, he summarized his attitude in a letter to Governor Leslie A. Miller:

My acceptance of the office, at your invitation, was born of the conviction that we were qualified to make geological

investigations and give accurate and unbiased reports, and that appropriations, even though comparatively small, would be used to better advantage than under a separate organization not connected with the Department of Geology of the University. I realize that services without salary are usually lightly held and considered by others of little value. Our compensation has been an opportunity to be of service to the state.⁴⁰

The attempt to relocate the State Geologist in Cheyenne ultimately failed, and the Geological Survey remains on the University of Wyoming campus to this day.

After defeating this challenge, Samuel H. Knight resigned as State Geologist in 1940. The strain of directing both the Geological Survey and the rapidly growing geology department exacted a toll on his health. Besides, Knight also accepted a sabbatical leave from the University that year in order to undertake a study of Hawaiian volcanoes. Governor Nels Smith reluctantly accepted the resignation.

Clearly, the infant Geological Survey of Wyoming made great strides toward permanence under Samuel Knight's leadership. It proved that having the agency at the University not only saved the State money, but it also greatly enhanced the Geological Survey's capability to foster development of mineral resources through scientific research. The Geological Survey, during this period, also demonstrated that it could render immediate and valuable service to Wyoming, as exemplified by its water resources work during the 1930s drought. By the time Knight resigned, the Geological Survey of Wyoming had firmly established itself as an integral part of State government.

Twenty-six years of growth and professionalism under Horace D. Thomas

The position of State Geologist remained vacant until University of Wyoming geology professor Horace D. Thomas took office on March 1, 1941. Bill Thomas, as he preferred to be called, was the son of a pioneer Laramie family and received a Bachelor of Arts degree from the University of Wyoming in 1926. Two years later, after serving as Samuel Knight's graduate assistant, he earned the first Master's degree in Geology awarded by the University. Following in his mentor's footsteps, Thomas was awarded his Ph.D. by Columbia University in 1935. Four years earlier, he began his teaching career at the University of Wyoming. Before assuming the post of State Geologist, the slightly built and bespectacled Thomas

⁴⁰ Knight to Miller, February 18, 1938, Governor's Correspondence, Leslie A. Miller, Wyoming Archives.



Horace D. Thomas, State Geologist, 1941 to 1967.

also worked for a time as a consulting geologist for the Union Oil Company of California and the Union Pacific Railroad.

No one at the time could possibly know it, but Thomas' appointment in 1941 marked the beginning of an unprecedented twenty-six-year tenure as State Geologist. Had he had his way, his term would have begun even earlier. In 1926, the newly enrolled Master's candidate applied to Governor Frank C. Emerson for the position of State Geologist. It took another fifteen years to secure the post, and from then on he continued to guide and direct the Geological Survey of Wyoming until his death in 1967 at the age of fifty eight.

America entered World War II within months of Thomas' taking office, and soon the war effort consumed the Geological Survey's energies. War meant that the study and identification of strategic minerals would have to be intensified, with an eye toward possible utilization by wartime industries. The State's abundant oil, coal and iron-ore reserves were also expected to aid the cause. The task of overseeing Wyoming's mineral contribution to the war effort fell to the Geological Survey.

Yet, in Thomas' opinion, the Agency was ill-prepared to satisfy the wartime demands placed upon it. In May, 1942, he told a mineral development meeting in Sheridan that the Geological Survey was "behind the eight-ball, so to speak".⁴¹ All the staff members also carried full teaching loads, training geologists whose services were in great demand by private industry because of the war. Oil and mining companies employed all the graduate students during the summer months, so this source of assistance was depleted. No one was available to make immediate field examinations when they were needed, and no funds for hiring such persons existed. Finally, the Agency lacked the facilities for doing assays, analytical work and research on processing minerals.

Thomas thus concluded that, under the circumstances, the Geological Survey could only be of a moderate assistance in developing Wyoming's mineral resources at this crucial time. This aid would be limited to making mineral examinations and identifying samples submitted by individuals and industry. The Survey could also act as a clearing house between owners of mineral properties and parties seeking raw materials. Geological advice and knowledge could be shared, too, with individuals, departments of state government and federal agencies such as the U.S. Bureau of Mines and the War Production Board. Taken together, all of these would

⁴¹ Speech of Thomas to the Mineral Development Meeting, May 16, 1942, p. 7. A copy of this speech is in the files of the Geological Survey of Wyoming.

be of real service to the war effort, but Thomas believed the Geological Survey should have been able to do more. Therefore, he asked the 1943 Legislature to provide additional funds for hiring several full-time geologists who would conduct field and laboratory work year round. Thomas hoped for a \$14,000 appropriation but received only \$10,000. Still, this was a substantial increase over the \$6,500 budgeted for the previous biennium. Help also came from the University when both Thomas and his assistant, Dr. Arthur F. Hagner, were virtually relieved of teaching duties in order to devote all their time to Survey business.

With increased funding and the staff freed from teaching responsibilities, the Geological Survey devoted much of its time to the search for, and evaluation of, the strategic minerals and fuels required by the war effort. Most of this work was accomplished in cooperation with Federal agencies.

In regard to critical minerals, for instance, the Geological Survey of Wyoming cooperated with the U.S. Geological Survey in several ways. The State Survey conducted much of the preliminary work ordinarily done by Federal geologists, thus freeing them for high-priority projects elsewhere. The two agencies also collaborated in a mineral identification program in which promising prospects of critical and strategic minerals were reported to the U.S. Geological Survey for detailed analysis. In a similar arrangement, the Geological Survey of Wyoming brought other important mineral deposits to the attention of the U.S. Bureau of Mines in order that they could be core-drilled, trenched or sampled. Mineral samples submitted by prospectors to the War Production Board, on the other hand, were identified and tested by the State Survey.

On campus, the Geological Survey worked in tandem with the University's Natural Resources Research Institute (NRRI), which was created in 1943. The Survey conducted geological investigations of mineral deposits and determined their extent, general quality and other features, while the NRRI analyzed their chemical and physical properties, and researched their potential beneficiation and industrial use. Although all these cooperative ventures failed to result in any significant development of strategic minerals, they did reveal a wealth of new information on Wyoming's mineral resources, especially previously neglected ones such as titaniferous magnetite, fluorite and hematite.

The war, obviously, also increased the demand for fuels, especially oil, and the Geological Survey was very active in this area as well. It participated in a petroleum investigation program with the Fuels Section of the U.S. Geological Survey. The University furnished this project with quarters on campus, and the State Survey opened

its files, library and data to project director, Dr. John David Love, and his assistants. The Geological Survey of Wyoming also established an oil well core and sample repository in 1943 with the help of the State's oil companies. Both cores and cuttings from deep wells throughout Wyoming were stored in one location and made available for public inspection. This, in turn, greatly facilitated the study and development of new fields by oil companies.

In addition to scientific investigations concerning strategic minerals and fuels, Thomas and the Geological Survey also participated in a number of war-related committees. Governor Lester Hunt, for example, appointed Thomas as Wyoming's representative to the Congressional Steel Shortage Investigating Committee. This committee received a \$2 million appropriation for the exploration of iron, coal and limestone, with the funds channeled to the State through the U.S. Bureau of Mines. The more than \$60,000 allotted to Wyoming funded Survey-sponsored projects in the Iron Mountain region of Albany County, vanadium exploration in Lincoln County and the temporary operation of a sponge iron plant on the University campus. During the war years, Thomas and Hagner also testified on Wyoming's coal reserves before the Congressional Committee on Public Lands, which was studying synthetic fuels. Furthermore, the State Geologist sat on the Western War Council of the American Mining Congress.

Even though the war placed extraordinary demands on the Geological Survey, time was found for other, more routine, business. Four new bulletins appeared during the war years, thanks in part to the establishment of the Geological Survey Fund in 1941. This fund, comprised of the receipts from sales of publications, was used to pay for the printing of future maps, bulletins and reports. At this time, the Survey also made available to the public all unpublished maps from earlier studies and, as tools in oil and gas exploration, they were in great demand. The Geological Survey even managed to conduct preliminary studies on the economic geology of all Wyoming counties during these hectic years.

The most intriguing non-war-related episode of this period, however, concerns Thomas' official testimony against the creation of the Jackson Hole National Monument. President Franklin D. Roosevelt issued an executive order on March 16, 1943, setting aside over 200,000 acres of land adjoining Grand Teton National Park. State officials and the Wyoming Congressional delegation opposed the action as an infringement on State's rights. They joined many Teton County residents in protesting that the Monument would drastically reduce the County's tax base, threaten grazing rights, interfere with hunting and fishing and impede control of the famous Jackson Hole elk herd. While Wyoming's representatives in

Washington sought to abolish the Monument in the halls of Congress, the State turned to the courts for redress.

The Twelfth District Court in Sheridan heard *State of Wyoming v. Franke* during August, 1943. The State's case argued that the Jackson Hole National Monument contained nothing of particular scientific or historical interest, as required in the Antiquities Act of 1906, which authorizes the proclamation of National Monuments. As State Geologist, and with the support of Samuel Knight, Thomas testified that Jackson Hole lacks any outstanding or unique geological objects. The fault block evident in the valley, he contended, is not classic, and better evidences of glaciation can be found elsewhere. Nor is the area unique from the paleontological perspective, he claimed. Geologist Fritiof M. Fryxell, who wrote his 1929 University of Chicago dissertation on Jackson Hole, countered that the area was indeed geologically significant. The court found generally against the State, and thus Thomas. However, it also dismissed the case on the grounds that the Monument's legality was a conflict between the Legislative and Executive branches of the Federal government in which it could not interfere. Finally, a series of compromises culminated in a 1950 bill placing most of the disputed area along the valley floor within Grand Teton National Park. Yet, had the testimony of Thomas and other State officials prevailed in 1943, the Park today might not include the portion extending eastward from the spectacular mountains and the lakes at their base.

The Geological Survey certainly accomplished a great deal during the war years, both in the war effort and on the homefront. The search for strategic minerals yielded a wealth of new information on Wyoming's resources, even if no substantial development resulted. The Survey helped boost oil and gas production to meet wartime demand. By collaborating with Federal agencies, the Survey gave and received valuable services that aided in meeting the geological demands of this extraordinary time. Besides the U.S. Geological Survey and the U.S. Bureau of Mines, the Survey at various times also assisted the War Department, War Relocation Authority, Defense Plant Corporation, Securities Exchange Commission, Department of Agriculture and a host of other Federal entities. At home, it maintained a semblance of routine by issuing new bulletins, conducting county studies and lending its scientific opinion to the State's fight against the Jackson Hole National Monument. These were busy years.

The pace hardly slowed once the war ended, however. It actually quickened in many respects. The flood of students returning to the University after 1945 forced Thomas and Hagner to resume teaching. This essentially cut in half the time they could devote to

the Survey. Still, the workload was not halved. The Geological Survey was expected to help build a prosperous post-war economy by fostering a better understanding of the State's mineral resources and their economic potential. Since its formal creation in 1933, and especially during the war, the Survey had proven it could contribute significantly to this goal. Yet, the depression and the war also revealed that a great deal remained to be done in order to understand Wyoming's geology and its mineral resources. The problem now was how to do this.

Thomas certainly wanted the Survey to keep growing and keep serving Wyoming, so he sought funds for the 1945-1947 biennium that would pay the salary of a full-time geologist. As may be expected, the Legislature refused the request. Instead, it passed a bill enabling the State Geologist to appoint, with the Governor's approval, technical assistants "who shall be persons properly trained and fully competent to perform the work required".⁴² Basically, the law permitted Thomas to name Hagner as the official Assistant State Geologist.

In 1947, the Legislature once again focused its attention on the Geological Survey and specifically defined the duties of the State Geologist. The law charged the State Geologist with making, or causing to be made, examinations and reports on mineral deposits (other than coal, oil or gas) on State or school lands when requested by the Board of Land Commissioners. Valuation surveys, investigations, appraisements and reports on the State's mineral resources also were to be compiled. In addition, the State Geologist received the authority to designate and supervise — in the interest of economic development — mining operations on State and school lands. The law further authorized the entry into cooperative agreements with both governmental agencies and private industry in an effort to help develop the State's mineral resources. As in the past, the State's expense for participation in such projects was not to exceed half the total cost. Furthermore, the bill stipulated that biennial reports, complete with suggested changes in mineral laws, were to be made to the Governor. Finally, the law also required the State Geologist to maintain full records of the Survey's activities, and empowered the publication and distribution of reports, maps and data deemed to be of public interest.

Unfortunately, Hagner left the University of Wyoming and resigned as Assistant State Geologist in September, 1947, not long after the law outlining the State Geologist's duties became effective. This left Thomas as the lone staff member to carry out the new

⁴² *Session Laws of the State of Wyoming Passed by the Twenty-eighth State Legislature* (Casper: Prairie Publishing Company, 1945), p. 107.

responsibilities, and he spent half of his time teaching in the University's geology department. The Geological Survey budget for 1947-1949 did include \$6,900, or \$287 per month, for a full-time geologist, but it soon became apparent that no qualified person could be obtained for that rather meager salary. Graduates in geology with no experience commanded at least \$325 per month at this time thanks to numerous openings in the petroleum industry. Therefore, \$3,600 of the money instead paid for a number of part-time geologists and student assistants.

Throughout his long term, Thomas voiced his belief that Wyoming failed to support the Geological Survey in proportion to the importance of the minerals industry to Wyoming. In 1949, for instance, he pointed out the rather embarrassing fact that only four states spent less on geological investigations — Maine, Vermont, New Hampshire and Rhode Island. If the Survey was indeed to fulfill its mandate to encourage the economic development of mineral resources, more financial support was needed. Thomas argued that the organization of the Survey was sound and effective, but adequate funding for a full-time staff and for publishing reports was necessary. Only then could the Geological Survey live up to its potential. Although the plea was hardly new in the long history of the Agency, it was heard better than ever before. When Thomas took office in 1941, the Survey had a biennial budget of \$7,500. By 1967, it had grown to \$99,000.

The diverse services that the Geological Survey performed undoubtedly helped convince the various legislatures to increase the budget. During the late 1940s, the Survey continued to conduct water-supply studies requested by Wyoming communities. Graduate students kept studying and mapping areas of geological importance, even though the influx of students after the war forced the Survey to reduce its support to supply only field and laboratory equipment, and, in some cases, transportation. Somewhat inexplicably, Thomas refused to publish the geologic work of Master's candidates in the Survey's series of publications. He did, however, make many of the geologic maps of these students available on reproducible transparencies.

The Survey still cooperated on many projects with the NRRI, the U.S. Geological Survey, the U.S. Bureau of Mines and a host of other governmental agencies. An agreement with the U.S. Coast and Geodetic Survey also began, in which the State Survey supplied it with data on the occurrence of earthquakes in Wyoming. For the State, a Geological Survey study helped provide an adequate water supply for the Como Bluffs Fish Hatchery. Another study for the Board of Charities and Reform led to a concentration of hot water

in the Saratoga thermal springs. Clearly, the pace set by the war years slowed little, if at all, as the Survey entered into the 1950s.

The year 1951 was especially significant for the Geological Survey. During that year, it finally obtained its first full-time geologist, and the auxiliary duties of the State Geologist were expanded.

In June, William H. Wilson became the Survey's first full-time geologist. He received a Bachelor of Science degree in Geology from the University of Utah in 1949, and a Master's degree from the University of Wyoming in 1950, where he specialized in economic and ground-water geology. He resigned from the Minerals Deposit Branch of the U.S. Geological Survey to accept the State post. The hiring of Bill Wilson reflected the increasing professionalism and growth of the Geological Survey of Wyoming under Thomas' leadership.

In 1951, the Legislature also added to the duties expected of the State Geologist in two ways. First, all permits issued for fossil collecting by the State Commissioner of Public Lands also had to be endorsed by the State Geologist. More significantly, the State Geologist was named — along with the Governor, Commissioner of Public Lands and others — to the newly created Oil and Gas Conservation Commission. The law establishing the Commission charged it with preventing wasteful production practices, and gave it general regulatory power over the operation of Wyoming's oil and gas industry. Given the importance of oil and gas to the State's economy since 1951, this duty of the State Geologist has indeed been consequential. By law, the State Geologist remains a member of the Oil and Gas Conservation Commission.

The Geological Survey played another role at this time in developing the State's oil and gas resources. During the 1951-1953 biennium, the Riley Production Company of Denver donated to the Survey a set of electric logs from wells drilled in Wyoming. The donation included essentially all of the Wyoming wells that had been logged electronically. After this initial contribution, the Survey cooperated with the State Oil and Gas Supervisor to keep the file current. This extensive file of electric well logs, together with the core samples already being collected, made the Geological Survey an important repository of these invaluable research tools.

The Survey also aided uranium development during the 1950s. Its campus office served as one of the designated posting points for Atomic Energy Commission maps showing radioactive anomalies detected by airborne surveys. In fact, Thomas believed that the Geological Survey was the first non-federal agency to serve as a posting point. Uranium in the 1950s offered the individual prospector the same opportunity to strike it rich as gold and silver

had a century earlier. Only this time, the prospector used a geiger counter and rock hammer instead of a pick and washing pan. Therefore, would-be uranium miners anxiously awaited the posting of these maps in the Laramie office, at noon on the fifteenth of each month. Wyoming uranium prospectors also took advantage of the Survey's free mineral identification service, and throughout the uranium excitement of the 1950s, Assistant State Geologist Wilson could barely keep up with the specimens that arrived in each day's mail. During the 1960s and 1970s, uranium mining was an important Wyoming industry, thanks in part to the Survey's efforts during its pioneer stages.

Besides fostering oil, gas and uranium development, the Geological Survey, during the 1950s, performed a myriad of other services, both large and small. It assisted the State Highway Department, for example, by preparing geological descriptions for roadside markers. It also located a water well for the Harmony School District after earlier attempts by others had failed. In 1952, Converse County High School officials sought the Survey's opinion on the site for a new building. However, they ignored the Survey's advice, and when the school was completed, three years later, it quickly developed signs of structural failure because it had been built at an unsuitable location. On a grander scale, the Survey worked with the Commissioner of Public Lands during the mid-1950s to revise the state's mineral laws. Also, the U.S. Geological Survey used many of the State Survey's maps to complete a new geological map of Wyoming during the 1951-1953 biennium. In 1953, a formal agreement began with the U.S. Bureau of Mines, in which the Survey provided information on Wyoming's mineral production for the Bureau's *Minerals Yearbook*.

The most ambitious undertaking of this period, however, was the Precambrian project. Begun in July, 1957, this project involved mapping of the crystalline cores of Wyoming's southeastern mountain ranges. Up to 1961, areas of the Medicine Bow and Sierra Madre ranges received the most attention, and the results were encouraging. It soon became apparent that some of the discovered mineralized areas might be of immediate economic interest. Therefore, the Survey decided to issue reports containing summaries of the geology, economic possibilities and assays of the regions studied, together with the originally planned geological maps. The compilation of this information from the Precambrian project, in fact, marked the beginning of the preliminary report series of publications issued by the Geological Survey of Wyoming. The Precambrian project itself continued as a major Survey program for over a decade.



Graduate students of the Geology Department working on radioactive Precambrian quartz-pebble conglomerate deposits in the Sierra Madre, a joint Geological Survey of Wyoming/Geology Department/U.S. Geological Survey project. (Photograph by Robert S. Houston.)

Obviously, the 1950s, were dynamic and exciting times for the Geological Survey, and two events underscore the increasing professionalism that was then occurring within the Agency. First, in 1953, at the request of University President George D. Humphrey, the Legislature granted the State Geologist an annual salary of \$1,800 *above* that earned from the University. During the remainder of Thomas' tenure, the annual salary was raised in 1961, to \$2,400 and to \$3,000 in 1965. Second, in September, 1955, the Geological Survey moved into new quarters in the University's enlarged Geology Building. Here the Agency had three offices, a map filing and distribution room and a combination drafting and filing room. Also, a large portion of the basement was used to store oil well samples and cores. The new facility even afforded access to the Geology Department's new x-ray diffraction and differential thermal

analyses equipment. The spacious new quarters were certainly an improvement over the old, cramped office in the same building, and Thomas believed they would be sufficient to meet any future growth. Ultimately, this prediction proved wrong.

Despite the obvious growth and increasing professionalism of the 1950s, Thomas — always one to look ahead — hoped for even greater things during the 1960s. He outlined his plan for the Survey's immediate future in his 1959-1961 biennial report. Here he gave four reasons why the Survey should expand its program of geological investigations. A more comprehensive understanding of the State's economic geology, he maintained, was necessary in order to attract industry to Wyoming and to develop its mineral resources. Also, geological data was basic to solving water-related problems, an important consideration in the State's arid and semi-arid environment. Thomas further contended that State and municipal agencies would profit from more geological input when facing questions such as mineral availability, land classification, mineral leasing, foundation adequacy, road and highway construction, radioactive-waste disposal and a myriad of other concerns. Finally, an ever-growing number of rockhounds, tourists and public school children were turning to the Survey for geological information. Thomas concluded that:

*There is only one way in which the needed geological information can be obtained, and that is through technical investigations made in the field by competent geologists, and the only way geologists can operate effectively is under the supervision of experienced geologists — not under the aegis of nontechnical agencies — and with available laboratory and library facilities so necessary in modern geological studies.*⁴³

An expanded program of geological investigations such as Thomas envisioned could become a reality only with the financial support of the Legislature, and the lawmakers responded quite favorably to Thomas' argument. The Survey's budget for 1963-1965 skyrocketed to \$91,309, a thirty-six percent increase over the previous biennium's appropriation. The generous funding enabled work on the Precambrian project to continue. It also made possible studies of the economic geology of several counties, and a number of investigations focused on specific minerals. The results of all this activity usually appeared in the bulletins and preliminary reports of the period. Some findings were also included in *Contributions to Geology*, a publication begun in 1962 and published by the University's geology department.

⁴³ Geological Survey of Wyoming, *Biennial Report of the State Geologist for 1959-1961* (Laramie: Geological Survey of Wyoming, 1961), p. 5-6.

An especially noteworthy publication stemming from the new emphasis on geological investigation was *A Field Guide to the Rocks and Minerals of Wyoming*, authored by Assistant State Geologist, Bill Wilson, and issued as Bulletin 51 in 1965. This 72-page booklet served as a compendium on Wyoming geology. It described the physical and chemical nature of various minerals, gave their classification, summarized the geological history of Wyoming and classified and identified common rocks. The bulletin also contained a glossary and bibliography, and was the first Survey publication to feature a color photograph (Devil's Tower) on its cover. Thomas praised the field guide as one of the most important contributions ever made by the Geological Survey, because it provided a wealth of information in one handy publication.

Nevertheless, the programs of the 1960s also had results more tangible than the printed word. In at least one notable instance, the Survey during this decade was a major influence in attracting the minerals industry to Wyoming. In the late 1940s, the Geological Survey and NRRI jointly studied the iron ore deposits in the South Pass area. Their geological report on the study eventually prompted Geneva Steel to do some development work and, in 1963, U.S. Steel opened a taconite iron ore mine near the top of Wyoming's historic gateway to the Far West. Four years after the mine opened, Thomas explained to the new Governor, Stanley K. Hathaway, the Survey's role in the steel giant's decision to come to Wyoming:

U.S. Steel is mining at Atlantic City because we mapped the iron deposit, prepared a report on it, and circulated it to the iron mining companies. The large industrial concerns know they can get reliable technical information from the State Geological Survey, not "Chamber of Commerce" blow-ups!⁴⁴

In this passage, Thomas was not only highlighting a significant achievement of the Agency for the new Chief Executive, he also was summarizing his vision of the Geological Survey's mission.

On May 14, 1967, only a few months after writing Governor Hathaway about the South Pass iron mine, Thomas died after a short bout with emphysema. He left behind a legacy of twenty-six years of service to Wyoming and the Geological Survey. Under Thomas' guidance, the Survey rose to meet the extraordinary demands placed upon it by World War II and, in the post-war years, played a major role in shaping Wyoming's minerals industry. Under the influence of Bill Thomas, the Geological Survey grew and matured into a

⁴⁴ Horace D. Thomas to Governor Stanley K. Hathaway, February 1, 1967, Box 88, Governor's Correspondence, Stanley K. Hathaway, Wyoming Archives.



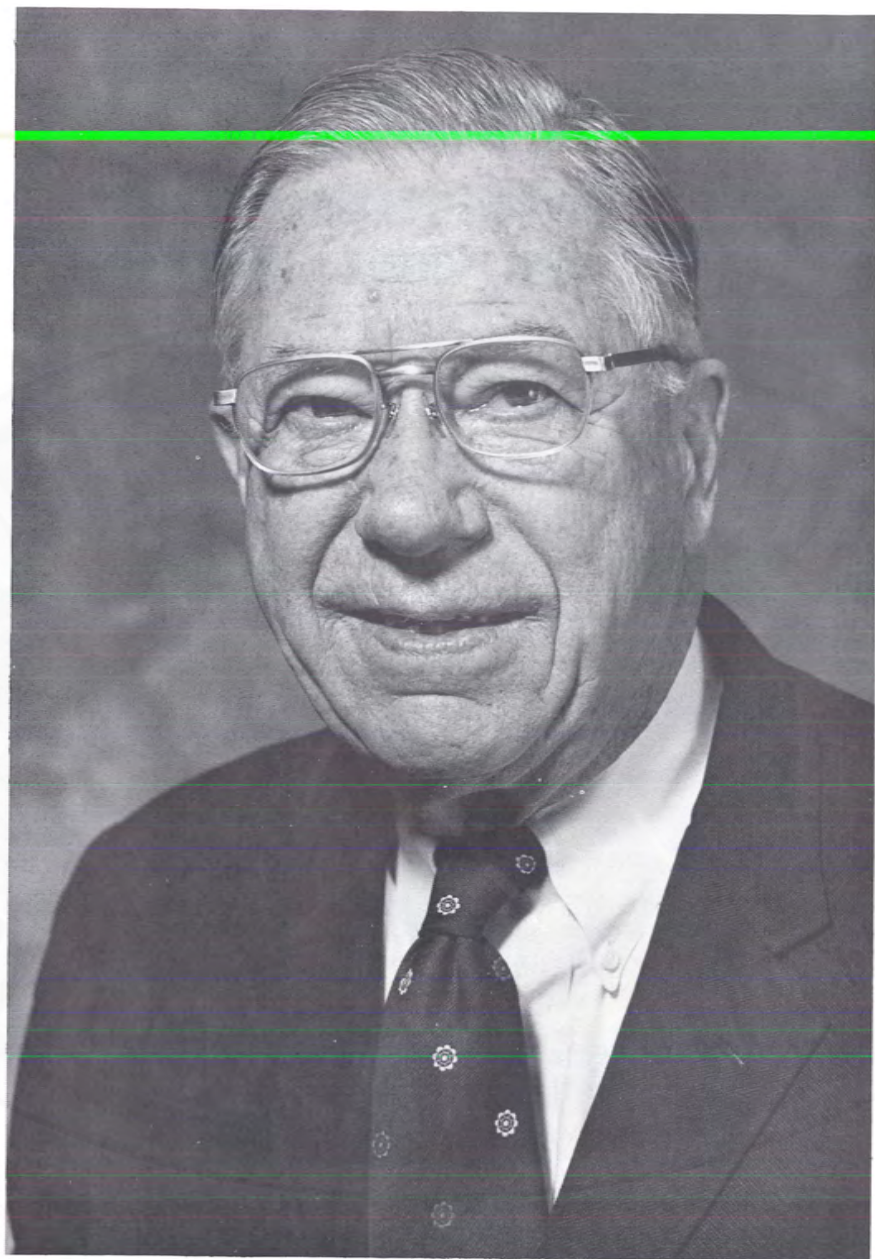
Aerial view of U.S. Steel's Atlantic City iron mine at the south end of the scenic Wind River Mountains, shortly after its completion in 1963. (Photograph courtesy of AHC, Robert W. Howard collection.)

professional scientific agency. His most significant legacy is that he demonstrated that the scientific study of Wyoming's geology not only benefited the academic community, but it also materially serviced the State as a whole. This was a most laudable accomplishment indeed.

Transition and reorganization:

The administration of Donald L. Blackstone, Jr.

Governor Hathaway appointed Dr. Donald L. Blackstone, Jr. on July 11, 1967, to fill Thomas' unexpired term. The Montana native brought to the post valuable experience in petroleum geology gained both in private industry and academia. Dr. Blackstone earned a Bachelor of Science degree from the University of Washington in 1931, a Master's from Montana State University three years later and a Ph.D. from Princeton in 1936. Before coming to Wyoming, Blackstone worked at various times as a geologist for the Carter Oil Company and as a Professor of Geology at the University of Missouri. He joined the geology faculty at the University of Wyoming in 1946, and was named chairman of the department in 1963.



Donald L. Blackstone, Jr. in 1985, State Geologist, 1967 to 1969.

Upon assuming the position of State Geologist under trying circumstances, Blackstone informed the press that his main concern for the immediate future would be the completion of a number of special projects already underway. Although his own term lasted only two years, he managed to accomplish this goal, and more.

The Precambrian project, for example, was completed in 1969. For over a decade, University geology professor, Dr. Robert S. Houston, and numerous graduate students participated in this monumental undertaking. The investigations conducted in conjunction with the project eventually yielded a total of twenty graduate theses and ten published reports. In May, 1968, the Survey also issued a colored map on the scale of one inch to the mile, which depicted the geology of the 1,500-square-mile study area. The Precambrian project revealed a great deal of new information about the economic potential of southeastern Wyoming's mineral deposits and, therefore, can be deemed a success.

Since 1951, The Geological Survey had also been studying mineralized areas of the Absaroka Mountains in northwestern Wyoming, and this long-range project continued under Blackstone. By 1969, more than 1,200 square miles in the Kirwin, Stinkingwater and Sunlight regions — along with a number of gypsum deposits around Cody — had been explored in detail. The initial findings prompted several major mining companies to explore for copper and molybdenum. One company exercised an option to purchase property, though no actual mining occurred. Like the Precambrian project, the Absaroka study also generated a number of reports and maps published by the Survey. Assistant State Geologist Wilson served as director and principle investigator for this ongoing study.

These large projects, however, represented only a portion of the Survey's effort during Blackstone's brief tenure. For example, commodity studies on the State's glass sand, limestone, bentonite and iron deposits also were made. Answering geological questions for the general public remained an important service rendered by the Survey at this time as well. As part of the Agency's educational program, Wilson helped prepare a manual for a 4-H project in geology. A bulletin on the Devonian rocks of northern Wyoming, four preliminary reports stemming from the Precambrian and Absaroka investigations and the geological map of the Precambrian study area all appeared during the 1967-1969 biennium. Toward fulfilling the Survey's legislative mandate to prepare bibliographies on Wyoming geology, Max Troyer began final preparations on such a work covering material published between 1917 and 1965. Of course, the long-term cooperative programs with, and services to, State and Federal agencies continued. Even though Blackstone was

only completing the unfinished term of his predecessor, he kept the Agency moving forward at the rapid pace established earlier by Thomas.

Moreover, Blackstone, like Thomas, envisioned an even greater future for the Geological Survey. In the biennial report for 1967-1969, Blackstone concluded that:

The Geological Survey of Wyoming has provided sound technical knowledge concerning many phases of the mineral potential of the State. The investigations of the Survey have been accomplished under a very modest budget, and limited personnel. Substantial changes designed to increase the potential of the Survey will be presented to the 40th Legislature for consideration. It is the hope of the State Geologist that the Geological Survey of Wyoming can continue to be an active and useful part of the State Government.

The "substantial changes" that Blackstone had in mind amounted to a fundamental reorganization of the Agency.

Governor Hathaway wholeheartedly endorsed the call for reorganization. Wyoming experienced excruciatingly slow growth during the 1960s and, by 1969, was actively seeking solutions to the problem. Oil, natural gas, uranium, trona, bentonite and a limited amount of coal already contributed significantly to the State's economy. But many looked to a still-larger minerals industry to lead Wyoming out of the stagnation of the 1960s. In his message to the 40th Legislative Assembly, Hathaway asserted that Wyoming's future economic development depended largely upon the exploitation of its mineral resources and, therefore, the State should have a full-time State Geologist and an expanded Geological Survey. The Legislature concurred and, in 1969, the Survey was reorganized.

Essentially, the changes represented another step in the professionalism process underway since 1933. The formal ties between the University and the Survey were severed, although the new law implementing the reorganization stipulated that the Agency be permanently located in Laramie. The State Geologist would no longer be a regular member of the geology department, forced to divide his time and attention between teaching and Survey business. Instead, the official would be a full-time staff member of the Geological Survey and serve as its Executive Director. A separate bill set the State Geologist's salary at \$14,500 per year⁴⁵

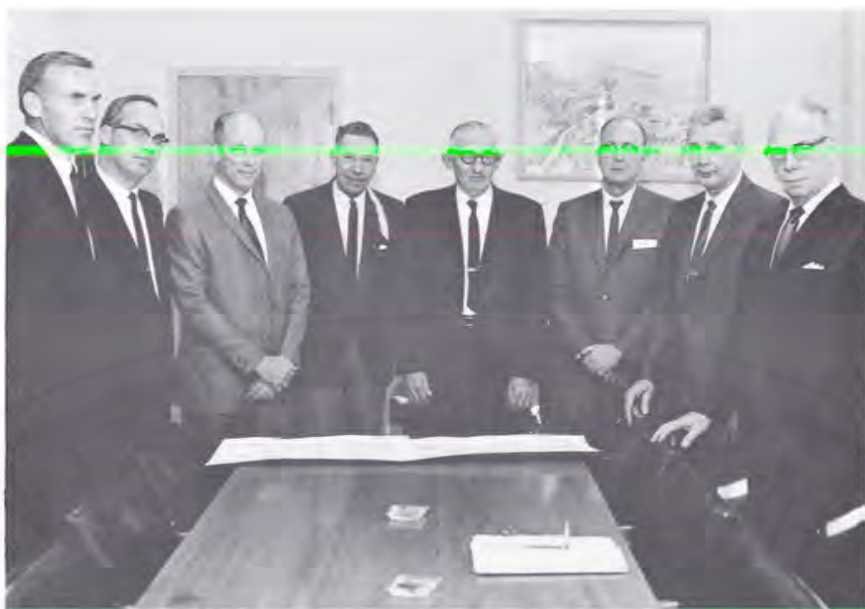
⁴⁵ D.L. Blackstone, Jr., *Biennial Report of the State Geologist for 1967-1969* (Laramie: Geological Survey of Wyoming, 1969), p. 11. Since 1969, the Legislature at various times has raised the State Geologist's salary. In 1971, it was set at \$17,000 per year, and in 1975 at \$22,500. By 1981, the position of State Geologist had changed to a classified position with the salary set by the State Employees Salary Compensation Plan rather than by the Legislature.

and expressly prohibited additional compensation from any other source. He could, however, earn up to \$5,000 more per year for his day-to-day supervision of the Survey as its Executive Director.

The law revamping the Geological Survey did not substantially alter its duties and purposes, but it did considerably transform the Agency's organization. An expanded Advisory Board was created to aid the State Geologist — Executive Director in the formulation and implementation of policies and programs. The Executive Director also had to consult the Board before hiring any new employees. Placed within the Executive branch of State government, the new Advisory Board consisted of five members from the public at large, appointed to four-year terms by the Governor. In order to make the Board as nonpartisan as possible, no more than three appointees could be from the same political party. In addition to these five members, the Governor, the State Geologist and the State Oil and Gas Supervisor served as *ex officio* members with full voting privileges. By law, the Board was to meet quarterly — in March, June, September and December. Also, special meetings could be called by the Board president, who was to be elected annually at the March meeting, or by a majority of the members.

The 1969 reorganization marked an important juncture in the Agency's long evolution. Separated from the University, it now became a part of the State government, something it had not been since 1933. Yet in the pre-depression years, the Agency was basically a one-man operation doing what little it could with very little financial support. The reorganization meant that at least several geologists would staff the Survey, and that these professionals would concentrate, as never before, on scientific investigation as the means of promoting mineral development and answering the public's questions on Wyoming geology. Moreover, the Agency would no longer operate on a shoestring budget, or one that combined University and Survey resources. The 1969 Legislature nearly doubled the Geological Survey's biennial appropriation, raising it from \$99,000 to \$190,000. The reorganization of 1969, in short, created the Geological Survey of Wyoming as it essentially exists today.

After the reorganization, Blackstone submitted his resignation as State Geologist because he wanted to return to teaching. In his own words, Blackstone noted that "I have done my duty". He maintained his ties with the Survey, however, as a member of the Advisory Board — a position he has continued to serve in since 1969.



The expanded Geological Survey of Wyoming Advisory Board after reorganization, December, 1969: Philip Schockey, Teton Exploration, Casper; Donald B. Basko, State Oil and Gas Supervisor, Casper; John S. Runge, Casper, chairman of the board; D.L. Blackstone, University of Wyoming professor of geology; S.H. Knight, professor emeritus; Harry Hedgpeth, Stauffer Chemical Company, Green River; Dan Miller, State Geologist, and William H. Curry, Casper (University of Wyoming photograph — Pownall).

Daniel N. Miller, Jr. and the energy boom of the 1970s.

Governor Hathaway announced the selection of Dr. Daniel N. Miller, Jr. as the new State Geologist and Executive Director of the Geological Survey of Wyoming on July 16, 1969. Miller earned both his Bachelor's (1949) and Master's (1951) degrees from the Missouri School of Mines and Metallurgy, and received his Ph.D. (1955) from the University of Texas. Specializing in the exploration and research phases of the petroleum industry, before his appointment he worked for the Pan American Petroleum Corporation, Monsanto Chemical Company and the Casper geological consulting firm Barlow and Haun, Inc. He joined the geology department at Southern Illinois University in 1963, and chaired the department at the time he was named the State Geologist of Wyoming.



Daniel N. Miller, Jr., State Geologist, 1969 to 1981.

Miller directed the Geological Survey through the most dynamic decade in the Agency's history. Throughout the 1970s, and especially after the Arab oil embargo of 1973, the Nation increasingly looked toward Wyoming and the West for solutions to the perceived energy crisis. As the price of crude oil soared, deep drilling and the use of costly secondary and tertiary recovery techniques in Wyoming oil fields became more economical. New oil and gas discoveries in the Overthrust Belt, Powder River Basin and elsewhere further stimulated the State's petroleum industry at this time. Wyoming's plentiful reserves of low-sulfur coal also suddenly assumed new importance, both as the raw material for possible synthetic fuel production and as a relatively clean-burning fuel for steam-generated electricity. Many predicted that nuclear power would likewise contribute to energy independence, so interest in the State's uranium deposits peaked as well. Thus, Wyoming's minerals industry, thanks largely to these energy resources, virtually

exploded in the 1970s. And, as had been the case in the past, the Geological Survey grew along with it and guided much of the development.

The Geological Survey during this period became a public service agency such as it had never been before. Within two years of taking office, Miller estimated that inquiries from the public, private industry and governmental agencies consumed from 75 to 80 percent of the Survey's time. The ratio never dropped below 60 percent throughout the decade. Journalists, mining firms, consultants, Federal agencies, departments of state government, legislative committees, concerned citizens and others sought technical information from the Geological Survey regarding the thriving minerals industry. After passage of the Industrial Development Information and Siting Act in 1975, planners and elected officials from practically every county joined the throng. Where is a likely location for a new coal mine, an oil rig or a uranium mine? How much oil and gas, coal and uranium were produced last year, and how much is expected in the future? What tax revenue can the State expect from mineral production? Is there a sufficient supply of ground water to supply energy boom towns? Are the technical sections of this environmental impact statement accurate? These and a myriad of other questions were asked the Geological Survey. Obviously, the energy boom of the 1970s presented quite a challenge to the Agency, but the Survey took the steps necessary to meet that challenge.

Increasing the staff was one means by which the Survey coped with the pressing demands placed upon it. When Miller assumed office in 1969, the Survey employed on a full-time basis only himself, one other geologist, one secretary and a clerk-typist. By 1980, the staff had grown to twelve full-time employees. They included the Director, five staff geologists, a technical publications editor, two cartographers, two clerk-stenographers and a secretary. The budget also allowed the hiring of up to fourteen part-time employees. Each of the five staff geologists headed an operational section of the Survey related to that individual's particular expertise. The creation of these sections — oil and gas, minerals, coal, environmental geology and stratigraphy — reflected the Geological Survey's organizational response to the explosive growth of the minerals industry during the energy boom of the 1970s. Of course, staff increases and the creation of operational sections would have been impossible without increased appropriations from the Legislature, and Miller successfully convinced the lawmakers that increasing the number of professional and support employees better enabled the Survey to serve Wyoming during these dynamic times.



The Butler Hut. In the early 1970s part of the Geological Survey's professional staff was headquartered here behind the S.H. Knight Geology Building on the University of Wyoming campus.

With staff additions and the demands being placed upon the Survey increasing at an almost exponential rate, it soon became apparent that more office and laboratory space would be needed. In 1955, Thomas believed the new quarters in the Geology Building addition would be adequate to meet any future growth, but he, of course, could not foresee the extraordinary events of the 1970s. Miller, however, realized soon after taking office that a new facility was necessary. The oil-well sample repository had already run out of space, and a study estimated that the Geological Survey would require over 16,000 square feet by 1981 in order to maintain its established level of performance. Besides, the same factors that contributed to the phenomenal growth of the Survey also affected the University's geology department, and it could certainly use the area in the Geology Building occupied by the Survey.

Progress toward new quarters proved slow but deliberate. In November, 1971, Miller met with the University's Campus Planning Committee to request a building site. The following year, the University of Wyoming Trustees approved a site for the building adjoining the Geology Museum on the east. In 1973, Miller and the Advisory Board put together a "Recommendation for Planning the Geological Survey Building Addition" for the Legislature's consideration. The Board repeated the argument that the increasing demands placed upon the Agency made the new building an absolute

necessity, and added that additional space for visiting geologists and technical personnel would enable the Survey to participate in more cooperative programs. Miller and the Advisory Board must have been persuasive, because Governor Hathaway and the Legislature that year granted funds for the preliminary architectural planning. In September, Casper architect, Henry Therkildsen, who earlier had designed the University's Pharmacy Building, was hired.

The final step toward realizing the goal of a new building came when the Legislature, at Governor Ed Herschler's request, approved a \$920,000 appropriation for constructing and furnishing new quarters for the Geological Survey. The funds came after \$10,000 in private pledges for the massive undertaking were received by the Survey through the endeavors of Miller and the Agency's Advisory Board. On October 11, 1976, Secretary of State Thyra Thompson dedicated the new 22,400-square-foot Geological Survey of Wyoming Building.⁴⁶ The new facility was not only ample enough for the Survey's needs, it even allowed office space to be rented to the U.S. Geological Survey. Just as the operational sections reflect the Geological Survey of Wyoming's organizational response to the energy boom, the new building physically symbolizes the Agency's growth during the 1970s.

The increase in staff, coupled with new office and laboratory space, made possible a reciprocal increase in the studies and projects undertaken by the Survey, many of which were directly attributable to the boom. For example, work began in 1971 on a County Resource Series, a county-by-county compendium of mineral, energy and water resources. This project continued throughout the decade; thanks, in part, to grants from the U.S. Bureau of Mines, which paid for graduate student assistance. In return, the Survey tabulated information on the occurrences of uranium in Wyoming for the Bureau. An energy resources map of Wyoming, published in cooperation with the State's Department of Economic Planning and Development, also appeared in 1971. The map was the first of its kind published in the country, and it met with acclaim when it was displayed at the 1972 Annual Meeting of the American Association of Petroleum Geologists in Denver, Colorado.

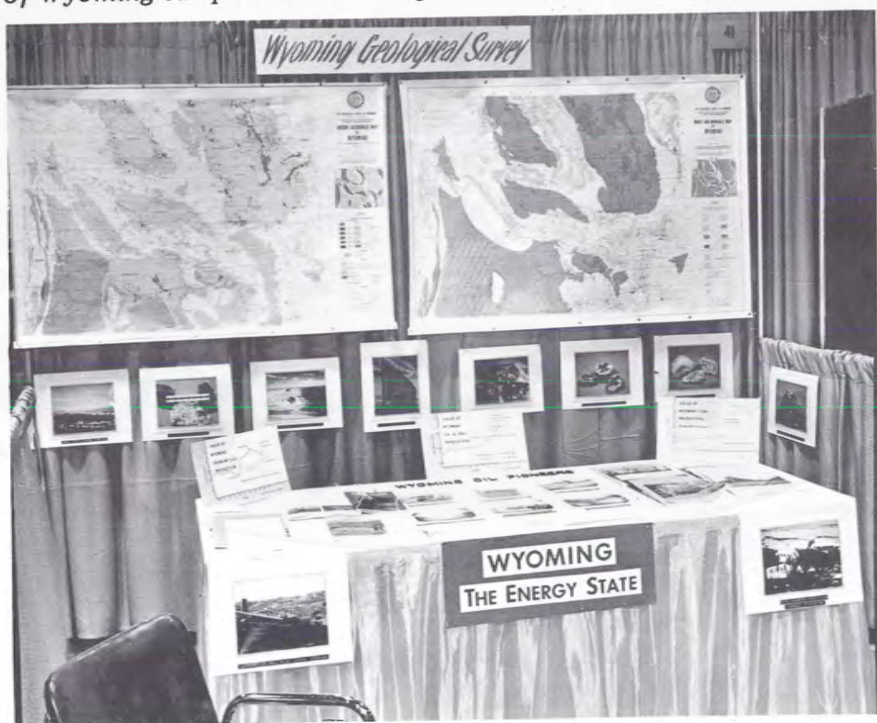
⁴⁶ As a side note, while the new Geological Survey building was under construction, a Survey draftsman, Evan Groutage, sculpted a 32-inch diameter rendition of the Great Seal of the State of Wyoming. The State purchased the sculpture and bronze casts of his seal now adorn State buildings across the State. The first seal cast was affixed to the Geological Survey building in Laramie.



Dedication of the Geological Survey of Wyoming Building and unveiling of the State's seal, September 12, 1976. Evan Groutage, sculptor of the seal, second from left, Governor Ed Herschler third from left, and Secretary of State Thyra Thomson fourth from left (Laramie Boomerang, September 12, 1976, photograph by Stoesz).



The new Geological Survey of Wyoming Building on the University of Wyoming campus. The building was completed in 1976.



Geological Survey of Wyoming's publications on exhibit at the 1972 National Convention of the American Association of Petroleum Geologists, held in Denver, Colorado.

After the establishment of operational sections, much of the Survey's work became more specialized. The Coal Section, for instance, cooperated with the U.S. Geological Survey in an evaluation of northern Powder River Basin coal lands. It also reported on the strippable coal reserves of the Hanna Coal Field for the U.S. Bureau of Mines, collected and described more than 100 coal samples from Wyoming (which were analyzed by the U.S. Geological Survey and the U.S. Bureau of Mines and published through the Section's efforts) and performed a variety of other studies related to the State's increasingly important coal reserves. The most important of these other tasks was the continuous updating and forecasting of the growth of the coal industry in Wyoming.

The most notable accomplishment of the Oil and Gas Section involved the initial preparation and almost constant revision of a geological reference map to the Overthrust Belt. Former State Geologist, D.L. Blackstone, Jr., prepared the first version of this important reference. The Section also completed a new general map of Wyoming oil and gas fields in 1980. It also conducted an inventory of tight gas sands, a potential future source of energy, with the assistance of a special \$45,000 appropriation from the Legislature. The project culminated in an Open File Report.



Dragline stripping overburden from coals in the newly rejuvenated Hanna coal field of southcentral Wyoming, 1972. (Photograph by G.B. Glass.)

The Minerals Section, for its part, studied Precambrian uranium occurrences in southeastern Wyoming and began preliminary mapping of diamond-bearing kimberlite deposits in south-central Albany County. The diamond-related work culminated in a major exploration effort by Cominco American, Incorporated. Their exploration documented the existence of both industrial quality and gem grade diamonds in Wyoming.



Wyoming diamonds collected in the State Line district south of Laramie (photograph by W. Dan Hausel).

Meanwhile, the Stratigraphy Section was busy compiling and cross indexing a master stratigraphy file for the entire State. The Environmental Geology Section began a long-term assessment of potential geological hazards in the State. It included studies and maps of landslide-prone areas, windblown sand deposits, earthquakes, mine subsidence and flood-prone areas. All the sections devoted a great deal of their time to reviewing the technical aspects of environmental impact studies for the Governor's Clearing House. These projects and studies obviously represent only a sample of the Survey's total effort, but they do illustrate the frenzy of activity that surrounded Miller's tenure.

In fact, Miller was kept just as busy as his staff. In addition to directing the day-to-day operation of the Survey, he also sat on the Wyoming Oil and Gas Conservation Commission, the Interstate Oil and Gas Compact Commission and the Governor's Interdepartmental Water Planning Conference. Furthermore, the Governor, Legislators and numerous State agencies often sought Miller's advice on geologically related matters. In 1976, Miller was named Minerals Industries Man of the Year by the Casper Chamber of Commerce. The citation reads:

Mineral Industries Man of the Year, 1976, Dr. Daniel N. Miller, Jr., awarded in recognition of outstanding achievement in the mineral industry and meritorious service to his State and community.

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Despite the pressing demands on his time, Miller also helped frame 1977 legislation that defined the qualifications of a professional geologist and set standards for geological reports submitted to the State — a significant accomplishment in a state where so much geological work was being done at a very rapid pace. This same law also outlined in specific terms the duties of the State Geologist, since the 1969 act reorganizing the Survey had neglected to do so. However, the duties remained exactly the same as those in force before the reorganization.

Also in 1971, at Miller's urging, legislation was passed that required the submission of all subsurface log reports of mineral exploration drilling on State lands. Copies of all electrical, gamma-ray, resistivity and other types of subsurface logs were to be submitted to the State Geologist's office within three years after their completion. Up until this law was enacted, only subsurface logs of oil and gas drilling were required by the State, and these went to the Wyoming Oil and Gas Conservation Commission.

Miller's capable direction of the Geological Survey during the boom of the 1970s attracted the attention of officials in Washington, D.C. Early in 1981 he was asked to consider possible nomination as the Department of the Interior's Assistant Secretary for Energy and Minerals. He moved to the Nation's capitol that March and assumed the position in an acting capacity. President Ronald Reagan officially nominated Miller on May 22, 1981, and the Senate unanimously confirmed him on June 19, 1981. The new Assistant Secretary's responsibilities included the implementation of all energy and mineral policies related to the programs of the U.S. Geological Survey, the U.S. Bureau of Mines, the Office of Surface Mining and, for a time, the Office of Minerals Policy and Research Analysis. Miller came to his Federal post well prepared because his administration of the Geological Survey had helped transform Wyoming from the "Cowboy State" into the "Energy State".

Into the 1980s: Gary B. Glass

Gary B. Glass, who had served as the Survey's Coal Geologist between 1971 and 1978 and as the agency's Deputy Director since 1978, finished Miller's unexpired term and, in 1982, began a full six-year term of his own. A native of Pennsylvania, Glass received a Bachelor of Science degree in Geology from Bucknell University in 1962. Two years later, he completed a Master's degree in Geology



*Gary B. Glass, State Geologist,
1981 to present.*

at Lehigh University. While pursuing his degrees, Glass worked summers as a field assistant for the Pennsylvania Geological Survey and, after graduation, continued that association as a part-time Associate Geologist for the Agency. A stint in the U.S. Army Corps of Engineers followed from 1964 to 1967, complete with a tour of duty in Vietnam. After an honorable discharge at the rank of Captain, Glass rejoined the Pennsylvania Geological Survey as a coal geologist. He held that position until coming to the Geological Survey of Wyoming as its coal specialist. Fittingly, Miller's successor was himself a product of the 1970s energy boom.

The momentum established during Miller's administration carried over into Glass' term, although the circumstances under which each served differed markedly. While Miller guided the Survey through a period of rapid expansion associated with the energy boom, Glass dealt with a slowdown in Wyoming's minerals industry. By the early 1980s, it became apparent that boom-time predictions for growth in the production of energy minerals, especially uranium, simply would not materialize. Americans began conserving electricity with a new vigor as the price of energy rose during the 1970s. Also, a moratorium on new nuclear power plants and public concerns over the safety of atomic energy, following the Three Mile Island incident, combined with an influx of imported yellowcake to deliver a devastating blow to the State's uranium industry. As a result of these developments, the market for coal softened, and the uranium

industry entered a major depression. These seemingly unfavorable events, however, had little impact on most Survey activities.

The question arises as to why the Survey's level of activity failed to slump along with the State's minerals industry during the 1980s. There are several explanations. First, mineral production merely slowed; it did not grind to a halt. Petroleum, natural gas and coal — the traditional stalwarts — remained significant factors in Wyoming's economy. Second, many of the forces unleashed during the boom were still intact and, likewise, the need for services rendered by the Survey. Federal Resource Management Plans, Environmental Impact Statements and mining and industrial siting permits, for example, were still being issued, albeit at a slower pace. They still required technical review. In addition, taxes from mineral production continued to be a major determinant in the revenue available to State government, so accurate projections were vital to sound planning for the future. Finally, the recession actually underscored the importance of the Survey. The Agency's history teaches that it serves an important function during such times by maintaining interest in Wyoming resources. In fact, Glass touched upon this historical theme in his 1983 annual report. Questioning the possible consequences of State-wide budget cuts and freezes, he argued:

The point is that there are some agencies whose importance to the recovery and long term stability of the State's economy is magnified by "bad times". The Geological Survey is such an agency since its services, investigations and publications keep the State's mineral resources in view where industry might be enticed into beginning or renewing exploration and eventual production. While cutting or freezing budgets for such agencies may realize some small savings, long term losses resulting from scaled down Survey activities may overshadow these short term gains.⁴⁷

All of these reasons explain why the Survey stayed very busy during the early 1980s, despite the hard times.

Providing information, advice and assistance on questions about geology and mineral resources continued to dominate the Survey's efforts. Such service to the general public, State government and Federal agencies still consumed approximately half of the staff's time. Indeed, the actual number of inquiries rose at a modest rate from 1980 to 1983. In the latter year, a total of 3,408 requests for information were received, a figure equivalent to nearly two questions per staff geologist per day. The Geological Survey, as a

⁴⁷Gary B. Glass, *Fiftieth Annual Report of the Geological Survey of Wyoming for Fiscal Year 1983* (Laramie: Geological Survey of Wyoming, 1983), p. 20.

whole, also employed several means for keeping the public and industry continually informed about Wyoming resources. Each section geologist authored articles for professional journals, presented papers at conferences and gave public talks. They also contributed production forecasts for the University's quarterly publication, *Wyoming Issues*. This same information also appeared in the Survey's own periodical, *Mineral Outlook for Wyoming*. Yearly production figures were provided for the U.S. Bureau of Mines' *Minerals Yearbook* as well.

Each Section, of course, concentrated on projects of their own. A brief review of their accomplishments further demonstrates that the bustle of activity begun during the boom slowed little, if at all, during the early 1980s.

The Oil and Gas Section, headed by Alan J. VerPloeg, provided a variety of services and new information relevant to this important sector of Wyoming's economy. The Overthrust Belt remained a hub of exploration and drilling activity, and in response the Section prepared a report with a fourth edition of the popular tectonic map of the region. On a larger scale, work on an updated general oil and gas map of Wyoming began in 1983. The Oil and Gas Section directly served the State by continuing its evaluation of all new oil and gas discoveries with regard to State mineral ownership and reported these findings to the Commissioner of Public Lands.

Circumstances prevented the Coal Section from being as active as it had been during the boom, but it managed to contribute a great deal as well. When Gary Glass became State Geologist and Director of the Survey, the Section was left without a full-time coal geologist until March, 1982. Finding a qualified replacement proved difficult, but finally Richard W. Jones was hired. Before Jones' arrival, the Section's efforts were accomplished by Glass serving in a dual role as Coal Geologist and Survey Director. In this interim period, the Section aided the Environmental Section in a study of geological hazards by identifying old mine sites. It also prepared guidebooks to the Powder River Coal Basin and the Hanna Coal Field, and it continued its forecasts of coal development and production. With the hiring of Jones, things picked up considerably. During fiscal year 1983, most coal mines in the State were visited and a photographic file for each was compiled. The Coal Section at this time also cooperated with several University departments on a number of special undertakings. It assisted the Departments of Engineering and Geology with a coal drilling and coal analysis project in southwestern Wyoming. The Section also supplied information on coal prices, taxes, contracts, deliveries, production and quality to the University of Wyoming's Economics Department

for a computer program designed to forecast coal economics and marketing.

The Minerals Section, during this period, experienced an important change. In fiscal year 1983, it was divided into a Metallic Minerals Section and a separate Uranium and Industrial Minerals Section. W. Dan Hausel, who headed the Section before the separation, also served as Deputy Director of the Survey, and this responsibility detracted from the time he could spend as Section geologist. The split alleviated this problem. Before the division, the investigation of diamondiferous kimberlites dominated the Section's effort. The kimberlite project included a National Aeronautics and Space Administration (NASA) sponsored joint venture between the Survey and the University's Department of Geology and Geophysics. This program evaluated satellite remote sensing techniques for rapid exploration of kimberlite deposits. A study of base, precious and industrial mineralization within Wyoming was another of the old Mineral Section's projects. After the separation, the Metallic Minerals Section focused its attention on studies of metallic and precious minerals in Precambrian and other rocks in Wyoming. The Uranium and Industrial Minerals Section, headed by Ray E. Harris, started work on maps depicting levels of background radiation throughout the State. Studies of industrial minerals such as limestone, bentonite and talc were also begun by the new Section.

Much of what the Environmental Geology Section achieved at this time was attributable to the remnants of the energy boom. It still reviewed environmental impact statements, planning documents and industrial siting permits. Also, some energy boom towns were still completing their infrastructures, and the Section assisted county agencies in determining areas geologically unsuited for development. During 1983, for example, James C. Case, head of the Section, prepared a special report for Lincoln County's master plan. Of course, not all of the Section's effort was related to the boom and its aftereffects. As a follow-up to a grant from the State's Department of Environmental Quality, which began during Miller's administration, Section personnel accelerated their studies of geological hazards throughout Wyoming. For this project, maps and reports were produced on landslides, earthquakes, deposits of windblown sand, flood-prone areas, poor water, mined-out areas, shrinking-swelling soils, naturally occurring toxic elements and mine subsidence. The Section, together with the State Geologist, also investigated a suspected decline in the flow of the hot spring at Hot Springs State Park in Thermopolis, and recommended a system for monitoring flows and identifying any future problems.



Geologic hazards research accelerated in the 1980s as the Environmental Geology Section began inventorying landslide-prone areas and mine subsidence. (A) Boulder fall that crushed a pedestrian walkway at Buffalo Bill Dam in 1982. (B) Mine subsidence west of Carbon townsite. In some parts of Wyoming such collapse features threaten housing developments that have encroached onto mined-out areas (photographs by Gary B. Glass).

The Stratigraphy Section, headed by Rodney H. DeBruin, was actively engaged in a number of projects. In 1981, it investigated and reported on Wyoming's helium resources. The compilation of numerous index maps depicting geological mapping of the State was also begun during this period, and the ongoing project to acquire all pertinent publications concerning Wyoming's geology was accelerated.

The Laboratory Section of the Survey augmented many of the other Sections' accomplishments. Early in Glass' administration, however, the lack of sophisticated equipment hampered these efforts. Still, this support Section of the Survey contributed significantly to the kimberlite project by designing an apparatus capable of recovering diamonds of one millimeter or less by the use of a surface-tension floatation device. The dearth of technical equipment lessened somewhat in fiscal year 1982 with the acquisition of an Olympus BH-T microscope. This instrument materially aided in the identification of diamond and heavy-mineral kimberlite indicators. Another major step in updating laboratory equipment came in 1983 with the purchase of a Scintag Pad II automated X-ray powder diffractometer. The computer and software that accompany this valuable tool greatly simplified the processes of data collection and interpretation when making mineral analyses. Consequently, the time required for such analyses was greatly reduced.

Glass, in his capacity as State Geologist and Executive Director of the Survey, was just as active as the individual Sections. The years 1981 and 1982 proved especially hectic, since he acted both as the Agency's chief administrator and its Coal Geologist. As State Geologist, of course, he also served on the Governor's Water Forum and on the Wyoming Oil and Gas Conservation Commission, later becoming the Acting Chairman of the Commission. Since 1980, this latter responsibility had become increasingly burdensome. Monthly meetings of the Commission, which routinely had lasted only a day in the past, stretched into one-and-a-half to two-day affairs. By 1983, the Oil and Gas Conservation Commission required up to five days of Glass' time each month. Nevertheless, Glass found time to lend his expertise and advice on other matters. As noted above, he helped in the study of flows at Hot Springs State Park. In 1983, he advised the Wyoming Highway Department on a coal condemnation proceeding concerning the completion of Interstate 90 in the State. Reminiscent of the past, when fraudulent operators plagued Wyoming's mining industry, Glass that year also provided expert testimony for the California Attorney General in a civil case against a company charged with misrepresenting coal properties leased from the State of Wyoming. This case was

followed by several other similar cases. Glass also exercised his legal duty to make recommendations relative to the minerals industry. Throughout the early 1980s he called, unsuccessfully, for the establishment of a State Minerals Supervisor. In essence, the Mineral Supervisor would have been comparable to the State Oil and Gas Supervisor, having the responsibility to verify production reports, prevent waste and promote the conservation of mineral resources exclusive of oil and gas.

Perhaps Glass' most important contribution came each September when he consulted with each Section geologist and other State agencies in order to estimate future minerals production and mineral values, and then reported the findings to the Legislative Service Office. These figures formed the basis of the Office's forecast for mineral revenue. In 1983, Glass became a member of the State's newly formed Consensus Revenue Estimating Group, charged with presenting revenue forecasts for use by both the Governor and the Legislature. Glass' input specifically dealt with forecasts of mineral revenues. The Group was formed to help avoid the lengthy arguments about future revenues that so often consumed vast quantities of valuable time during each legislative session.

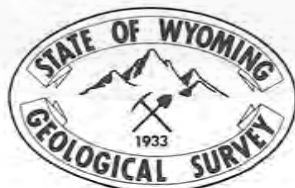
The various tasks undertaken by Glass and his staff generally resulted in new Survey publications. From fiscal year 1981 through fiscal year 1983, a remarkable total of forty-eight such publications appeared, carrying on the annual increases in publications started during Miller's tenure as State Geologist. Publications in these three fiscal years included two annual reports, three bulletins, ten public information circulars, three preliminary reports, ten open file reports, four reports of investigations, eight contributions to the map series, seven reprints of information originally published elsewhere and one miscellaneous report. The general public especially welcomed the flood of new information and bought three quarters of the 25,596 maps and publications purchased during this period. The Survey obviously was meeting its obligation to publish timely and significant reports and maps that contribute to a better understanding of the State's geology and mineral resources. Revenue from the sales of Survey publications, which by this time went directly into the State's General Fund, peaked at \$94,237 in fiscal year 1981.

Against the background of these many achievements of the early 1980s, the Geological Survey celebrated its Fiftieth Anniversary in the Summer of 1983. The agency certainly had come a long way since legislators, seeking to reduce expenditures, created the Geological Survey of Wyoming in 1933. It had come even further since 1877, when Territorial Assayer, John G. Murphy, set up his office in a Rawlins stable. Between 1877 and 1983, the Survey

evolved from a sometimes zealous promoter of an infant minerals industry into a competent scientific agency helping to shape the leading economic sector in the State. Indeed, the history of the Survey has been intertwined with the history of mining in Wyoming. Moreover, this history reveals that the Geological Survey and its predecessors played a significant role in making a viable mining industry possible. It kept Wyoming's mineral resources before the eyes of industry and the public, especially at times when an unfavorable economic climate might have turned those eyes elsewhere. It regulated the minerals industry when necessary, such as during the oil boom of the 1920s. It guided the industry when needed, as exemplified by its efforts during the energy boom of the 1970s. And, especially during the last two decades, it fostered a better understanding of the State's geology and mineral resources by undertaking scientific investigations and publishing the results. The key to the Survey's survival and success in the past has been an ability and willingness to meet new challenges and needs. As long as the Agency continues to follow this historic tradition, it will no doubt continue to serve Wyoming well into the second century of statehood.

About the author

William Bryans is a Ph.D. student in History at the University of Wyoming, Laramie. He has worked at the University's American Heritage Center, the Buffalo Bill Historical Center and with the Wyoming Historical Survey. He also has published articles on Wyoming forests and the history of coal mining in the State during the 20th Century. Bryans coordinated programs on mining and energy for a radio series about Wyoming history, *Visions of the Past*. This history of the Geological Survey of Wyoming is an outgrowth of his interest in mining and energy development in the American West.



Advisory Board Members (1969-1986)

109

Basko, Donald B., (1969-present)

Blackstone, D.L., Jr., (1969-present)

Carlson, William D., University President, (1969-1978)

Carlton, James L., Jr., (1969)

Curry, William H., (1969-1976)

George, Gene R., (1983-present)

Glass, Gary B., (1981-present)

Graham, A. Thomas, Jr., (1975-1982)

Graves, William H.B., (1982-present)

Hathaway, Stanley K., Governor, (1969-1974)

Hedgepeth, Harold G., (1969-1971)

Heisey, Edmund L., (Roy), (1977-1983)

Herschler, Ed, Governor, (1975-present)

Houston, Robert S., (1975-present)

Jennings, Edward H., University President (1979-1981)

Lisco, Richard K., (1973-1974)

McFadden, Hugh B., Acting University President, (1978-1979)

Miller, Daniel N., Jr., (1969-1981)

Rea, Bayard D., (1976-present)

Runge, John S., (1969-1976)

Shockey, Philip N., (1969-1972)

Steele, Robert J., (1971-1975)

Veal, Donald L., University President (1981-present)

Biennial Budgets of the Geological Survey and its predecessors

111

Territorial Assayer Office		Geologic Survey of Wyoming	
1878-1879	\$ 2,200	1933	?
Office of Territorial Geologist and Mining Engineer		1934-1935	\$ 7,500
		1936-1937	\$ 9,000
		1938-1939	\$ 9,000
		1940-1941	\$ 7,500
		1942-1943	\$ 6,500
1880-1881	\$ 1,500	1944-1945	\$ 10,000
1882-1883	\$ 4,000	1946-1947	\$ 15,000
1884-1885	\$ 4,000	1948-1949	\$ 23,300
1886-1887	\$ 5,800	1950-1951	\$ 27,835
1888-1899	\$ 6,100	1952-1953	\$ 28,900
1890	\$ 3,700	1954-1955	\$ 36,766
Office of the State Geologist		1956-1957	\$ 45,000
		1958-1959	\$ 52,530
1891-1900	No funding	1960-1961	\$ 53,730
1901-1902	\$ 6,800	1962-1963	\$ 66,925
1903-1904	\$ 6,800	1964-1965	\$ 91,309
1905-1906	\$ 6,800	1966-1967	\$ 99,860
1907-1908	\$ 6,800	1968-1969	\$ 99,000
1909-1910	\$ 9,800	1970-1971	\$ 190,000
1911-1912	\$ 14,800	1972-1973	\$ 264,424
1913-1914	\$ 14,800	1974-1975	\$ 369,563
1915-1916	\$ 17,300	1976	\$1,471,858*
1917-1918	\$ 15,700	1977-1978	\$ 593,877
1919-1920	\$ 15,700	1979-1980	\$ 743,992
1921-1922	\$ 35,700	1981-1982	\$1,026,836
1923-1924	\$ 29,140	1983-1984	\$1,496,582
1925-1926	\$ 27,000	1985-1986	\$1,450,846
1927-1928	\$ 36,600		
1929-1930	\$ 53,700		
1931-1932	\$ 43,770		

*1976 budget includes the new Survey Building.

Partial list of employees (1878-1986)

113

Adams, Penny R., Assistant (part-time), (1971-1972)
Adkins, Betty S. (see Betty S. Wills)
Adler, Frank, Temporary Field Assistant (part-time), (1944)
Ahlf, Jean, Secretary, (1948)
Aker, Stephanie, Secretary, (1962-present)
Albanese, John, Field Assistant (part-time), (1947)
Albert, Karl G., Geologic Research Worker II (part-time),
(1982-present)
Amend, Paris J., Assistant (part-time), (1972-1973)
Anderson, James E., Temporary Geologist (part-time), (1966)
Anderson, Vernon, Temporary Assistant (part-time), (1955)
Aronson, Teresa M., Library assistant (part-time), (1977-1978)
Ary, Max D., Assistant (part-time), (1958)
Atkinson, Robert F., Office Assistant (part-time), (1962-1963)
Attride, Pamela, Assistant (part-time), (1955)
Aughey, Samuel, Territorial Geologist and Mining Engineer,
(1884-1886)
Backer, Mary E., Temporary Typist (part-time), (1961)
Badgley, Kirk, Assistant (part-time), (1952)
Bailey, Gilbert E., Territorial Geologist and Mining Engineer,
(1882-1883)
Bailey, Robert V., Assistant (part-time), (1954-1956)
Banchieri, Peter L., Jr., Assistant (part-time), (1966-1967)
Barnes, Ellen, Secretary (part-time), (1980-1981, 1983)
Barnes, William C., Assistant (part-time), (1956-1957)
Bartlett, Albert B., State Geologist, (1922-1926)
Basko, Donald B., Assistant (part-time), (1954)
Beattie, Brenda J., Temporary Assistant (part-time), (1965-1966)
Beckwith, R.H., Geologist (part-time), (1935)
Beeler, Henry C., State Geologist, (1901-1908)
Bell, Wallace, G., Assistant (part-time), (1948-1950, 1953)
Berg, William R., Geologic Research Worker I (part-time),
(1977-1979)
Bergstrom, John, Assistant (part-time), (1948, 1951-1952)
Berry, Lois M., Clerk-Trainee (part-time), (1975); Clerk (part-time),
(1976)
Beshara, Diane E., Secretary (1971-1973)
Billings, Karen D., Assistant (part-time), (1966-1967)
Bishop, Donald T., Office Assistant (Oil well sample library)
(part-time), (1962-1963)
Bishop, Mark R., Library assistant (part-time), (1981-1982)
Blackstone, D.L., Jr., Field Geologist (part-time), (1947); State
Geologist, (1967-1969)

- Blackstone, George, Camp assistant, (1912)
- Blackstone, Robert E., Temporary Geologist (part-time), (1971)
- Bland, Norah L., Assistant draftsman (part-time), (1980-1983)
- Blodgett, Coral L., Clerk/typist (part-time), (1972)
- Blydenburg, C.E., Assistant Assayer, (1877)
- Bogrett, Jack, Assistant (part-time), (1949-1950)
- Boles, James R., Temporary Geologist (part-time), (1967)
- Boman, Fern, Stenographer, (1930-1932)
- Bothner, Wallace A., Jr., Lab Assistant (part-time), (1964);
Temporary Lab Assistant-Temporary Geologist (part-time),
(1965); Temporary Geologist (part-time), (1967)
- Bowman, Joseph L., Assistant (part-time), (1954)
- Bowman, Ramona, Secretary, (1944-1947)
- Boyd, Cynthia S., Geologic Research Worker II (part-time),
(1980-present)
- Bragdon, Frederick F., Temporary Geologist (part-time), (1963)
- Breckenridge, Roy M., Temporary Geologist (part-time),
(1970-1971); Environmental Geologist (1973-1978)
- Bright, Thomas J., Office Assistant (part-time), (1963-1964)
- Brink, Carl F., Geologic Research Worker I, (part-time), (1984)
- Brooks, Kenneth J., Geologic Research Worker II (part-time), (1976)
- Brooks, Rae Ann, Temporary Assistant, (1951)
- Brown, Norvall, (Mrs.), Secretary, (1947-1948)
- Brummell, Joseph L., Assistant, (1956-1957)
- Bryans, William S., Historian (temporary), (1983)
- Bujak, Paul, Technical Assistant (part-time), (1971)
- Bullock, James M., Temporary Geologist (part-time), (1963)
- Burgess-Lyon, Patti J., Geologic Research Worker I (part-time),
(1979-1980); Assistant draftsman (part-time), (1982-1984)
- Burk, Creighton, Assistant (part-time), (1952)
- Burke, Shirley S., Secretary, (1956-1958)
- Burritt, Edward C., Temporary Geologist (part-time), (1961)
- Cannia, James C., Geologic Research Worker I (part-time),
(1985-present)
- Carlson, Sylvia E., Librarian (part-time), (1964-1965)
- Case, James C., Environmental Geologist, (1981-1985), Geologic
Hazards Geologist (1986-present)
- Case, Karen M., (see Karen M. Heckendorf)
- Casto, Bille C., Assistant (part-time), (1952)
- Chadeayne, Dennis K., Temporary Geologist-Draftsman (part-time),
(1965), Draftsman (part-time), (1966)
- Chamberlain, Lori S., Geologic Research Worker I (part-time),
(1980-1984)
- Clark, Dorothy B., Secretary, (1958-1962)
- Clark, Michael L., Geologic Research Worker I (part-time),
(1979-1983)

- Coe, Twila, Assistant (part-time), (1957)
 Coffey, Millard J., Oil and Gas Inspector, (1925-1926)
 Coffin, Linda L., Clerk-Trainee (part-time), (1973-1974), Secretary (part-time), (1975), Secretary/bookkeeper (part-time), (1976)
 Colby, C.E., Camp assistant, (1912)
 Cole, Perry A., Clerk, (1927-1932)
 Collins, Charles, Librarian (part-time), (1965)
 Conley, Curtis D., Assistant (part-time), (1964)
 Conley, Millicent S., Assistant (part-time), (1952-1953)
 Coons, G.F., Field assistant (1914)
 Copeland, David A., Geologic Research Worker II (part-time), (1976); Technical Writer/Editor, (1977-1985)
 Cramer, Louis W., Draftsman (part-time), (1961-1962)
 Currey, Donald R., Temporary Geologist (part-time), (1958)
 Cuthbertson, Richard B., Student Assistant I (part-time), (1975-1978)
 Davidson, Peter S., Temporary Field Geologist (part-time), (1964)
 Davis, James C., Temporary Geologist (part-time), (1962)
 Davis, James R., Temporary Field Geologist (part-time), (1964)
 Davis, John C., Temporary Field Geologist (part-time), (1962, 1964-1965)
 Deardorff, Don L., Temporary Geologist (part-time), (1958)
 Deaton, Chadwick C., Clerk-Trainee (part-time), (1973-1975); Clerk (part-time), (1976)
 DeBruin, Rodney H., Environmental Geologist, (1978-1979); Stratigrapher (1980-1985); Petroleum Geologist (1986-present)
 Del Mauro, Gene L., Assistant (part-time), (1952)
 DelMonte, Lois, Assistant (part-time), (1948-1949)
 DeNault, Kenneth J., Librarian (part-time), (1965), Temporary Geologist (part-time), (1966-1967)
 DeVore, George W., Field Assistant (part-time), (1946-1948)
 Dickey, Marlin L., Librarian (part-time) (1960), Temporary Geologist (part-time), (1961)
 Dietz, C.S., Deputy State Geologist, (1927-1932)
 Dimitroff, Pencho B., Temporary Assistant (part-time), (1965-1966)
 Dinelly, Delano, Assistant (part-time), (1950)
 Dreier, John E., Jr., Temporary Geologist (part-time), (1966-1967)
 Drwenski, Vern, Assistant (part-time), (1951)
 Duff, Mary Ruth, Secretary, (1943-1944)
 Dufford, Robin, Student Assistant I (part-time), (1973-1974)
 Duhling, William H., Jr., Temporary Geologist (part-time), (1965-1967)
 Dunrud, C. Richard, Field Assistant (part-time), (1960)
 Durkee, Edward F., Assistant (part-time), (1953)

- Eastwood, William P., Assistant (part-time), (1963, 1965-1966)
- Ebbett, Ballard E., Assistant (part-time), (1954, 1956, 1962)
- Ebbett, Sandra E., Temporary draftsman (part-time), (1963)
- Ebens, Richard J., Temporary Geologist (part-time), (1965, 1967)
- Elliott, Jerry E., Assistant (part-time), (1950-1951)
- Eychaner, John D., Librarian (part-time), (1963-1964)
- Falls, Robert A., Librarian (part-time), (1957-1958)
- Faulkner, Glenn, Temporary Field Geologist, (1949)
- Felt, Karin G., Office Assistant (part-time), (1961-1963)
- Fenton, Michael D., Assistant (part-time), (1965)
- Ferris, Clinton S., Jr., Temporary Geologist (part-time), (1962-1963)
- Fields, Edward D., Temporary Geologist (part-time), (1961)
- Fisher, Frederick S., Temporary Field Geologist (part-time), (1963-1964)
- Frailey, Marlyn A., Publications Sales Clerk (part-time), (1976); Clerk/typist (part-time), (1978)
- Frerichs, Deborah M., Assistant (part-time), (1970)
- Frey, Darwin M., Assistant (part-time), (1957-1958)
- Fruchey, Richard A., Temporary Geologist (part-time), (1961)
- Fulton, Kenneth R., Temporary rock sampler (part-time), (1967)
- Furer, Lloyd C., Temporary Geologist (part-time), (1961)
- Galey, John T., Jr., Temporary Assistant-draftsman (part-time), (1965-1966); Temporary Assistant (part-time), (1967); Temporary Geologist (part-time), (1970)
- Gardner, Hal Arch, Assistant (part-time), (1961)
- Dilmer, Douglas R., Geologic Research Worker I (part-time), (1982, 1984); Temporary Geologist (part-time), (1985-present)
- Glahn, Paul R., Laboratory technician, (1980)
- Glass, Gary B., Coal Geologist, (1971-1978); Deputy Director, (1978-1981); State Geologist, (1981-present)
- Glozzi, J.P., Temporary Geologist (part-time), (1966)
- Gloor, Edward A., Temporary Assistant (part-time), (1967-1968)
- Good, Loren W., Temporary Geologist (part-time), (1959)
- Gooldy, Penn L., Assistant (part-time), (1947)
- Grant, Stanley, Assistant (part-time), (1954)
- Grasso, Dennis N., Assistant draftsman (part-time), (1977-1979)
- Graveson, David H., Jr., Assistant (part-time), (1964), Temporary Geologist (part-time), (1965)
- Gray, Loren, Assistant (part-time), (1946)
- Greer, Phillip L., Geologic Research Worker I (part-time), (1985-present)
- Gries, John C., Temporary Geologist (part-time), (1963)
- Groff, Kathleen M., Geologic Research Worker I (part-time), (1984-1986)
- Groutage, Evan S., Draftsman, (1973-1977)

- Guyton, James W., Temporary Geologist (part-time), (1959)
 Hadsell, Warren F., Field assistant, (1914)
 Haff, John C., Temporary Geologist (part-time), (1944)
 Hager, Michael W., Temporary Editor (part-time), (1968-1969);
 Assistant (part-time), (1972)
 Hagner, Arthur F., Assistant State Geologist (part-time),
 (1943-1947); Temporary Field Geologist (part-time), (1964)
 Hall, Edwin, State Geologist, (1909-1910)
 Hansen, David C., Librarian (part-time), (1970-1971)
 Harden, Suzanne A., Clerk-Trainee (part-time), (1974-1975);
 Typist (part-time), (1976)
 Harder, Vicki M., Geologic Research Worker II (part-time),
 (1978-1979)
 Hardyman, Richard F., Assistant (part-time), (1964-1966)
 Harris, Mary L., Librarian (part-time), (1972-1973)
 Harris, Ray E., Uranium and Industrial Minerals Geologist,
 (1982-present)
 Harston, Lee W., Assistant (part-time), (1957-1959)
 Hasselman, Rebecca S., Secretary/bookkeeper, (1985-present)
 Hauck, William C., Assistant (part-time), (1968-1971)
 Hauf, Charles B., Temporary Geologist (part-time), (1962-1963)
 Haun, John, Assistant (part-time), (1948)
 Hausel, W. Dan, Minerals Geologist, (1977-1980); Deputy
 Director, (1981-present)
 Heckendorf, Karen M., (Case), Bookkeeper (part-time), (1979);
 Bookkeeper, (1980-1984)
 Heisey, Edmund L., Assistant (part-time), (1948)
 Henning, Carlton F., Temporary Draftsman (part-time),
 (1968-1971)
 Hensley, Frank S., Jr., Assistant (part-time), (1954-1955)
 Herbeck, Norma, Assistant (part-time), (1951)
 Hinckley, Bern S., Geologic Research Worker II (part-time),
 (1976-1977)
 Hinds, George W., Librarian (part-time), (1958)
 Hintze, F.F., Field geologist, (1914)
 Hitchcock, Penny L., Librarian (part-time), (1966-1969)
 Hodge, Dennis S., Temporary Geologist (part-time), (1962, 1965)
 Holden, Gregory S., Geologic Research Worker II (part-time), (1978)
 Houston, Robert S., Geologist (part-time), (1957-1967)
 Hoyt, Phil S., Oil and Gas Inspector, (1923-1924)
 Hubbard, Charles J., Assistant (part-time), (1969-1970)
 Huycke, David T., Geologic Research Worker I (part-time), (1977)
 Irwin, Barbara R., Temporary Geologist (part-time), (1971)
 Jamison, Claude E., State Geologist, (1911-1912)
 Jereb, Shirley A., Draftsman (part-time), (1962, 1964-1965)
 Johnson, Ara Jean, Librarian (part-time), (1971-1972)

- Johnson, Franklin O., Temporary Geologist (part-time), (1961)
 Johnson, Michael O., Assistant draftsman (part-time), (1976-1979)
 Johnston, Richard H., Geologist (part-time), (1958)
 Jones, Richard W., Assistant (part-time), (1971-1974); Coal Geologist, (1981-present)
 Jones, Suzanne C., (see Suzanne C. Luhr)
 Jones, Warren W., Publications Stock Clerk (part-time), 1980-1984)
 Jordan, Sally L. (see Sally L. Petersen)
 Kaplan, Sanford S., Student Assistant II (part-time), (1975)
 Kelly, Colleen, Student Assistant I (part-time), (1973-1974)
 Kennedy, H.L., Field assistant, (1914)
 Kennedy, Michael J., Assistant draftsman (part-time), (1979)
 King, James R., Temporary Geologist (part-time), (1960-1961)
 King, John S., Temporary Geologist (part-time), (1961-1964)
 King, Jonathan K., Geologic Research Worker I (part-time), (1985-present)
 Kirn, Douglas J., Temporary Geologist (part-time), (1971)
 Kistner, Frank B., III, Temporary Geologist (part-time), (1967)
 Klockslem, Gretchen K., Clerk-Trainee (part-time), (1975)
 Knight, Samuel H., State Geologist, (1933-1940)
 Knight, Wilbur C., Assistant, (1885); Assistant Territorial Geologist (1887); State Geologist, (1897-1901)
 Koenig, A.A., Jr., Assistant (part-time), (1951-1952)
 Kunkel, Sharon L., Assistant (part-time), (1965)
 LaBeff, Randy L., Assistant draftsman (part-time), (1980)
 Lackey, Larry Lee, Assistant-Temporary Field Geologist (part-time), (1964-1965)
 Lageson, David R., Geologic Research Worker II (part-time), (1975-1976); Stratigrapher, (1977-1980)
 Landau, David, Assistant-Temporary Geologist (part-time), (1965)
 Lane, Donald W., Staff Geologist, (1970); Oil and Gas Geologist (1971-1973)
 Lawrence, John C., Temporary Geologist (part-time), (1961); Librarian (part-time), (1962)
 Lawson, Donald, Assistant (part-time), (1948)
 Learned, Andrea C., Librarian (part-time), (1968-1969)
 Lee, William, (Mrs.), Secretary, (1951)
 Lindeen, Lynn E. (see Lynn E. Stolworthy)
 Litchford, Robert F., Jr., Temporary Geologist (part-time), (1963)
 Long, Joseph S., Jr., Geologist (part-time), (1958)
 Love, Charles M., Temporary Geologist (part-time), (1967)
 Love, J.D., Geologist (part-time), (1935)
 Love, Jane M., Geological Staff Assistant (part-time), (1970-1972)
 Lowry, Kathleen, Secretary, (1953-1956)
 Luhr, Suzanne C. (Jones), Geologic Research Worker I, (1982-1984), Geologic Research Worker II, (1985-1986)

- Lynn, John, Assistant (part-time), (1946)
 Lyon, Denton L., Assistant (part-time), (1955)
 MacLeod, Jacqueline, Clerk typist (part-time), (1977-1979)
 Maghee, Val B., Oil and Gas Inspector, (1923-1926)
 Maher, Patrick D., Temporary Assistant (part-time), (1955-1956)
 Manske, Monte C., Publications Stock Clerk (part-time),
 (1985-present)
 Maxwell, Kenneth E., Field Assistant (1970)
 Marzel, John G., State Geologist, (1926-1932)
 Masell, Nancy M., Assistant (part-time), (1952)
 Masterman, Frederick J., Librarian (part-time), (1960)
 Matus, Irwin, Field Geologist (part-time), (1957)
 Max, Michael D., Temporary Geologist (part-time), (1965)
 McAndrew, James S., Temporary Geologist (part-time), (1968)
 McCallum, Malcolm E., Temporary Geologist (part-time),
 (1959-1961)
 McClain, Beverly R., Temporary Typist (part-time), (1964-1965)
 McClelland, Deborah A., Clerk typist, (1980)
 McConnell, Marlene R., Secretary (part-time), (1977);
 Secretary/bookkeeper, (1978-1980)
 McDonald, Robert E., II, Draftsman (part-time), (1971)
 McGraw, Robert B., Jr., Acting Assistant State Geologist
 (1953-1954)
 McGrew, Alan R., Temporary Field Geologist (part-time), (1964)
 McGrew, Laura, (Wenger), Assistant (part-time), (1948-1949)
 McGrew, Paul O., Field Geologist (part-time), (1947-1948);
 Temporary Geologist (part-time), (1961-1962, 1964)
 McInerney, Theresa, Clerk, (1923-1926)
 McJunkin, Jean, Secretary/bookkeeper, (1976-1977)
 McKay, Carole A., Secretary/bookkeeper, (1984-1985)
 McKeown, Patricia Jo, Office Assistant (part-time), (1963)
 McLean, Howard L., Library assistant (part-time), (1982-1983)
 McMannis, William, Assistant (part-time), (1949)
 Memmi, John M., Geologic Research Worker I (part-time), (1982)
 Merrill, Donna M., Student Assistant I (part-time), (1973-1974)
 Merritt, Senith S., Assistant (part-time), (1954)
 Merry, Ray D., Temporary Geologist (part-time), (1963)
 Meyer, John E., Geologic Research Worker I (part-time),
 (1983-1985)
 Michael, Robert C., Temporary Geologist (part-time), (1968)
 Miller, Daniel N., Jr., State Geologist, (1969-1981)
 Miller, Glenn E., Student Assistant I (part-time), (1975)
 Miller, W.R., Assistant (part-time), (1950)
 Millgate, Marvin L., Assistant (part-time), (1952); Geologist
 (part-time), (1963-1966)

- Millice, Roy G., Temporary Geologist (part-time), (1959)
 Mills, Rodger K., Temporary Assistant (part-time), (1965)
 Mogensen, Cheryl A., Library Assistant (part-time), (1977)
 Monckton, Richard W., Staff Geologist, (1969-1970)
 Montagne, John de la, Assistant (part-time), (1949-1951)
 Monteith, Robert A., Technical Writer/Editor (1975-1977)
 Moore, Edward W., Assistant (part-time), (1955-1956)
 Morgan, Glenn W., State Geologist (1918-1922)
 Mrak, Marian M., Secretary, (1948-1951)
 Muhm, James, Assistant (part-time), (1949-1950)
 Muntz, Donna L., Clerk typist (part-time), (1978-1979);
 Geologic Research Worker I (part-time), (1980)
 Murphy, John G., Territorial Assayer, (1878-1879)
 Murray, William B., Geologic Research Worker I (part-time),
 (1982-1984)
 Myers, William, Field Geologist (part-time), (1957)
 Nelson, Kathleen L., Clerk-Steno, (1975)
 Nelson, R.L., Assistant (part-time), (1951)
 Nichols, Truman, Assistant (part-time), (1950)
 Nicoll, Gerald A., Temporary Geologist (part-time), (1961)
 Oakes, Edward H., Geologic Research Worker II (part-time),
 (1975-1976)
 O'Connell, Kevin E., Assistant draftsman (part-time), (1980)
 Oedekoven, Diana M., Publications Sales Clerk (part-time),
 (1976-1978)
 Oliver, Robert L., Geologic Research Worker I (part-time), (1979-
 1981); Geologic Research Worker II (part-time), (1982-1983)
 Oster, L.D., Assistant (part-time), (1948-1949)
 Osterwald, Doris, Assistant (part-time), (1950-1951)
 Osterwald, Frank W., Field Geologist (part-time), (1946-1951)
 Painter, Lynne A., Secretary/Clerk (part-time), (1976-1977)
 Parker, Steven E., Geologic Research Worker I (part-time),
 (1984-1986)
 Partridge, Lloyd, Assistant (part-time), (1948)
 Paulson, Sharilyn J., Temporary Assistant (part-time), (1967);
 Clerk-typist (part-time), (1968-1969)
 Peden, Marilyn L., Assistant (part-time), (1965-1966)
 Pedersen, Kenneth, Temporary Geologist (part-time), (1967-1968)
 Pederson, Selmer L., Assistant (part-time), (1952-1953)
 Pekarek, Alfred H., Temporary Geologist (part-time), (1971)
 Perry, Kenneth, J., Temporary Geologist (part-time), (1961)
 Petersen, Sally L., (Jordan), Technical Writer/Editor, (1973-1975)
 Peterson, Wallace, Assistant (part-time), (1950)
 Phillips, George S., Assistant (part-time), (1953-1954)
 Phillips, J.B., Consultant (unpaid), (1911)

- Piwoschuk, Kathryn L., Geologic Research Worker II (part-time), (1982-1983)
- Polson, Leslie E., Publication Sales Clerk (part-time), (1978-1980)
- Porter, Fred H., III, Draftsman, (1976-present)
- Powell, Joe D., Assistant (part-time), (1955-1956)
- Preator, Lea A., Clerk/Typist (part-time), (1977-1979)
- Prichinello, Kathryn, Librarian (part-time), (1970)
- Prochaska, Eugene J., Librarian (part-time), (1958-1960)
- Pruss, Edward F., Temporary Geologist (part-time), (1970)
- Raforth, Robert L., Temporary Geologist (part-time), (1970)
- Randolph, Susan E., Clerk-typist (part-time), (1969-1971)
- Ranz, Phyllis A., (Wenger), Assistant draftsman (part-time), (1974-1976); Draftsman (1980-present)
- Reavis, Georgia L., Geologic Research Worker I (part-time), (1979-1980)
- Reed, Sharon D., (see Sharon D. Smith)
- Reeder, Susan D., Assistant (part-time), (1972)
- Reitenbach, Jacob A., Geologic Research Worker I (part-time), (1979)
- Richardson, Michelle A., Manuscript typist, (1981-1983); Editorial Assistant, (1984-present)
- Ricketts, Louis D., Territorial Geologist and Mining Engineer, (1887-1890)
- Ridgley, Neill H., Temporary Geologist (part-time), (1971)
- Riedl, Gary W., Temporary Geologist (part-time), (1958)
- Ringdahl, Kristine L., Clerk-Trainee (part-time), (1973-1974)
- Riva, Joseph P., Geologist (part-time), (1958)
- Roberts, Jay T., Geologic Research Worker I (part-time), (1976-1978); Geologic Research Worker II (part-time), (1979-1980); Laboratory technician, (1981-present)
- Roberts, Sheila M., Technical Writer/Editor, (1985-present)
- Robinson, James, Assistant (part-time), (1955)
- Rodriguez, Gladys, Typist (part-time), (1947)
- Root, Forrest K., Minerals Geologist, (1971-1977)
- Rudkin, Thomas G., Geologic Research Worker I (part-time), (1979-1980)
- Rue, Cledith, Secretary, (1950-1952)
- Ruehr, Ben B., Jr., Assistant (part-time), (1959-1961)
- Russell, Robert T., Assistant (part-time), (1948)
- Sailer, Lawrence E., Temporary Assistant (part-time), (1970)
- Sanders, Jerry D., Librarian (part-time), (1969-1970)
- Sawatzky, Don L., Geologist (part-time), (1970-1971)
- Scarlett, Dawn E., Clerk-Stenographer (part-time), (1975); Publications Sales Clerk (part-time), (1976)
- Schmitt, James G., Geologic Research Worker I (part-time), (1981)

- Schoen, Robert, Assistant (part-time), (1953)
 Schooler, Mino Jo, Secretary, (1949)
 Schuster, J. Eric, Temporary Geologist (part-time), (1967, 1969)
 Selby, Laurence N., Assistant (part-time), (1956-1957)
 Selden, Anne K., Assistant (part-time), (1954-1955)
 Sewell, James, Assistant (part-time), (1950)
 Sherer, Richard L., Temporary Geologist (part-time), (1967)
 Shipp, Bobby, Assistant (part-time), (1957-1959)
 Shive, Louise J., Typist (part-time), (1976)
 Short, Ben, Assistant (part-time), (1956)
 Simnacher, Faroy, Temporary Geologist (part-time), (1969)
 Sisca, Stephanie, Librarian (part-time), (1966)
 Skorcz, Tamra A., Library assistant (part-time), (1979-1980)
 Smith, Bruce D., Temporary Assistant (part-time), (1966-1967)
 Smith, Donald L., Assistant (part-time), (1963-1965)
 Smith, Frances M., Publications Sales Manager, (1981-present)
 Smith, Sharon D., Assistant (part-time), (1964-1965)
 Smithson, Scott B., Temporary Geologist (part-time), (1958);
 Geologic Editor (part-time), (1967)
 Sowell, Jenny K., Secretary (part-time), (1985)
 Spanski, Gregory T., Temporary Field Geologist (part-time), (1964)
 Spatz, Robert R., Jr., Geologic Research Worker I (part-time),
 (1977-1979)
 Spivey, Donald R., Temporary Geologist (part-time), (1958)
 St. John, M. Germaine, Temporary Typist (part-time), (1968-1972)
 Staley, C.G., Oil and Gas Well Inspector, (1921-1922)
 Stanton, Fred J., Territorial Geologist and Mining Engineer, (1881)
 Stensrud, Howard L., Temporary Geologist (part-time), (1959)
 Stephenson, Thomas R., Laboratory technician (part-time), (1978);
 Laboratory technician, (1979-1980); Geologic Research Worker
 II (part-time), (1983-1984)
 Stolworthy, Lynn E. (Lindeen), Publications Sales Clerk,
 (1980-1981)
 Storrie, Walter, Field assistant, (1914)
 Strange, J.K., (Mrs.), Secretary, (1950)
 Stuart, William J., Jr., Temporary Geologist (part-time), (1962)
 Sutherland, Wayne M., Temporary Assistant (part-time), (1971)
 Suydam, Robert B., Temporary Geologist (part-time), (1962)
 Swain, Barbara W., Assistant (part-time), (1955-1956)
 Swetnam, Monte N., Temporary Geologist (part-time), (1960)
 Sylvester, George H., Assistant (part-time), (1969-1972)
 Taylor, Frank B., Oil and Gas Inspector, (1927-1932)
 Thomas, Horace D., State Geologist, (1941-1967)
 Thornburg, Hazel, Assistant (part-time), (1954)
 Tihen, E. Lucile, Secretary, (1952-1953)
 Timmermeyer, Richard P., Assistant (part-time), (1959-1960)

- Tombaugh, Karen L., Drafting Assistant (part-time), (1971-1972)
 Tomes, Barbara J., Draftsman (1971-1973)
 Townsend, Robert B., Librarian (part-time), (1961)
 Traill, Ann, Assistant (part-time), (1951)
 Trask, L.M., Field assistant, (1911); General assistant (1912)
 Troyer, Max L., Field assistant (part-time), (1944-1947)
 Trumball, Loyal W., State Geologist, (1913-1918)
 Tucker, Lorraine, Secretary (part-time), (1948)
 Tudor, Mathew, Assistant (part-time), (1950-1951)
 Twiford, Theodore F., Assistant (part-time), (1957)
 Urban, Kathleen, Clerk-Trainee (part-time), (1974)
 Valenti, Gerard L., Geologic Research Worker I (part-time),
 (1978-1979)
 VerPloeg, Alan J., Oil and Gas Geologist, (1976-1985);
 Stratigrapher (1986-present)
 Voorhees, Gerald E., Assistant (part-time), (1962-1963, 1964)
 Walters, Richard F., Assistant (part-time), (1953)
 Ward, Marion, Assistant (part-time), (1950)
 Ward, William N., Library assistant (part-time), (1980-1981)
 Wendell, William G., Oil and Gas Geologist (1973-1976)
 Wenger, Laura, (see Laura McGrew)
 Wenger, Phyllis A., (see Phyllis A. Ranz)
 Wertz, Cyrus O., Mineral Production Supervisor, (1929-1932)
 Whitaker, Richard M., Assistant (part-time), (1970-1971)
 White, O.W., Oil and Gas Well Inspector, (1921-1922)
 Whittenberger, Steven W., Assistant Draftsman, (1983-1984)
 Wied, Otto J., Temporary Geologist (part-time), (1958)
 Wiegman, Ronald W., Librarian (part-time), (1962-1963)
 Wilkinson, Janice G., Typist (part-time), (1976-1977)
 Wills, Betty S., (Adkins), Assistant Draftsman (part-time),
 (1980-1981, 1984-present)
 Wilson, Bruce D., Temporary Geologist (part-time), (1970)
 Wilson, Christie, Temporary Assistant (part-time), (1967)
 Wilson, William H., Assistant State Geologist, (1951-1971)
 Winkelman, Carol M., Publications Sales Clerk (part-time),
 (1976-1977)
 Wood, Craig B., Temporary Geologist (part-time), (1965)
 Wood, Libun T., Assistant Assayer, (1886)
 Woolery, Oscar, Teamster, (1911)
 Worl, Ronald G., Temporary Field Geologist (part-time),
 (1962-1964)
 Wright, Alice, Stenographer, (1930-1932)
 Yekel, Starla M., Secretary (part-time), (1972-1975)
 Young, Harry B., Assistant (part-time), (1952)
 Zochol, Frank W., Assistant (part-time), (1969-1970)

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