

GEOLOGICAL REPORT
on the
ZUNI MOUNTAIN COPPER PROPERTIES
VALENCIA COUNTY, NEW MEXICO

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Geologist

ZUNI MOUNTAIN COPPER PROPERTIES

PREFACE

Covering a large mineralized area in the Zuni Mountains of northwestern New Mexico, these properties are located in Valencia County 87 miles west of Albuquerque and 40 miles southeast of Gallup.

Approximately 20,040 acres comprise these contiguous properties, leased by Mercury Uranium and Oil Company. The George E. Breece Lumber Company of Albuquerque owns the land.

One lease, obtained by assignment from Central Mining Company of Santa Fe, involves approximately 2,520 acres in four sections. This lease is dated May 28, 1956, and was assigned to Mercury on August 24, 1956 by Central Mining Company of Santa Fe.

The assignment was obtained by Mercury for \$2,500 cash payment and an additional \$37,500 to be paid out of ore production at the rate of \$1.00 per ton.

Minimum royalty on the assigned lease property is \$100 per month, which was to have begun with the calendar month of November 1956 but this starting time was waived by Breece until January 1957. Royalty on copper and associated minerals is 7 1/2% on ores of \$40 per ton value or less and 10% on ores of more than \$40 per ton value including gold, based on net smelter returns. Royalty on uranium ore ranges from a minimum of 10% to a maximum of 20% based on mine value per dry ton scaled from \$10.01 to \$100.01 and more.

Approximately 17,520 acres are covered by a second lease dated August 28, 1956, direct with the George E. Breece Lumber Company. This lease was obtained for \$256 cash. Mercury has the right to select and retain any number of acres of its choice upon a bonus payment of 40 cents for each acre selected in excess of 640 acres. Mercury has until August 28, 1957 to select any number of acres in excess of 640 acres. The bonus payment of 40 cents per acre on the acres selected is not effective until selection is made. Minimum royalty on this property is \$100 per month beginning in the calendar month of January 1957.

The second and direct lease from Breece has the identical condition for royalties on mined ores as is stipulated in the lease assigned to Mercury by Central Mining Company.

Both leases are liberal in that they grant Mercury a full year from the date of each in which to conduct exploration on the properties and begin development.

These properties, located in the Zuni Mountains Mining District of Valencia County, are easily accessible from U. S. Highway 66 via good Forest Service roads. The nearest railhead is at Grants, 27 road miles east of the properties, which is served by the Atchison, Topeka and Santa Fe Railroad.

Water for all purposes is in abundant supply on the properties.

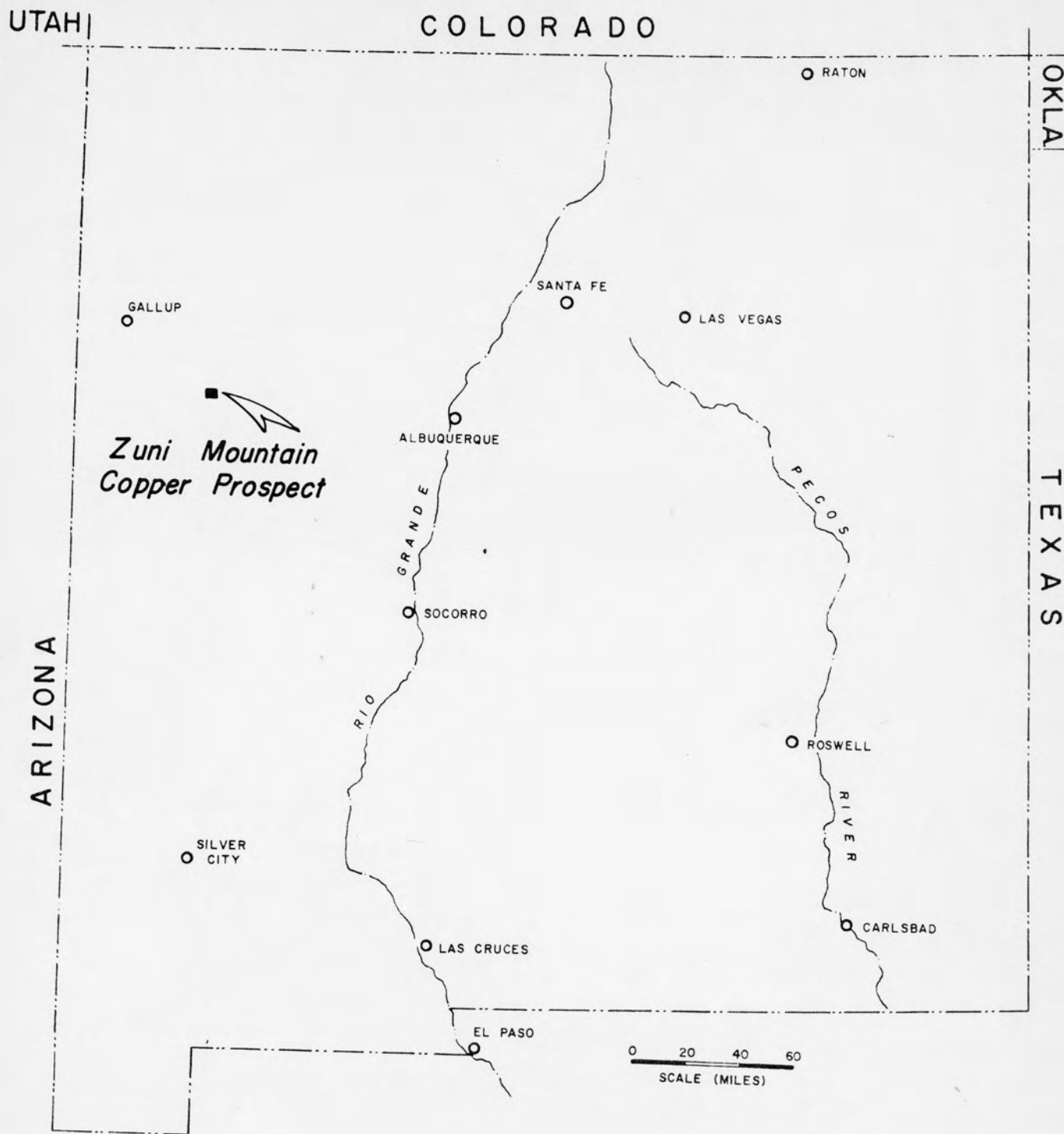


Figure 1.
INDEX MAP
of NEW MEXICO
Showing Location of Zuni Mts. Copper Prpt.



Base from maps by U. S. Geological Survey,
U. S. General Land Office, U. S. Forest Service
somewhat modified by N. H. Darton

RECONNAISSANCE GEOLOGIC MAP OF ZUNI MOUNTAIN REGION, NEW MEXICO

Geology by N. H. Darton

Scale 250,000
2 1 0 2 4 6 8 10 Miles

Contour interval 200 feet.

Datum is mean sea level.

1929

I CERTIFY THAT THIS IS A TRUE AND EXACT PHOTO
NEGATIVE OF THE ORIGINAL AND WAS MADE BY ME

THIS 18 DAY OF Dec

1956

L. Garcia
Photostat Operator

R. M. METCALFE, INC.
ALBUQUERQUE, NEW MEXICO

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SUMMARY AND RECOMMENDATIONS

These properties consist of approximately 20,040 acres of mining leases. One lease, covering approximately 2520 acres, was acquired by assignment dated August 24, 1956, by Mercury Uranium and Oil Company from Central Mining Company, Inc., lessee of The George E. Breece Lumber Company. This lease is in four contiguous sections in the old Copper Hill portion of the Zuni Mountains Mining District. The lease is dated May 28, 1956.

A second lease, covering approximately 17,520 acres, was obtained by Mercury Uranium and Oil Company from The George E. Breece Lumber Company on August 28, 1956. This acreage adjoins that of the other lease.

Copper deposits on the subject leases have been known to exist in the sedimentary rocks overlying the Precambrian basement complex for more than 130 years, and it is possible that copper mineralization is also present in the igneous and metamorphic rocks in the southern part of the leased block.

At the present time, Mercury Uranium and Oil Company is conducting a program of exploration and development in the northeast quarter of Section 12, Township 11 North, Range 13 West, in an area where sedimentary copper deposits outcrop at the surface. Several diamond core holes have been drilled, and trenching is in progress to determine the thickness and grade

of mineralization. Copper assays received to date have been up to 6.7%, and gold and silver values have been as high as 0.2 ounces and 1.6 ounces per ton, respectively. Present indications are that the average grade of copper will be between 2.0% and 2.5%.

The copper ore may be shipped to smelters at Douglas, Arizona or El Paso, Texas; or, if it appears economically feasible, Mercury Uranium and Oil Company may construct a small mill to treat the ore at the site of operations. The shallow depth of the ore over a considerable area already explored indicates that strip-mining will be practical, thus permitting very low mining costs.

It is recommended that development of the sedimentary copper deposits continue by means of drilling, trenching, sampling, and assaying in the current area of interest, in order that the orebody may be delimited and evaluated. At such time as a mineable quantity of commercial ore has been proven, shipment of ore may commence in order to assure a self-sustaining, profitable operation.

INTRODUCTION

Location and Legal Description

The properties encompassed in the assigned lease include Sections 1, 11, and 13, and all of Section 12 except the southwest quarter of the northwest quarter in Township 11 North, Range 13 West, N. M. P. M., Valencia County, New Mexico. The properties in the second lease, direct from The George

E. Breece Lumber Company, consist of practically all of Township 11 North, Range 13 West, plus approximately three and three-quarters sections in the adjoining Township 10 North, Range 12 West, Valencia County, New Mexico. The properties are 40 miles southeast of Gallup, and 87 miles west of Albuquerque, in the northwestern portion of the state.

Access and General Description

The subject leases are 27 road miles from Grants, New Mexico. Access is via 21 miles of good Forest Service roads from Grants through Zuni Canyon to Harding's Cabin; thence, via 6 miles of rather primitive dirt roads to the prospect.

The leases are in what is known as the Zuni Mountains Mining District, and are near the crest of the northwest-trending Zuni Mountains, whose highest point, Mount Sedgwick, attains an elevation of 9,200 feet, and is four miles east of the property. On the subject leases, elevations range from about 7,600 feet to about 8,500 feet above sea level. Vegetation is moderate, and heavy timber is sparse. Water for human and mining requirements can probably be obtained in sufficient quantity from Bluewater Creek, on the north end of the leases, or from springs in a valley less than a mile to the east.

History of Copper Hill District

The Indians are reported to have collected copper ore for ornamental purposes from the vicinity of the subject leases, in the "Copper Hill" area, ever since prehistoric times. Two adobe smokestacks used in the treatment

of ore were said to date back at least to 1825 (Lindgren, 1910).

Mineral rights on the subject sections belong to the George E. Breece Lumber Company of Albuquerque, New Mexico, and are now under lease to Mercury Uranium and Oil Company. The surface rights were sold to the U. S. Forest Service by the Breece Lumber Company, but are re-purchaseable at about \$4.50 per acre in the event that an orebody of sufficient size warrants the acquisition.

GEOLOGIC SETTING

Geologic Column

As shown on an accompanying geologic map, the southern portion of the subject leases lie on the Precambrian core of granites, gneiss, and schist of the Zuni Uplift. The basement complex is very heterogeneous, and intense deformation has resulted in local alterations to gneiss and schist of varying compositions, which in turn underly the sedimentary sequence with great unconformity. The copper deposits in the southern portion of the mineralized district are mainly found as lodes or veins occupying shear zones and fractures.

Of primary importance to this report are the sedimentary beds which rest upon the Precambrian basement complex, because the "red bed" copper deposits are found in conglomerate, siltstone, sandstone, and shale derived from erosion of the basement rocks. These sedimentary copper deposits are in what is known as the "Copper Hill" district. On the north flank of the Zuni Uplift, the entire pre-Permian section appears to be absent through

erosion or non-deposition, including rocks of Cambrian, Ordovician, Silurian, Devonian, Mississippian, and Pennsylvanian age. The lowest sedimentary rocks are the basal conglomeratic sandstones and shales of the Permian Abo formation, red in color where not altered. Superimposed upon the Abo are gray sandstones of the Chupadera formation, and above these are limestones of the Chupadera formation. Northward from the subject property, successively younger members of the sedimentary sequence are exposed, but inasmuch as they have no bearing on the present report, they will not be described further.

Structure

The subject leases are near the crest of the Zuni Uplift, a great north-west-trending anticlinal upthrust which bounds the San Juan Basin on the south. The Zuni Uplift has an area of 1,800 square miles, and a structural relief estimated at 5,000 feet. Sedimentary rocks in the Copper Hill district reflect their position north of the axis of the Uplift, and dip northward at from 10 to 25 degrees. No faulting of appreciable displacement is known. However, the underlying basement complex has been intensely metamorphosed in places, and copper deposits in the Precambrian are commonly restricted to shear zones or lines along which rock movement or sheeting have taken place.

Physiography

Erosion, coupled with structure, has resulted in a present relief of some 2,000 feet in the Zuni Mountains. As might be expected, the central portion of the mountains presents a rugged topography in which deeply-incised canyons have dissected the highlands. Regionally, the Zuni Mountains are

in the southern part of the Colorado Plateaus physiographic province. Steep rims represent the outcrop of hard sandstone beds, while rounded slopes typify the presence of less-resistant shale strata. Roads within the mountainous area generally follow the natural alignments of stream gradients.

SEDIMENTARY COPPER DEPOSITS

Origin or Genesis

The "red bed" deposits in the Copper Hill district are typical of such localities on the flanks of older continental areas containing Precambrian copper deposits. The sandstones and conglomerates were rapidly laid down during a long period of Paleozoic rock decay, the products of which were removed during a subsequent arid epoch. The sedimentary deposits must have contained finely divided copper ores, in part from solutions derived from the land area, in part as cupriferous detritus. When atmospheric waters charged with salt and gypsum invaded these beds, they must have taken the copper into solution and concentrated it at certain horizons where reducing substances like carbonaceous vegetation were present. Hydrothermal solutions originating in the basement complex were probably involved in the emplacement of copper and small quantities of gold and silver in the gneiss and schist which are stratigraphically below but topographically above the red beds in certain localities.

Description

In the Copper Hill District, a fringe of "red beds," resting upon the

edge of the Precambrian mass at an elevation of about 8,000 feet, constitutes a copper-bearing group, which apparently consists, in ascending order, of reddish conglomeratic quartz grit, sandstone, or marl, and shale, with a total thickness of 30 to 60 feet. The underlying rock is granitoid gneiss, on which the "red beds" rest unconformably.

The beds are copper-bearing more or less throughout an area of about one-half square mile. The copper occurs principally as azurite and malachite (carbonates), and as chalcocite (copper sulfide), replacing vegetal debris, or forming thin layers interbedded and disseminated in the rocks. Some of it, particularly in the conglomerate, appears to have been deposited with the enclosing sediments and to have been derived like them from the Precambrian complex.

One of the best ore horizons seems to be that of the shale, which occurs in a layer some 20 feet thick. A 2,645-pound sample of picked ore reported to be from this shale, probably consisting most of chalcocite, yielded 36.5% copper and 3.6 ounces of silver to the ton. Preliminary sampling by F. B. Baca of exposed conglomerate beneath the shale has shown copper content varying from 5.3% to 6.7% with 0.2 ounces of gold and 1.6 ounces of silver to the ton. An old prospect pit in the vicinity of current exploration by Mercury Uranium and Oil Company shows a high degree of secondary copper mineralization within the conglomerate, and the writer estimates a maximum grade approaching 10% copper in this horizon.

COPPER DEPOSITS IN PRECAMBRIAN ROCKS

In the Precambrian rocks of the Zuni Mountains, copper ore is found mainly in lodes or "veins" which are shear zones. As the geologic map accompanying this map indicates, the southern portion of the subject leases encompass Precambrian rocks similar to those outcropping less than a mile to the east in the old Copperton mining area. As yet, Mercury Uranium and Oil Company has not explored the area south of the known copper deposits in the sedimentary rocks. Until development of the sedimentary occurrences has been completed, it will be logical to delay exploration of the Precambrian outcrops to a later phase of exploration.

PRESENT AND PROJECTED EXPLORATION PROGRAM

At the present writing, Mercury Uranium and Oil Company has commenced the thorough exploration of the northeast quarter of Section 12, Township 11 North, Range 13 West, in the Copper Hill district. In the vicinity of an old prospect pit showing high-grade copper mineralization, diamond drilling is in progress to determine the geologic column which overlies the Precambrian granite, and to establish the sequence and lithology of mineralized horizons. At the same time, trenching is under way to determine the lateral extent and configuration of the near-surface deposits. It is hoped that selectivity in the exploratory trenching will permit stockpiling of some commercial grade ore during this initial phase of exploration.

Mercury Uranium and Oil Company intends to continue diamond drilling and test-pitting of the present area of interest to block out a mineable quantity of sedimentary copper ore.

Estimated Economic Figures

The same cupriferous conglomerate which carries commercial values of copper (plus as much as \$7.00 per ton in gold and \$1.50 per ton in silver) in the area being explored, is also mineralized on its outcrop some 900 feet to the northeast. A sample from the outcrop assayed 4.04% copper. At the present time, it may be said that the inferred dimensions of the copper deposit are approximately 150 feet by 900 feet, with an average thickness of at least two feet. Applying a volume factor of fifteen cubic feet to the ton, these figures give an inferred ore tonnage of 18,000, which is assumed to have an average grade of at least 2.0% copper plus gold and silver of at least \$5.00 per ton. Continued exploration is expected to increase the dimensions of the deposit substantially.

If copper ore averaging 2.0% is shipped to the smelter, approximately the following settlement should result:

2.0% copper	=	40 lb. per ton
95% recovery	=	38 lb. per ton
@ 32¢ per lb.	=	\$12.16 per ton*
Less: Trucking (28 miles @ 8¢ /mi)		2.24
Less: R. R. Freight		4.70

Net recovery per ton (less direct and indirect mining costs = \$5.22
Plus estimated values in gold and silver per ton = 5.00

*NOTE: It is expected that smelting charges will be waived for siliceous ore.

Present indications are that the ore horizon (s) will not be at a depth greater than twenty feet, thus permitting strip mining. If the ore is to be shipped to a smelter, it will be necessary to mine somewhat selectively to maintain a higher grade of mill heads. and the cost of stripping may be as high as two dollars per ton. However, should Mercury Uranium and Oil Company construct a mill to treat the ore on the property, mill heads of lower grade could be treated, and mining costs should not exceed one dollar per ton. If gold and silver values hold to those already shown in preliminary sampling, they may be expected to produce about five dollars per ton in addition to the copper settlement.

Results of Preliminary Sampling

Up to the present writing, some assays have been received from plug holes, diamond cores, grab samples, and channel samples from the Breece copper properties. The results of the grab and channel samples are summarized below, and assays from plug and core holes are appended hereto.

<u>Locality</u>	<u>Nature of Sample</u>	<u>Interval or thickness</u>	<u>% Cu.</u>	<u>Ounces Gold</u>	<u>Ounces Silver</u>
Test pit	Channel (congl.)	1.5'	2.69	0.01	1.0
Test pit	Channel (shale)	1.1'	1.76	NOT ASSAYED	
Surface	Grab (siltstone)	----	1.28	NOT ASSAYED	
Outcrop	Grab (congl.)	unk.	4.04	NOT ASSAYED	
Test pit	Channel (congl.)	3.0'	1.36	NOT ASSAYED	
Test pit	Grab spl. from dump of conglomerate	----	6.7	0.2	1.6

TRANSCRIPT OF ASSAY CERTIFICATE NO. 2100
OF CHAPMAN AND WOOD, ALBUQUERQUE, NEW MEXICO
DATED OCTOBER 27, 1956

Hole #1

Chapman and Wood No.	Plug Hole Depth	Copper %	Chapman and Wood No.	Core Hole Depth	Copper %
6779	1 Ft.	.75	6799	3 Ft.	2.05
6780	2 Ft.	.59	6800	4 Ft.	1.99
6781	3 Ft.	.43	6801	5 Ft.	.74
6782	4 Ft.	1.11	6802	6 Ft.	.31
6783	5 Ft.	1.09	6803	8 Ft.	.04
6784	6 Ft.	.48	6804	9 Ft.	.03
6785	7 Ft.	.42	6805	10&11 Ft.	.06
6786	8 Ft.	.57			
6787	9 Ft.	.76			
6788	10 Ft.	1.28			
6789	11 Ft.	.71			
6790	12 Ft.	.53			
6791	13 Ft.	.80			
6792	14 Ft.	.40			
6793	15 Ft.	.53			
6794	16 Ft.	.35			
6795	17 Ft.	.28			
6796	18 Ft.	.23			
6797	19 Ft.	.88			
6798	20 Ft.	.36			

The plug hole was drilled, two feet north of the cored hole, with about 80% core recovery in the cored hole. The samples from the plug hole were taken, by the driller, by separating the coarse cuttings from the drilling mud, by washing.

Inasmuch as the plug hole samples do not check the core hole samples, in the same horizon, they are to be regarded as unreliable.

SUBMITTED BY
ANDERSON DEVELOPMENT COMPANY
112 8th St., N. W.,
Albuquerque, New Mexico

No. 2171
Date 11/14/56

Hole #3

<u>Description of Sample</u>	<u>Cu %</u>	<u>Depth</u>
7251 - #3A	0.51	2'8" to 4'8"
7252 - #3B	1.93	4'8" to 5'0"
7253 - #3C	0.21	5'0" to 7'3"
7254 - #3D	0.56	7'3" to 10'0"
7255 - #3E	0.02	10'0" to 15'0"
7256 - #3F	0.03	15'0" to 17'0"
7258 - #3H	0.03	15'0" to 25'0"
7259 - #3J	0.02	25'0" to 30'0"
7260 - #3K	0.03	30'0" to 37'0"
7261 - #3L	0.02	37'0" to 45'0"
7262 - #3M	0.02	45'0" to 47'6"

Respectfully submitted,

Henry S. Birdseye

STATEMENT OF WRITER'S QUALIFICATIONS

Henry S. Birdseye:

Completed one semester of basic engineering curriculum at University of Wisconsin, 1943-1944. Was graduated from Harvard College in 1950 with degree in Geological Sciences, cum laude.

Geologist, United Dominion Mining Company in Quebec-Labrador area, 1949; worked on drilling crew for Kerr-McGee Oil Industries, Inc., 1950; geophysicist, Stanolind Oil and Gas Company, 1 year; Vice-President and Chief Geologist, Lowry Oil Company, 3 years; Consulting Geologist, 2 years.

More than six years' experience as Professional Geologist and Geophysicist in New Mexico, Colorado, Utah, Arizona, Wyoming, Texas, North and South Dakota, Oklahoma, Kentucky, Louisiana, Arkansas, California, and Canada.

Qualified as Expert Witness before New Mexico Oil Conservation Commission hearings.

Member of the following professional societies: American Association of Petroleum Geologists; American Institute of Mining, Metallurgical, and Petroleum Engineers; Society of Exploration Geophysicists; Four Corners Geological Society; New Mexico Geological Society; Independent Petroleum Association of America, etc.