



CONTACT INFORMATION

Mining Records Curator
Arizona Geological Survey
1520 West Adams St.
Phoenix, AZ 85007
602-771-1601
<http://www.azgs.az.gov>
inquiries@azgs.az.gov

The following file is part of the

Arizona Department of Mines and Mineral Resources Mining Collection

ACCESS STATEMENT

These digitized collections are accessible for purposes of education and research. We have indicated what we know about copyright and rights of privacy, publicity, or trademark. Due to the nature of archival collections, we are not always able to identify this information. We are eager to hear from any rights owners, so that we may obtain accurate information. Upon request, we will remove material from public view while we address a rights issue.

CONSTRAINTS STATEMENT

The Arizona Geological Survey does not claim to control all rights for all materials in its collection. These rights include, but are not limited to: copyright, privacy rights, and cultural protection rights. The User hereby assumes all responsibility for obtaining any rights to use the material in excess of "fair use."

The Survey makes no intellectual property claims to the products created by individual authors in the manuscript collections, except when the author deeded those rights to the Survey or when those authors were employed by the State of Arizona and created intellectual products as a function of their official duties. The Survey does maintain property rights to the physical and digital representations of the works.

QUALITY STATEMENT

The Arizona Geological Survey is not responsible for the accuracy of the records, information, or opinions that may be contained in the files. The Survey collects, catalogs, and archives data on mineral properties regardless of its views of the veracity or accuracy of those data.

PRINTED: 08-15-2001

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: CARRIZO MOUNTAIN VANADIUM

ALTERNATE NAMES:

ALCOVE MESA
CURRAN LEASE
CARRIZO
WADE LEASE
REDDINGTON LEASE
SOLE LEASE

APACHE COUNTY MILS NUMBER: 204

LOCATION: TOWNSHIP 37 N RANGE 28 E SECTION 25 QUARTER NW
LATITUDE: N 36DEG 35MIN 32SEC LONGITUDE: W 109DEG 17MIN 35SEC
TOPO MAP NAME: LOS GIGANTES BUTTE - 15 MIN

CURRENT STATUS: RAW PROSPECT

COMMODITY:

VANADIUM
URANIUM

BIBLIOGRAPHY:

ADMMR CARRIZO MOUNTAIN VANADIUM FILE
ADMMR "U" FILE APACHE V-1
RMO 25
RME 117
RME 183
RMO 28
CHENOWETH, W.L., 1997, RAW MATERIALS ACTIVITY
OF THE MANHATTAN PROJECT ON THE COLORADO
PLATEAU

References

- RMO 25 = Summary Report on Geology & Ore Deposits of Parts of West Carrizo Uplift & Chuska Mts. Areas, Northeast Arizona. DOE Microfiche.
- RME 117 Geology & Uranium Deposits of the Carrizo Mountains Area, Apache County, Arizona, & San Juan County, New Mexico. DOE Microfiche
- RME 183 - Drilling & Geologic Studies in the Northwest Carrizo Area, Apache County, Arizona. DOE Microfiche
- RMO 28 - Vanadium Deposits in the Carrizo Mountains District, Navajo Indian Reservation Northeastern Arizona and NW New Mexico. DOE Microfiche

Vanadium

Carrizo Mountain Vanadium

Located in Crawford district, Apache county, Arizona.

Claims leased from Indian Service (Navajo Reservation)

Paved road 6 mi S.W., of Shiprock to Rattlesnake Junction, then 12 mi of surfaced road to Red Wash, thence 8 mi to Biltabito Trading Post. From Biltabito Trading Post to east group at Oak Springs seven miles. From Biltabito Trading Post to Carriso Mt. Trading Post 12 mi, thence west 8 mi to junction with Kayenta road, thence 8 mi to road branches (1) to Sweetwater Trading Post 5 mi; (2) Eurida claims 4 mi; (3) Martin and San-Tah claims 6 mi. Abundant water in area.

Properties in Tps 11, 12, 13 and 14 North, Range 6, 7 and 8 West. East line of 6 is the boundary line between Arizona and New Mexico.

Elevations around 8000-ft.

Lessees estimate that on five leased claims net 2,400,000 lb V_2O_5 .

Royalty to Navaho tribe 15%

Coal, crude oil, high octane gas and natural gas close by (Rattlesnake Field)

Lessees: T.F.V. Curran of Pittsburg and John Wade, Farmington, N.M.

Curran's home address: 3507 Corona St., N.S. Pittsburg, Pa.

*Carrizo mts - extreme N.E. corner of state
is Vanadium with Carnotite in McClellan Sandstone
Shipping to Durango etc.*

Had access road built -

Operated by U.S. Vanadium Co & Vanadium Corp. of Am.

In Dept - Files -

*Writing is Arthur Flagg's
Probably 1939-1942*

See A.L. Flagg vanadium reports Book V



Abandoned Mine Land Reclamation Award Winners

[Home Page](#)
[Directory](#)
[Index](#)
[Search](#)
[Ask a question](#)
[Help](#)

1992 Awards (Presented in 1993)

- ★ Boonville Hospital RAMP Project, Indiana
- Coppermine Abandoned Mine Project, Navajo Reservation
- Gay Branch Gob Pile Project, Virginia
- Lead and Zinc Mine Sites Reclamation Project, Illinois
- Ocean Refuse Removal Project, Maryland
- Pine Creek Mine Shafts Project, West Virginia
- Pyramid Coal Company Reclamation Project, Illinois
- Shiloh Reclamation Project, Arkansas
- Veca Pit and Spoils Project, Wyoming
- White Oak Four Reclamation Project, Ohio

2000 Awards

Regional Awards

- Pleasant View Mine Project, Kentucky (Appalachian Region)
- Midwestern Reclamation Project, Indiana (Mid-Continent Region)
- ★ Carrizo 1 Reclamation Project, Navajo Reservation, Arizona and New Mexico (Western Region)

National Award

Pleasant View Mine Project, Kentucky

People's Choice Award

Midwestern Reclamation Project, Indiana

1999 Awards

Regional Awards

- Blackwater River Limestone Drum Station, West Virginia (Appalachian Region)
- Oklahoma Partnership Approach to Reclamation of Abandoned Mine Land, Oklahoma (Mid-Continent Region)
- Socorro West, New Mexico (Western Region)

National Award

- ★ Monument Valley 2 AML Reclamation Project, Navajo Reservation



Abandoned Mine Land Reclamation Award Winners

[Home Page](#)
[Directory](#)
[Index](#)
[Search](#)
[Ask a question](#)
[Help](#)

1992 Awards (Presented in 1993)

- ★ Boonville Hospital RAMP Project, Indiana
- Coppermine Abandoned Mine Project, Navajo Reservation
- Gay Branch Gob Pile Project, Virginia
- Lead and Zinc Mine Sites Reclamation Project, Illinois
- Ocean Refuse Removal Project, Maryland
- Pine Creek Mine Shafts Project, West Virginia
- Pyramid Coal Company Reclamation Project, Illinois
- Shiloh Reclamation Project, Arkansas
- Veca Pit and Spoils Project, Wyoming
- White Oak Four Reclamation Project, Ohio

2000 Awards

Regional Awards

- Pleasant View Mine Project, Kentucky (Appalachian Region)
- Midwestern Reclamation Project, Indiana (Mid-Continent Region)
- ★ Carrizo 1 Reclamation Project, Navajo Reservation, Arizona and New Mexico (Western Region)

National Award

Pleasant View Mine Project, Kentucky

People's Choice Award

Midwestern Reclamation Project, Indiana

1999 Awards

Regional Awards

- Blackwater River Limestone Drum Station, West Virginia (Appalachian Region)
- Oklahoma Partnership Approach to Reclamation of Abandoned Mine Land, Oklahoma (Mid-Continent Region)
- Socorro West, New Mexico (Western Region)

National Award

- ★ Monument Valley 2 AML Reclamation Project, Navajo Reservation

Apache Arizona
County State

Chief Mineral vanadium No. V 10
Accessory Minerals uranium

Property Name: Syracuse

Location: S2W, 16 mi. from common corner
of NE-Aris.-Colo.-Utah.
Date Sec 20, T12N, R5W, Navajo Base

Owner: Name Address

Navajo Indians Window Rock, Ariz. 6/1943

Operator:

Wade, Curran & Co. Farmington, NM. 6/1943

Production:

Total 1015 T 2.98 U₃O₈ on 5/1942 to 3/1943
Present Rate _____ per _____ Date _____

Source of Information:

Status	Date
<u>Inactive</u>	<u>6/1943</u>
_____	_____
_____	_____

USBR Report: File No. 402,19008

Engineer: Thos. L. Chapman

Classification: Prospect

(See other side for general information)

General Information 6/1943

This is one of the properties worked by Wade, Curran & Co. under permit from Navajo Indians. In flat lying sandstone & shale beds occur irregular masses of vanadium-uranium ranging from a few T to 1000 & slightly over. Ore exposures are exposed from the surface in & often abandoned on extraction of a mass because of high costs hunting more masses. Work has stopped on this prospect.

Sunnyside, Maryin-Say Tah & Burida are other prospects of this group. Deposits average about 0.3% U₃O₈.

Character of Ore:

Romcoelite & uranium

Equipment (Date 6/1943)

No list.

Apache Arizona
County State

Chief Mineral vanadium No. V 4
Accessory Minerals uranium

Property Name: Eurida

Location: S 44 W, 19 mi. from the common corner of NM-Ariz-Colo-Utah. Sec 3, T12N, R8W, Navajo base
Date

Owner: Name Address

Navajo Indians Window Rock, Ariz. 6/1943

Operator:

Wade, Curran & Co. Farmington, NM 6/1943

Production:

Total 521 T From _____ to 6/1943
Present Rate _____ per _____ Date _____

Source of Information:

Status Date

Inactive 6/1943

File No. 402,19008

Engineer: Thos. L. Chapman

Classification: Prospect

(See other side for general information.)

General Information: 6/1943

This is one of the properties worked by Wade, Curran & Co. under a permit from the Navajo Indians. In flat lying sandstone & shale beds occur irregular tabular masses of vanadium-uranium ore ranging in size from a few T to 1000. Ore exposures are stoped from the surface & often abandoned on extraction of a mass because of high costs in hunting more masses. Altho abandoned this property was included with the Sunnyside, Martin-Say Tah & Syracuse for drilling by USNM. Drilling program was approved but no drilling done. Deposits in this vicinity average about 0.3% U₃O₈.

Character of Ore:

Roscoelite & carnotite.

Equipment (Date 6/1943):

No list.

Apache Arizona
County State

Chief Mineral vanadium No. 79
Accessory Minerals uranium

Sunnyside
Name Address

Location: S 36 W 22 mi. from the common
corner of NM-Ariz. & Colo-Utah
date Approx sec 29, T12N, R7W, Navajo Base

Navajo Indians 6/1943

Wade, Curran & Co. Farmington, NM 6/1943

Production:
Total About 200 T From to 6/1943
Present Rate per Date

Source of Information:

Status	Date
	<u>6/1943</u>

NSM Report: File No. 402,19008
Engineer: Thos. L. Chapman

Classification: Prospect

(See other side for general information)

General Information: 6/1943

This is one of the properties worked by Wade, Curran Co. under a permit from the Navajo Indian Agency. In flat lying sandstone & shale beds occur irregular tabular masses of vanadium-uranium minerals ranging from a few T to 1000. 200 T produced

In case of a V shortage drilling was recommended for this property along with the Syracuse, Burda & Martin-Say Tah/

Character of Ore:
Roscoelite & carnotite.

Comment (Date 6/1943):
No list.

Series 1111 Canadian File

Apache Arizona
County State

Chief Mineral vanadium No. F 7
Accessory Minerals uranium

Property Name: Martin-Say Tah

Location: 3587 17 mi. from common corner of NE-Colo-Ariz-Utah.

where: Navajo Indians Name Window Rock, Ariz. Address 6/1943

Date Sec 10, T13N, R3W, Navajo Base

Operator:

Wade, Curran & Co. Farmington, NM. 6/1943

Production: 2.73%
Total 1381 T/V205 From 8/1942 to 5/1943
Percent Rate per Date

Source of Information:

Status	Date
<u>Active</u>	<u>6/1943</u>

SM Reports: File No. 402,19008
Engineer: Thos. L. Chapman

Classification: Prospect

(See other side for general information)

General Information 6/1943

This is one of the deposits worked by Wade, Curran & Co. under permit from Navajo Indians. In place lying consists of shale beds occur irregular tabular masses of vanadium-uranium ranging in size from a few T to 1000. One exposures are stopped in from surface & often abandoned on extraction of a deposit because of high costs hunting more deposits. ~~_____~~
~~_____~~ - Drilling was recommended but none done by them.
Deposits average about 0.3% U₃O₈.

Character of Ore

Residualite & carbonate

Equipment (Date 6/1943)
No. 1184

Apache Arizona
 County State
Property Name: Rattlesnake
Operator: Name Address
 Navajo Indians Window Rock, Ariz. 1/1943
Chief Mineral vanadium No. 2-8
Accessory Minerals uranium

Location: S 60° W, 15 mi. from common corner of Ariz-Utah-Colo-NM.
Date Sec 2, T13N, R3W, Navajo Base

Operator:
 ? 1/1943

Production: Has produced. No records.
Total From to 1/1943
Present Rate per Date

Source of Information:

<u>USGS report sent USPM</u>	<u>Status</u>	<u>Date</u>
	<u>Active</u>	<u>1/1943</u>
<u>USGS report: File No. 402-19008</u>		

Classification: Prospect

(See other side for general information)

General Information: 1/1943

In flat lying sandstone & shale beds occur irregular masses of vanadium-uranium ore ranging in size from a few T to 1000. Ore shipped from these deposits runs over 25 V₂O₅ & carries approx. 0.3% U₃O₈. Little is known about this deposit except that it is located in the Wade, Curran & Co. prospecting lease permit from the Navajo Indians. US Vanadium appears to have crews working in this area also.

Character of Ore:

Roscoelite & carnotite.

Equipment (Date 1/1943):

No list.

General Information

Apache Arizona
County State

Chief Mineral vanadium No. _____
Accessory Minerals uranium

Property Name: Carrizo Mts.
Owner: Name Address

Location: 40 to 75 mi. W & S from Shiprock, N.M.
Date: For details see Exam File 402.19008

Navajo Indians 10/1943

Operator: Wade, Curran & Co. Farmington, N.M.
U.S. Vanadium Corp. N.Y., N.Y. 10/1943

Production: About 13,000 T 2.5% V₂O₅
Total _____ From _____ to 10/1943
Present Rate 1200 T per 1000 Date 11-1942

Source of Information:

403.3 (43 & 5) U.S. Bureau of Mines
See also

Status	Date
<u>?</u>	<u>10/1943</u>

USPM Report: File No. 402.19008
Engineer: Thos. L. Chapman

Classification: Respect

(See other side for general information)

General Information 10/1943

In flat lying sandstone & shale beds a formation 180 to 200' carries vanadium-uranium in irregular tabular masses ranging from a few tons up to 1000 T. Two companies, the US Vanadium & Wade-Curran obtained permits from the Navajo Indian Agency to prospect & work the V-U areas. Wade-Curran's permit covers an area 7 x 24 mi. & includes the Sunnyside, Florida, Bay Tah & Syracuse (the prospects are written up separately). What the US V permit covers & what prospects they work is not known. For an area of 350 sq.mi. USGS assumes sporadic V-U occurrences totalling about 6,000,000 T containing 1.5 to 2.0% V₂O₅. Deposit averages about 0.3% U₃O₈.

Character of Ore:

Equipment (Date) _____

Apache Arizona Chief Mineral vanadium No. V-1
County State Accessory Minerals uranium

Property Name: Alcove Mesa Location: S 34° W, 27 mi. from the common
corner of Ariz-Utah-Colo-Mt.
Owner: Name Address Date Sec 25, T11N, R5W, Navajo Base
Navajo Indians Window Rock, Ariz. 10/1943

Operator:
Wade, Curran & Co. Farmington, N.M. 10/1943

Production:
Total none From _____ to 10/1943
Present Rate _____ per _____ Date _____

Source of Information:

Status	Date
<u>Inactive</u>	<u>10/1943</u>

USBR Report: File No. 402.19008
Engineer: Thos. L. Chapman

Classification: Prospect

(See other side for general information)

General Information: 10/1943

This is a prospect located by Wade, Curran & Co. under a permit from Navajo Indians. In flat lying sandstone & shale beds occur irregular masses of vanadium-uranium ore ranging in size from a few T to 1000. This mesa has about 25 showings 5 to 200' long & 1 to 6' thick over 1.5 mi. [REDACTED]. Similar deposits being worked also carry about 0.3% U₃O₈. [REDACTED]

Character of Ore:
Roscoelite & carnotite.

Equipment (Date 10/1943):
None.

(6)

Apache Arizona
County State

Chief Mineral vanadium No. 33
Accessory Minerals uranium

Property Name: Curran Mesa

Location: S 3/4° W, 25 mi. from common corner of Ariz-Utah-N.M.-Colo.

Owner: Name Address
Navajo Indians Window Rock, Ariz.

Date See 10, T11N, R3W, Navajo Base
10/1943

Operator:
Wade, Curran & Co. Farmington, NM. 10/1943

Production:
Total none From to 10/1943
Present Rate per Date

Source of Information:

Status	Date
<u>Inactive</u>	<u>10/1943</u>

USPM Report: File No. 402.19008
Engineer: Thos. L. Chapman

Classification: Prospect

(See other side for general information)

General Information 10/1943

V. 3
(6)

This is a prospect located by Wade, Curran & Co. under a permit from Navajo Indians. In flat lying sandstone shales occur irregular masses of vanadium-uranium ranging in size from a few T to 1000. This prospect has about 10 exposures, over 1 mile length, one 200' long with thickness 3' to 10'.

Similar deposits being worked also carry about 0.2% U₃O₈.

Character of Ore:
Roesselite & carnotite.

Equipment (Date 10/1943):
None.

CARRIZO MOUNTAIN

Carrizo Mountain rises a solitary mass above the floor of the Chuska and San Juan valleys. It is separated from its nearest neighbor, Lukachukai Mountain, by the beautiful Redrock Valley. Unlike Lukachukai and other subdivisions of the Chuska Mountains, Carrizo owes its form to the intrusion of igneous rock which has flexed the sediment of the strata into a dome. The top of the mountain presents a roughly flat surface/ ~~irregular~~ at an elevation of 8000' to 8500'; its plateaus stand at 9000'; above them rise rounded peaks reaching their greatest height at Zilbetod (9400') and Pastora (9420').

The mountain sides are gashed by valleys which reach well into the body of the mass. Near the heads, these valleys are bordered by nearly walls; farther down, the canyons are replaced by wide floored washes. Permanent streams occupy portions of these valleys and together with springs perched high upon the mountain flanks furnish sufficient water for the needs of the Navajo. Where the mountain is not overgrazed, grass is found over the top and sides among thinly spread groves of yellow pine. Search for gold and silver or copper wealth on Carrizo has resulted in failure and the Navajo tends to his sheep undisturbed by other interests.

Stores at Tinsasbas, at Biltabito and in the Redrock Valley supply local needs with the Mission at Tinsasbas, include all the white inhabitants of Carrizo Mountain area. Until recently, Carrizo was forbidden ground to the whites, but no obstacles are placed in the way of scientists whose mission is understood by the Navajo.

That the soil of the Reservation possesses fertility is amply demonstrated by the vigorous natural growth of perennials and annuals where water is present and by the fact that the Hopis and their ancestors have cultivated crops of corn, peaches and melons without irrigation and even in sand dunes.

Whipple classified a list in a belt 30 miles wide and 110 miles long between Campbell Pass and Flax River (Little Colorado) as follows; woodland 1/10, cultivatable soil 1/30, rocky hills 1/10, prairies and pastures 7/10.

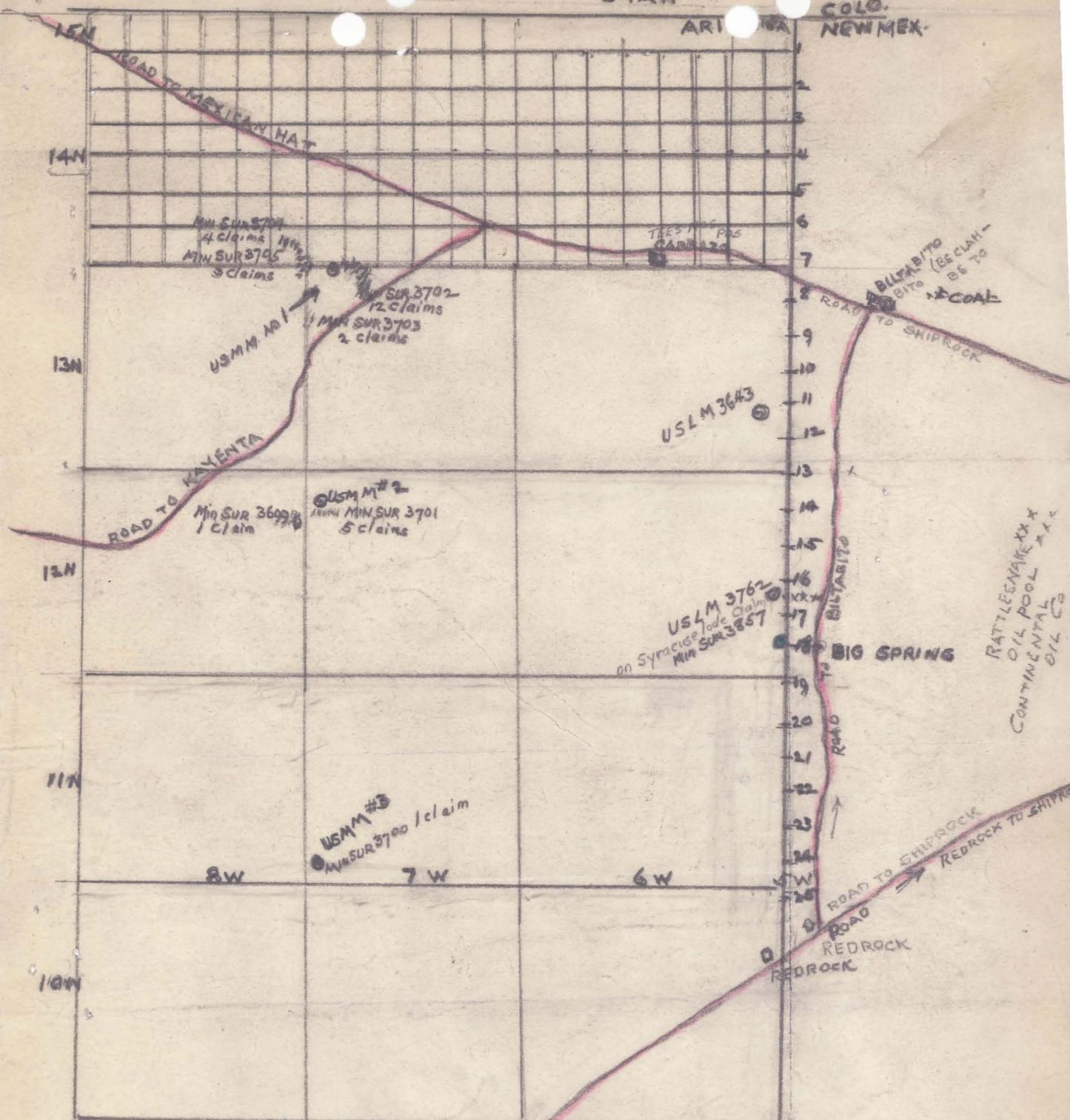
The early Spanish name of the Little Colorado River is "Rio de Lano". Ives (1861) uses the term Flax River. Navajo name is Tolchico - Red Water Canyon. Wild flax is common in the Little Colorado valley.

Large bodies of residual soil may be found on Carrizo Mountain. Bare rock, however, predominates on the tops and slopes of the smaller mesas and ridges; the canyon walls are generally without soil and hundreds of square miles along the Little Colorado and San Juan rivers have prevailing bare rock floors. It is probable that the Reservation could be traversed along a selected route from Carrizo Mountain to Lee Ferry and from Grand Falls to Bluff without setting foot on soil of local origin. Limestone underlies less than 5% of the area, occurring only in the Carboniferous Age and in certain beds of the Chinle formation and of the La Plata group. The sandstones of both the La Plata group and the McElmo formation are prevailingly quartzose and are therefore sparingly provided with plant food. The Cretaceous strata - Dakota, Mancos and Mesaverde - contain a higher proportion of mineral plant food than any of the other formations represented on the Reservation and the lavas (largely basaltic) furnish a soil of high fertility. However, in spite of its origin, the soil of the Reservation is not lacking in fertility, - a condition which is due largely to the arid climate.

UTAH

ARIZONA

COLORADO
NEW MEXICO



- U.S. MIN. SUR. 3699, EURIDA #4
- 3700, SUNNYSIDE
- 3701, EURIDA 1, 2, 3, 5
- 3702, MARTIN 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
- 3703, MARTIN AND SAY-TAH
- 3705, PRESTON, PRESTON #1, STORMYDAY
- 3762, 1866- VALLEY VIEW, NORTH STAR, NORTH STAR 2, 3, 4 CANARY.
- 3857, SYRACUSE
- 3643, NAVAJO #1, 2, 3, 4
- 3704 - PRESTON No. 2, 3, 4 AND 5

LUKUCHUKAI PASS

BILPABITO (85 CLAIM - 86 TO 87) COAL

ROAD TO SHIPROCK

USLM 3643

USLM 3762
ON SYRACUSE ROAD
MIN SUR 3857

BILPABITO

BIG SPRING

RATTLESNAKE OIL POOL
CONTINENTAL OIL CO

ROAD TO SHIPROCK

ROAD TO SHIPROCK

REDROCK ROAD

REDROCK ROAD

Small groves of spruce occur on Carrizo Mountain and the Chuska Mountains and on Dutton Plateau. In the open places beneath the trees, beautiful, luxuriant growths of blackjack, oak willow, poplar, juniper, manzanita, sage, gooseberry, and raspberry are to be seen and flowers in large variety are embedded in the grass.

Westward from Carrizo Mountain the strata of the Gothic Mesa form a synclinal basin, the Western limb of which is a bomb monocline which extends in a curved wall from Marsh Pass to and beyond the San Juan River, is carved from from Monument Upward, an anticlinal dome, the Western limb of which passes downward into the narrow and shallow eljeto syncline.

The San Juan River is a perennial stream. Along its upper course, it receives the waters of vigorous tributaries which have their source in the San Juan and La Plata mountains. Within the 90-mile stretch of winding channel from Bluff to Colorado River, it receives no continuous supply of importance. It maintains a depth at Rockhouse Spring of 3' to 5', even in dry season.

The West side of Carrizo Mountain is drained by Walker Creek. (Capt. Walker crossed the stream at Ojo de Casa). The upper portion of the stream, emerging from the narrow, steep-floored canyon is called by the Navajos Chinlini ("place where water comes out of the canyon). The lower portion is sometimes spoken of as Mexican Water, a name still retained for the store at the point where the Mormon road of 1879 crossed the creek. At this point, even in low water, Walker Creek flows at 500 gallons per minute.

The Navajo Reservation is outside the usual path of cyclonic storms, so the procession of high and low barometer, warm and cold spells and wet and dry periods, which characterize the climate of most other parts of the United States is absent. There is a difference of 2021' of altitude between the Southern and the Northern edges of the area, but the influence of this factor is so completely nullified by topography that Hite, 40 miles North of the Reservation, in altitude 3750' is warmer and drier than Holbrook in altitude 3455'. Topography may, indeed, be considered the primary factor in the climate of the Navajo Country. Ft. Defiance, elevation 6900' is colder and wetter than Holbrook, Tuba and Aneth at an elevation 2000' lower. In the Little Colorado group of meteorological stations, Flagstaff, elevation 6907', has a rainfall of 23.87" and mean annual temperature of 54.7° and Winslow, elevation 4853' follows with an annual rainfall of about 7" and a mean temperature of over 53°. A snowfall of 2" per year is normal for Holbrook, elevation 5,069'. The corresponding figure for St. Michael, elevation 6900' is 46.1". At elevations above 7000', snow may fall at any time between October 1st and June 1st and may remain on the ground for days and even weeks. My Indian guide states that in some years snow lies on Navajo Mountain, 10416', well into July, and San Francisco Mountain, 12611' retains its snow in protected places throughout the year. The general effect of elevation is modified generally by secondary topographical features.

Carrizo is Spanish for reed grass.

Carrizo Springs -

#271 - South West base of Ghezindexa Mesa, alluvial deposits near bases of mesa, 3/4 gallon per minute, excellent water, stream perennial.

- #272 - North base of Carrizo Mountain, West of Tinasbas, McElmo formation, several small springs; excellent quality water.
- #273 - S.E. base of Carrizo Mtn. bedding plane of Wingate sandstone, flow $\frac{1}{2}$ to $\frac{1}{3}$ gal. per minute; several springs of this type.
- #274 - 4 miles E. of Pastora Peak, contact of talus and white sandstone, excellent quality water - perennial.
- #275 - $1\frac{1}{2}$ miles S.W. of Pastora Peak, head of Chonati Canyon, contact of alluvium and rock; excellent quality; perennial.
- #276 - 2 miles S.W. of Pastora Peak; contact of alluvium, flow $\frac{1}{3}$ gal. per minute; also spring of this type on summit of Carrizo.

Keet Seel, also known as Kit Sil or Kit Siel, is a cliff dwelling and means "broken pottery".

Chazhindeza Canyon and Mesa, province of Carrizo Mountain; Navajo meaning lava; other name in use Malpais-Point.

Chinlini Canyon, Carrizo Mountain; Navajo meaning "at the mouth of the Canyon; other name in use To Chinlini.

Tinasbas stream, settlement; province of Carrizo Mountain, Chaco Valley, Navajo meaning Circle of Cottonwoods; other name in use Tecs-nos-pos.

Zilbetod, peak, Carrizo Mountain; Navajo Deil meaning and Betod bare or bald.

P.O. Box 829
Carlsbad, New Mexico

July 25, 1941

Mr. E. R. Fryer, General Superintendent,
Office of Indian Affairs,
Navajo Service,
Window Rock, Arizona.



Dear Mr. Fryer:

Part of the land included in the mining leases I-149-ind-3798 and 4225 which were issued to Messrs. Wade, Curran and Redington involving 106.34 acres of land in the Crawford Mining District of the Navajo Indian Reservation in Apache County, Arizona, was examined Tuesday, July 22, 1941, in company with Messrs. Marvin Long of the Land Division of the Navajo Service, Thomas F. V. Curran, one of the lessees, and James Palmer, manager of the trading post at Sweetwater, Arizona.

A road had been blazed to the site of the prospect pit on the Eurida claim No. 2 and at the time of the examination three Indians under the supervision of one G. A. Benson were digging along the outcrop on the north and south side of the draw in the vicinity of the strip pit examined October 18 and 19, 1937, by B. W. Dyer of the Salt Lake City office of the Geological Survey. Also, additional prospecting had been done on the Say Tah, Martin, Sunnyside and Syracuse claims but all prospecting work has been done only along the outcrop and not at depth. The ore body, which is a bedded deposit, varies in thickness along the crop and undoubtedly under ground and prospecting should be done at depth as well as along the outcrop.

Mr. Curran was requested to extend a drift into the ore bed, at least one drift on each claim, at locations where the ore bed is thickest and where surface buildings and equipment, necessary for mining, could be erected.

The records in this office indicate that only about two-thirds of the 106.34 acres included in the two leases is underlain with carnotite ore, the workability of which can be determined more definitely by additional prospecting. This office was informed that at present all funds needed for prospecting, paying of rentals, etc., are being furnished by Mr. Redington, one of the lessees, and that

associates of Mr. Redington and Mr. Curran would not contribute money for the project until a company has been formed, thus relieving them of any personal liability.

A large sum of money will be needed to erect a mill either in Farmington or Shiprock and therefore the lessees or their successors must be assured that sufficient ore is available for the present and future operation of a mill. Therefore, I see no objection to either modifying the present leases to include additional adjoining land or to the issuance of additional leases so that the total holdings will equal about 450 acres, provided that surveys are made and maps are submitted showing the location of all work done to date and the position of the outcrop on each claim together with a plan as to future development and also a definite plan as to the location, size, etc., of the proposed mill.

Upon receipt of a map or maps showing the location of all prospect pits, outcrop, etc., recommendations will be made by this office as to the issuance of additional leases.

The sandstone overlying the carnotite bed is badly broken in places and will cave easily without much warning; therefore it is believed that, if and when mines are opened, they should be supervised by a competent mining man as the safety and welfare of the employees is just as important as the recovery of ore.

Therefore, it is suggested that the issuance of leases to others be withheld pending definite information that a plant will be erected within a reasonable distance from the ore deposits for milling any or all ore mined in this district or nearby districts. No doubt the mill operators will need all ore that can be mined in this district.

This office will gladly co-operate with the lessees in the development of the carnotite beds.

Very truly yours,



R. D. Reeder,
Acting District Mining Supervisor.

cc: Marvin Long
H. I. Smith

CONFIDENTIAL REPORT
TO MR. ZOELLER
(A.M. Byers & Co.,)
UPON GARRIZO MOUNTAIN, ARIZ.,
VANADIUM MINING & MILLING

April 15, 1941

by

Thos. F. V. Curran, of Wade, Curran & Redington,
Sole Vanadium mines lessees
in Navajo Indian Reservation.

Large areas in the Navajo Indian Reservation in the Morrison formation and the Shinarump Conglomerates are mineralized in vanadium minerals, particularly Carnotite. More than a dozen of the ore bodies have been explored so as to show large tonnages of vanadium ore. Lease was applied for by Wade, Curran & Redington on eight of the claims which showed the largest tonnages, and was granted on five (of the largest tonnages,) and refused on three (at last meeting of the Navajo Tribal Council, in April, 1941, but will be renewed at the next meeting in July, 1941.

The history of the commercial development of Carnotite in the Reservation is brief. The U.S. Interior Dept. in the early nineteen twenties issued thirty leases upon Carnotite claims in the Carrizo Mountains to John F. Wade, of Fruitland, N.M., Indian Trader and Prospector, principally for its radium values. As he was unable to find capital to carry on mining and milling operations, the leases were cancelled.

A decade ago, the deposits attracted attention of the famous Vanadium and Molybdenum Steel metallurgist, J. Kent Smith, O.B.E., and his associates Thos. F. V. Curran, Edward L. Curran and H. R. Redington, and eventuated in leases being issued on five of the largest deposits.

The ore deposits developed thus far predominate in vanadium oxide. Claims on the Western flank of Carrizo Mountain range in content from 2.75% V_2O_5 , to 50 to 75% richer ore in claims from the Eastern flank.

Estimate of tonnage in these broken, cross-bedded Carnotite deposits is made by analogy and comparison to ore in sight in other deposits in other regions at similar development stage. Calculated thus, the ore available in the five leased claims should aggregate 2,400,000 pounds vanadium pentoxide, V_2O_5 .

Market available to Lessees approximates 800,000 pounds vanadium pentoxide, V_2O_5 , per annum; present market price \$1.10 per lb. V_2O_5 .

Costs, delivered Pittsburgh, inclusive of overhead but exclusive of taxes, sixty cents (60¢) per pound V_2O_5 .

Understanding was reached with a prominent Ferro-Alloys Corporation to convert vanadium oxide to ferro-vanadium.

Navajo Indian Tribesmen will mine the ore at \$2.60 per day of 8 hours; and drive trucks at \$3.60 per day. These tribesmen are diligent and productive compared with white labor in Colorado Carnotite mines.

Royalty of fifteen per cent (15%) is paid the Navajo Tribe for all ore shipped from Reservation by Lessee.

From the Eastern group of claims to West Water Flow Millsite (11 miles East of Shiprock, N.M., and 18 miles West of Farmington, N.M., the terminal of Denver & Rio Grande Southern R.R.) is 42 miles; the Western group of claims are 25 to 30 miles farther West, i.e. 67 to 72 miles from the millsite. The roads are in good condition in dry weather, which in this arid climate means 80 per cent of the year.

Ample supply of water, high-grade bituminous coal, high octane gasoline, liquified natural gas, fuel oil, and natural gas are available at millsite. Prices are reasonably low.

The lessees propose to carry on the business by a New Mexico corporation, capital \$75,000.00, divided into 7500 shares at \$10.00 each. Lessees and Process Chemist will receive 50 $\frac{1}{2}$ % for assignment of leases to Company, and for service contracts and processes, sales contracts and agreements; and 49 $\frac{1}{2}$ % of the stock will be sold at par for cash to raise \$37,125.00, which will be expended for mine and mill construction and equipment, physical and chemical laboratory, and cash working capital. Business will begin in mill at rate of 12 tons crude ore per day of eight hours, 252 tons a month.

Cash reserve of \$12,000.00 will be built up from Net Income and will be added to Cash Working Capital; whereupon, capitalization of Company will be increased \$24,000.00, and will be distributed pari passu among shareholders of record, as stock dividend, and mill capacity will be increased to 20 tons per day of eight hours.

As soon as possible, the mill will be operated two shifts of 8 hours each per day.

Estimated monthly net earnings, exclusive of taxes, on \$75,000.00 capitalization, \$5,499.00.

Estimated monthly net earnings, exclusive of taxes, on \$99,000.00 capitalization, \$10,162.00.

Lessees Counsel, Paul B. Palmer, attorney at law, Farmington, N.M.

Mines Manager, Thos. F. V. Curran, Avery Hotel, Farmington, N.M.,
P. 3507 Corona St., N.S., Pittsburgh, Pa.

Lessees Agent and Asst. Mines Manager, John F. Wade, Fruitland, N.M.

Process Chemist and Mill Manager, Edward L. Curran, 3507 Corona St., N.S.,
Pittsburgh, Pa. Telephone Linden 3074-R.

NAVAJO INDIAN RESERVATION
VANADIUM ORE MINING AND MILLING
APACHE COUNTY, ARIZONA
CARRIZO MOUNTAIN

The Redington-Wade vanadium ore leases in the flanks of Carrizo Mountain fulfill in the most abundant manner all conditions of the Kent Smith-Redington Vanadium Survey, namely:

- (a) Ore in sight from which more than two million five hundred thousand (2,500,000) pounds vanadium oxide, V_2O_5 , could be profitably extracted;
- (b) Price \$1.00 a pound V_2O_5 delivered to Ohio or Pittsburgh buyer;
- (c) Delivered cost less than 60 cents a pound V_2O_5 ;
- (d) Large available ore reserves;
- (e) Tested and proven concentration and extraction processes.

The Survey was undertaken ten years ago by J. Kent Smith, O.E.E., of Detroit, manufacturer of fine chemicals and metallurgist specialist in vanadium, molybdenum, beryllium and radioactive elements, and his associates (a young chemical engineer, who carried through all laboratory tests and experiments, and a mineralogist who was a pioneer in American Vanadium mining and refining,) and by H. R. Redington, of Pittsburgh, geologist and metallurgist, member of the Specification Committee of a big U.S. Steel Corporation subsidiary.

As four of the five claims chosen by the Survey were once held by John F. Wade, an Indian trader and prospector of the region, fluent in the Navajo tongue and respected by the Indians, he joined Mr. Redington in applying for the leases, which were ultimately issued, and are the only leases for the mineral which have been issued. U.S. Interior Dept. has referred for action by the Navajo Tribal Council Redington-Wade application for lease upon three additional claims where large vanadium ore bodies have been uncovered by the exploration work. These are on the Eastern flank of the Mountain, and are adjacent to one of the claims under lease.

The ore uncovered thus far by development and prospecting work is low in uranium, and in vanadium ranges from an average of 2.32% V_2O_5 in three of the claims on the Western side of the mountain, (the ore is considerably richer in the isolated fourth claim,) to well over 3% V_2O_5 on the Eastern side.

Despite the low uranium content, this mineral is classified as Carnotite, that is, it is an uranyl vanadate of potassium and is deposited in the Morrison formation, a series of thin, cross-bedded sandstones which underlie the Dakotas, constituting the surface of the high mesas ranches. Some of the deposits have abnormally high carbon and kaolin contents, which require special treatment during concentration or extraction processing.

All the ore is amenable to dry differential grinding and air separation concentration in an inexpensive mill built near the ore deposits. Three tons of crude ore may be concentrated into one ton, with 80 percent recovery of values. Fuel Oil from Continental Oil Company's "Rattlesnake" Oil Field, which is only fifteen miles East of the Eastern group of vanadium claims, will be used in the mill. The area has mines of unusually good grade bituminous coal, and ample supply of water for mining and milling purposes is available on both sides of the Mountain.

NAVAJO VANADIUM

- page 2 -

The nearest railroad station to the mines is Farmington, N. M., terminal of Denver & Rio Grande Southern R.R. The rate on Carnotite or concentrates to Ohio and Pittsburgh points, carload, is \$16.54 per ton. Five-acre millsite will be given the Company building mill on the Arrington Airport grounds, three miles West of Farmington, to which it will be connected by gas, water and oil lines. This site is 26 miles East of Shiprock, on an almost level paved road.

The road is paved also to "Rattlesnake Dome Junction", six miles Southwest of Shiprock, and is twelve miles by surfaced road maintained by the Oil Company to the edge of "Red Wash", a six-mile stretch of rough road, and two miles on the mesa to Biltabito Trading Post. From Biltabito to Oak Springs Camp of the Eastern group of Vanadium Claims, is seven miles, over a road which is steep and rough for two miles.

The road from Biltabito to Garrizo Mission Trading Post, (Tees Nos Pos,) is 12 miles by a level, dirt road, thence West eight miles to junction with the Kayenta road, thence via the Kayenta road eight miles to a point where roads branch off to (1) Sweetwater trading post, five miles; (2) "Eurida No.2" claim, four miles; (3) "Martin" and "Say-Tah" claims, six miles. Walker Creek runs within distance of two miles from the "Eurida No.2" claim and Sweetwater trading post.

All labor employed in the Reservation must be Navajo tribesmen, and the pay fixed by the Office of Navajo Service or Office of Indian Affairs of Interior Department is \$2.60 per day of eight hours, forty hours a week; \$3.60 per day for drivers of trucks, etc.

The Wade-Redington lessees employed experienced white Carnotite miners as foremen and Navajo tribesmen for mining, mucking, etc. They found the Navajo workers patient, diligent, easy to teach prospecting, and fully as productive as the white men employed in mining and mucking in Carnotite mines in Colorado and Utah.

For the operation of the business of mining and milling this ore, Mr. Redington plans to incorporate a Company under laws of the State of New Mexico, for period of one hundred years, with capitalization of \$75,000.00, divided into seventy-five hundred shares (7500) of \$10.00 each, and invite some of his friends to join him in the business, by purchasing at par for cash three thousand seven hundred twelve and one-half (3712½) shares, so as to obtain for the Treasury of the Corporation the sum of \$37,125.00, which would be expended, as follows:

Mines Equipment - - - - -	\$ 1,424.00
Laboratory - - - - -	2,500.00
Chemical Ore Extraction Works - -	12,518.00
Cash Working Capital - - - - -	<u>20,683.00</u>

(This constitutes 49½% of Capitalization).

(The remaining 50½% would be issued to Mr. Redington and associates who developed the mines, processes, sales contracts, etc.)

NAVAJO VANADIUM

- Page 3 -

The mining and chemical extraction mill equipment could handle twenty tons crude ore per diem, or equivalent amount of concentrates, but operations will begin at rate of twelve tons crude ore per diem, so as to reduce the amount of Cash Working Capital.

Operations will be increased to twenty (20) tons per diem whenever \$11,880.00 may safely be transferred by the directors from monies accumulating in the Treasury from sale of the vanadium oxide product, to the Cash Working Capital Fund. At the same time capitalization of the Company will be increased to \$99,000.00, divid divided into ninety-nine hundred (9900) shares of \$10.00 each. A stock dividend will distribute the \$24,000.00 increase of Capital Stock among the shareholders, pari paru.

Practically all ore required for initial operations of the business will be mined and trucked from claims on the East side of the mountain, because the ore thus far revelopex from claims on the East side is richer in vanadium and the trucking distance is much shorter. For estimation purposes, the first year's Net Earnings (exclusive of Taxes,) are based upon mining and milling twelve tons crude ore per diem at the Farmington Airport site. The net receipts from sale of the vanadium oxide (deducting the freight allowance,) would be \$12,669.20 per month, and the total expenditures (not including taxes,) \$7,170.20, leaving Net Earnings of \$5,499.00 a month, or \$65,988.00 a year, of 252 days.

When the mines and mill are operated at the rate of twenty (20) tons per diem, the receipts from sale of vanadium oxide will be (monthly) \$21,089.00, after the freight East has been deducted. The monthly expend itures will total \$10,916.90, which will leave Net Earnings permonth of \$10,162.30, or \$121,947.60 a year.

Bids upon all mining and milling equipment have been obtained from reliable firms and it is believed by Mr. Redington that a delivery can be made, buildings and foundations constructed, and equipment installed ready for operations to begin within sixty days from receipt of advice from the proposed Company's Treasurer.

As the information here given is private and confidential, many personnel, processing and cost details have been omitted, but will be imparted by Mr. Redington in personal interviews with friends who wish to join him in the proposed business.

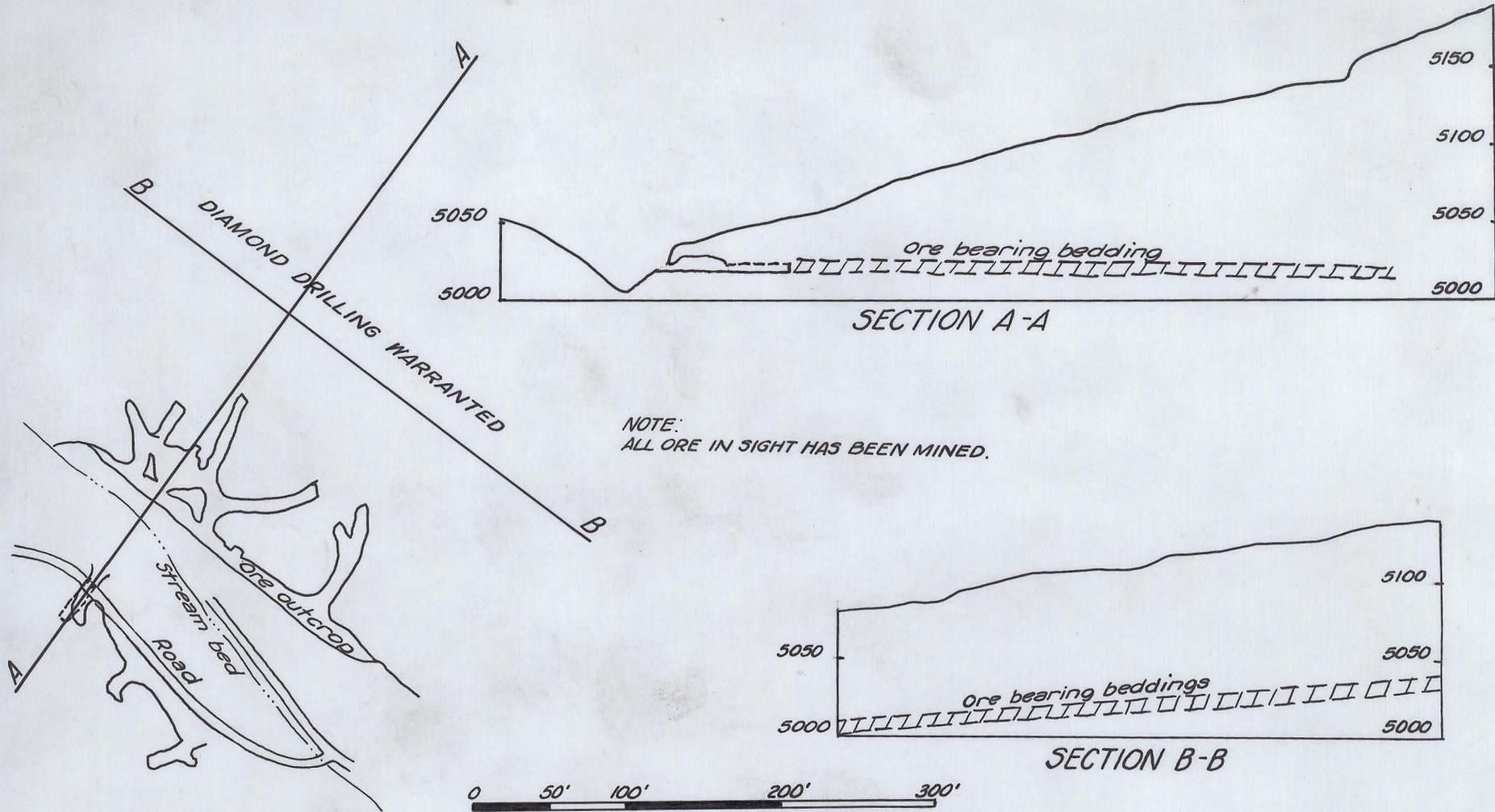


FIG. 5-PLAN & SECTIONS, EURIDA VANADIUM MINE

19008