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12/04/96

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES FILE DATA

PRIMARY NAME: APACHE IRON

ALTERNATE NAMES:

EAST APACHE DEPOSIT
ALSACE LORRAINE HEM. MS 3711
SWAMP CREEK MOUNTAIN
CANYON CREEK
SILETTE DEPOSIT
SHELL MOUNTAIN DEPOSIT
NAIL RANCH DEPOSIT
ROCK HOUSE DEPOSIT

NAVAJO COUNTY MILS NUMBER: 22B

LOCATION: TOWNSHIP 9 N RANGE 15.5E SECTION 15 QUARTER C
LATITUDE: N 34DEG 10MIN 45SEC LONGITUDE: W 110DEG 44MIN 30SEC
TOPO MAP NAME: CHEDISKI PEAK - 7.5 MIN

CURRENT STATUS: PAST PRODUCER

COMMODITY:

IRON

BIBLIOGRAPHY:

ADMMR U FILE
ADMMR APACHE IRON FILE
STEWART, L.A., USBM RI 4093, P.
BURCHARD, E.F., USGS BULL. 821-C, P. 60
HARRER, C.M., USBM IC 8236, P. 72-80
KLEMIC, H., AZBM BULL. 180, P. 173
ADMMR CARD FILE
USGS CRIB DATA REC. #W016072
MOORE, R., MINERAL DEPOSITS OF FT. APACHE RES
P. 29-32

APACHE IRON DEPOSITS

NAVAJO COUNTY
SAN CARLOS APACHE
RESERVATION
T9N R15E Sec. 15

R E F E R E N C E S

MINING WORLD Nov. 1962 p45
MINING WORLD, Catalog, Survey & Directory Number April 25, 1963 p77
E & M J Volume 165 No. 11 p129 November 1964
WORLD MINING Dec. 1964 p70
METAL MINING AND PROCESSING April 1965 p42

PAY DIRT JULY, 1966 (in file)
WORLD MINING, Nov. 1966 p37
SKILLINGS MINING REVIEW Jan 28, 1967 p20
MINING CONGRESS JOURNAL FEB. 1967 p 7

WORLD MINING, NOVEMBER 1967 p45

See: MINERAL DEPOSITS OF THE FORT APACHE INDIAN RESERVATION, ARIZONA, by Richard T. Moore.
(APACHE, COW CREEK, CHEDISKI, SPLIT ROCK, ROCK CANYON, OAK CREEK, and MARLEY- (1967)
GRASSHOPPER deposits)

In Geology files.///

MAPS - Upstairs in the flat storage area - Fourth drawer

Navajo County MILS Index #228

AKA: East Apache deposit, Alsace Lorraine Hematite MS 3711, Swamp Creek Mtn.,
Canyon Creek, Silette Deposit, Nail Ranch Deposit, Rock House Deposit,
Shell Mtn Deposit.

"U" Files

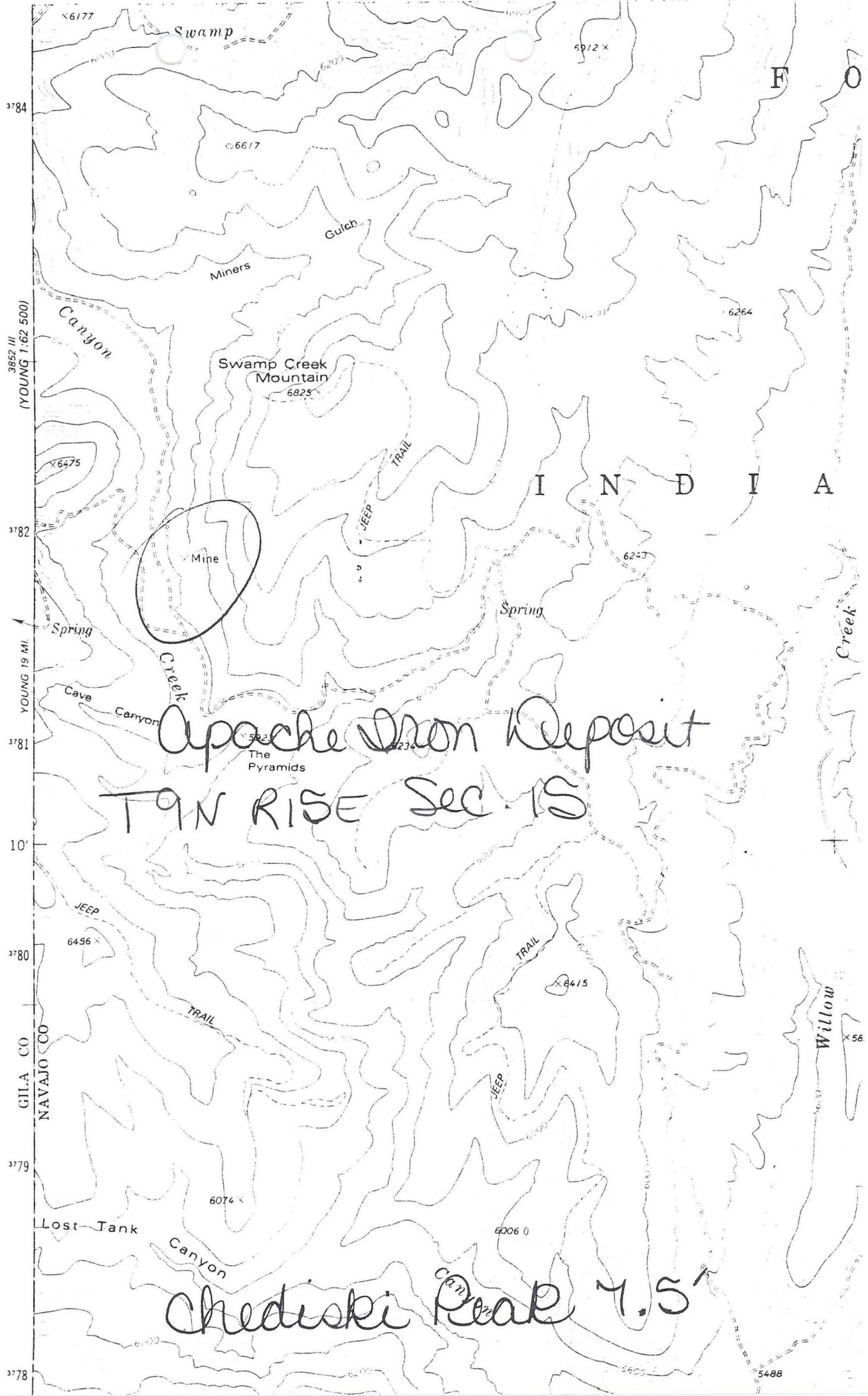
ABM Bull. 180, p. 173

IC 8236, p. 72-80

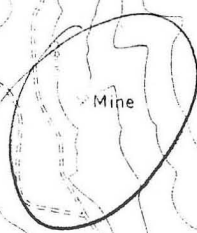
USGS 821-C, p. 60

RI 4093

Chediski Peak 7.5' Topo (included in file)



3784
3852 III
(YOUNG 1:62 500)
3782
YOUNG 19 MI.
3781
10'
3780
GILA CO
NAVAJO CO
3779
3778



Apache Iron Deposit
TAN RISE Sec. 15

Chediski Peak 7.5'

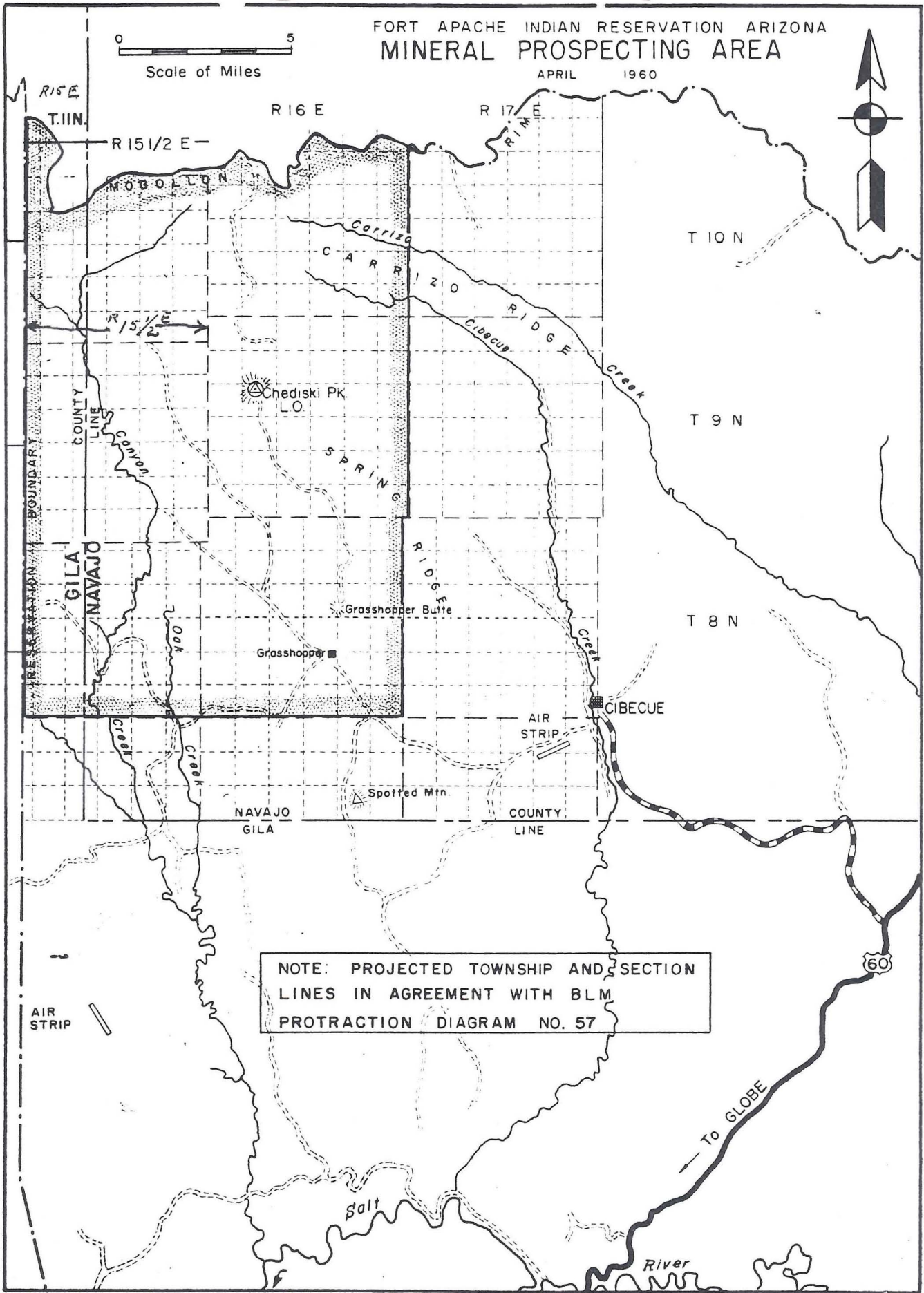
I N D I A

F O

Swamp
6617
6203
5972 x
Culch
Miners
Swamp Creek Mountain
6825
TRAIL
JEEP
6264
6247
Spring
Spring
Cave Canyon
The Pyramids
6236
6475
6456 x
TRAIL
JEEP
6415
TRAIL
JEEP
6074
Lost Tank Canyon
6006 0
Willow
x 58
6000
5488

FORT APACHE INDIAN RESERVATION ARIZONA
MINERAL PROSPECTING AREA

APRIL 1960



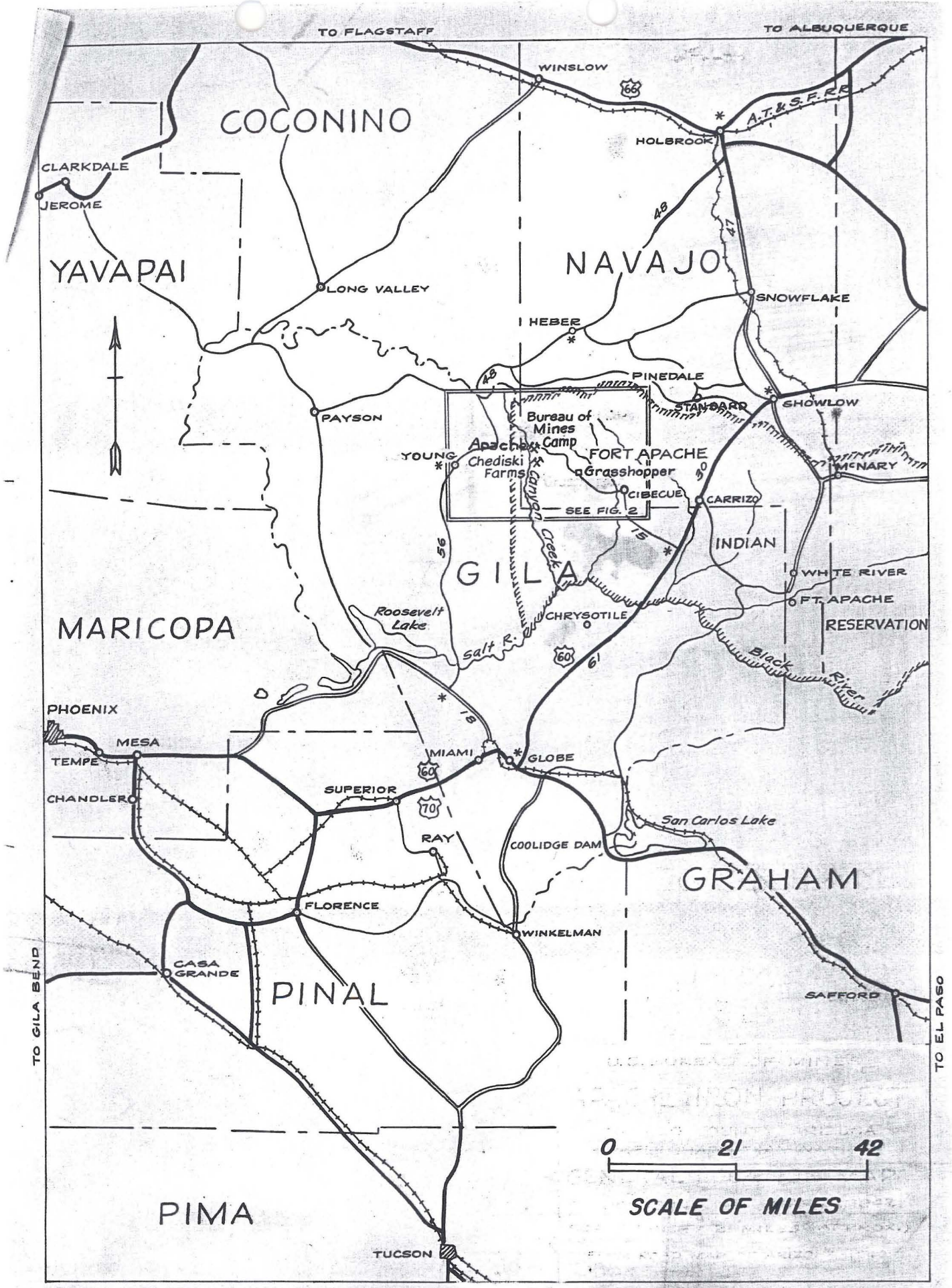
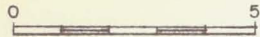


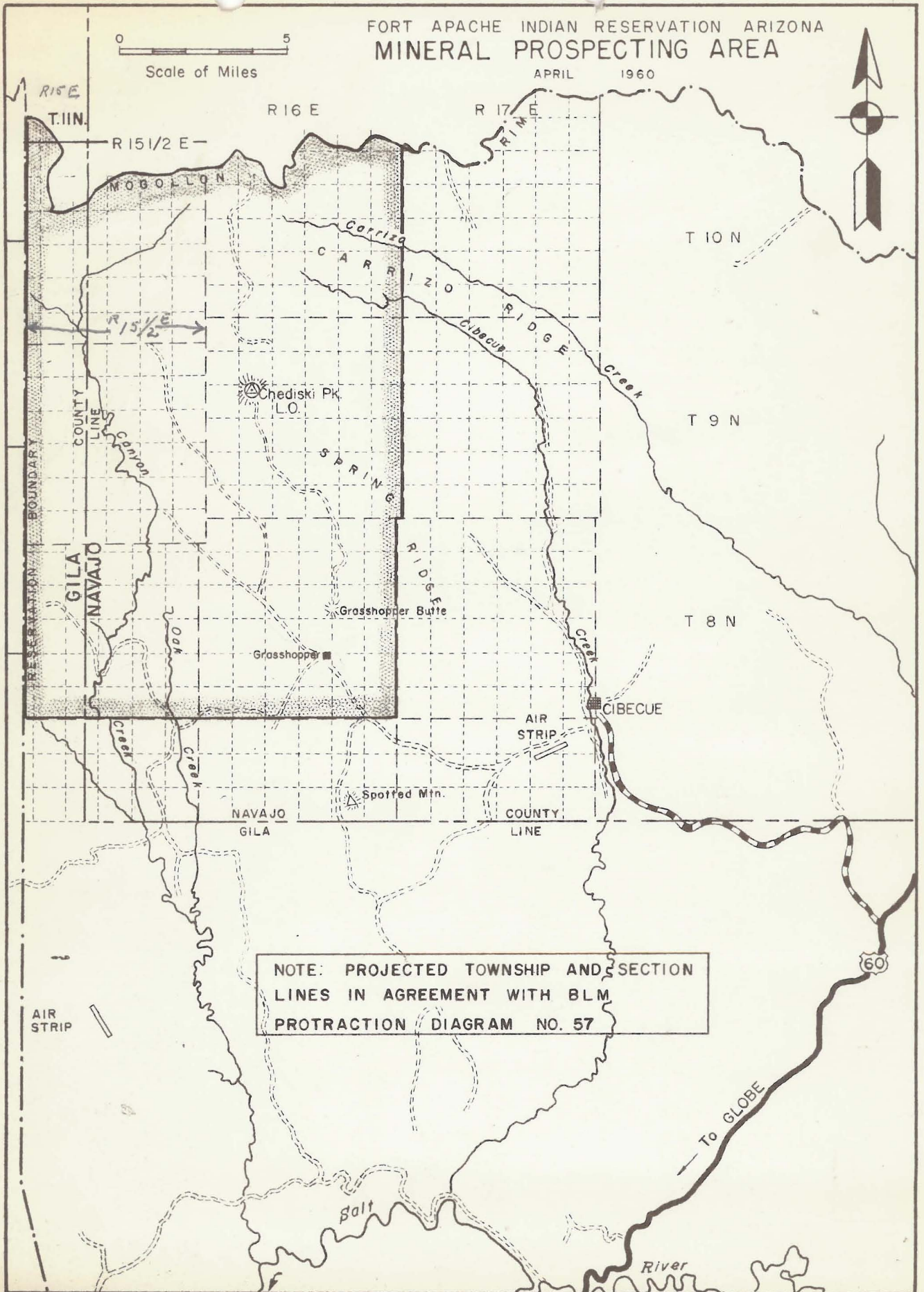
FIG. 1-GENERAL LOCATION MAP

FORT APACHE INDIAN RESERVATION ARIZONA
MINERAL PROSPECTING AREA

APRIL 1960



Scale of Miles



NOTE: PROJECTED TOWNSHIP AND SECTION
LINES IN AGREEMENT WITH BLM
PROTRACTION DIAGRAM NO. 57

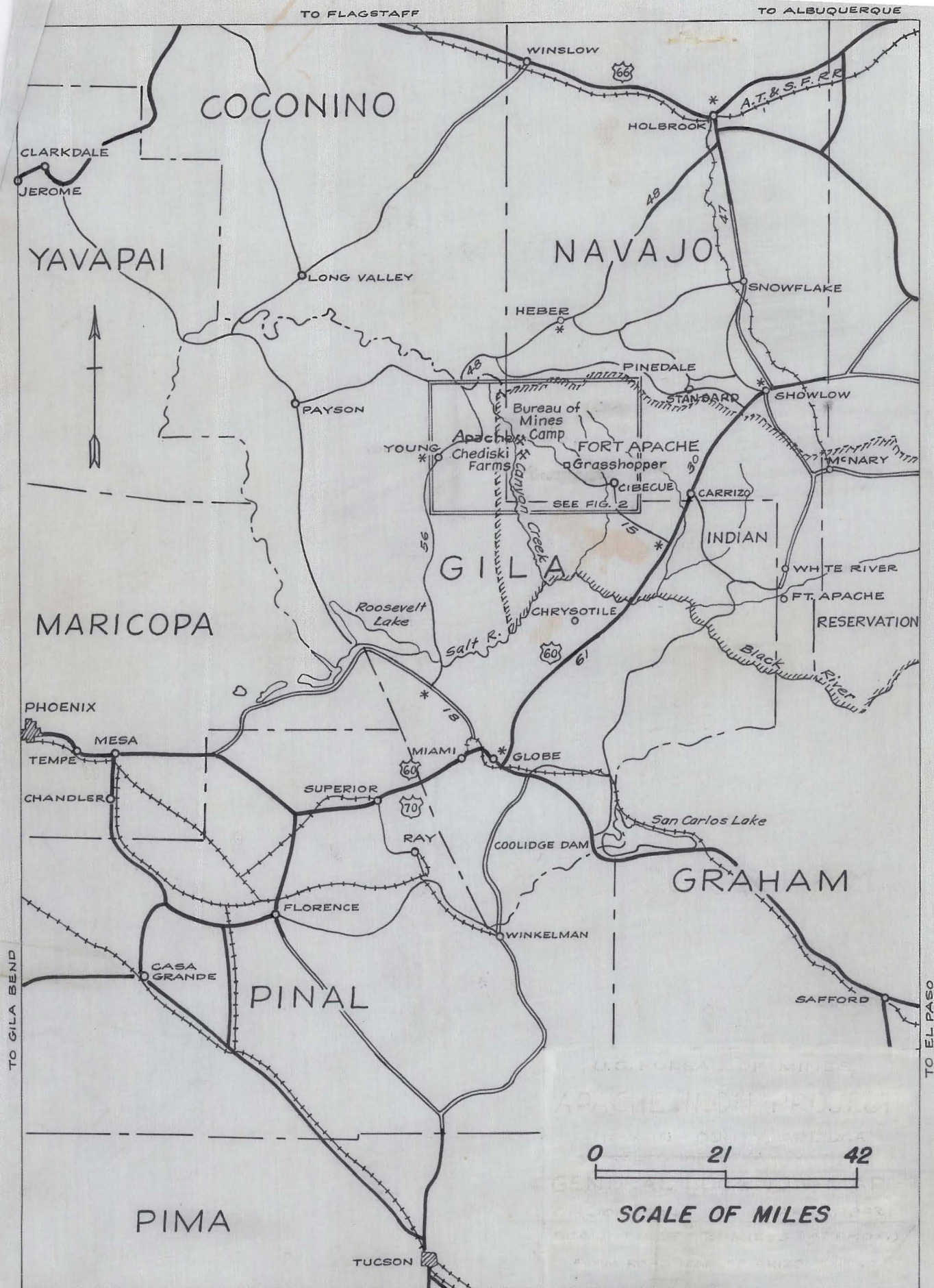


FIG. 1 - GENERAL LOCATION MAP

FIGURE 1

IRON DEPOSITS

a result of exploration for iron ore in the Apache Indian Reservation in Central Arizona, the CF&I Steel Corp. has leased over 5,000 acres of land. In 1966, a nominal tonnage of iron ore was mined from the Arizona property and shipped to the CF&I Steel Plant at Pueblo, Colorado, for testing, development for the iron ore deposit is continuing. SKILLINGS MINING REVIEW July 1, 1967

Visitor, Jim Brooks, CF&I Steel geologist, said company has mined about three times the amount mined in 1966 from the Apache deposit. Mining there for the year will be completed next week. FTJ WR 8-25-67

Active November 1967
Active April 1968 - Exploration
Active October 1968 - Exploration

Apache Iron (CF&I Steel) mined from their deposit NE of Young. FTJ Annual Report 6-30-68

Active Mine List - 4-1969 - Exploration - James R. Brooks, Geol.
Active Mine List - 10-1969 - Exploration - Bud Blalock - CF&I
Active Mine List - 5-1970 - 4 men - Bud Blalock - CF&I
Active Mine List - 10-1970 - 4 men - Bud Blalock - CF&I

Office call - Jack Gillespie regarding CF&I problems with the Apache Iron deposit and that the company was still maintaining assessment work at their Dragoon claims. GWI WR 3/5/76

Jack Chapman, representing an unknown German Mining & Money firm, is interested in discussing possible development of the Apache Iron property. KAP report dated 2/22/77

Abstract from "Arizona Iron Ore Deposits" in IRON COMMODITY file: The Apache Iron Deposits" in IRON COMMODITY file: The Apache Iron Mine, Navajo County (comprising the Apache and Chedeski deposits) lies along Canyon Creek approximately 20 miles southwest of Pinedale, 50 miles north of Globe, 20 miles east of Young, and from 23-27 miles up Canyon Creek from its confluence with the Salt River. They are 3 miles east of the Navajo-Gila County line. The deposits are adequately described by the United States Bureau of Mines in R.I. 4093 (1947). At present the area is being drilled by Colorado Fuel and Iron Company, under a 2-year prospecting lease from the Fort Apache Indian Reservation. The lease is reported to comprise about 40,000 acres which includes the Apache and Chedeski mines. Should the company desire to continue on a productive basis after two years they can secure an indefinite production lease which would continue as long as production is maintained.

APACHE IRON DEPOSITS

See: MINING WORLD, October, 1960, p 84.

See: ENGINEERING & MINING JOURNAL, October, 1960, p 151

C.F.I. - grading roads and getting ready for contract drilling. Have only 2 years to do prospecting. Indians would give more but Gov't ruled.

FPK - 12-4-60

Colorado Fuel & Iron Corporation is using the most advanced methods for exploration of the tribal lands of the Fort Apache Indian Reservation to which it has exclusive mineral prospecting rights. R. R. Williams, manager of the firm's mining dept.; W. J. Schenler, Chief mining engineer, and D. A. Carter, geologist, were among those on a recent inspection trip in the wilderness area where preliminary surveys indicate reserves of 10,000,000 tons of iron ore. Reported deposits of asbestos, manganese and coal on the 188-square mile area will also be investigated.

Taken from MINING WORLD, March, 1961, p 56.

Barry DeRose reported that Colorado Fuel & Iron Company has drilled 3 holes at the Apache-Chediski iron deposit with encouraging results. He also said that the prospective lease can be replaced by an indefinite operative lease which would run as long as production was made.

LEWIS A. SMITH - Weekly Report 5-19-61

APACHE IRON (and CHEDISKI MINES) NAVAJO COUNTY

Interview with Berry DeRose (council for the White River Apache Reservation) Mr. DeRose stated that C. F. & I. has 3 drill crews and 13 men working at the Apache and Chediski Mines. The results, thus far, are considered satisfactory.

Lewis A. Smith 9-22-61

DRILLING FOR IRON ORE IN ARIZONA - The Colorado Fuel & Iron Corp.

Exploration for iron ore in the Fort Apache Indian Reservatuon in eastern Ariz. by the Colorado Fuel & Iron Corp. is reported to be proceeding on schedule. A number of access roads are being completed, and detailed mapping in some areas is in progress. One diamond drill rig is currently being employed on a two-shift operation, and two drill holes have been completed through the ore horizon. An additional diamond drill rig may be put in operation in the near future.
From - SKILLINGS MINING REVIEW - May 20, 1961, p 11

MEMO

APACHE MINE

ELLISON DISTRICT

NAVAJO CO.

Barry De Rose counsel for the Fort Apache Indian Reservation, reported that Colorado Fuel and Iron Co. is now operating 2 shifts at the Apache Mine. They have drilled several holes with satisfactory results. He said some of the holes are outside of the drilling done by the Bureau of Mines.

Memo - LEWIS A. SMITH - 1-23-62

Active Feb. 1962

Colorado Fuel and Iron Corp. is employing 13 men in its exploration activities at the Apache iron deposit on the Apache Indian Reservation in eastern Arizona. Drilling is proceeding on a two-shift basis. Some of the holes have been drilled outside the area previously tested by the U.S. Bureau of Mines.

Taken from MINING WORLD, April, 1962, p 39

Jim Brooks, C.F. & I., called about the Cleopatra - he said that C. F. & I. are now constructing a truck haulage road to the Apache Iron deposit. They plan to take out representative truck size ore samples from selected places for metallurgical tests.

LAS WR 9/3/65

Mr. R. J. Allison, Archean Iron, reported that C.F. & I. were building a good road into Apache Iron. This would aid Archean too. Allison said his group planned to build a reduction plant near the Snowflake Lumber mill. This plant would use a different reduction method than Madaras, but which is now used successfully in New Jersey.

LAS WR 11/26/65

J. R. Brooks, Chief Field Engineer for C F & I in Arizona, reported that the Canyon Creek Iron Project would be down until spring.

LAS WR 1/7/66

Mr. Jim Brooks, Colorado Fuel and Iron Co. stated they would be opening up operations at Apache Iron in Canyon Creek with the idea of testing a large sample of ore.

EAS WR 4/1/66

C F & I Co. name has been changed to C F & I Steel Corp.

Skillings Mining Review 8/6/66

Examined C.F & I. cut and ore. Between 10 & 20 thousand tons have been mined and stockpiled. This will be shipped to Pueblo for a test run. The hematite is flat lying about 20' thick and covers a considerable area.

FTJ WR 9/16/66

J. R. Brooks reported that C F & I plan to haul a considerable tonnage of iron ore from Apache Iron to Pueblo as soon as they can get straightened out on rates with Santa Fe R.R.

LAS WR 9/30/66

Active Mine List 10-1966 - Exploration CF&I Steel Corp.
" " " 4-1967 - " " " "

No activity at C F & I mine. Gate locked.

FTJ WR 6/30/67

CHAPMAN AND LEISE
ATTORNEYS AT LAW
282 NORTH 115TH STREET
OMAHA, NEBRASKA 68154

JACK F. CHAPMAN
CLAIR L. LEISE

TELEPHONE
402-334-5816

December 15, 1976

Mr. Kenneth Phillips
Arizona Dept. of Mineral Resources
Mineral Building
Fairgrounds
Phoenix, Arizona 85007

re: Hematite

Dear Mr. Phillips:

In response to a telephone conversation with Harry Moseley, to whom a copy of this letter is directed, I am directing this request to your attention for information as concerns Hematite availability in large quantities located in the White Mountain on the Apache iron deposits.

I understand that this deposit has or is being worked by a mining company out of Colorado, but said company presently is incapable of financing the substantial sums of money necessary to fully develop the tract which consists of reserves up to one hundred million metric tons. I also have been advised that this is one of the more significant deposits located and known to exist within the continental territorial limits of the United States.

I would be most interested in receiving from your office any and all information as concerns these deposits, and I am especially interested in the complete specifications, as well as any information as concerns terrain, topography, overburden, transportation availability from the area, preliminary drillings, if any, done by the government or by the Apache nation.

At the present time, I am representing a group of metalurgical coal owners in the southeast and we are marketing, with one of the substantial Western European purchasers, on a direct basis, these significant metalurgical coal reserves. Another division of their company, on one of my recent trips to Europe, has advised that they would be most interested in procuring, through my association with them, substantial reserves of high grade hematite which has capable mining economics.

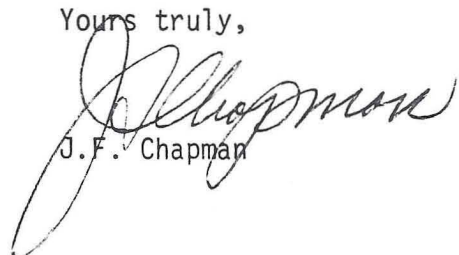
Mr. Kenneth Phillips
December 15, 1976

Page 2

The interest in entering into this proposal would be from the aspect of our making the necessary capital expenditures to actually implement a mining operation after the necessary verifications and evaluations have been completed. I would appreciate your submittal as soon as possible of any and all information which you may have as concerns the above tracts of hematite.

Awaiting your reply, I remain,

Yours truly,


J.F. Chapman

JFC;jjw

cc: Mr. Harry Moseley

DEPARTMENT OF MINERAL RESOURCES

**STATE OF ARIZONA
FIELD ENGINEERS REPORT**

Mine Apache Iron

Date January 31, 1963

District San Carlos Apache Reservation,
Ellison District, Navajo Co.

Engineer Lewis A. Smith

Subject: Interview with Barry De Rose

Mr. De Rose said he had recently conferred with the geologist in charge of Colorado Fuel and Iron Company's project in Canyon Creek. He was informed that drilling at the Apache Iron deposit had ceased and that it had been recommended by this geologist that a long adit and other underground work be undertaken in order to check the drill results and to obtain bulk sample. The last holes drilled are said to have yielded good results. The question of driving the underground openings is now before the Board of Directors for decision.

Meanwhile the survey of the railroad and mill potential is progressing.

MEMO

Apache Iron Deposit

10-15-62

Ellison Dist., Navajo Co.

Lewis A. Smith

Colorado Fuel & Iron Corp. has secured a two-year extension of their prospective lease, but with a reduced acreage. According to Barry De Rose, the 3 crews will continue drilling. In addition studies will be made relative to the feasibility of building a railroad into the mine area and the possible erection of beneficiation plant. De Rose was under the impression that thus far exploratory work at the Apache was satisfactory, although he did not know to what degree.

APACHE MINE

NAVAJO COUNTY
CANYON CREEK DIST.

According to Berry DeRose's secretary, there have been no new developments by Colorado Fuel & Iron Co. at the Apache mine.

MEMO LEWIS A SMITH 5/29/63

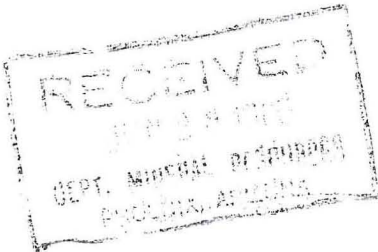
INTERVIEW WITH J. R. BROOKS (Box 153, Young) Chief Exploration Eng., for Colorado Fuel & Iron Co. 1/30/64.

Mr. Brooks stated that the C.F. & I. drill program had been terminated, for now, but that it had greatly added to the iron ore reserves. The drilling was begun on a 1600-foot grid and was lately close to 800 feet. A second ore body was discovered near the original ore body that had been drilled and trenched by the U. S. Bureau of Mines. Check holes, in the previously drilled area, checked Bureau results well. The average thickness of ore is about 17 feet and the ore lies under a discordant diabase sill in residual masses of Mescal (?) limestone and residual chert both of which lie on a post-Mescal erosional epoch surface. The iron ore, formed by replacement of the limestone remnants, is relatively pure hematite that runs up to nearly 60 percent iron. The cherty ore is considerably lower grade and would have to be beneficiated up to at least 55 percent iron. The diabase is regarded as Precambrian since Paleozoic formations were laid down in angular unconformity with the erosional surface and the older Apache group as well as the diabase. (Other geologists regard the diabase as considerably more recent. However, there is more than one diabasic intrusion in the region). One economic limit, is determined by the depth of the ore zone below the diabase sill and this is partly due to the local thickness of the diabase. The diabase is not regarded as genetically connected with the ore formation. In some places, along the old erosion, surface, white, severely leached sandstone is found and is a good marker. Some thrust faulting, of undetermined extent, was seen in the nearby regions both to the west and east. The sandstone is silicified. Local metamorphism has caused the conversion of kaolin to feldspars at as much as 200 feet from the diabase contact. During the erosional epoch, that produced the previously described erosion surface, much of the upper Mescal and overlying basalt flows were removed. The iron ore could have in part, resulted from the erosion of the basalt.

Mining will have to be underground. If the project is approved, 30 miles of railroad would be constructed from the Snowflake paper mill. A beneficiation plant would be built at the mine since adequate water appears to be present. One of the prime costs will be beneficiation of the cherty ore and this may determine in part if the project is feasible.

MEMO Lewis A. Smith 1/30/64

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
Fort Apache Agency
Whiteriver, Arizona



June 27, 1960

NOTICE

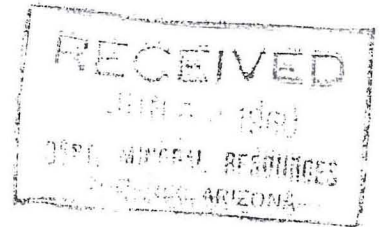
On June 6, 1960 there was sent to you a notice of competitive sale of a mineral prospecting permit on approximately 120,200 acres of tribal land of the Fort Apache Indian Reservation, Arizona. The permit grants an exclusive right to prospect for iron ore as well as other minerals except oil and gas with an option to a lease or leases. A copy of a mineral prospecting permit form, mining lease form and a map of the mineral prospecting area were attached to the notice.

In the notice of sale the mineral prospecting area was described as the northwest part of the Fort Apache Indian Reservation embraced in Townships 8, 9, 10 and 11 North, Ranges 15½ and 16 East, Gila and Salt River meridian, Arizona. The area was described in virtually the same way in the mineral prospecting permit form. We were in error in including the extreme northwest part of the reservation located in Township 11 North to be in Range 15½ East. Township 11 North should be in Range 15 East. The correct land description of the mineral prospecting area should read as follows:

The northwest part of the Fort Apache Indian Reservation embraced in Township 11 North, Range 15 East, Townships 8, 9 and 10 North, Range 15½ East and Townships 8, 9 and 10 North, Range 16 East, Gila and Salt River meridian, Arizona.

The map should also be amended to show that part of the reservation located in Township 11 North to be in Range 15 East.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
FORT APACHE AGENCY
Whiteriver, Arizona



NOTICE OF COMPETITIVE SALE
EXCLUSIVE PROSPECTING PERMIT
WITH OPTION TO LEASE
RESTRICTED INDIAN LANDS FOR MINING
Fort Apache Indian Reservation
Arizona

JUN 6 1960

SEALED BIDS will be received until 2:00 p.m. Mountain Standard Time, JUL 7 1960 and opened at that time in the office of the Superintendent of the Fort Apache Agency, Whiteriver, Arizona, for a prospecting permit on approximately 120,200 acres of tribal land of the Fort Apache Indian Reservation, located in Navajo and Gila Counties, and described as the northwest part of the Fort Apache Indian Reservation embraced in Townships 8, 9, 10 and 11 North, Ranges 15½ and 16 East, Gila and Salt River meridian, Arizona. A sketch of the mineral prospecting area is attached hereto. The permit grants an exclusive right to prospect for iron ore as well as other minerals except oil and gas with an option to a lease or leases. *See collection*

The sale will be conducted under the regulations promulgated by the Secretary of the Interior, 25 CFR 171 (act of May 11, 1938, 52 Stat. 347; 25 U.S.C. 396 a-g). The right is reserved to reject any and all bids and to disapprove any permit submitted on an accepted bid. Should any bid be rejected or permit disapproved through no fault of the bidder, all deposits shall be returned to the bidder. The tract is offered subject to the approval of the Tribal Council of the White Mountain Apache Tribe.

Before a bidder is notified that he is the successful bidder, he may be required to furnish additional information as to character, experience in mining and financial standing. The successful bidder will be required to pay a filing fee of \$10 for the permit.

A permit will be sold to the qualified bidder who offers the highest money bonus for the tract. Conditional and alternate bids will not be considered. If two or more bids are in the same amount and the bids are the highest qualified bids, the bidders may be required to draw lots to determine the successful bidder. The permit will grant an exclusive right for a period of two (2) years from the date of approval by the Secretary of the Interior or his authorized representative to prospect for iron ore as well as other minerals except oil and gas. The permittee may exercise his option at any time during this term to a lease or leases. A lease may not exceed 2,560 acres. If the permittee does not exercise his option to a lease or leases during the two-year term of the permit, the permittee may renew the permit for one (1) additional two-year term upon written application to the Superintendent and payment of a renewal bonus equal to the original bonus paid.

INSTRUCTIONS TO BIDDERS AND CONDITIONS OF THE INVITATION FOR BIDS

1. DEPOSIT AND BOND. - Each bid must be accompanied by a certified check, cashier's check, or postal money order, payable to the Bureau of Indian Affairs for at least 25 per cent (25%) of the bonus bid. The successful bidder, upon being notified that his bid is acceptable, shall be required to remit the balance of the bonus, the filing fee and to execute the prospecting permit and return it to the Fort Apache Agency within thirty (30) days after notification. The executed permit shall be accompanied by an acceptable surety bond in the amount of Five Thousand Dollars (\$5,000.00). If the successful bidder shall, within the thirty-day period, fail to execute and deliver the permit and bond, his deposit made with the bid shall be forfeited to the use of the White Mountain Apache Tribe.

2. MARKING AND SUBMISSION OF BIDS. - Bids with deposit must be securely sealed in a suitable envelope, addressed to the Superintendent, Fort Apache Agency, Whiteriver, Arizona, and marked on the lower left corner of the envelope "Bid for prospecting permit on Fort Apache Indian Reservation, not to be opened until 2:00 P.M. MST, ^{JUL 7} 1968 ." The bidder's name and address must be shown on the upper left corner of the envelope.

3. SIGNATURE TO BIDS. - Each bid must show the address of the bidder and be signed by him with his usual signature. Bids by partnerships must be furnished with the full names of all partners and must be signed with the partnership's name by one of the members of the partnership or by an authorized representative, followed by the signature and designation of the person signing. Bids by corporations must be signed with the legal name of the corporation, followed by the names of the State of incorporation and by the signature and designation of the president, secretary, or other person authorized to make the matter binding. The name of each person signing shall also be typed or printed below the signature. Satisfactory evidence of authority for an officer to sign on behalf of a corporation shall be furnished.

4. CORPORATE PAPERS. - The Superintendent may in his discretion before or after the execution and approval of a permit require the successful bidder to file evidence of financial responsibility, articles of incorporation or other corporate papers.

5. TIME FOR RECEIVING BIDS. - Bids received prior to the time of opening will be securely kept, unopened. The officer whose duty it is to open them will then decide when the specified time has arrived, and no bid received thereafter will be considered. No responsibility will attach to an officer for the premature opening of a bid not properly addressed. Telephone or telegraphic bids will not be considered.

6. BIDDERS PRESENT. - At the time fixed for opening of bids, their contents will be made public. Bidders or interested parties are invited to attend the opening of bids; however, bidders are not required to be present.

7. PROSPECTING PERMIT AND LEASE FORMS. - There are attached hereto, and by this reference made a part of this Notice of Sale, a copy of a mineral prospecting permit form and mining lease form which shall be used for the execution of a permit or lease.

8. INFORMATION. - The Fort Apache iron deposit was the subject of a Report of Investigation by the United States Bureau of Mines entitled "Apache Iron Deposit, Navajo County, Arizona, (R. I. 4093)," dated July 1947. The United States Geological Survey also published a bulletin on this iron deposit in 1931 entitled "Iron Ore on Canyon Creek, Fort Apache Indian Reservation, Arizona," (Bulletin 821-C). Copies of these publications are available for examination at the Fort Apache Agency, Whiteriver, Arizona; Phoenix Area Office of the Bureau of Indian Affairs, 3508 North Seventh Street, Phoenix, Arizona; and the office of the Regional Mining Supervisor, United States Geological Survey, Carlsbad, New Mexico. Additional information regarding the submission of bids may be obtained from the Superintendent, Fort Apache Agency. Interested persons should contact this office Mondays through Fridays, between 8:00 a.m. and 5:00 p.m. On Saturdays, Sundays and holidays the Agency is closed and personnel will not be available for furnishing information.

To: Frank P. Knight, Director
Arizona Dept. of Mineral Resources

June 19, 1957

From: Lewis A. Smith

Subject: ✓ Apache Iron Deposits

The Apache Iron Deposits lie in Navajo County, along Canyon Creek, some 20 miles East of Young.

Two main deposits are listed and several minor ones as follows:

Main Deposits - (1) Apache
(2) Chediski

Minor Deposits - (1) Oak Creek
(2) Rock Canyon
(3) Shell Mountain
(4) Gillette
(5) Nail Ranch
(6) Rock House
(7) Cow Creek

The geological section is:

Martin Ls
Troy Quartzite
Mescal Limestone (coal)
Dripping Springs Quartzite
Diabase Laccolith

The iron ore ranges from 2 to 25 feet, the thickest section having more than 45 feet. Where bed lies along the Troy-Chediski white sandstone-Mescal contact the ore is largely in the upper member of the Mescal.

The ore beds pitch southward in places and southeastward in others. The structure is complicated by an anticline traversed by transverse faults which displace the ore zone to a considerable extent, locally.

The ore is composed of hematite associated with chert and jasper. Two main divisions occur: -

- (1) Soft red hematite
- (2) Mixed
- (3) Highly cherty and jasperoid phase.

Overall average of better ore is about: -

50-65 % Iron
45-26.5 SiO₂
0.12 - 0.40 P₂O₅

Apache Iron

to Bin to file K

STATE OF ARIZONA
DEPARTMENT OF MINERAL RESOURCES
MINERAL BUILDING, FAIRGROUNDS
PHOENIX, ARIZONA 85007

cc - to Bin of
L... 10/1/74

gm

Apache Iron

C
O
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The Apache Iron deposit consists of two related deposits near the northwestern boundary of the Fort Apache Indian Reservation along Canyon Creek. The two major deposits are separated by approximately eight miles and are referred to as the North Lease and South Lease. Descriptions of the geology and characteristics of the deposits are contained in a number of previously published documents listed here.

Moore, Richard T.; 1968, Mineral Deposits of the Fort Apache Indian Reservation; Arizona Bureau of Mines Bulletin 177, 84 p. (Includes detailed map showing lease areas).

Stewart, L.A.; 1947, Apache Iron Deposit, Navajo County, Arizona; U.S. Bureau of Mines Report of Investigation, RI4093, 87 p.

Burchard, E.H.; 1931, Iron Ore on Canyon Creek, Fort Apache Indian Reservation, Arizona; U.S. Geological Survey Bulletin 821-C, p. 51-75

In addition to information contained in the above documents, a former CF&I Steel Corporation exploration employee was contacted. This contact reported the deposit to contain as much as 100 million long tons of iron ore averaging 52-53 percent iron.

The two major deposits have been leased to CF&I Steel Corporation since 1966. Each of the two deposits have been covered by a separate lease. Each lease specified an acreage rental of \$1.00 per acre annually, a royalty of 20c per long ton of ore produced the first year with the royalty to be escalated annually based on the commodity price index for iron ore and a minimum annual royalty of \$10,000. All production by CF&I has been from the North Lease. Production has been 197,139 long tons over the last ten years. Production in 1974 was 48,000 long tons and in 1975 was 28,000 long tons. The entire production has been produced from benches in ore exposed on the east side of Canyon Creek and shipped to the company's steel mill in Pueblo, Colorado.

Neal Hall, the Tribal Administrative Manager for the Apache Tribal Council, requested technical data from the Department of Mineral Resources on potential mining costs, ore prices, shipping methods, ore grade, ore reserves, etc. The information requested will help the Tribe in determining which of several courses of action to follow in leasing their iron ore deposit.

In the Spring of 1976 the Tribe cancelled the lease with CF&I Steel Corporation. The Tribe feels that the royalty has not been escalated as required, that both leases have been erroneously lumped together to avoid paying greater than minimum royalties on the one producing lease and that CF&I has been doing little more than holding the property for future possible use.

The cancelling of the CF&I leases has caused some disagreements between the Tribe, the Bureau of Indian Affairs (BIA) and the Arizona area office of the United States Geological Survey-Conservation Division (U.S.G.S.) The lease with CF&I had been issued by the BIA and the conditions of the lease were to be enforced by the U.S.G.S. The Tribe has alleged that the BIA and USGS were not enforcing the lease in the Tribe's best interest. The BIA and the USGS have alleged that the Tribe has no authority to cancel the lease, that the lease was being properly enforced and that any lease at all with CF&I was in the best interest of the Tribe as there is no other viable leasee.

One of the major problems, according to the Tribe, has been the lack of use of Tribal labor by CF&I. Secondly, although the price of iron ore has risen approximately 50% since 1966, Tribal authorities report that the royalty on the iron ore has been adjusted only once during the last ten years. The adjustment is reported to have amounted to only slightly more than one cent. However, the USGS has indicated the royalty has been adjusted to about 32¢ per long ton. Settlement sheets personally observed at the Tribal offices show the royalty to be around 21¢. Although the North Lease and South Lease were leased under separate agreements the minimum royalties were lumped together. If each lease were considered separately and a properly escalated royalty applied for the 1974 production from the North Lease, royalty payments from that lease should have substantially exceeded the minimum.

Following the cancelling of the lease CF&I has initiated two separate courses of action. First, they have filed a suit in Federal court which, if decided in their favor, would essentially nullify the Tribe's cancelling of the lease. Second, they have opened negotiations with the Tribe for a joint venture which, although in many ways different from a lease, would essentially allow continued operation of the deposit by CF&I.

STATE OF ARIZONA
DEPARTMENT OF MINERAL RESOURCES
MINERAL BUILDING, FAIRGROUNDS
PHOENIX 7, ARIZONA



July 29, 1963

B. J. Allison, nephew of W.L.A., is with Archean Exploration Co., or with a concern having a substantial interest in it. He and another man called re estimated consumption of grinding balls in Arizona. He claimed to have knowledge of C. F. & I. Co. drilling results in Fort Apache reservation and said the average grade found was 55% Fe. I said that that didn't check very well with the U.S.B.M. sampling and he agreed and added that the Bureau drilling was poorly done. He claims that they have the biggest hematite deposit west of the Mississippi - bigger than Cedar City, Utah.

He said C. F. & I. were working on railroad route and that it would not be via the old Avergaard grade.

See letter to Allison 7/31/63 re grinding balls.

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↓ Apache Iron Deposit

2-13-57
Newajo

↓ Apache + Cheliski Iron ores on
Canyon Creek, San Carlos Indian Res.

Refer: USBM RI 4093

↓ USGS B 821C

Ore is in Mercal Ls, exposed by Canyon Creek

Ore about 45% Fe w high SiO₂

Covers large area w ore thickness
of about 10 ft.

Grade drops from exposure down dip

· Mining problems, ground none too good.

USBM drilling and Mike O'Leary

(Phoenix engr.) check well in sampling

ap to B. S.

Possible set-up with coal fields to make
sponge iron for L.P.F.

Most of the ore is fine grained and massive, containing 3-5% of sericite and up to 1% of apatite.

The average composition of the Chediski Area: -

Fe	=	48.92 %
SiO ₂	=	23.02
P	=	0.285
S	=	0.55
CaO	=	1.01
Al ₂ O ₃	=	2.26
Mn	=	0.10

In half of the Chediski sample trenches the ore was under a mineable width in thickness.

Trenches 6-37 showed 50.48% Fe and 17.6 SiO₂. 25 drill holes 1,000 feet from exposure showed the following results: -

(3 - 14)	=	14' @ 44.89 % Fe
(15-25)	=	11:2' @ 40.40 % Fe

A study of the analytical data shows that as the iron grade goes down the silica, roughly and proportionally, rises in amount.

Recovery tests indicated 80 to 85% of iron ore averaging 46.6 % Fe. The overburden over the ore horizon ranges from 200 to 600', in the drillhole logs.

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1. USGS Bull. 821, pp 51-75, 1931
 2. Stewart, L. A., US Bureau of Mines R. I. Paper 4093, 87 pp. (1947)

The joint venture proposed by CF&I would provide for mining a minimum of 90,000 long tons annually, employment of approximately 20 Tribal workers and a 32¢ per long ton royalty. The operation would be governed by a six person mining committee - three representing CF&I and three representing the Tribe. The committee will monitor the mining operation, enforce the conditions of the joint venture agreement, arbitrate labor disputes and approve mining and reclamation plans.

Based on a projected 90,000 tons per year operation, the following annual costs have been projected by the Tribe and CF&I.

	Total/90,000 Tons Year	Cost/ton
Labor	\$265,000	\$ 2.94
Supplies	30,000	.33
Depreciation	5,000	.05
Subtotal	\$300,000	\$ 3.33
CF&I overhead @ 12%	36,000	.40
Total cost @ mine	\$336,000	\$ 3.73
Motor freight		5.06
Rail freight		12.00
Total freight		\$17.06
Total delivered to Pueblo, Colorado		\$20.79

The \$20.79 per long ton of iron ore delivered to Pueblo less royalty is 5 to 7 percent higher than typical Lake Superior region iron ore delivered to Lake Superior ports. Further, the \$20.79 value does not include any royalty to the Tribe.

The unit pricing method is a useful approach to comparing the cost of iron contained in iron ore. Although unit pricing takes into account the effect of differing grades of ore, it ignores the fact that lower grade, even at reduced prices, require additional handling expenses per unit of iron. Price per long ton is related to cost per long ton unit by the following formula:

$$P = (g)(c)(100)$$

where: g=ore grade
c=price per long unit in dollars
P=price per ton in dollars

Using the above formula, an ore grade 52.5 percent iron (average of 52 to 53 percent), and a projected CF&I cost per ton delivered price to Pueblo, Colorado, of \$20.79, the long ton unit price would be as follows:

39.60¢ @ \$20.79 long ton cost
40.21¢ @ cost plus 32¢/long ton royalty
40.66¢ @ cost plus 56¢/long ton royalty

Metals Week quotes pelleted iron ore at 50.45¢ per long ton unit. Such pellets usually contain about 63 percent iron. Iron ore delivered in the Lake Superior region is quoted at \$19.25 per long ton for 51.5 percent iron ore equivalent to 37.3¢ per long ton unit.

Direct feed lump ore ($\frac{3}{4}$ inch or larger) contains 48 to 70 percent iron and is less common than either lower grade material, fines (less than $\frac{3}{4}$ inch), sinter feed or pellet feed ore, but is generally more desirable. A considerable amount of the Apache Iron ore should qualify as lump ore. Lump ore is currently imported from South America and delivered to domestic steel mills for 54 to 60¢ per long ton unit. A Kaiser Steel geologist reported that some Apache ore contains enough specularite (a variety of hematite) to reduce the value of the ore as direct feed.

A major question for the Tribe has been the determination of a fair royalty. GF&I has offered 32¢ per long ton. An alternative for discussion could be based on the cost of production plus a reasonable before taxes profit (i.e. a FOB mine selling price) with a royalty percentage figured on the result. As an example, a 15 percent before taxes profit on the production cost of \$3.73 would establish a possible FOB mine selling price of \$4.29 per long ton. With \$4.29 as a selling price, a reasonable royalty of 8-12% might be applied. However, in a case where the lease holder is making other concessions such as employment guarantees, investment commitments, etc., a royalty of considerably less might be reasonable.

Any mining plan approved by the joint venture committee should outline procedures which will assure orderly advance development of the orebody and discourage wasteful and/or "high grading" mining methods. It would be advantageous for the Tribe to retain a qualified mining engineer on a part-time basis. A listing of such individuals has been provided by the Department.

GS

STATE OF ARIZONA
DEPARTMENT OF MINERAL RESOURCES
MINERAL BUILDING, FAIRGROUNDS
PHOENIX, ARIZONA 85007

January 14, 1977

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Chapman and Leise
282 North 115th Street
Omaha, Nebraska 68154

Dear Mr. Chapman:

This is in response to your letter of December 15, 1976. The location and accessibility of the Apache Iron deposits (Apache and Chediski deposits) are situated on Canyon Creek at an elevation of 5,000 to 6,000 feet in T9 & 10N, R15 1/2E, Gila and Salt River Base and Meridian in southwestern Navajo County, Arizona.

According to C. M. Harrer's (2) "Reconnaissance of Iron Resources in Arizona", published by the U. S. Bureau of Mines as Information Circular 3236, the Apache Iron deposits are part of an iron rich region in east-central Arizona which is perhaps 36 miles wide and over 90 miles long, extending from Globe, north-northwest to beyond Young, Arizona.

Present access to the property is by either Cibecue or Young from Globe or Snowflake. Distance by road from Globe through Cibecue is 103 miles; from Globe through Young, 123 miles; from Snowflake through Young, 83.5 miles; and from Snowflake through Cibecue, 38 miles.

The nearest railroad siding is Sedan, on the Apache Railroad which connects McNary with Holbrook on the Atchison, Topeka and Santa Fe Railroad. Sedan is on U. S. Highway 60, 33 miles northeast of the junction with the Cibecue road. An abandoned logging railroad bed extends from Snowflake on the Apache Railroad to Standard 30 miles northeast of the deposits. A practical railroad grade that would connect the deposits with Sedan or Snowflake would be about 60 miles long, as it would traverse country which is dissected by deep canyons and steep-walled gulches. The enclosed maps show the general location of the deposits relative to communities and transportation.

PHYSICAL FEATURES AND CLIMATE

The locality of the deposits is in the rough, dissected margin of the high plateau of northeastern Arizona. Canyon Creek, which flows south through the area, and its numerous tributaries have cut the former smooth upland into V-shaped valleys with intervening ridges and many steep-walled canyons. Only small remnants of the gently rolling upland remain.

Maximum relief in the area is about 1,200 feet. Iron ore outcrops principally on the margins of the upland remnants. Altitudes of the outcrops at Apache range from 5,325 feet at Canyon Creek to 6,750 feet on the north side of Swamp Creek Mountain. At Chediski they range from 6,075 to 6,200 feet along the face of Chediski Mountain.

The entire area near the iron deposits is fairly well wooded with yellow pine, juniper, cedar, and scrub oak, with cottonwoods along the streams. The hillsides are typically covered with heavy underbrush of manzanita and scrub oak.

Canyon Creek is a perennial stream estimated to flow about 20 second-feet of water in June, one of the driest months of the year; at the time of melting snows and heavy rains it becomes greatly swollen.

The climate is moderate in summer and fairly cold in winter, temperatures ranging from about 100° in summer to zero in winter.

Annual precipitation is about 15 inches. Snow is common in winter. Summer rains, frequently torrential, fall in July and August. Local dirt roads become impassable during wet weather and are sometimes closed in the winter for a month at a time.

CHARACTER AND ORIGIN OF THE IRON ORE

The iron ore of the Apache deposit occurs as hematite closely associated with chert and jasper. The ore ranges from soft and earthy to hard and massive. Fracturing and jointing make intermediate types of finely broken to blocky ore. The lower-grade ore is generally harder and more massive.

The specific gravity ranges from 2.55 to 10 percent iron to 4.25 at 62 percent iron, with about 3.60 for 45 percent iron ore. (4)

Burchard (1) states: The iron ore is hematite ranging from soft, pulverulent, bright-red material to hard, dense, dark-blue iron oxide. More or less specularite is present. The association of the iron ore with beds of chert having "curly" or contorted laminations is of significance in connection with the origin of the ore. No limestone was noted anywhere at this horizon, and no oolitic or granular material was noted in the ore which might indicate original deposition as a ferruginous sediment. Much of the ore, however, shows traces of a contorted banding similar to that of the associated chert, a feature which strongly suggests that it originated through replacement of the banded rock by iron compounds.

As the Mescal rocks contain much limestone in other parts of Arizona, it may be that they were calcareous here and were replaced by solutions carrying both silica and iron. The ore bed contains also more or less chert partly replaced by iron oxide, and in some places the banded chert contains little or no iron oxide. The banded chert superficially resembles the remains of an algal growth which perhaps existed in the form of a reef in the Cambrian (?) sea.

The best ore ranges from 50 to 65 percent in metallic iron, 4.5 to 26.5 percent in silica, and 0.12 to 0.40 percent in phosphorus, but there is much ferruginous siliceous material that does not carry enough iron to warrant its classification as an ore. Ferruginous material that has been formed by replacement of a siliceous bed such as this is very likely to be irregular or "spotty" in composition.

The United States Geological Survey assigned Arthur P. Butler, Jr., to take charge of all geological work for the survey during a government trenching and drilling campaign. Butler (5) describes the ore as follows:

The ore zone is composed of hematitic beds interlayered with chert, jasperoid, sandstone, and shale. The chert and jasper have replaced sandstone and other rock whose original composition is not now discernible.

Most of the hematite is fine-grained and massive. In addition to hematite, the ore contains 3 to 5 percent of sericite and as much as 1 percent apatite.

The deposit is believed to be of hydrothermal origin, because some of the hematite replaces jasper and chalcedony, which have replaced part of the original rock, and because hematite and specularite fill vugs and fractures in jasper, in chalcedony, and in the massive hematite.

Microscopic examination of lower-grade ore (35.7 percent iron) showed that the iron oxide is intimately associated with silica grains ranging in size from 65 to 200 mesh. The iron oxide also occurs as isolated stringers and veinlets.

The following analyses of composite samples from trenches and drill holes at Apache show the composition of the ore.

	(1) Trenches, plus 50%	(2) Trenches, 35-50%	(3) Drill holes
Fe	58.53	42.96	47.35
SiO ₂	12.14	30.60	27.23
P	0.214	0.191	0.220
S	0.020	0.018	0.054
CaO	0.38	0.51	1.28
Al ₂ O ₃	2.12	2.55	2.92
Mn	0.05	0.05	0.04
TiO ₂			0.15
MgO			0.29

(1) An average of 6 composite samples made up of 41 channel samples from trenches.

(2) An average of 15 channel samples from trenches.

(3) An average of 3 composite samples made up of 41 core samples from drill holes.

The grade of ore evidenced by all trench and diamond-drill sampling is 46.3 percent iron. Therefore, the composition of group 3 should be indicative of the typical composition of the Apache ore.

Analyses of four bulk samples sent to the Bureau of Mines testing laboratories are as follows:

	<u>Salt Lake City, Utah</u>			<u>Laramie, Wyo.</u>
Fe	35.7	44.3	59.8	63.96
Insol.	47.0	34.4	12.4	7.36
SiO ₂	43.8	28.2	10.1	6.33
P	0.115	0.143	0.217	0.136
S	0.05	Tr	0.05	0.033
CaO	0.3	0.6	0.6	0.46
Al ₂ O ₃	1.5	3.5	2.3	1.15
Mn	0.20		0.15	
MgO	0.15	0.14		0.05
Cu	0.02	Tr	0.02	
Pb	0.05	Nil	0.05	
Zn	nil	Nil	Nil	
Ba		Nil		
WO ₃		Nil		
Co		Nil		
TiO ₂				0.06

The average composition of the Chediski ore (plus 35 percent iron), exclusive of interbedded low-grade material and waste, is as follows:

	<u>Percent</u>
Iron.....	43.92
Silica.....	23.02
Phosphorus.....	0.235
Sulfur.....	0.055
Lime.....	1.01
Alumina.....	2.26
Manganese.....	0.10

This compares closely with the composition of the Apache ore and suggests a similar mineralogical content.

REFERENCES

Descriptions of the geology and characteristics of the deposits are contained in a number of previously published documents listed here.

- (1) Burchard, E. F.; 1931, Iron Ore on Canyon Creek, Fort Apache Indian Reservation, Arizona; U. S. Geological Survey Bulletin 821-C, p. 51-75
- (2) Harrer, C. M.; 1964, Reconnaissance of Iron Resources in Arizona; U. S. Bureau of Mines Information Circular, IC8236, p. 72-80
- (3) Moore, Richard T.; 1963, Mineral Deposits of the Fort Apache Indian Reservation; Arizona Bureau of Mines Bulletin 177, 34 p. (includes detailed map showing lease areas).
- (4) Stewart, L. A.; 1947, Apache Iron Deposit, Navajo County, Arizona; U. S. Bureau of Mines Report of Investigation, RI4093, 37 p.
- (5) Butler, Arthur P., Jr., Swamp Creek Mountain Iron Deposit; U. S. Geol. Survey Preliminary Report, January 1943. (Not Available)
- (6) In addition to information contained in the above documents, a former CF&I Steel Corporation exploration employee was contacted. This contact reported the deposit to contain as much as 100 million long tons of iron ore averaging 52-53 percent iron based on exploratory and development work done privately subsequent to the above published reports.

In conclusion, the data and information presented above is a short summary of the contents of the various references. It should at least provide enough information for your client to determine if they have any further interest. The references are available for consultation in our Phoenix office and arrangements to have copies made can be handled through a commercial copy service.

I have contacted Neal Hall, Tribal Administrator for the White Mountain Apaches, as I indicated I would in our phone conversation. He indicated a desire to discuss the subject with you or your client.

Please feel free to contact us if we may be of further assistance.

Sincerely,

Ken A. Phillips
Mineral Resources Engineer

KAP:jm

cc: Neal Hall
Tribal Administrator
White Mountain Apaches

KAP files
Apache Iron files ✓
Pink reading file
Yellow "Alpha" file "C"