Show Thursday Done W.H.K. J.B.

Mining Division
Date Rec'd.

APR 9- 1952

BUREAU OF MINES
Denver, Colorado

MINING DIVISION
REGION IV

April 7, 1952

Mr. Joseph B. Rice, Jr.
c/o Mr. Charles Elmer
Attorney at Law
Masonic Temple
Kingman, Arizona.

Re: DMA Docket 913, Williams Tungsten Mine, Mohave County, Ariz.

My dear Mr. Rice:

In answer to your letter of April 5, which was received this morning, I am enclosing six copies of Form MF-202, Landlord's Subordination Agreement.

I will expect to see you here in Tucson on Friday.

Sincerely yours,

Walter R. Storms, Chief
Arizona-New Mexico Branch

CC W. H. King
DMA-913
DF

WRStorms:frj

[illegible], New Customhouse
Denver 2, Colorado

October 2, 1953

Memorandum

To: Executive Secretary, Defense Minerals Administration

From: DMA Field Team, Region XV

Subject: Final Report, DMA Project [illegible], Mining and Mill, uranium, Williams Tungsten Mine, Crownpoint Mining District, Mohave County, Arizona

Enclosed herewith are the original and two copies of the report on the subject design.

We concur with the conclusions and recommendations of the attending team that the development loan of $[illegible],000 be denied, with certain reservations pending review by the Production Expansion Division.

J. H. EAST, JR.

J. H. East, Jr.

for J. H. Engelhardt

WDM:oj
cc: DMA Subject and Chron.

DMA, New Customhouse
Denver 2, Colorado

October 2, 1952

Memorandum

To: DMA Field Team, Region IV

From: Chief, Mining Division, Region IV

Subject: Final Report, DMA Docket 913, Highsky and Nine, applicants, Williams Tungsten Mine, Greenwood Mining District, Mohave County, Arizona.

The application of the subject docket was for a development loan of $50,000 for the purpose of camp rehabilitation, mine equipment, and mill construction, with the objective of producing from 2,000 to 3,000 tons of tungsten concentrate per month.

The principal deposit is a narrow flat-dipping quartz vein associated with an aplite dike which contains a persistent fracture zone in granite. The width of the vein varies considerably in thickness, but averages about 2.0 feet in the ore shoot area. The dominant tungsten minerals are huebnerite or wolframite near the huebnerite end of the series.

The present reserves are estimated by the field examiners at 9,600 tons, from 50 to 65 percent of which are indicated. Potentially, a similar tonnage could exist above the bottom level.

With an estimated average grade of 0.75 percent WO_3, the total units in the ore are 13,725.

The examining team has estimated total costs of $33.31 per ton of ore before royalty and taxes. Allowing a recovery of 85%, the estimated gross revenue at $45.00 per unit would be $37.88, leaving an operating profit of $4.57 a ton before deductions for royalty and taxes.

The examining team recommend denial of the loan on the premises that the reserves are insufficient to amortize the loan.

Because of the critical shortage of tungsten, the Administrator may be inclined to accept the risk of losing part of the loan. If this is the case, additional investigation, principally in the form of mining amenability tests on representative samples of the ore, and investigating the mill and proposed rehabilitation, should be made by the metallurgists.

Paul F. Allaman

WDM:oj
cc: DMA Subject and Chron.

September 12, 1951

Memorandum

To: George B. Holderer

From: Regional Director, Region IV

Subject: DMA-913 - Tungsten - Blonsky and Rice

Referring to your letter dated September 10, 1951, relative to DMA-913, Blonsky and Rice.

The property has been examined, and the field man recommend denial of the development loan. They are contacting the applicants to see if they will participate in an exploration loan, which would be recommended.

The report is in Tucson and we have written Storms to forward same so that it may be transmitted to Washington for your consideration without receiving word as to their willingness to participate in an exploration loan.

WOM
9.7.51

J. H. East, Jr.

Copy to: P. T. Allsman

JHE:fm

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

REGIONAL DIRECTOR'S
OFFICE
REGION IV
SEP 12 1951
BUREAU OF MINES
DENVER, COLORADO

SEP 10 1951

Mr. J. H. East, Jr.
224 New Customhouse Building
Denver 2, Colorado

In reply please refer to:
DMA-913 Tungsten
Blonsky and Rice

Dear Mr. East:

The subject application was forwarded to you on May 16, 1951. Do you have anything yet on the examination?

Very truly yours,

George B. Holderer, Chief
Tungsten Branch

Our low bidder
applicant OK for applar

WM aug 17
J.H.E.

Mining Division
Date Rec'd.

SEP 12 1951

BUREAU OF MINES
Denver, Colorado

September 12, 1951

Memorandum

To: George B. Holderer

From: Regional Director, Region IV

Subject: DMA-913 - Tungsten - Blonsky and Rice

Referring to your letter dated September 10, 1951, relative to DMA-913, Blonsky and Rice.

The property has been examined, and the field men recommend denial of the development loan. They are contacting the applicants to see if they will participate in an exploration loan, which would be recommended.

The report is in Tucson and we have written Storms to forward same so that it may be transmitted to Washington for your consideration without receiving word as to their willingness to participate in an exploration loan.

J. E. East, Jr.

Copy to: P. T. Allsman

JEE:fm

September 18, 1951

Memorandum

To: C. A. Anderson

From: Engineering Officer, Region IV

Subject: DMA Reports

It is noted on the Progress Report dated September 10, that Docket DMA-913, Williams Tungsten mine, is being held for notification by the applicants regarding their participation in an exploration program.

After the completion of the examination, the report should be made and forwarded to this office so as to clear our records and the Washington records at the same time. Please do not hold reports after the examination has been made.

J. H. Rash, Jr.

Copy to: A. H. Kopelmann
W. R. Stokes
P. Z. Allyson
A. F. Shride

JHR:fbm

SEP 21 1951
Bureau of Mines
Denver, Colorado

MINING DIVISION
REGION IV

September 19, 1951

Re: DMA Docket 913

Mr. Joseph B. Rice, Jr.
2696 Santa Rosa Ave.
Altadena, California

My dear Mr. Rice:

Enclosed is the map which you so kindly loaned us in connection with our examination of your Williams tungsten mine in Mohave County, Ariz. Thanks very much for the loan of this map.

Sincerely yours

Walter R. Storms, Chief
Arizona-New Mexico Branch

CC: P.T. Allsman
C.A. Anderson
DMA-913
DF

WRStorms:als

L. L. Farnham

August 8, 1951

LaMar G. Evans - through J. Bruce Clemmer

Microscopic examination of two samples from the William Tungsten Mine (DMA-913)

No. 1 Examination of these three samples shows that they are composed chiefly of quartz in which crystals of wolframite, muscanite and apatite occur. The apatite is the mineral which exhibits the orange fluorescent color under the ultra-violet lamp. Qualitative visual-arc spectroscopic tests reveal the apatite contains a small amount of manganese which occurs as part of its chemical composition.

No. 2 Part of this sample was crushed and the black manganese oxide coated fragments were selected by hand-picking under the binocular microscope. Qualitative chemical tests for tungsten on this product was negative, visual-arc spectroscopic tests for tungsten were also negative.

LaMar G. Evans.

Mining Division
Date Rec'd.
SEP 4 1951
BUREAU OF MINES
Denver, Colorado

cc - WRStorms
531
DF

Paul: —

9/3:— I noticed that this was para loan and not for explor-ation but did not mention it for various reasons.

8/58— Pb-Zn suggested exploration in May 25.

Mr Mullan
file

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
MINING DIVISION
REGION IV

Arizona-New Mexico Branch
[redacted]
Box 4097
UNIVERSITY STATION
TUCSON, ARIZONA

Mining Division
Date Rec'd JUN 7 1951
BUREAU OF MINES
Denver, Colorado

June 5,1951

Memorandum

To : Paul T. Allsman, Denver, Colorado

From : Chief, Arizona-New Mexico Br., Mining Div., Region IV

Subject : DMA Examination

Reference is made to a recent memorandum from the Regional Director that was attached to additional material for DMA Docket 913:

We are examining the applications for exploration loans as advised, and are leaving the development applications for a later date.

Romslo and Faick are in the Prescott area examining the Mt. Union mine (DMA-617). Farnham and Bromfield will examine the Budd tungsten property (DMA-1057) and the King Heckla group (DMA-514) next week.

I hear that DMA Docket 858 is to be revised to an exploration application, so it will be visited soon. At the present time the other dockets seem to be for development loans although some may change to exploration.

Walter R. Storms
Walter R. Storms

CC P. T. Allsman
DMA
DF

FOR VICTORY
BUY UNITED STATES SAVINGS BONDS AND STAMPS

June 5,1951

Memorandum

To : Paul T. Allsman, Denver, Colorado

From : Chief, Arizona-New Mexico Br., Mining Div., Region IV

Subject : RMA Examination

Reference is made to a recent memorandum from the Regional Director that was attached to additional material for RMA Docket 913:

We are examining the applications for exploration loans as advised, and are leaving the development applications for a later date.

Romslo and Faick are in the Prescott area examining the Mt. Union mine (RMA-617). Farnham and Brumfield will examine the Dodd tungsten property (RMA-1037) and the King Hecla group (RMA-514) next week.

I hear that RMA Docket 858 is to be revised to an exploration application, so it will be visited soon. At the present time the other dockets seem to be for development loans although some may change to exploration.

Walter R. Storms

CC P. T. Allsman
RMA
RF

WRStorms:frj

NATIONAL DEFENSE
STOCKPILE
AUG 1951
RECEIVED

MINING DIVISION
REGION IV

July 31, 1951

Re:DMA Docket
913

Mr. George B. Blonsky
9251 E. Marshall St.
Rosemead, California

My dear Mr. Blonsky:

In regard to your letter of July 28, I will try to answer your questions. I am enclosing a copy of MO-5, 5 copies of Form MF-103, 5 copies of Form MF-202, a copy of MO-7, 5 copies of Form MF-100, and 1 copy of Form MF-200. I believe a careful study of this material will answer most, if not all of your questions.

The following are your questions, which I have tried to answer to the best of my ability:

"1. Should we now put up a request for an exploration loan, would we be considered as applicants with a seniority equal to that of our original (production) loan application?"

Your application for an exploration loan would go directly to Washington. If your application was complete and answered all questions, I see no reason why it couldn't be acted upon in Washington without a further field examination as our men already have examined your property. I believe that exploration loan applications are being given seniority over production loan applications.

"2. Since we applied for production loan, we have sustained about $3,000 of expenses. Is it possible to count this expenditure as part of our contribution towards our one quarter of the total sum to be expended on the proposed exploration program?"

No. Expenditures made prior to the signing of an exploration contract cannot be counted as part of your share of the loan.

cc: P.T. Allsman
DMA-913
DF

WRStorms:als

"3. Should the exploration loan be granted and the program be completed successfully, would we have to start from scratch applying for a production loan, or will our original application still be considered valid and, in the light of the results of the exploration program be quickly acted upon ?"

So far as I know, your application for a production loan still would be valid. However to date, I have not heard of any production loan having been granted. An exploration loan is handled only by DMA. A production loan needs the approval of many Government agencies so cannot be acted upon very quickly. If our field engineers recommend a production loan, it must be approved by our Denver office, then by the DMA in Washington, then by the Secretary of the Interior, then by numerous other agencies in the Department of Commerce and elsewhere, before it finallygoes to R.F.C. This means that action on a production loan is very slow.

"4. How many weeks' delay usually will be necessary between the date of presentation of our expenditure bill and the date of reimbursement by the Government of the three quarters of the expenditures reported?"

After an exploration contract (MF-200) has been signed, the mine operator must pay all expenditures for the first full calender month of operations, then report these expenditures to the Bureau of Mines on Form MF-104. Your expenditures are checked, then if your accounts are in order, our Denver office vouchers your account and a check is sent you for the Governments share, in this case three-fourths of the amount spent. I understand that if the operator sends in his accounts soon after the first of the month, that he should receive his check by the middle of the same month.

"5. In the middle of page 8 of the above mentioned (Questions and Answers on Mineral Exploration Program) one of the answers states: 'If you have to buy equipment, the Government will pay its prorata share of the cost, and the difference between the purchase price and its salvage value at the close of work will be charged to the cost of the project as in the case of improvements added at the project site.' In this case my question is, whether I can understand the above quotation that if and when we are buying equipment such as hoists, compressor, hammers and steel, we would have to pay only one quarter of the vendor's bill, while the Government would pay the other three quarters of the vendor's bill directly to the supplying company, thus relieving us of the necessity of first paying the whole bill and then waiting for the Government's reimbursement of the three quarters?"

I believe this was answered in question 4. You must pay all monthly expenditures, then turn your accounts in to the Bureau of Mines, who acts for DMA, and be repaid the Government's share.

"6. We are fully capable to carry our quarter of the expenses of the exploration program, while we would have considerable difficulties of footing the bill for the whole program, if actual reimbursements by the Government would start after completion of the program contemplated. Under present circumstances and as discussed with Mr. Shride and Mr. Farnham, we visualize only 27 operating days and nights to complete the actual work needed. This is exclusive of a preparatory period of three or four weeks, during which time the camp would be whipped in shape and machinery and supplies brought to the mone by a skeleton crew. Therefore we would like to know, whether it would be possible for us to use the exploration contract with the U.S. Government as a collateral or inducement to the private banks to extend us a short term loan equivalent to say three quarters of reimbursement expected. Our total exploration program is estimated to last not over three months and to cost not over $20,000.00. Should reimbursement be anything but very prompt we would get into a difficult financial situation right in the middle of our exploration work. Does the Government have any information as to such short term loans by private banks to the exploration loan contract holders?"

This question I cannot answer. I would suggest that you as your banker.

"7. Will the Government approve an arrangement under which we would be allowed to start with a skeleton crew of two or three men engaged in preparation of the camp and mine for proposed exploration, during which period the purchases of all the equipment needed and of some of the supplies would be made, and then let us await reimbursement of the three quarters of the expenses thus incurred, before we would be obliged to hire a complete crew and proceed full speed ahead with actual exploration such as drifting, etc."

Make this proposal in your application. I cannot say whether DMA Washington would approve such an arrangement ornnot, but if you say in your application that the camp must be prepared, etc., I see no reason why you cannot do so. As already explained, you will be repaid shortly after the end of the first full calendar month, so I see no reason for saying anything about waiting for this reimbursement

If I have failed to answer your questions to your satisfaction, please read the application form (MF-103), MO-5, and the contract form (MF-200). I believe these forms will explain the whole procedure.

Sincerely yours,

Walter R. Storms, Chief
Arizona, New Mexico Branch

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

REGIONAL DIRECTOR'S
OFFICE
REGION IV
JUN 11 1951
BUREAU OF MINES
DENVER, COLORADO

June 7, 1951

AIR MAIL

Mr. J. H. East, Jr., Executive Officer
DMA Field Team, Region IV
244 New Customhouse Building
Denver 2, Colorado

In reply please refer to
DMA-913

Dear Mr. East:

We are enclosing a copy of a letter from Mr. George B. Blonsky relative to the Williams tungsten mine, which is self explanatory.

Very truly yours,

P. R. Bradley

P. R. Bradley, Jr.
Chief, Tungsten Branch

Enclosure

GEORGE B. BLONSKY
MINING ENGINEER
9251 E. MARSHALL ST.
ROSEMEAD, CALIFORNIA

May 31, 1951

Mr. P. R. Bradley, Chief
Tungsten Branch
Defense Minerals Administration

% Mr. Landon F. Strobel, Executive Secretary
United States Department of the Interior
Defense Minerals Administration
Washington 25, D. C.

RE: DMA-913
Williams Tungsten Mine
Nr. Kingman, Arizona

Dear Mr. Bradley,

In connection with my application for a loan to equip the Williams Tungsten Mine for which I have a lease, I would like to send you the following additional information.

Dr. Carlton Hulin, well known Western Geologist, has personally examined the Williams Tungsten Mine early this year. He is in a position to furnish you or any other government official you might indicate authoritative and unbiased opinion as to the merits of that property.

Dr. Hulin can be reached at his office, 100 Bush Street San Francisco, California. His office phone is Yukon 2-6487.

Hoping that this may help you in your search for information in connection with my application.

Yours very truly

(S) George B. Blonsky

GEORGE B. BLONSKY
MINING ENGINEER
9251 E. MARSHALL ST.
ROSEMEAD, CALIFORNIA

May 31, 1951

Mr. P. R. Bradley, Chief
Tungsten Branch
Defense Minerals Administration

% Mr. Landon F. Strobel, Executive Secretary
United States Department of the Interior
Defense Minerals Administration
Washington 25, D. C.

RE: DMA-913
Williams Tungsten Mine
Nr. Kingman, Arizona

Dear Mr. Bradley,

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Dr. Hulin can be reached at his office, 100 Bush Street San Francisco, California. His office phone is Yukon 2-6487.

Hoping that this may help you in your search for information in connection with my application.

Yours very truly

(S) George B. Blonsky

Mining Division
Data Rec'd.
JUL 6 1951
BUREAU OF MINES
Denver, Colorado

MINING DIVISION
REGION IV

July 6, 1951

Re: DMA Docket 913,
Williams
Tungsten,
Mohave Co., Ariz.

Mr. Jas. B. Rice, Jr.
2696 Santa Rosa Ave.
Altadena, Calif.

My dear Mr. Rice:

This letter is to confirm our telephone conversation of this afternoon. Unless we notify you differently, our examiners will meet you at the Beale Hotel desk in Kingman, Arizona, at 8 a.m. on Tuesday, July 17, and will visit your Williams tungsten mine with you and Mr. Blonsky. Mr. Andrew F. Shride of the Geological Survey and Mr. L. L. Farnham of the Bureau of Mines will make up our examination team.

Sincerely yours,

Walter R. Storms, Chief
Arizona-New Mexico Branch

CC P. T. Allsman
C. A. Anderson
DMA 913
DF

WRStorms:frj

224 New Customhouse
Denver, Colorado

June 20, 1951

Mr. George B. Blonsky
3251 E. Marshall Avenue
Rosemead, California

Dear Mr. Blonsky:

This will acknowledge your letter dated June 17 regarding your loan application DMA 913.

We are forwarding your letter to Mr. W. M. Storms, Chief, Arizona-New Mexico Branch, Mining Division, Region IV, Bureau of Mines, Box 4097, Tucson, Arizona.

Sincerely yours,

J. H. East, Jr.

J. H. East, Jr.
Executive Officer
DMA Field Team, Region IV

cc-dma files

REGIONAL DIRECTOR'S
OFFICE
REGION IV
JUN 1 0 1951
BUREAU OF MINES
DENVER, COLORADO

GEORGE B. BLONSKY
MINING ENGINEER
9251 E. MARSHALL ST.
ROSEMEAD, CALIF.
At. 6 - 1079.

June 17, 1951.

Mr. J. H. East, Jr. Regional Director
United States Department of the Interior
Bureau of Mines, Region IV.
224 New Customhouse
Denver 2, Colorado.

Re DMA 913

Dear Mr. East,

Since my last writing to you I spent a week at the mine supervising surveying and assessment work. I took a dvantage of this opportunity to mark up the road from Kingman to the mine. Once a traveller gets started on the Wickieup road, he will find that every major turnoff or fork is marked with a white board arrow on which is written in green paint so many miles to WOTHREE MINES. Last Tuesday the last three miles of the road, which were in very poor condition before, were now gone over by a bulldozzer, and we hope will be in better shape shortly.

Since I do not know Mr. W.R. Storms' address I am sending this letter to you with an extra carbon copy, which you could kindly forward to him.

My vacation is over and I am returning to work tomorrow, but should I get a two days' notice from Mr. Storms, it will be most probably possible for me to arrange to meet him or his men at Beal Hotel in Kingman at any pre-arranged date.

Yours very truly

George B. Blonsky

GEORGE B. BLONSKY.

June 5, 1951

Mr. George B. Blonsky
9251 E. Marshall Street
Rosemead, California

Dear Mr. Blonsky:

This will acknowledge receipt of your letter dated May 31 relative to your application, DMA 913.

It is noted that Dr. Carlton D. Hulin is familiar with your property. The Defense Minerals Administration conducts its investigations with its own geologists and engineers and if we find it necessary we will be very glad to get in touch with Dr. Hulin.

Sincerely yours,

J. H. East, Jr.

J. H. East, Jr.
Regional Director

JHE/el
cc-dma files

GEORGE B. BLONSKY
MINING ENGINEER
9251 ~~X~~01 E. MARSHALL ST.
ROSEMEAD, CALIF.
~~XXXXXXX~~
At. 6-1079.

May 31, 1951.

REGIONAL DIRECTOR'S OFFICE
REGION IV
JUN 4 - 1951
BUREAU OF MINES
DENVER, COLORADO

Mr. J. H. East, jr., Executive Officer
DMA Field Team Region IV
224 New Customhouse Building
Denver 2, Colorado.

Re: DMA - 913.

Dear Mr. East,

Supplementing my letter to you of May 28th I wish to state that, should you or your office be interested in obtaining an outside, independent and disinterested opinion on the Williams Tungsten Mine, for equipping of which I am requesting a loan, I am in a position to refer you to Dr. Carlton D. Hulin , Geologist, 35 Eucalyptus Path, Berkeley, California . Dr. Hulin is an outstanding geologist, well known in the Western States, whose opinion on such subjects carries considerable weight. I was fortunate to know that early this year Dr. Hulin has examined personally the Williams Tungsten Mine and therefore has firsthand information on same. What is more, very recently Dr. Hulin expressed his willingness to answer any questions you may have on the subject of the Williams Tungsten Mine.

Dr. Hulin's office address is 100 Bush Street, San Francisco, California; his office phone is Yukon 2-6487.

Hoping that this may help you in your search of information in connection with my application

Yours very truly

George B. Blonsky

GEORGE B. BLONSKY.

JHE

May 31, 1951

Memorandum

To: W. R. Storms

From: Regional Director, Region IV

Subject: DMA-913, Williams Tungsten Mine

According to our records, the brochure of the Williams tungsten mine was sent you on May 24. We have received a letter from Mr. George B. Blonsky, a copy of which is attached.

I believe Mr. Allsman has instructed you that every effort was to be made to visit the properties on which exploration projects are contemplated. These are to take precedence over any development properties or reports that you have on your list. In other words, between now and June 30, every effort is to be made to secure reports on the exploration projects requests.

J. H. East, Jr.

J. H. East, Jr.

Enclosure

CC: PT Allsman

JHE:ftm

DMA
Chron.

May 31, 1951

Mr. George E. Klensky
9251 East Marshall Street
Rosemead, California

Dear Mr. Klensky:

This will acknowledge receipt of your letter dated May 28, 1951, in reference to the Williams tungsten mine, Denied DM-911.

It is impossible for us at this time to give you the exact date as to when field engineers will be available to inspect your property. We are forwarding a copy of your letter to Mr. Stearns, and will request that he contact you before sending engineers to visit your property.

Sincerely yours,

J. H. Ernst, Jr.
Regional Director

Copy to: MR Stearns (w/copy incoming letter)
PT Allaman " " "

PLEASE RETURN THE ENCLOSED REPORT AFTER IT HAS SERVED ITS PURPOSE

JHE:fbm

DMA
Chron.

GEORGE B. BLONSKY
MINING ENGINEER
9251 E. MARSHALL ST.
ROSEMEAD, CALIF.
At. 6-1079.

REGIONAL DIRECTOR'S OFFICE
REGION IV
MAY 31 1951
BUREAU OF MINES
DENVER, COLORADO

May 28, 1951.

Mr. J. H. East, jr. Executive Officer
DMA Field Team Region IV
224 New Customhouse Building
Denver 2, Colorado.

Re: DMA-913.

Dear Mr. East,

Referring to Mr. Rice's and my application for a loan to open up and equip the Williams Tungsten mine and mill near Kingman, Arizona, on suggestion of Mr. Tom Lyon, Director Supply Division, Defense Minerals Administration, I wish to inform you as follows:

The Williams Tungsten Mine is located 72 miles southeast of Kingman, Arizona and is easily found by those familiar with the country. On the other hand, for a stranger it is not so easy to locate and therefore it is almost essential that the examining party should have a guide to the property. Personally the writer is at present employed by the Southwestern Engineering Co. of Los Angeles as a project engineer in connection with design and construction of a 1200 ton manganese concentration plant. It just happens that the week starting Saturday, June 9th, the writer has one week of vacation, which he is going to spend at the Williams Tungsten Mine. It would be very advantageous, if Mr. East found it possible to have his field engineers arrive at Kingman (Beal Hotel) on Saturday, June 9th, or at Williams Tungsten Mine during the following week until June 16th.

If it is impossible for the field engineers to arrive during that period, two other alternatives present themselves:

a: to pre-arrange a weekend visit with the field engineers meeting the writer at Beal Hotel in Kingman on any Saturday morning they may want to indicate.

b: if a weekend visit would be impossible for the field engineers, then to visit the mine directly on any day from Monday to Thursday including. At this time they could be shown the mine by Mr. Jack Zwinge, who is a Colorado School of Mines man and will be instructed to guide the visitors. Fridays and Saturdays Mr. Zwinge is in Kingman.

Of these three arrangements the first one is most desirable to the writer and would give the examining party the best chance to obtain the fullest possible information.

Since I am starting for Kingman on Friday night, June 8th, I would greatly appreciate, if you could be so kind as to send me a word to the above address to reach me before that date, so as to let me know whether your party will be able to make the mine during my stay there. At the mine we have a little camp with beds and mattresses and while I am there a sort of cookhouse will be kept. In case your party comes to Kingman while I am not there and should be in need of an automobile, the best thing to do is to rent a car available for that purpose at the airfield and have some local man familiar with the road to Williams Tungsten Mine act as a guide. On the other hand if you could set a definite date for the arrival of your engineers at the Beal Hotel in Kingman duringmy proposed stay at the mine from June 9th to June 16 inclusive, I shall make it a point to be at the appointed time at Hotel Beal in Kingman and to personally guide the party to the mine.

Please find enclosed one copy of a descriptive report of the Williams Tungsten Mine. I included one copy of this with my original application for a loan. As I am not sure whether Mr. East has a copy of this report, I am allowing myself to send an extra copy. In this report is given a fair description how to get to the mine.

Yours very truly

George B. Blonsky

GEORGE B. BLONSKY.

May 24, 1951

Memorandum

To: W. R. Storms

(Through Chief, Mining Division) W. H. K.

Charles Anderson

From: DMA Field Team, Region IV

Subject: DMA Docket 913, George B. Blonsky and J. B. Rice, Jr., 9251 E. Marshall St., Rosemead, California. Williams Tungsten Mine, Aquarius Mountains, Mohave County, Arizona

We are attaching a letter from the Chief, Tungsten Branch, regarding the Williams Tungsten Mine, and the brochure on the above docket.

Please make the necessary investigation and forward your report and the original brochure.

Please note Mr. Bradley's statement regarding the property - in the last paragraph on the first page.

J. H. East, Jr.

A. H. Koschmann

Attachments
NSRB 146 and report by George B. Blonsky
JHE/el
cc: DMA files
Koschmann

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

No DMA file

May 16, 1951

REGIONAL DIRECTOR'S
OFFICE
REGION IV
23 1951
BUREAU OF MINES
DENVER, COLORADO

Mr. J. H. East, Jr., Executive Officer
DMA Field Team Region IV
224 New Customhouse Building
Denver 2, Colorado

Through: Coordinating Committee
Director, Supply Division

Subject: DMA-913 - George B. Blonsky and J. B. Rice, Jr.
9251 E. Marshall St., Rosemead, California
Williams Tungsten Mine
Aquarius Mountains, Mohave County, Arizona

Dear Mr. East:

We are referring the subject application to you for a field investigation.

Please review the applicant's statement of measured ore reserves, particularly his interpretation of sampling results. There appears to be justifiable doubt as to applicant's extension of the results from the sampled surfaces to the tonnage and grade he accepts. Because of this doubt, the financial outcome predicted by applicant may be extremely optimistic.

The exposed surfaces seem insufficient for 2,850 tons; and the average grade of 1.73 percent is hardly supported by an assay map showing 56 samples of which 34 assayed less than 0.5 percent.

Assuming a 70 percent mill recovery, amortization will be at the rate of $23 per unit to repay the $80,000 loan. As indicated above, there is doubt as to the number of units to be considered; there is further doubt as to the sufficiency of the $80,000 loan, which as you will see is supposed to provide camp rehabilitation and road repair, purchase of house trailers, trucks, power units, stores, and mine equipment; and mill rehabilitation and re-equipment, mine development, and operating capital, for a 50-ton per day operation. We suspect that the costs will run twice his estimate; are almost certain that the grade of mill feed, if not the tonnage, will be lower than he estimates, and that the relation of capital requirement to tungsten output will be wholly out of line.

To procure the production of tungsten, we cannot, as a general rule, limit ourselves to granting only such loans as can be supported by ore in

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sight; instead we must usually gamble on the mining chance; but in the case of the Williams mine, the gaps appear to be very wide, and there appears to be an element of super-optimism on the part of applicant which may reflect a deficiency in operating competence. These things can probably be resolved by your examination of the premises and subsequent discussions with applicant in person.

We are enclosing applicant's completed application Form 146, a letter dated March 26, 1951 from George B. Blonsky, bound report on proposal with two letters and assay map.

Very truly yours,

P. R. Bradley

P. R. Bradley, Jr.
Chief, Tungsten Branch

Enclosure

Approved:

Tom Lyon

Chairman, Coordinating Committee

Lowell B. Moon

Bureau of Mines

T. P. Thayer

Geological Survey

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

224 New Customhouse
Denver 2, Colorado

October 2, 1951

Memorandum

To: Executive Secretary, Defense Minerals Administration

From: DMA Field Team, Region IV

Subject: Final Report, DMA docket 913, Blamey and Hiss, applicants, Williams Tungsten Mine, Greenwood Mining District, Mohave County, Arizona

Enclosed herewith are the original and two copies of the report on the subject docket.

We concur with the conclusions and recommendations of the examining team that the development loan of $80,000 be denied, with certain reservations pending review by the Production Expansion Division.

J. H. EAST, JR.

J. H. East, Jr.

Ogden Tweto
for A. H. Koschmann

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

224 New Customhouse
Denver 2, Colorado

224 NEW CUSTOMHOUSE
DENVER 2, COLORADO

October 2, 1951

Memorandum

To: DMA Field Team, Region IV

From: Chief, Mining Division, Region IV

Subject: Final Report, DMA Docket 913, Blonsky and Rice, applicants, Williams Tungsten Mine, Greenwood Mining District, Mohave County, Arizona

The application of the subject docket was for a development loan of $80,000 for the purpose of camp rehabilitation, mine equipment, and mill construction, with the objective of producing from 2,000 to 3,000 tons of tungstic trioxide per month.

The principal deposit is a narrow flat-dipping quartz vein associated with an alpite dike which occupies a persistent fracture zone in granite. The width of the vein varies considerably in thickness, but averages about 2.0 feet in the ore shoot area. The dominant tungsten minerals are huebnerite or wolframite near the huebnerite end of the series.

The present reserves are estimated by the field examiners at 9,650 tons, from 50 to 65 percent of which are inferred. Potentially, a similar tonnage could exist above the bottom level.

With an estimated average grade of 0.75 percent WO_3, the total units in the ore are 13,725.

The examining team has estimated total costs of $33.31 per ton of ore before royalty and taxes. Allowing a recovery of 80%, the estimated gross revenue at $63.00 per unit would be $37.80, leaving an operating profit of $4.47 a ton before deductions for royalty and taxes.

The examining team recommend denial of the loan on the premises that the reserves are insufficient to amortize the loan.

Because of the critical shortage of tungsten, the Administrator may be inclined to accept the risk of losing part of the loan. If this is the case, additional investigation, principally in the form of making amenability tests on representative samples of the ore, and investigating the mill and proposed rehabilitation should be made by the metallurgists.

Paul T. Allsman

Engr. report & bmks

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Defense Minerals Administration
200 New Customhouse
Denver 2, Colorado

September 21, 1951

Memorandum

To: DMA Field Team, Region IV

From: A. H. Koschmann

Subject: DMA Docket 913, Williams Tungsten Mine, Mohave County, Arizona

Enclosed are the original and 7 copies of the geologic report covering the above docket.

A. H. Koschmann
A. H. Koschmann
Supervising Geologist
Colorado-Wyoming

Enclosures (8)

Mining Division
Date Rec'd.
SEP 24 1951
BUREAU OF MINES
Denver, Colorado

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Arizona-New Mexico Branch
[redacted]
Box 4097
UNIVERSITY STATION
TUCSON, ARIZONA

MINING DIVISION
REGION IV

September 20, 1951

Memorandum

To : Paul T. Allsman, Denver, Colorado

From : Chief, Arizona-New Mexico Br., Mining Div., Region IV

Subject : Final Report, DMA Docket 913, Williams Tungsten Mine, Greenwood Mining District, Mohave County, Ariz.

Enclosed are original and 7 copies of the section on Summary, Conclusions and Recommendations of the above report by A. F. Shride of the Geological Survey and L. L. Farnham of the Bureau of Mines; and the section on Engineering by Farnham.

We have been holding this report for several weeks with the hope that the applicants, Blonsky and Rice would be able to apply for an exploration loan on this property. However, recent correspondence with the applicants states that such an application cannot be made evidently because (1) applicants cannot furnish their share of exploration funds, and (2) owner or owners will not sign subordination agreement.

This report has my approval, and that of A. F. Shride, Acting District Supervisor of the Geological Survey.

Brochure is enclosed.

Walter R. Storms
Walter R. Storms

CC P. T. Allsman (7)
C. A. Anderson
DMA-913
DF

FOR VICTORY
BUY UNITED STATES SAVINGS BONDS AND STAMPS

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
P.O.Box 4126, University Station
Tucson, Arizona

September 19, 1951

Memorandum

To: Mr. A. H. Koschmann, Denver, Colorado

From: Mr. A. F. Shride, Tucson, Arizona

Subject: Geologic Report on Docket DMA 913, Williams Tungsten Mine, Mohave County, Arizona

Enclosed are the original and 7 copies of the above report by A. F. Shride of the Geological Survey.

A production loan cannot be recommended due to lack of reserves. This report and the engineering report have been held in this office for the past 2 months because of the possibility that the applicants would be able to make arrangements to participate in an exploration program. The examining team was very favorably inclined toward recommending an exploration loan. However, the applicants have informed us by letter, dated September 15, that they cannot participate in an exploration program at this time because:

1. They cannot obtain a subordination agreement from one man who owns a 1/6 interest and by power of attorney controls another 1/3 interest.

2. The applicants cannot raise $20,000 cash which they believe necessary as operating capital at the beginning of an exploration program. Something on the order of $20,000 would be the entire cost of a suitable exploration program. Therefore the applicants are unduly concerned about the amount of cash that they will need to begin the project.

A. F. Shride

A. F. Shride
Acting District Supervisor
Arizona-New Mexico

Enclosures 8

RECEIVED
SEP 1951
U.S. Geological Survey
Water Resources Branch
Denver

UNITED STATES
DEPARTMENT OF THE INTERIOR
OSCAR L. CHAPMAN, SECRETARY

DEFENSE MINERALS ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION IV

DMA-913 - Williams Tungsten Mine

Greenwood Mining District

Mohave County, Arizona

A. F. Shride, Geologist
U. S. Geological Survey

L. L. Farnham, Mining Engineer
U. S. Bureau of Mines

September 1951

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SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

by A. F. Shride[1] and L. L. Farnham[2]

On March 26, 1951, George B. Blonsky and J. B. Rice, Jr. applied to the Defense Minerals Administration for a production loan of $80,000. The application is docketed as DMA-813. This loan was to be used for camp rehabilitation, mine equipment, and mill erection, so the Williams Tungsten mine might produce from 2,000 to 3,000 units of WO_3 a month. The applicant estimated that established reserves, containing 4,500 units of WO_3 were available for immediate mining and that 13,500 to 20,000 units were potentially available. The property was examined by the writers during the week of July 16, 1951.

The Williams Tungsten mine is near the crest of the Aquarius Mountains of Mohave County, Ariz. and is 71 miles by road southeast of Kingman, Ariz.

Sporadic production of tungsten ores and concentrates by several different operators have been made from the property since 1904. Available records indicate that about 2,500 units of WO_3 have been produced since 1917.

The principal deposit is a narrow, flat-dipping quartz vein associated with an aplite dike which occupies a persistent fracture zone in granite. The vein has an westerly strike and dips from 18° to 30° northerly. It varies considerably in thickness, but averages

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1/ Geologist, U. S. Geological Survey
2/ Mining Engineer, U. S. Bureau of Mines

about 2.0 feet in the ore shoot area. The tungsten minerals of the wolframite series are irregularily distributed within the vein in the spotty manner which is so generally characteristic of deposits of this type.

The present ore reserves amount to 9,650 tons, two thirds of which are classed as inferred. Potentially, a similar tonnage could exist above the bottom level. The present reserves were found to average 0.75 percent WO_3, thus containing a total of 7,216 units.

The estimated operating costs will exceed $33 a ton. Nothing is known concerning the past or the possible mill recoveries, which are so vital on this grade of ore. In this case, it becomes necessary to assume an 80 percent mill recovery of the tungsten minerals at current prices before an operating profit is possible. The indicated profit, on this optimistic basis, would be less than $4.00 a ton, so that the mine would have to contain more than double the amount of its present ore reserves in order to amortize the requested loan. Therefore, it is recommended that the application for an $80,000 production loan be denied.

The property appears worthy of further exploration and the applicants were informed as to the necessary procedure for obtaining such a loan, but they have declined to participate in an exploration program.

WILLIAMS TUNGSTEN MINE
MOHAVE COUNTY, ARIZONA
DMA 913

Geology

By A. F. Shride
Geologist, U. S. Geological Survey

WILLIAMS TUNGSTEN MINE
MOHAVE COUNTY, ARIZONA
DMA 913

CONTENTS

Geology	Page
General Geology	1
Mineralogy	1
Extent and Structure of the Mineralized Area	2
Ore Reserves	5
Conclusions	7

ILLUSTRATIONS

Fig. 2	Mine workings, Williams Tungsten Mine	See Engineering Report
Fig. 3	Assay map of Williams Tungsten Mine	" " "
Fig. 4	Longitudinal section in plane of vein, Williams Tungsten Mine	" " "

GENERAL GEOLOGY

The Williams tungsten deposit is near the crest of the Aquarius Range, Mohave County, Arizona. The Aquarius Range is composed of granite capped by flat-lying basaltic lavas. In the vicinity of the Williams mine the lavas have been eroded away exposing the granite, which is the host rock for the tungsten deposits of this area.

The granite is a fine- to medium-grained brownish-gray rock fairly uniform in character. The principal constituents are orthoclase and quartz; plagioclase, biotite and hornblende are minor constituents. The granite is cut by numerous irregular dikes of aplite and pegmatite and associated quartz veins. These dikes are a few inches to several feet wide. Tungsten minerals are associated with the quartz veins. The Williams mine is on quartz veins which border and/or traverse a 4-8 feet thick aplite dike. The mineralized aplitic zone strikes easterly and dips 18°-30° northerly.

MINERALOGY

The dominate vein minerals are huebnerite or wolframite near the huebnerite end of the series, pyrite, pale green mica, and the quartz gangue. Chalcopyrite and scheelite are minor vein constituents; rarely chalcopyrite and fluorite can be observed. Sporadically distributed crystals of manganiferous apatite, which fluoresces pinkish-orange, are common in the same distribution as the wolframite. Most of the sulfides have been oxidized to limonite above the 4th level; between the 4th and 5th levels oxidation is less prevalent, and below the 5th level comparatively little of the sulfides have been oxidized. Manganese oxides as joint and fracture coatings are common throughout the deposit.

The wolframite occurs chiefly as bladed crystals enclosed in quartz; some crystals are as much as 3 inches long. In some places the wolframite borders veins of mica, which occurs as fine-grained aggregates along the walls of the quartz veins or as coarse rosettes along fractures in the veins. This association of tungsten and mica is not prevalent. Scheelite makes up only a small percentage of the tungsten content of the ores. It occurs rarely as small particles enclosed by quartz, and more commonly as coatings around the wolframite crystals and in fractures through the crystals. Some scheelite is as thin films in fractures in the gangue. Most of the scheelite will probably be lost into the fines during milling. From visual inspection it is judged that the ore will be free-milling, but slime losses may be excessive particularily for the more oxidized ores.

EXTENT AND STRUCTURE OF THE MINERALIZED AREA

About 3,200 feet of tunnels, drifts, and winzes expose the principal tungsten deposit on the northeast side of a southeast-trending, elongate hill. The hill crest is about 600 feet higher than the lowest workings, and the highest exposed portion of the vein is about 400 feet above the lowest mine level. In the main workings the tungsten-bearing quartz-veins border or traverse a 4-8 feet thick aplite dike that strikes N. 60°-80° W. and dips 18°-30° N. (see figs. 2 and 3). The dip of the quartz veins and the aplite dike apparently decreases from about 30 degrees in the uppermost workings to about 18° on the 5th level. The flat-dipping aplite and associated tungsten-bearing quartz veins are displaced a few inches to a few feet by several normal faults which, in general, strike N. 80°-85° W. and are vertical or dip steeply to the north. These faults are in most places not simple faults but a 2-15 feet

wide zone containing several small faults. The high-angle faults break the vein into a series of steps that descend to the north (see cross-section, fig. 3). On the lower levels some high-angle reverse faults were noted; in general, these faults dip less than 70 degrees to the north and the measurable displacement is in inches. It is obvious also that some of these faults are in part pre-mineral as wolframite, sulfides and quartz fill the fault zone.

In general, the quartz that contains wolframite is concentrated in one vein which borders or is within the aplite dike. In places, however, there are two veins, one vein usually is on the foot-wall of the dike and the other vein is 1 to 4 feet higher and surrounded by aplite. The usual strike of the exploited portion of the quartz vein is N. 80° W., but there are many irregularities in its trend.

Low angle faults very nearly parallel the quartz veins, but usually are in the aplite or between the aplite and the granite and are conspicuous due to gouge. Though most of the low angle faults apparently are post-ore as evidenced by cross-cutting relations, there is some suggestion that these same faults or like faults were the channelways along which the quartz veins were emplaced.

There is no obvious control for the ore veins, except that structurally the aplite was obviously a favorable host. The upper stopes of the mine, from the assay data available, contained the best grade of ore. These stopes are along the steepest part of the vein. There is also a hint that near the high angle faults the tenor of the ore is better than elsewhere. This is only a suggested ore control; insufficient work has been done to confirm this possibility. Wolframite and sulfides (or relicts of sulfides) are present throughout the exposed workings. The minable portions of the deposit are, as well as is known, erratic

in distribution. However, it is likely that detailed geologic mapping, followed by selective sampling, would result in outlining the distribution of the ore shoots within the deposit.

The ore zone is cut off approximately 115 feet down the inclined winze from the 5th level by a fault that strikes N. 80° E. and dip 55° NW. (see fig. 4). Down-dip the vein is not again exposed in the winze. The vein up-dip from this point has been stepped-down to the north a few inches or feet along such faults. Apparently the vein has not been displaced in a like manner below the last exposure in the winze or it would be exposed in the vertical winze that connects the 6th level with the inclined winze (see cross-section, fig. 2). It is likely that the N. 80°E. fault, mentioned above, is a reverse fault that displaces the ore zone a few feet into the back above the inclined winze.

A wolframite-bearing quartz vein, similar in all respects to the vein found in the main workings, has been prospected on the haulage level by a short drift. This vein is about at the place that the main vein would intersect the haulage level if projected down-dip from the place it disappears in the inclined winze. More development will be required to prove that this exposure represents an extension of the main vein.

The outcrop of the vein can be traced with ease for about 300 feet (outcrop distance) to the southwest and up-hill from the portal of the uppermost adit in the Williams deposit. Beyond this point, to the southwest and west, wolframite-bearing outcrops and abundant wolframite float can be traced along the outcrop for approximately 700 feet. It is not certain, however, that these outcrops and the float represent the same zone as is seen in the mine. Several thin pegmatite dikes that contain small amounts of wolframite certainly do not represent the

same zone as that in the mine proper. Three small stopes on the southwest side of the hill and approximately 500 feet west of the mine expose two wolframite-bearing zones; one of these zones may represent the zone in the Williams mine. However, the veins in this area strike N. 25°-60° W. and dip 20°-30° NE. in contrast to the zone in the mine which strikes nearly east-west and dips to the north.

ORE RESERVES 1/

Above the 3d level the deposit has apparently been mined out. Below the fault that cuts off the zone in the inclined winze there is no data on which to infer possible reserves. Therefore, reserves can be estimated only for that area between the 3d level and the fault which limits the exposures down-dip and to the north (see fig. 4). In this area the vein ranges in thickness from 6 inches to 4 feet, and in the area (fig. 4) for which reserves are estimated averages about 2 feet in thickness. At the surface below the 3d level debris covers the ore-bearing zone. The mineralized zone is persistent for 600 feet along the 3d level and known to exist certainly for 340 feet down dip below this level. Nowhere does the vein pinch or swell abruptly, and nowhere was it seen to pinch out completely. In places it does split into two parallel veins. The tungsten content of the vein does vary erratically from place to place. In view of the erratic distribution of the wolframite adequate sampling is necessary if a fair estimate of grade and tonnage is to be made. As the deposit is exposed at the present time, undoubtedly the highest grade pockets thus far exposed have been extracted and are not available for sampling. The writers had at their disposal the assay data

1/ L. L. Farnham, Mining Engineer of the U. S. Bureau of Mines, calculated all ore reserve data used in this report.

from four independent sampling jobs. Other incomplete data was available for comparison. The examining team believes that a compilation of the four sets of assay data give a fair picture of the grade and tonnage of ore that can be estimated for this deposit as presently developed. In all, 103 samples were used in arriving at the reserve estimates set forth below. Tables showing a comparison of the sample data are appended to the engineering report.

Because of poorly distributed sample data for some portions of the mine, or because the perimeters of a block are not available for sampling, none of the estimated reserves are said to be measured. Because of the erratic distribution of the ore, indicated reserves are calculated for blocks that are extended no more than 25 feet from a sampled face. From the portal of the 3d level to a point about 50 feet east of the collar of the inclined winze the vein ranges from 6 to 12 inches in thickness and the tungsten content is low. At the east face of the 5th level, approximately 70 feet east of the inclined winze the vein narrows and the tungsten content is low. Therefore ore is inferred for a distance of only 60 feet to the east of the winze. On the 4th and 5th levels and to the west of the inclined winze, the vein is of good width and is persistent, and the faces of the levels appear to contain an average amount of wolframite as compared with other parts of the deposit. West of the crosscut (see fig. 3) on the 3d level the vein is not exposed due to faulting; therefore the deposit cannot be sampled along the last 135 feet of the 3d level. However, stopes up-dip, above the 3d level, indicate that ore minable during World War II extended at least 210 feet west of the inclined winze. In view of the good vein widths at the west end of the 4th and 5th levels and the known

extent of the ore on the 3d level, it is believed that ore can reasonably be inferred west of the inclined winze for a distance of 200 feet. Figure 4 shows the blocks for which ore is indicated and inferred; a block by block summary of calculations is given in the appendix to the engineering report. The calculated reserves are as follows:

	Tons	Percent WO_3	Units WO_3
Assuming 15% dilution the indicated reserves are	3,000	0.75	2,266
Inferred reserves	6,600	0.75	4,950
Total Reserves	9,600	0.75	7,216

Less conservative examiners might classify 50 percent of the above "indicated reserves" as "measured reserves."

The above "inferred reserve" figure allows a 25 percent deduction for portions of the vein that may be too low grade or too narrow to be minable.

CONCLUSIONS

The above indicated reserves obviously are not sufficient to amortize the $80,000 production loan that the applicant originally requested. Therefore, a production loan should be denied at this time.

The following favorable conclusions regarding an exploration program were written prior to advice from the applicants that they are not interested in participation in an exploration program. Blonsky and Rice cannot participate because:

(1) they cannot obtain a subordination agreement from one of the owners; and

(2) the applicants have difficulty in raising enough money to participate in an exploration program on a 25-75 percent basis.

However, for the record, the writer believes that it is worthwhile to present the following remarks in regard to exploration possibilities. If wolframite ore that averages 0.75 percent WO_3 can be profitably mined and concentrated, an exploration loan could be given strong consideration. The geologic possibilities of finding additional ore containing 0.75 percent WO_3 are excellent. To date at no place in the Williams mine is the ore zone known to pinch out completely, although parts of the deposit are too low grade and/or too thin to mine profitably. To the west of the inclined winze the tungsten-bearing vein is 2 to 4 feet wide, apparently persistent, and carries a moderate amount of wolframite (see applicant's assay map, fig. 9). This appears to be the best area for future exploration.

To the east of the inclined winze the easternmost faces on the 3d and 5th levels are discouraging; however, in view of the known persistence of the Williams vein further exploration to the east of the inclined winze might be warranted. Erratic distribution of tungsten in the Williams vein is characteristic; therefore the possibility of additional minable bodies of ore to the east of the winze should not be ruled out.

Exploration of the ore down-dip past the lowest known part of the quartz vein in the winze deserves some consideration. Although far distant from the already mined ore body, the prospect drift off the haulage adit might be extended to determine the potentialities of the tungsten deposit at the haulage level. The above is suggested because of the ready access to this vein which quite probably is an extension of the main Williams vein. A better possibility for exploring the vein down-dip, below the lowest exposed portion, is to raise from the vicinity of the vertical winze that connects the haulage level and the

inclined winze. A raise not longer than 15 or 20 feet should intersect the ore horizon and indicate whether or not drifting from such a raise would be warranted.

Apparently past operators have had some difficulty in making clean concentrates. Ore testing to determine the best means of concentrating should be a part of any exploration program.

WILLIAMS TUNGSTEN MINE
GREENWOOD MINING DISTRICT
MOHAVE COUNTY, ARIZONA

Engineering Report

By L. L. Farnham
Mining Engineer
U. S. Bureau of Mines

September 1931

WILLIAMS TUNGSTEN MINE
OREENWOOD MINING DISTRICT
MOHAVE COUNTY, ARIZONA
IMA-313

CONTENTS

Engineering Report	Page
Introduction	1
Acknowledgments	1
Location and physical features	1
History and production	2
Ownership and extent	4
Description of deposit	4
Mineable ore reserves	7
Present status	9
Mining equipment	10
Milling equipment	11
Camp facilities	11
Project proposals	12
Mining methods and costs	13
Milling methods and costs	15
Summary	16
Conclusions and recommendations	17
Sampling results - appendix	18

ILLUSTRATIONS

Figure	Following page
1 Location map	1
2 Mine workings	5
3 Assay map	5
4 Ore reserves	7

INTRODUCTION

This report covers the results of a field examination of the Williams Tungsten property, made in connection with the production loan application of George B. Blensky and J. B. Rice, Jr. of Rosemead, Calif., to the Defense Minerals Administration, DMA Docket No. 813. The writers visited the property during the week of July 16, 1951. The applicants requested a loan of $80,000 to be used for the rehabilitation of the property and the purchase and erection of the necessary mine and mill equipment so that the Williams mine might produce from 2,000 to 3,000 units of tungsten ore a month.

ACKNOWLEDGMENTS

Acknowledgments are due George B. Blensky, one of the applicants, for the help he extended the field team during the investigation of the property. Thanks also are extended to the former engineers of the Bureau of Mines and the Reconstruction Finance Corporation, whose sampling results were used in this report.

LOCATION AND PHYSICAL FEATURES

The Williams Tungsten mine is located in the Aquarius Range some 71 miles by road southeast of Kingman, Mohave County, Ariz., This town is the nearest shipping point. The mining claims are situated in Secs. 19 and 30, T. 16½ N., R. 11 W., G. & SR. Meridian. The mine is reached by driving east out of Kingman on U. S. Highway 66 for 1½ miles, then turning south on the Wilcup road for 43

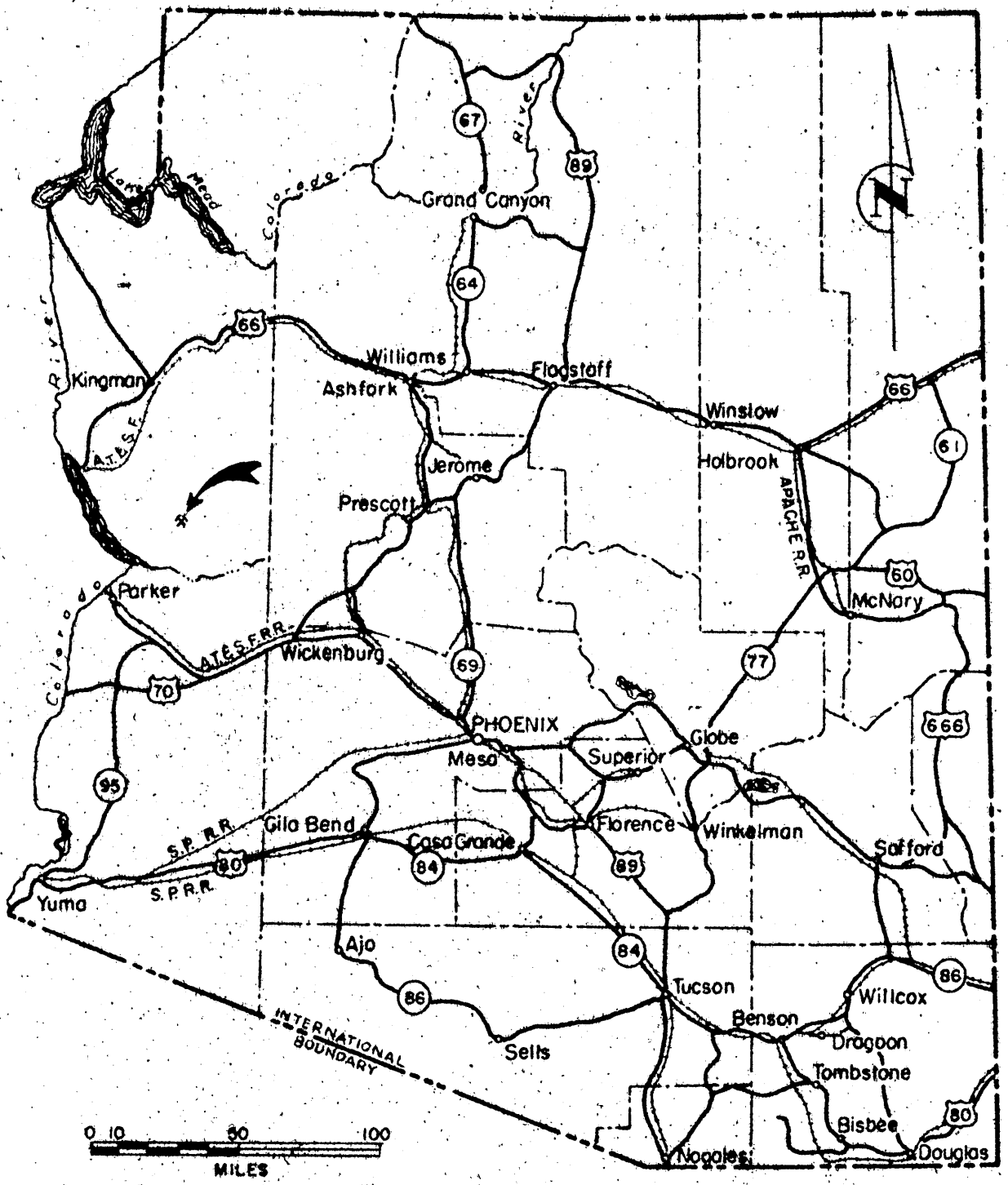


FIG. I - LOCATION MAP
WILLIAM'S TUNGSTEN PROPERTY
MOHAVE COUNTY, ARIZONA

DMA 913

miles to the Trout Creek store. At that point a branch road running east crosses the Big Sandy river and proceeds easterly to the crest of the Aquarius Cliffs, thence it turns southward and after some 28 miles from Trout Creek, reaches the mine. The first 43 miles out of Kingman is a good graded road, while parts of the last 28 miles would be impassable in wet weather. This is particularily true of the Big Sandy crossing which at times during the rainy season cannot be forded for days.

The mine is on a steep southeasterly slope near the crest of the range. The altitude of the lower adit is about 4,800 feet above sea level from which the hillside rises rapidly to the west and reaches an altitude of 5,400 feet. Several switch-backs in the road were necessary in order to reach the upper mine workings.

The area surrounding the property is sparsely covered with typical desert vegetation.

HISTORY AND PRODUCTION

The claims originally were located by Ed Williams in 1902. Sporadic production of tungsten ore started in 1904 and continued intermittently until 1945. Since that time the mine has been idle.

No authentic records of the tungsten production are available. The following summary was taken from the report of O. R. Bishop, Mining Engineer, U. S. Bureau of Mines, who examined the property in 1942.

From 1904 to 1913 concentrates were shipped in small lots to the Primos Chemical Co. of Primos, Penn.

In 1917-1918, James Townsend sand-jigged 300 tons of ore and produced 12 tons of 60 percent WO_3 concentrates (720 units).

Twenty thousand pounds of 65 percent concentrates were marketed in the period of 1936-1939 (650 units).

The Continental Mining Co. sold 30,000 pounds of 63.5 percent WO_3 concentrates between April 1940 and December 1941 (935 units).

Ray Williams produced 6,600 pounds of concentrates in 1942 that averaged 64.25 percent WO_3 (212 units).

According to these records the total known production since 1917 has amounted to about 2,535 units of WO_3.

In 1943, Wm. Bradbury secured a lease on the property and was granted a development loan of $20,000 by the Reconstruction Finance Corporation. This operation proved unsuccessful and Bradbury lost his lease and the Reconstruction Finance Corporation lost its $20,000, together with any rights it might have had to the property. Two different small groups of lessees have "enlerided" in the mine since Bradbury's operations. Nothing is known as to what was produced by these last three attempts.

In general, it appears that the many attempts which were made to operate this property on a substantial scale have all proved unsuccessful. During 1940-1941, when the property was operated by the Continental Mining Co., the average price of tungsten concentrates was over $20 a unit; operating costs at that time were about one third of such costs today. With the current price of $63 a unit

for tungsten concentrates and production costs 300 percent greater, the economics remain about the same as they were during the unprofitable operation of the Continental Mining Co.

W. B. Gehring, the late principal engineer in the Phoenix office of the Reconstruction Finance Corporation, in a letter dated July 11, 1943 (enclosed in brochure), attributes the failures of these operations to inadequate milling facilities.

OWNERSHIP AND EXTENT

The ownership of the ten unpatented mining claims comprising the Williams property rests with the estate of Edward G. Williams, deceased. On February 2, 1951, the estate gave George B. Blemsky a lease and option to purchase the property under the following terms: A total purchase price of $21,000 of which $7,000 was to be paid within two months after the Court's approval of the contract. It is the writer's understanding that this payment of $7,000 has been made. The remaining $14,000 was to be paid either by a 10 percent royalty on net returns or by cash within two years after the Court's approval of the contract. No specific payments nor a minimum number of man-shifts were called for under the lease and option agreement.

George B. Blemsky and Jos. S. Rice, Jr. have formed a partnership in connection with the operation of the property.

DESCRIPTION OF THE DEPOSIT

There are several tungsten-bearing quartz veins associated with pegmatites on the Williams property. The fractures in the

granite which the veins occupy are of various sizes and attitudes.

The principal deposit, from which the bulk of the production has come, is a narrow, flat-dipping quartz vein following the lower portion of an aplite dike. The vein varies in strike from N. 60° W. to N. 80° W. and dips from 18° to 30° northward. As exposed on the 3rd level adit it is persistent for over 600 feet along the strike (Fig. 2). The quartz likewise persists down the dip for over 400 feet where it disappears against a fault. There is evidence that indicates this same vein was found on the bottom level crosscut (Fig. 2 and 4). Even though it may not prove the same vein, it is no doubt a part of the same vein-system. The distance up the dip between the bottom level and the fault is about 300 feet, thus the vein or vein-system has a known persistence of 700 feet as measured on the dip. This area of the vein, between the bottom level and the fault, has not been explored. It could contain a tonnage equal to the reserves as established in this report.

The thickness of the quartz varies from a few inches to several feet, averaging within the mineable portions about 2.0 feet. The changes in the vein thicknesses are seldom if ever abrupt, but locally the quartz may split into two or more parts, separated by horses of wall rock.

The tungsten minerals are of the wolframite series with some associated scheelite. Pyrite and small amounts of chalcopyrite are

present. Quartz and mica constitute the principal gangue minerals. Both the tungsten minerals and the mica are most abundant on or near the walls of the vein. The wolframite, never observed outside the quartz, is distributed very erratically as bunches or pockets within the vein. These enriched areas may be completely surrounded by practically barren vein material. Thus, in mining within the ore shoot the greater portion of the vein must be stoped or well "cut up" to avoid overlooking the small high-grade areas.

In the lower parts of the mine the hanging wall of the vein, as exposed in the former stopes, appeared strong and was standing well, supported only by a few posts and pillars.

Four steeply-dipping faults trending almost parallel to the vein are exposed in the incline winze (Fig. 2). The upper three of these faults each displace the quartz a few feet vertically. However they would not appear to cause any particular trouble when mining the area. The fourth fault below the collar of the winze upon which the vein disappears, has a somewhat different strike and a much flatter dip than those above, suggesting that it may be of the reverse type with its throw in the opposite direction to that of the other faults. Evidently no systematic search was made for the vein beyond the fault.

The bottom, or 6th level crosscut intersected a similar tungsten-bearing quartz vein, which in projection lines up fairly well with the main vein. The applicant took two samples across 12 inches of this vein on the 6th level, and both are said to have contained over 1.0 percent WO_3.

MINEABLE ORE RESERVES

The mineable ore reserves on the Williams property are located below the westerly half of the 3rd level (Fig. 4). Probably some small unmined vein-areas exist between the 3rd level and the outcrop, but for the most part any ore remaining in that section would probably cost more to recover than it would be worth. In the easterly half of the 3rd level the vein is consistantly less than 12 inches thick, which would seem to eliminate this area from consideration at this time.

The block containing the ore reserves is about 265 feet measured along the strike, and approximately 320 feet along the dip of the vein. The top of the block is the bottom of the 3rd level, the bottom of the block is the easterly and westerly projection of the fault exposed in the winze, below which the vein disappears.

The sample results used to estimate the grade of the ore in this report were taken from the assay maps resulting from four different examinations of the mine. Realizing the difficulty of attempting to establish the true value of the ore in this type of deposit, it was thought the more samples used in the calculations the more closely the real value might be approached. The sample results that were used were taken by Geo. B. Blonsky, the applicant, Wm. S. Bradbury, a mining engineer and former lessee of the mine, T. P. Lane, former supervising engineer for the Reconstruction Finance Corporation, and O. M. Bishop, mining engineer, Bureau of Mines. A comparison of their respective sampling results, together

with the average grade of the ore used in this report, will be found in the appendix.

The tonnage and value assigned to the indicated ore was calculated on the premise that the average value, shown for the surface samples, extended for 25 feet beyond that surface. Areas were computed by dividing irregular blocks into triangles and measuring their dimensions on the map projections. The sides of the block containing the inferred ore were taken as the east and west limits of the stopes above the westerly half of the 3rd level. These limits were extended downward to the projected position of the fault (Fig. 4).

The tabulation of the indicated and inferred ore reserves follows.

Williams Tungsten Property

Indicated Ore Reserves (Fig. 4)

Block	Location	Tons	Percent WO_3	Units WO_3
"A"	Below 3rd level for 35' west of winze	75	0.63	47.3
"B"	West side winze between 3rd & 4th levels	170	1.36	230.5
"C"	Below 4th level west	320	0.45	144.0
"D"	East side winze, between 4th & top of stope	302	1.33	401.8
"E"	West side winze, between 4th & 5th levels	560	1.30	728.0
"F"	Below 5th level, west	240	0.40	96.0
"G"	Below 5th level, east	166	0.97	160.0
"H"	East side winze between 5th & fault	430	0.73	314.6
"I"	West side winze, between 5th & fault	234	0.73	170.8
		2,506	0.87	2,344.2
	Assuming 15 percent dilution	361		
	Total indicated	2,867	0.75	2,156

Of this 3,000 tons of indicated ore, perhaps one half, or 1,500 can be classed as measured ore, containing 1,125 units of WO_3.

Williams Tungsten Mine

Inferred Ore Reserves (Fig. 4)

Block	Location	Tons
"K"	East of winze, between 3rd level and top 5th level	900
"L"	East side 5th level stope	312
"M"	East side, below 5th level	708
"N"	West side above 5th level stope	820
"O"	West end of 5th level	240
"P"	West side, below 5th level	612
"Q"	West westerly block between 3rd level and fault	[illegible]
	Total 1/	8,664
	Less 25 percent	6,648

PRESENT STATUS

The Williams vein has been developed by about 3,200 feet of underground work. This consists of three adits and an incline winze from which two short intermediate levels were driven. All of this work followed the vein. A crosscut adit some 1,400 feet long in the bottom level and served as a tonnage-way to the mill. The adit and intermediate levels are herein designated as the 1st, 2nd, 3rd, 4th, 5th, and 6th levels with the 1st as the upper-most and the 6th as the bottom or tonnage level (Fig. 2).

1/ Based on the spotty characteristics of the tungsten mineralization, there will be within this area low grade and narrow portions of the vein that will not be minable. The relative tonnage of such areas is, of course, indeterminate. Assuming that they would amount to 25 percent of the ore sweet area, then some 6,600 tons would be minable. Lacking data with which to judge otherwise, it is presumed that this inferred ore will have the same tungsten content as assigned to the indicated ore, i.e. 0.75 percent WO_3. On this basis the inferred reserves would contain about 4,950 units of WO_3.

The productive portion of the vein between the surface and the 3rd level evidently has been largely mined out. It now is caved and for the most part inaccessible. The ore shoot area considered in this report has only been partly developed below the 3rd level. Good widths of tungsten-bearing quartz are present in the westerly faces of both the 4th and 5th levels, and the vein has been productive on the 3rd level for over 100 feet west of these faces. No lateral work has been done on the vein between the 5th level and the limiting fault.

A stope was carried up to the 3rd level from the west side of the 4th level. Some stoping was done on the east side of this level but it was filled so the extent of work done there is unknown. Two small stopes, never completed, extend above both sides of the 5th level. Some gouging was done in several places along the sides of the winze. Rough calculations of the volume of all the openings below the 3rd level indicate that some 2,000 tons of vein material has been removed. Unfortunately there are no records of the tungsten content or the mill recoveries on this material.

MINING EQUIPMENT

An old 400 c.f.m. Ingersol-Rand, Type 10, air compressor and a 100 H.P. Fairbanks-Morse, Type Y, Diesel engine still remain on the property. Both are old obsolete models and nothing is known of their condition. Both the track and pipe lines, for the most part, are still in place in the lower mine workings. There is little if any other mining equipment on the property.

MILLING EQUIPMENT

Only a small part of the remains of the old 50 ton jig mill is of value. The corrugated iron mill building, an 8- by 15-in. jaw crusher, and a set of 12- by 16-in. rolls could no doubt be reconditioned and used again.

Adequate water, pumped from a well in a gravel filled wash, is said to have been available for a one-shift per day operation of this mill. This is presumed to mean that there was only enough water for the treatment of between 16 and 20 tons of ore daily. Judging from the crude de-watering apparatus used, at least 2 tons of water were consumed for each ton of ore treated. This would indicate a water supply of about 40 tons per day. By filtration of the mill tailings, one ton of water would treat 3 tons of ore. Thus by filtering the tailings there would appear to be sufficient water for a 50 ton mill.

CAMP FACILITIES

In addition to the mill building and water storage tanks there are 2 3-room dwellings, an office, a boarding house, and one small bunk house. The buildings, other than the mill, are all of frame construction with sides and roofs covered with composition roofing.

At little expense they could be patched up and would constitute sufficient housing for a modest crew.

The boarding house, in addition to serving [illegible], could [illegible] (Indian) [illegible] of maids.

PROJECT PROPOSALS

In the application for a loan of $80,000 the proposed expenditures are itemized as follows:

A.	Camp rehabilitation	$ 9,000
B.	Road repairs	800
C.	Transportation equipment	3,000
D.	Mine equipment	8,000
E.	Mill equipment	22,000
F.	Erection of mine & mill equipment	8,100
G.	Mill power unit	6,000
H.	Laboratory	800
I.	First aid & fire prevention	500
J.	Small tools	600
K.	Stock supplies	1,000
L.	Development, mine preparation	4,000
		$63,500
	Contingencies & working capital	16,500
	Total	$80,000

The lack of more detailed information covering many of these expenditures makes it difficult, if not impossible, to judge whether or not the $80,000 requested is sufficient to put the property into profitable production at the rate of 40 tons of ore a day.

No flow sheet or machinery list covering the $22,000 for the proposed mill is included in the application. The $4,000 alloted to mine development is certainly insufficient to outline enough ore

to justify a 50 ton mill. In general, it would appear that the requested loan for $80,000 would prove inadequate for the proposed program.

Since filing the application, the last few miles of the road into the mine have been repaired, so that in dry weather the roads leading to the property from Kingman would suffice for ordinary mining operations. During the rainy season supplies sufficient for two or three weeks should be kept on hand at the mine.

Man-power will not be readily obtainable at this isolated location. It is presumed that sufficient men could be obtained for the operation by incorporating a bonus or other system whereby the employee's earnings would be substantially greater than the established wage scale of the larger camps.

There are no electric transmission lines in the area, so power for mine and mill would have to be furnished by internal-combustion engines.

MINING METHODS AND COSTS

A combination of two simple mining methods would be suitable for the Williams vein. In areas where the thickness of the vein was 20 inches or more an open stope supported by posts and/or pillars, could be carried up the dip using small slusher hoists to pull the broken ore down into cars on the haulage level. Where the vein was less than 20 inches thick, resuing would have to be used in order to provide working space.

The vein is not "frozen" to either wall so it could be readily and cleanly stripped. A rough estimate indicates that resuing would

be necessary for perhaps 25 percent of the ore shoot area. At the Alvarado and Octave mines near Congress, Ariz., during 1934-1941 narrow, flat-dipping gold quartz veins were mined by these methods. Open stopes without any stripping were carried on in most areas where the vein thickness did not exceed 18 inches. These were referred to by the miners as "belly stopes".

The cost of this type of mining at the Alvarado , where and when the vein thickness was about 24 inches, was approximately $6.00 a ton. Using this figure as a basis and assuming current mining costs as 300 percent greater than in 1940, the cost of mining the thicker portions of the Williams vein would be about $18 a ton. Where the quartz narrows from 20 inches to 10 inches and stripping would be necessary the cost would probably be $25.a ton.

Based on the assumption that 75 percent of the vein could be mined for $18 a ton and that it would cost $25 a ton for the remaining 25 percent, then the average cost for the area would be about $20 a ton.

Little, if any, further development work would be necessary prior to the mining of some 3,500 tons of the present reserves. Estimating the cost of this work at $25 a foot, the total cost of development for the area containing the present ore reserves would be $12,500 or about $3.00 a ton. Thus the total cost of mining and development of the present reserves is estimated at $22 a ton.

MILLING METHODS AND COSTS

With an ore containing less than one percent WO_3, as has been estimated in this case, the success or failure of the enterprise would depend almost entirely upon the amount of that tungsten that could be recovered from the ore in the form of a marketable concentrate. No ore-testing data was submitted with the application. Nothing is known as to the past mill recoveries obtained on this ore. It has been shown that past recoveries were not sufficient to permit the profitable operation of the property at a time when economic conditions were comparable to those that exist today. This lack of success has been attributed by some to inadequate and unsuitable mill equipment. If that is true, then there is hope that better recoveries than were formerly made are possible with a proper flow sheet and the right mill equipment. At any rate, the necessity for reliable ore testing work is "a must" before milling again is attempted.

The cost of operating a 50 ton mill at the Williams property would probably be between $5 and $6 a ton.

If a 75 percent recovery of the tungsten minerals was possible on a ore containing 0.75 percent WO_3, with the resulting concentrate averaging 60 percent WO_3, the ratio of concentration would be about 106 to 1. According to Earnest Fernstrom of Tucson, who has been buying and selling tungsten ores for past 25 years, the cost of marketing tungsten concentrates, including freight, insurance,

and warehousing, amounts to between $4 and $5 a unit. On that basis, to market a ton of 60 percent WO_3 would cost $270 or about $2.50 per ton of mill ore. Thus the cost of milling and marketing the resulting concentrates for the Williams ore is estimated at about $[illegible].00 a ton.

A ton of concentrates containing 60 percent WO_3 would have a gross value of $3,710, if $[illegible]3 a unit was realized. The cost of marketing has been estimated at $270, hence the net would be $3,510 per ton of concentrate or $33.11 per ton of ore with a ratio of 100 to 1. The royalty at 10 percent would be $3.31 a ton in this case.

SUMMARY

Operating cost estimates - per ton of ore:

Mining and development	$22.00
Milling	5.50
Marketing concentrates	2.50
Royalty	3.31 1/
Taxes	
Overhead 2/	
Total	33.31

Gross Recoverable Values.

Based on the average grade of 0.75 percent WO_3 the Williams ore would have the following gross values under the different assumed mill recoveries as shown below:

65 percent recover		(0.75 x .65 x [illegible]3)	30.71 a ton
70 " "		(0.75 x .70 x [illegible]3)	33.0[illegible] a ton
75 " "		(0.75 x .75 x [illegible]3)	35.43 a ton
80 " "		(0.75 x .80 x [illegible]63)	37.[illegible]0

1/ At this rate, 4,320 tons of ore will complete the payments for the property and no further royalty will need to be paid.
2/ A reasonable local operating overhead is included in the costs of mining and milling.

It is apparent from the above, that before the Williams property could be operated at a profit under current prices, either an 80 percent recovery would be necessary, or better ore would have to be found. An operating profit of about $4 a ton, before taxes, depletion and depreciation, is possible if an 80 percent recovery of the tungsten can be made. In view of past experience, the assumption of obtaining such a recovery no doubt is optimistic.

CONCLUSIONS AND RECOMMENDATIONS

The mineable ore reserves in the Williams property amount to less than 10,000 tons, two-thirds of which are classed as inferred. The estimated average grade of these reserves, with 15 percent dilution, is 0.75 percent WO_3. The indicated operating costs exceed $33 a ton before taxes, depletion and depreciation. Nothing is known about the actual or possible mill recoveries on this ore, which are vital to the success or failure of the project. Unless 80 percent of the tungsten minerals could be recovered from the ore in the form of a marketable concentrate, the operation of the property would not be profitable. With the optimistic assumption of an 80 percent mill recovery, the estimated profit is about $4 a ton. On this basis more than double the amount of the present ore reserves would be necessary to amortize the requested loan. Therefore, it is recommended that the application for an $50,000 production loan be denied.

The persistent character of the vein-system and its association with a strong structure suggests that the potential of the property

could greatly exceed the reserves that are inferred from the present development work. If better metallurgy or a more critical need for tungsten should develop whereby the economics were improved it appears possible that the Williams vein could contribute a worthwhile amount of tungsten to the defense effort.

The applicants were fully informed as to the proceedure for obtaining an exploration loan, but declined to participate in the further exploration of the property.

WILLIAM TECUMSEH FITZ
GERALD HIGH SCHOOL DISTRICT
MOHAVE COUNTY, ARIZONA
1962-963

APPENDIX

Williams Tungsten Property

Comparison of Sample Results used in
the calculations of ore reserves

Location - 3rd Level for 150 feet west of winze.

3 Samples by T. P. Lane averaged - 17 in. & 0.51 percent WO3
5 Samples by C. M. Bishop averaged - 25 in. & 0.91 percent WO3
5 Samples by Wm. Bradbury averaged - 20 in. & 0.92 percent WO3

Total of 13 samples averaged - 21 in. & 0.84 percent WO3.
The 3 samples used for Block "A" averaged 2.0 ft. & 0.63 percent WO3.

Location - Winze between 3rd and 4th levels

7 Samples by C. B. Blonsky averaged - 17.5 in. & 1.27 percent WO3 1/
1 Sample by C. M. Bishop averaged - 23 in. & 0.[illegible] percent WO3
2 Samples by Wm. Bradbury averaged - 31 in. & 0.92 percent WO3

Total of 10 Samples averaged - 21 in. & 1.35 percent WO3

Location - Winze between 4th and 5th levels

12 Samples by Blonsky averaged - 31.[illegible] in. & 1.04 percent WO3
2 Samples by Bishop averaged - 2[illegible] in. & 2.90 percent WO3
4 Samples by Bradbury averaged - 31 in. & 0.92 percent WO3
3 Samples by Lane averaged - 2[illegible] in. & 1.20 percent WO3

Total of 21 Samples averaged - 30 in. & 1.20 percent WO3.

Location - Winze between 5th level and fault

[illegible] Samples by Blonsky averaged - 2[illegible] in. & 0.35 percent WO3
4 Samples by Bishop averaged - 24 in. & 0.[illegible] percent WO3
5 Samples by Bradbury averaged - 23 in. & 1.3[illegible] percent WO3

Total of 17 Samples averaged - 25 in. & 0.79 percent WO3.

Location - 4th level, west

12 Samples by Blonsky averaged - 29 in. & 0.[illegible] percent WO3
3 Samples by Bishop averaged - 20 in. & 0.4[illegible] percent WO3
4 Samples by Bradbury averaged - 19 in. & 0.10 percent WO3

Total of 19 Samples averaged - 25 in. & 0.45 percent WO3.

1/ Two high samples modified by 50%

Comparison of Sample results used in
the calculations of ore reserves (Cont'd.)

Location - 5th Level, west

7 Samples by Blonsky averaged - 45 in. @ 0.3[illegible] percent V_2O_5
2 Samples by Bishop averaged - 31 in. @ 0.2[illegible] percent V_2O_5
3 Samples by Bradbury averaged - 33 in. @ 0.45 percent V_2O_5

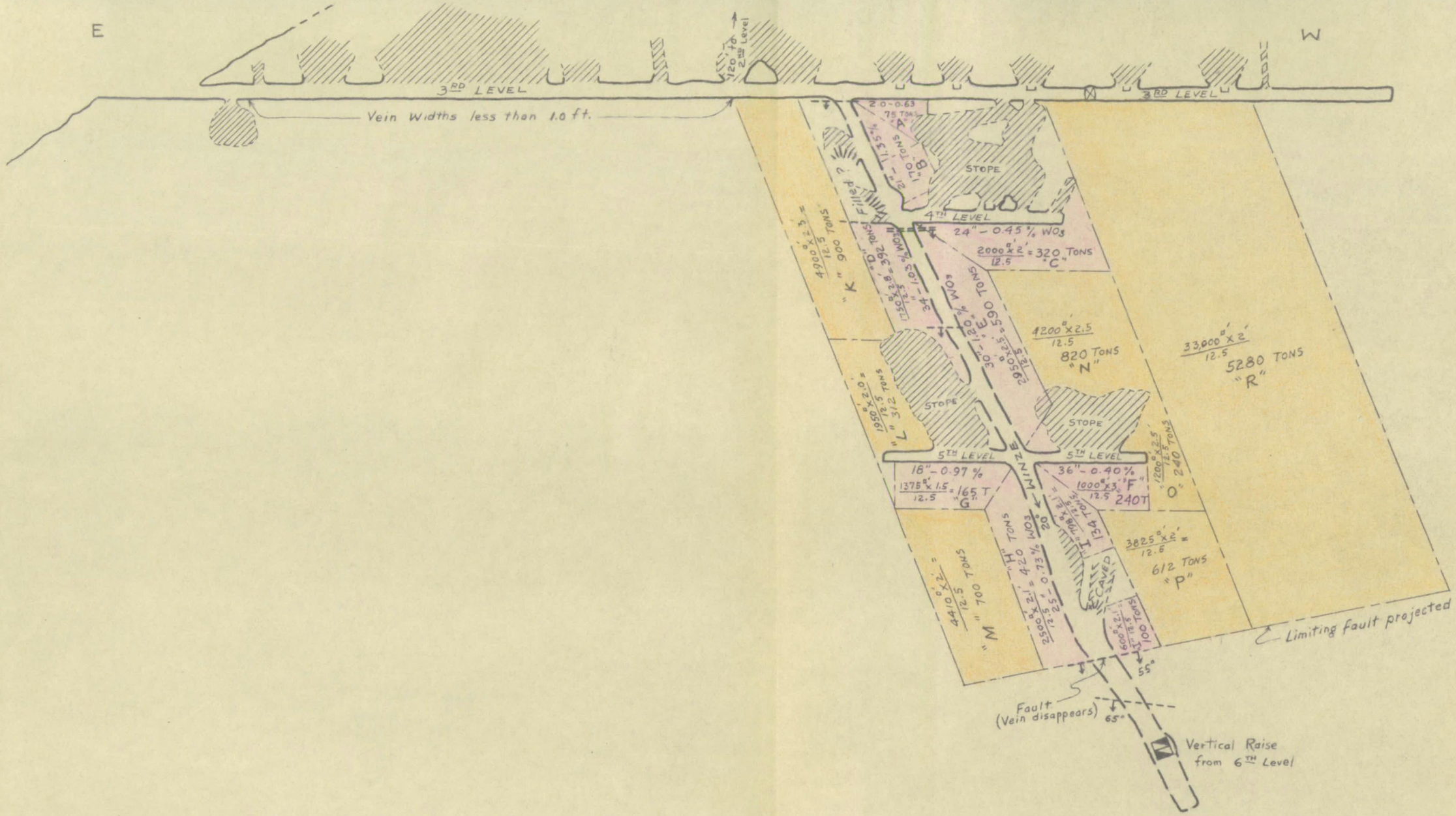
Total of 12 Samples averaged - 3[illegible] in. @ 0.40 percent V_2O_5.

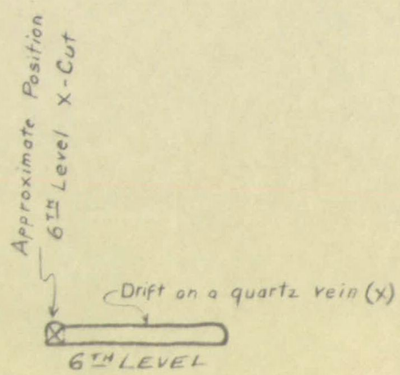
Location - 5th Level, east

[illegible] Samples by Blonsky averaged - 17 in. @ 0.[illegible]7 percent V_2O_5
5 Samples by Bradbury averaged - 1[illegible] in. @ 0.09 percent V_2O_5

Total of 11 Samples averaged - 1[illegible] in. @ 0.97 percent V_2O_5.

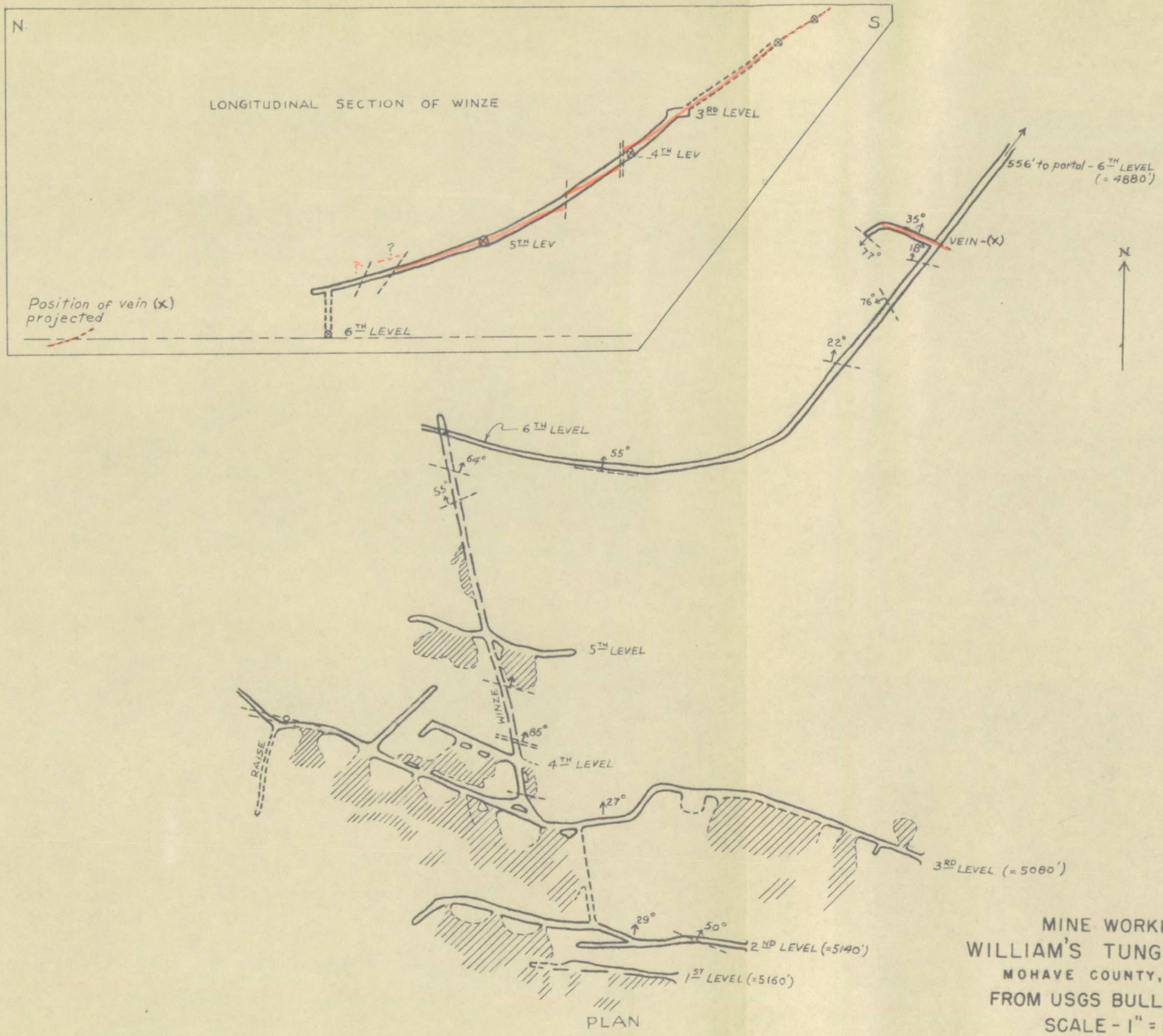
Average of all, 103 Samples - 2[illegible] in. @ 0.[illegible]1 percent V_2O_5.



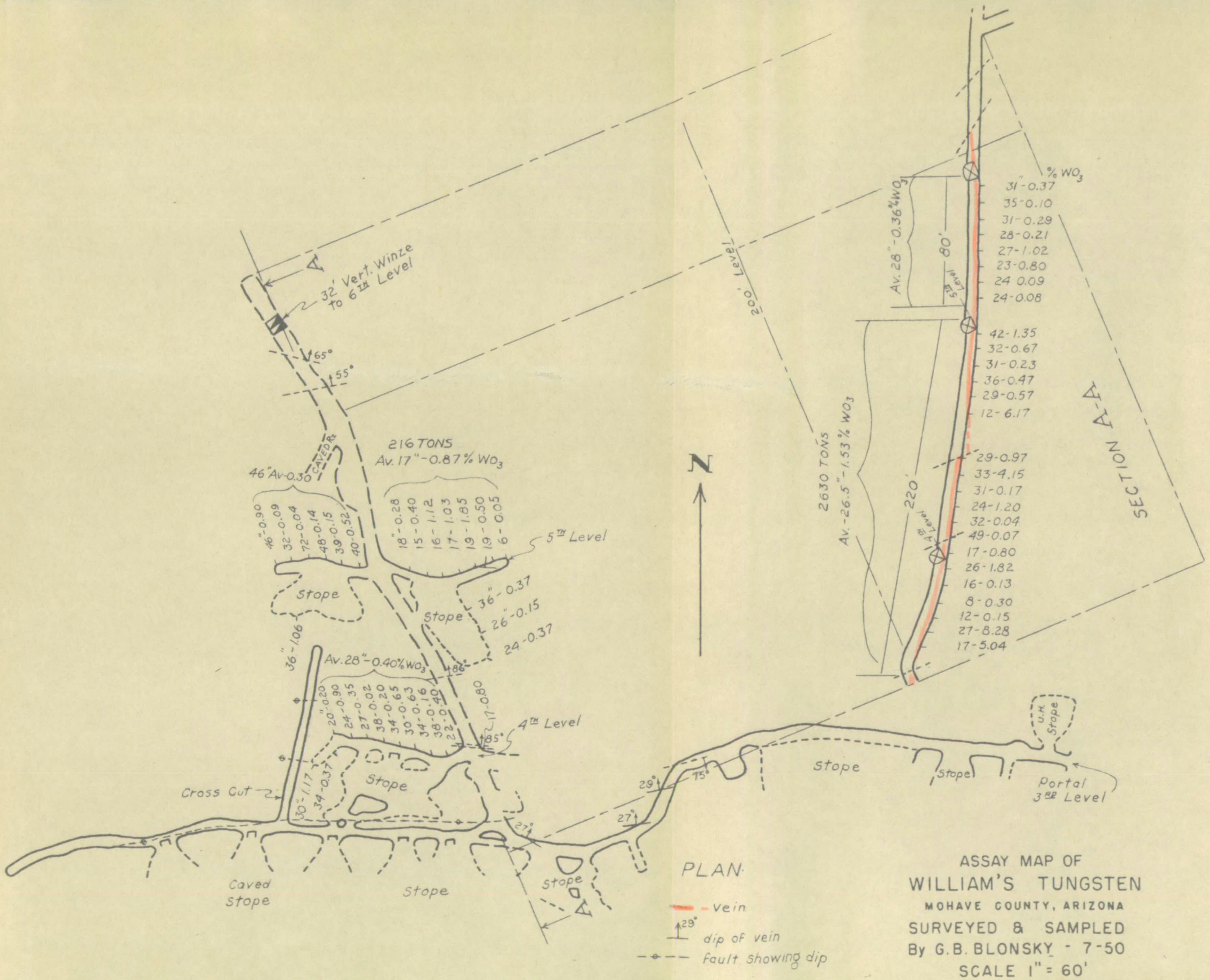


WILLIAM'S TUNGSTEN
MOHAVE COUNTY, ARIZONA
LONGITUDINAL SECTION
IN PLANE OF VEIN
SCALE - 1" = 60'
DMA - 913
FIG. 4

- STOPED - INDICATED - INFERRED



MINE WORKINGS
WILLIAM'S TUNGSTEN MINE
MOHAVE COUNTY, ARIZONA
FROM USGS BULLETIN 940
SCALE - 1" = 100'
DMA-913
FIG.-2



ASSAY MAP OF
WILLIAM'S TUNGSTEN
MOHAVE COUNTY, ARIZONA
SURVEYED & SAMPLED
By G.B. BLONSKY - 7-50
SCALE 1" = 60'
FIG. 3 DMA 913