12/30/52

Docket Room and Division:

Please leave markers in docket until next conference with Secretary.

COM(fw)

DMA Form 1

DEFENSE MINERALS ADMINISTRATION
Control Slip

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DMEA ~~DMA~~ Docket No. 2397

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EXPLORATION PROJECT

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To: Code 400, Rm. 3538 Date 3-3-52

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APR 1954

Mr. Dudley Cornell
Attorney at Law
First National Bank Building
Albuquerque, New Mexico

Re: Docket No. DMSA 2397 - Michael
Macifas and Company
Friday mine
San Diego County, California

Dear Mr. Cornell:

This will acknowledge your letter of April 21, 1954, requesting a review of the above-designated application for exploration assistance, denied March 31, 1952, to ascertain if under the new DMSA Order-1 Amended, dated March 23, 1954, the subject application may be reactivated.

It will be necessary for your company to submit a revised application for exploration assistance on the subject property. Application Forms, MF-103, for aid in an exploration project are enclosed for use in making such a request.

In reviewing the subject docket, it was noted that Mr. Donald B. Macifas, in his letter of April 15, 1952, stating that arrangements had been made for private financing, requested the return of several reports that had been attached to the original application. The revised request for exploration assistance, therefore, should be supported by these same reports and all other pertinent data with particular attention to the results of any work by your company since the date of the original application.

Sincerely yours,

C. O. Mittendorf

Administrator

Enclosures

FARutledge:foc
cc to: Docket
Code 400
F. Reg. 3
Adm. Reading File
H. W. Davis, USBM
Phillip Guild, USGS

G. C. Selfridge

NOV 12 1952

Mr. Tom Lyon, Director
Domestic Expansion Division
Defense Materials Procurement Agency
Washington 25, D. C.

re: Docket No. DMA 2377 - Nickel
Keaffee and Company
Friday Mine
San Diego, California

Dear Mr. Lyon:

This is in response to your letter of October 23 transmitting a copy of Mr. Wrath's report on the subject mine.

In February of this year, Keaffee and Company submitted an application for exploration aid in the amount of $126,760.00 which involved a program seemingly much too ambitious and too costly since all available reliable information suggested that the reserve target was small and not large.

The application included such items as diamond drilling of the area without regard to possible structure; consulting, superintendence and engineering at $900.00, $750.00 and $600.00 a month respectively with a labor force of only 8 men which included 2 diamond drillers and 2 hoistmen; and an item for analytical work, all out of proportion for the intended exploration.

Because (1) the literature suggested that the partly exposed sulphide body was seemingly limited in extent, (2) of the lack of a readily available water supply, (3) of the unfavorable geographic location for the successful operation of a small tonnage nickel operation, (4) of the lack of any nearby beneficiation or metallurgical facilities to handle such a type of sulphide, and (5) of the questioning of the competence of the applicant, the application was denied.

As mentioned in the literature and reports, the mine was first opened as a gold mine and later was explored for copper. The presence of nickel was known at an early date and further exploration was carried out to determine the extent and grade of the nickel

mineralization. It is reported that two small shipments of nickel ore, mined at depth, were made to Norway. Evidently, at that time, the operators were convinced that the operation would not be profitable.

Cressey, in his report, estimates that the Friday mine contained an estimated reserve of 5,000 tons of indicated ore between the 132 and 180 foot levels, approximately 17 percent of which had already been mined. He based his estimate on the assumption that the mineralization did not extend westward on the 132 foot level and that the 55 foot ore length opened on that level could probably be considered the true length of the ore shoot since the northeastward trending drift had been backfilled to its present termination. At the east end of the 132 foot level, the ore is at least 22 feet in width with only one wall exposed. On the 180 foot level directly below the sulphide has been mined but in the stope just 7 feet above the level, Cressey reports the mineralization is only from 6 to 9 feet in width with both walls exposed, a fact not mentioned by Mr. Groth in his report. The length on the 180 foot level is not known since there is ore at both ends of the 30 foot stope.

Study of Cressey's report and maps shows that the sulphide body is localized on the footwall side of a horse of schist in the gabbro. The schist decreases rapidly in width with depth and seemingly the sulphide does also in the vicinity of the east winze between the levels. It would appear that the size of the schist horses would have a bearing on the size of the sulphide bodies.

There could be a remote possibility that the mineralization on the 132 foot level extends westward north of the level. A drill hole from the bottom of the shaft, for which no data are available, is reported as containing no nickel for the first 10 feet but from 10 to 50 feet, it is said to have averaged 2.16 percent nickel. In 1930, when the hole and 4 other were drilled, nickel was worth 35 cents a pound and copper 13.4 cents a pound. Thus, the ore would have had a gross value of approximately $18.00 a ton at that time if one assumes the copper content averaged 0.5 percent. If the values reported in the drill hole are present, it would seem that they might represent a different sulphide body since the described one seemingly dips to the north.

Sections C-C' of both maps Nos. 1 and 2 show some difference in width of the sulphide body, partly due to the difference in the direction of the section. Cressey's section indicates the possibility

of the body increasing in width with depth. It would seem that the future of the prospect might depend on depth rather than on lateral extension along the upper level. It would seem that the proposed crosscuts to the north on both levels at section C-C' would have little value since Creasey's map shows gabbro in the faces if only in the upper part on the lower level.

The width of the mineralization at section C-C' could be determined by drilling more cheaply and quickly and any difference of results obtained by drilling compared to what might have been obtained by crosscutting would probably have little effect on the overall picture.

During the studies of the assays, it was noted that No. 11 was given as 0.57 percent nickel at the place where the sample was taken and 5.7 in the table. If the former figure is correct, it would lower the average from 1.9 to 1.6 percent. Odds would favor the lower figure.

In his report, Mr. Vreth states that the Pacific Company plans to rehabilitate the mine workings. Should it do so DMA would not be adverse to considering a reasonable exploration program that might consist of two stages, the first including the drilling of 4 or 5 large core drill holes northward from the 190 foot level and the second including some drifting and/or sinking.

It would appear that a hole at the shaft would be warranted to check the reported hole. A horizontal or slightly down hole from the crosscut at Section C-C' would check the width there and indicate any rake of the sulphide body to the northeast. Two or 3 holes off the crosscut at Section C-C' should determine lateral extension to the east and width below the level. If the mine is not rehabilitated, possibly three surface holes north of the levels would give sufficient information regarding depth and lateral extension beyond the present showing.

Sincerely yours,

C. O. Mittendorf

Administrator

GCSelfridge:lm
11/4/52

cc: Admn. Reading File
Docket
R. W. Davis, USBM
T. P. Thayer, USGS
Field Team Reg. III
G. C. Selfridge

DEFENSE MATERIALS PROCUREMENT AGENCY
WASHINGTON 25, D. C.

400

Mr. C. O. Mittendorf
Administrator
Defense Minerals Exploration Administration
Department of the Interior
Washington 25, D. C.

Omen 2397-Ni was denied

Subject: Friday Nickel Mine, San Diego County, California

Dear Mr. Mittendorf:

Enclosed is copy of a report by Mr. James S. Wroth, Consultant to this agency, on the Friday Nickel Mine, San Diego County, California.

As the underground workings were not accessible and, owing to the lack of surface exposures, Mr. Wroth's report was based upon the reports and geological investigations of the U. S. Geological Survey and the State of California Department of Natural Resources.

The underground development work which was conducted in search of gold mineralization indicates a nickel-copper bearing zone, the samples from which average 1.90 percent nickel. This development work apparently penetrated the nickel zone in only one dimension, so that the three other dimensions are not known, but it is apparent that limited initial exploration will outline this orebody, and it is recommended that this exploration be conducted to determine the extent and quality of the orebody.

Sincerely yours,

Tom Lyon, Director
Domestic Expansion Division

Enclosure

EXPLORATION

Case 400

Mr. H. C. Miller, Executive Officer
DMaA Field Team, Region III
1012 Flood Building
870 Market Street
San Francisco 2, California

Re: Docket No. DMaA 2397X - Nickel
McAfee and Company
Friday Nickel Mine
San Diego County, California

Dear Mr. Miller:

This is in reply to your memorandum of May 21, 1952, regarding reconsideration of the denial of the application for exploration assistance for the subject property.

At the present time we do not believe that the property warrants exploration assistance in any amount because all of the available information suggests that the reserve target is small and not large. It appears likely that the proposed drilling would only change the presently inferred tonnage to indicated. It would take many times the very optimistic reserve of 100,000 tons postulated by the applicant to justify the construction of a mine plant and smelter. In summation, the available geologic information is too negative to warrant exploration assistance by the Administration and, therefore, we believe that our denial is valid and so should remain.

Sincerely yours,

C. O. Mitteldorf

Acting Administrator
Defense Minerals Exploration
Administration

GCGelfridge:la
5/28/52

cc: Docket
Admn Reading File
Field Team, Region 3
G. C. Gelfridge
H. . Davis, USBM
E. P. Thayer, USGS

DMEA

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
WASHINGTON 25, D. C.

PRS #2473

Dmea 2397

May 1st, 1952

Dear Clint:

I have your letter of April 8, 1952, concerning the Friday Nickel Mine located in San Diego County, California.

We are both in agreement that it is important to develop nickel production, if at all possible, in the United States. However, in the case of the Friday Nickel Mine, it does not appear that additional exploration would discover or develop an orebody of sufficient size and grade to be commercial.

The orebodies of this mine appear to be relatively small and widely spaced. If they were fully developed, they would not warrant the cost of the facilities necessary for exploitation and recovery of the various metals in the ore. There is no market for nickel ores in the United States, nor facilities for recovering nickel from ores. For your information I am enclosing copy of a memorandum by Mr. C. O. Mittendorf, Acting Administrator, DMEA, concerning the Friday Nickel Mine.

If I can be of further assistance in this matter, please call on me.

Sincerely yours,

(Sgd.) Oscar L. Chapman.

Secretary of the Interior

Hon. Clinton C. Anderson
United States Senate
Washington 25, D. C.

Enclosure

FEJohnson/bih/pa
4-18-52

cc: Secy's Reading File
Admrs. Reading File
Mails & Files
Mr. Selfridge, DMEA
FE Johnson

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

April 18, 1952

Memorandum

To: Secretary of the Interior

From: C. O. Mittendorf, Acting Administrator
Defense Minerals Exploration Administration

Subject: DMA Docket No. 2397 (Nickel-Copper)
McAfee and Company
Friday Nickel Mine
San Diego County, California

The application of McAfee and Company for aid for an Exploration Project on the Friday Nickel Mine in the amount of $126,769 was denied on March 31, 1952.

The Friday Nickel Mine was first opened up as a gold mine prior to 1900 and later was explored for copper. The presence of nickel was known at an early date and further exploration was carried out to determine the extent and grade of the nickel mineralization. It is reported that some gold production was made from the oxidized outcrop and that two small shipments of nickel ore, mined at depth, were made to Norway. Evidently, the Operators were convinced that these operations would not be profitable. This mine has been examined several times by various private companies, as well as by state and national agencies.

The available information indicates that small scattered lenses of nickel and copper-bearing iron sulphides probably occur in this area. The workings of the Friday Nickel Mine have partially explored a small irregular body of massive iron sulphides containing nickel and copper, but indicate a very limited tonnage per foot of depth. A report by the U. S. Geological Survey published in 1945 gives approximately 5,000 tons of indicated ore in a block between the 132 and 180 feet levels of the Friday shaft, part of which had already been mined at the time of the Survey's examination. It was estimated that the orebody contains about 90 tons of inferred ore per foot of depth for a limited distance below the 180 foot level. The Survey also estimated that by Diamond drilling a moderate tonnage of 10,000 to 20,000 tons of ore averaging about 2% nickel might be developed in the Friday mine.

The applicant proposes a drilling program which he hopes will find about 100,000 tons of ore containing about 3% nickel, 2% copper and 0.3% cobalt. The Survey estimates that the small mineralized body in the Friday Mine will probably average 2.50% to 3.00% Ni and 0.5% to 1.00% Cu. As much as 0.15% Cobalt is found but the average content is unknown according to the Survey.

However, if 100,000 tons of ore of the grade applicant hopes to find were developed, it would require a mining plant and smelting facilities in order to recover the nickel and copper. There are no markets or smelting facilities in the United States for nickel ore of this grade. A tonnage of 100,000 tons would be insignificant towards the quantity of ore required to justify the construction of a mine plant and smelter.

Geologically, the chance of developing minable sized bodies of nickel ore is problematical and there is no evidence indicating the existence of a large low grade deposit.

Since geologically it appears improbable that the proposed program would make a significant discovery or development, the application was denied.

C. O. Mittendorf

Acting Administrator

FEJohnson/bih

cc to: Docket
Admr's Reading File
Mr. Selfridge
FEJohnson

Memorandum

To: Secretary of the Interior

From: Acting Administrator, Defense Minerals Exploration Administration

Subject: Docket No. DMEA 2397, Nickel-Copper
McAfee and Company
Friday Nickel Mine
San Diego County, California

The above-referenced application for approximately [illegible] for exploration assistance was denied on March 31, 1952.

The Friday Nickel Mine deposit was first opened for gold and copper before the turn of the century. During World War I, two shipments of nickel ore were sent to Norway. The property has been examined several times by various private companies as well as by state and national agencies.

The mineralized body of the Friday Nickel Mine is irregular in shape and small. The mine workings indicate very limited tonnage per foot of depth. A report by the U. S. Geological Survey published in 1945 lists approximately 5,000 tons of indicated ore in a block between the 132 and 180-foot levels of the Friday shaft, part of which had already been mined at the time of the Geological Survey's examination. It was estimated that the orebody contains about 90 tons of inferred ore per foot of depth for a limited distance below the 180-foot level. The surface and underground geology of the Friday Mine, the local areal extent of the gossan outcrops, and the lack of gossan float around the gossan areas indicate that the mineralized bodies are small and widely spaced.

Since geologically it appears that there is little possibility of making a significant mineral discovery or development which would warrant the erection of a mill and smelter, the application for exploration assistance was denied.

GCSelfridge:ls
4/15/52

Acting Administrator
Defense Minerals Exploration
Administration

Copy to: Docket No. DMEA 2397
Admn. Reading File
G. C. Selfridge
DMEA Field Team, Reg. III
H. W. Davis, USBM
T. P. Thayer, USGS

COPY

UNITED STATES SENATE

Committee on
Agriculture and Forestry

April 8, 1952

Honorable Oscar Chapman
Secretary of the Interior
Washington, D. C.

Re: D.M.E.A. Docket No. 2397
Friday Nickel Mine
San Diego County, Calif.

Dear Mr. Secretary:

I am advised that the above application for an exploratory loan of approximately $125,000 is now pending in your Defense Minerals Division. One of the parties making the application is an old friend of mine whom I have known to be interested in miningfor many years.

He advises me that this property contains a small body of proven ore carrying two percent to three percent nickel, and that there is a good possibility that core drilling and additional exploration might uncover an ore body of sufficient size to make a commercial mine.

Since there is not a single property being operated today as a producer of nickel within the continental limits of the United States, it would appear to be a matter of importance to develop nickel production if at all possible. In addition to nickel, this ore is reported to contain sulphur, copper and cobalt - all strategic minerals.

In view of the circumstances, I would appreciate being personally advised of the disposition of the pending application.

Sincerely yours,

Signed: Clint

Clinton P. Anderson

MAR 31 1952

denial

MacAfee and Company
12th Floor, James Oviatt Bldg.
617 South Olive Street
Los Angeles 14, California

Re: Docket No. 2397X - Nickel
Friday Mine
San Diego County, California

Gentlemen:

Your application for aid for an exploration project together with other information referring to the subject property available to us in Washington have been most carefully reviewed.

Our review, while noting a small amount of known and inferred ore, indicates that, geologically, there is little likelihood of making a significant mineral discovery. We regret, therefore, to inform you that your application is denied.

We wish to thank you for your interest in the Defense Minerals Program, and for your effort in this instance.

Sincerely yours,

C. O. Mittendorf

Acting Administrator
Defense Minerals Exploration
Administration

"L"Brewer'lm
3/27/52

cc: Admn. Reading File
Docket
H. W. Davis, USBM
T. P. Thayer, USGS
Field Team Reg. III
G. G. Selfridge
Q. L. Brewer

Acting Administrator, DMEA March 27, 1952

Iron and Ferro-Alloy Division, DMEA

Denial of exploration project in the amount of $126,769.00
Docket No. DMEA 2397X - Nickel
MacAfee and Company
Friday Mine
San Diego County, California

The denial of the subject application by this Division is based on the following information:

1. The country rock of the area in question is the Triassic "Julian" schist which was initially invaded by the "Stonewall" quartz diorite, and later both were intruded by the "Cuyamaca" gabbro. The gabbro is the host rock of the nickel mineralization. The known ore body was exposed on the surface at the Friday mine where a 180-foot shaft and some 200 feet of drifts on the 132-foot and 180-foot levels have partially explored the ore body. Analyses by various examiners at various times show the following values: nickel, 2.0 to 3.0 per cent; copper, 0.5 to 1.00 per cent; cobalt, probably 0.10 per cent; platinum and gold are noted in small amount. The minerals making up the heavy sulphide mineralization are pyrrhotite, pentlandite, pyrite, chalcopyrite and violarite.

2. There have been several attempts by private enterprise to discover sufficient ore of economic grade at the Friday mine in the past 25 years. The area was also examined by Tolman of Stanford University (1942), by the California Division of Mines in co-operation with the U. S. Geological Survey (1944), and by A. H. Heller, who cites other examinations by A. Locke and Prof. Frasier (California Institute of Technology) and further notes USGS Bulletin 640 (1916), and "Origin of Nickel Ore in Cuyamaca Region" by F. S. Hudson, University of California publication (1922).

3. Tolman suggests magnetometer work followed by diamond drilling; Heller states that this was done with negative results (page 5).

4. Refer to "Appendix No. 3" - being 2 maps prepared by E. H. Melcon in 1942. The diamond drill holes noted thereon show certain data as to the rock intersected and the thickness of the "nickel sulfide". <u>This data is from the memory of the driller, who saved no cores and kept no records.</u> (See page 2, Tolman's report.)

5. Tolman (1942) says the ores are of the Sudbury type (page 1 and 12) (ie, magmatic segregation) while the U. S. Geological Survey (Creasey) as published by the California Division of Mines (page 26),

says that the deposits are "an irregular replacement sulphide body" formed by ponded sulphide-bearing solutions reacting with the wall rock. Obviously, both these theories cannot at the same place be true. If the latter be true, then fissuring will control ore deposition; if the former, then magmatic segregation phenomena should be sought. The applicant herein is quoting both theories at the same time apparently believing that an excess of verbiage will obscure the scarcity of intelligence.

6. On page 17 of Creasey's report (USGS) (1944), it is noted: "The Friday mine - Inspiration Point area has little or no chance of becoming a war-producer. Consequently no further work is recommended by the U. S. Geological Survey or the U. S. Bureau of Mines" - - - - - - "However, in the event of an acute nickel shortage, the area should be reconsidered". - - - "Diamond drilling in the Friday mine might develop a moderate tonnage, in order of magnitude of from 10,000 to 20,000 tons of ore grading about 2 per cent nickel".

7. The applicant lists an expected development of 100,000 tons of ore (5 to 10 times as great as the above given amounts) at 1.50 per cent nickel; 1 per cent copper and 0.15 per cent cobalt.

8. The proposed plan of exploration is to drill what amounts to a circular cylinder of ground 500 feet in diameter and 370 deep, with the existing shaft as center. There are to be 19 drill holes in and/or through this cylinder. The total volume of this cylinder is about 12,000,000 tons, of which the applicant hopes 100,000 or 1/120 will be ore.

The geometric drilling pattern signifies that the applicant has no knowledge of the geologic occurrence of the ore, and only hopes to find ore within 250 feet of the shaft wherein is the only known ore occurrence.

9. The Commodity Division of the U. S. Geological Survey recommends denial; the Commodity Division of the U. S. Bureau of Mines notes the absence of smelting facilities; says the project does not merit the proposed loan, but a small loan might be considered.

George C. Selfridge

G. C. Selfridge, Chief
Iron and Ferro-Alloy Division

QLBrewer'lm
3/27/52

cc: Admn. Reading File
Docket
G. C. Selfridge
Q. L. Brewer

IN REPLY REFER TO:

G-MD-TPT

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

March 17, 1952

Memorandum

To: George C. Selfridge, DMEA

From: T. P. Thayer

Subject: DMEA 2397 Nickel MacAfee & Co., San Diego County

The applicant proposes diamond drilling at the Friday mine, from the surface and underground, to delineate sulfide ores averaging 2-3 percent nickel and somewhat less copper, irregularly scattered in gabbro. The project, set up on a step basis, would involve 10,540 feet of diamond drilling, some deepening of a shaft and 500 feet of drifting and cross-cutting. Estimated cost is $126,769, of which the applicant would provide 10 percent.

The Geological Survey report by S. C. Creasey is the latest available, and discusses the findings of earlier reports by other qualified geologists. Creasey indicates control of sulfide ore bodies by fractures and inclusions of older rocks, and says (p. 17) he "did not see any geologic evidence on the surface indicating a large low-grade deposit." Creasey estimated reserves at 5000 tons of indicated ore between the 132 and 180 foot levels and 90 tons per foot of depth below the 180 foot level, probably averaging 2-3 percent Ni and 0.5 to 1 percent Cu, with some Co.

The large ore body indicated on the applicant's Exploration Map (FNM-2) appears to be postulated on spots of sulfides encountered in a few drill holes for which no assay data are given. The speciousness of this interpretation is shown by the fact that barren gabbro exposed on the 180 level is included as inferred ore. The statements by Mr. Basil Prescott regarding origin, form and character of the deposits do not have any more basis in fact than the exploration map.

The system of radial holes would yield less information per exploration dollar than holes drilled from the surface, or distributed along the drifts. The estimates of ore to be found indicate maximum possible grades, rather than average that seems probable.

The cost estimates are padded in an unconscionable manner with respect to supervision, assaying, and analytical work. An operation with 8 workmen scarcely needs a $750/mo. superintendent and $600/mo. engineer, plus $1,000 a month for a consulting engineer. The provision

for assaying is out of this world with $8,250 for spectrographic and mineralogical work, 100 analyses for sulfur and iron at $850, and 200 analyses for platinum at $1,500. The necessary rock classifications could be made by a $400 a month geologist in half a day.

The application should be denied on the grounds of improbability of making a significant discovery by the proposed program, which has little resemblance to the exploration recommended by Creasey. The probability of finding workable deposits of sulfide ore in the Friday mine alone is too small to merit Government participation. The estimates for supervision, assaying and similar items show that the applicants have no appreciation of proper procedures in exploration, and would not be competent to execute a reasonable program.

TPThayer:gt

FILE COPY
Surname:

Davis
Kidgway

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

March 14, 1952

Memorandum

To: George C. Selfridge, Defense Minerals Exploration Administration

From: H. W. Davis, Bureau of Mines

Subject: Docket No. DMEA-2397 - application of MacAfee & Company for $126,769 to explore nickel deposits in San Diego County, California.

The subject property has been reported on by S. C. Creasy of the U. S. Geological Survey, by Tolman and Melcon for Henry J. Kaiser Co., and by A. H. Heller.

According to Creasy, the chance of developing minable sized bodies of nickel ore is problematical, there is no readily available water supply, the geographic location is unfavorable for successful operation of a small tonnage nickel deposit, and surface geological evidence did not indicate a large low-grade deposit. No custom mill or smelter is close enough for low-cost treatment of nickel ore.

It is stated by the applicant that it hopes to develop 100,000 tons of ore containing 6,000,000 pounds of nickel, 2,000,000 pounds of copper, and 300,000 pounds of cobalt. Obviously, this tonnage is not large enough to justify a smelter. Nevertheless, these quantities of metals would make a significant contribution toward the Nation's supplies were a smelter available to treat the ores from the scattered sulfide deposits in the Western United States and Alaska, no one of which is large enough to justify a smelter. However, in the absence of such a smelter, it is not believed that the project merits an exploration loan of $126,769 at this time. The project might have merit in a long-range program aimed at determining the nickel resources of the United States and, consequently, a small exploration loan should be considered for this purpose.

H. W. Davis

HWDavis:cb

Copy to: Ferrous Metals
T. P. Thayer
H. W. Davis
Files

DMEA-2397

CABLE ADDRESS MACAFEE

TELEPHONE TRINITY 5939

MACAFEE AND COMPANY

MINE • MILL AND INDUSTRIAL PLANT REPRESENTATION

12TH FLOOR • JAMES OVIATT BUILDING • 617 SOUTH OLIVE STREET • LOS ANGELES 14 • CALIFORNIA

ENGINEERING DEPARTMENT

February 20, 1952

Defense Minerals Exploration Administration
of the Defense Minerals Adminstration, D.P.A.
General Services Building
Washington, D. C.

Gentlemen: Subject: Friday Nickel Mine

Attached herewith you will find "Application for Aid for an Exploration Project pursuant to Mineral Order 5, under Defense Production Act of 1950", Form MF-103 and General Technical Data Form MF-100, fully executed with all required exhibits.

Summarizing this exploration project for your consideration, we would say that —

1. The attached reports by eminent engineers, such as Mr. S. C. Creasey of the U.S.G.S., Dr. C.F. Tolman, Professor of Geology, Stanford University, and Mr. A. H. Heller of the Scandinavian Nickel Corp., indicate excellent probabilities of developing a substantial tonnage of nickel ore with proper exploration work at the Friday Nickel Mine.

2. Mr. Basil Prescott, eminent geologist, (now retired from practice) kindly consented to study these reports and our proposed exploration maps and programs and stated the following conclusions —

   a. The Friday Nickel Ore body is of high temperature magnetic segregation origin.

   b. The source of the sulfide mineralization is the very basic core of the gabbro intrusion.

c. The ore is intrusive into the softer acidic norite and schist.

d. The ore will occur as irregular bodies or masses, emanating from continuous pipes, originating in the basic gabbro core of the intrusion.

e. These pipes or intrusive ore channels will be continuous to their source.

f. The grade of the sulfide ore in nickel and copper will remain uniform at about 3% Ni and 1% Cu wherever found and throughout the ore bodies and pipes, to the source of the ore in the basic gabbro.

g. There will probably be several pipes from the basic gabbro and a number of ore bodies offshot from these pipes may be expected.

h. The drilling and exploration program proposed is sound.

3. We propose to do 10,540 feet of diamond drilling, deepen the shaft to 200 feet and do 500 feet of underground drifting and cross cutting.

4. We propose to spend $126,769 on this work and supply 10%, or $12,677, as our contribution.

5. We hope to develop 100,000 tons of ore containing 6,000,000 lbs. (1½%) of nickel, 2,000,000 lbs. (1%) of copper, and 300,000 lbs. (.15%) of cobalt.

6. The exploration program is estimated to take 8 months.

We request favorable consideration of this application.

Yours very truly,

MacAFEE & COMPANY

By Donald B. MacAfee

Donald B. MacAfee

dbm/v

DMEA-2397

MACAFEE AND COMPANY

FRIDAY NICKEL MINE

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Report by A. H. Heller	Appendix No. 4
Photostatic copy of Section 2, Geology and Nickel Mineralization of the Julian-Cuyamaca Area, San Diego County, California	Appendix No. 5
DMA Form MF-100, General Technical Data and Attachments	Appendix No. 6

Form MF-100
(May 1951)

U. S. DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Form approved.
Budget Bureau No. 42-R1026.

GENERAL TECHNICAL DATA
FOR USE UNDER THE
DEFENSE PRODUCTION ACT OF 1950

NOT TO BE FILLED IN BY APPLICANT

Docket No. DMEA-2397

Date received 2-29-52

MacAfee & Company
1210 James Oviatt Building
617 South Olive Street
Los Angeles 14, California

Name and address of applicant

Date February 21, 1952

INSTRUCTIONS

This form is to be filed with Defense Minerals Administration, Department of the Interior, Washington 25, D. C. It should be accompanied by appropriate application form when a specific type of Government assistance is requested, in the form of (1) loan, (2) purchase contract, (3) Government guarantee of a private loan, (4) priorities or allocation of mining equipment, and maintenance, repair and operating supplies, and (5) other forms of Government assistance that might arise under the Act. Submit four (4) signed copies of the form and accompanying papers. Name and address should be stamped or typed on each sheet of this form and all accompanying papers. *When a question is inapplicable it should be so stated on the form.* Additional sheets may be attached in answering any questions or in supplying additional information. (IF YOU CANNOT ANSWER A QUESTION, SO STATE.) If a question is answered elsewhere indicate where answered. It is not necessary to answer it again.

GENERAL TECHNICAL DATA

Supply the following information on separate sheets, arranged, numbered, and lettered as indicated:

1. Materials produced:
   (*a*) What are the chief mine, mill, or smelter products?
   (*b*) What are the byproducts, if any?
2. Name(s) and type(s) of mine(s), mill(s), smelter(s), refinery(ies), pit(s), quarry (ies), drilling operation(s). Include old names of property, if any. Show extent of workings, including the following:
   (*a*) Linear feet of shafts.
   (*b*) Linear feet of drifts and crosscuts.
   (*c*) Linear feet of tunnels or adits.
   (*d*) Linear feet of other mine openings (explain briefly).

   Indicate whether mine is flooded or not. Describe any pumping problems. Give size or productive capacity.
3. For each operation listed above supply the following:
   (*a*) Distance and direction from nearest town and shipping point.
   (*b*) Mining district.
   (*c*) Township, Section, Range.
   (*d*) County, State.

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4. (*a*) State whether or not property is now in operation, and if in operation, by whom operated.
   (*b*) Are you operating this property as:
   ☐ Owner.
   ☐ Lessee.
   ☐ Contractor.
5. Number of years in production _____

   If not in production or operation, estimated date when production will begin _____
6. Experience of operators:

   Describe the mining and general business experience of (*a*) the applicant, and (*b*) the person or persons who manage the project.
7. History:
   (*a*) Give a statement, as complete as possible, of previous exploration, development, operation, and production of property, with reasons for suspension of operation.
   (*b*) State briefly the known history and production of adjoining and neighboring properties.
   (*c*) Furnish any available (private) reports that may apply to this application, including results of mine examinations, recommended exploration and development, and metallurgical investigations.

16—63792-2

APPENDIX No. 6

8. Names and addresses of Officers, Directors, or Partners, and in addition thereto, the five largest stockholders if applicant is a corporation.

Name and Address (a)	Official Title (If officer is also director indicate by "D") (b)	Total of Annual Salary, Commissions, Bonuses, Etc., Received From Applicant and Affiliates During Last Fiscal Year (c)	Estimated Net Worth Outside of Interest in Applicant (d)	Number of Shares Held in Applicant Corporation: Common (e)	Number of Shares Held in Applicant Corporation: Preferred (f)	Life Insurance Carried for Benefit of Applicant: Amount (g)	Life Insurance Carried for Benefit of Applicant: Net Cash Surrender Value After Loans (h)
Donald B. MacAfee	Partner	-0-	$75,000			-0-	
3110 La Suvida Drive							
Hollywood 28, California							
Merrill W. MacAfee	Partner	-0-	$53,000			-0-	
3901 Edgehill Drive							
Los Angeles 8, California							
	Total		x x x x x			x x x x x	x x x x x

If more lines are needed continue on separate sheet.

9. Capital Stock Issues:

For Corporate Applicants

Item	Authorized (a)	Outstanding (b)	Par Value (c)	Number of Shares Outstanding (d)	Dividend Rate Last Paid* (e)
Common stock	$	$	$		
INAPPLICABLE					
Preferred stock	$	$	$		

*Indicate period covered.

10. Production:

Item	Kind of Product (a)	1948 Total (b)	1949 Total (c)	1950 Total (d)	Present Average Monthly (e)
1. Quantity of product mined or quarried (Short, long, metric tons; barrels; pounds; etc.)	INAPPLICABLE				
2. Quantity of product processed (specify unit of measure and type of process)					
3. Quantity and grade of product sold or shipped (specify units of measure)					

11. Do you contemplate a change in the present average monthly rate of production? If so, state estimated maximum monthly production and basis of change. INAPPLICABLE

12. Ore or Mineral Reserves:

(a) Describe the ore or mineral deposit briefly. Accompany the application by any available report on the geology and ore reserves.

16—63792-1

See Appendix Nos. 2, 3, 4, & 5 attached to Form MF 103

(*b*) If deposit is other than placer:

(1) Submit assay plans and/or sections showing location and size of proved (measured) and probable (indicated) ore or mineral reserve.

(2) State the tonnage (indicate type of ton) and grade of each class of ore reserve, as above, and show how computed. Tabulated total ore reserve as follows: There is 5,500 tons indicated ore in the Friday Nickel Mine according to Report of S. C. Creasey, Appendix No. 5, attached to Form MF-103

TOTAL ORE OR MINERAL RESERVES

Ore or Mineral Reserve	Estimated Tons (a)	Metal or Mineral Content Per Ton (Grade) (b)	Gross Value Per Ton (c)	Recoverable Unit Value Per Ton (d)	Estimated Cost of Production Per Ton (e)
Measured (proved)					
Indicated (probable)					

(*c*) If placer: INAPPLICABLE

(1) Give estimated total yardage and average marketable mineral content of each deposit.

(2) Submit map showing location of placer deposit and surrounding area, with all test holes or pits. Submit logs of each hole and test pit with depth and average value of each.

(3) Describe gravel, stating whether fine, medium or coarse; loose, tight, cemented, or frozen, and whether it contains stumps or boulders more than 1 foot in diameter; if so, how large, and in what proportion.

(4) Describe bedrock, giving type (granite, sandstone, shale, etc.) and state whether it is hard or soft, smooth, uneven or rough.

(5) Describe overburden, stating whether loose, tight, or cemented; fine or coarse textured; furnish estimate of average thickness and total amount.

(6) Tabulate the reserves using the form outlined above for ore or mineral reserves.

13. Access Roads:

Give road distances to shipping, supply and residence points, stating kind and condition of roads.

14. Water Supply:

State source and quantity of water available for operations and whether sufficient for all seasons of year.

15. Power: INAPPLICABLE

State amount of power used, rate per hour, and source thereof.

16. Labor: INAPPLICABLE

State number and classes (miners, muckers, millmen, etc.) of men employed during a recent representative payroll period.

17. Equipment and Facilities:

Describe present equipment on the property, including buildings. (State condition.) List major pieces of equipment now owned or controlled and in serviceable condition available for this operation.

18. Are there any particular conditions or circumstances affecting your operations that are not described above? If so, explain.

CERTIFICATION

The undersigned company, and the official executing this certification on its behalf, hereby certify that the information contained in this form and accompanying papers is correct and complete to the best of their knowledge and belief.

MacAfee & Company
(Name of company)

By Donald B. MacAfee
(Signature of authorized official)

February 21, 1952
(Date)

Partner
(Title)

Title 18, U. S. Code (Crimes), Section 1001, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

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Par. 1 (a) The chief mine products will be nickel & copper

(b) The byproducts will be cobalt and platinum

APPENDIX No. 6

Par. 2. Friday Nickel Mine.

(a) There is 180 linear feet of shaft on the Friday Nickel Mine

(b) There are 380 linear feet of drifts and crosscuts in the Friday Nickel Mine

(c) There are no tunnels or adits

(d) There is a 40 linear feet raise in the Friday Nickel Mine. The mine is dry and no water is indicated in the workings so far.

Par. 3 (a) The Friday Nickel Mine is located 4 miles southeast from the town of Julian and 60 miles northeast from San Diego which would be the closest rail shipping point.

(b) Cleveland National Forest Mining District.

(c) T 13 S, R 4 E S B M

(d) San Diego County, California

Par. 4 (a) The property is not now in operation.

(b) We are the owners of this property.

Par. 5 The property has no production record.

Par. 6 (a & b) The partnership of MacAfee & Company, Consulting Engineers, is comprised of D. B. MacAfee and M. W. MacAfee.

D. B. MacAfee has had 25 years of successful mining and business experience connected with mining.

M. W. MacAfee has had 28 years of successful mining and business experience connected with mining.

The project will be managed by MacAfee & Company under the joint direction of the partners.

Par. 7 (a) See Appendix No. 2, 3, 4, & 5 attached to Form MF-103.

The property is still only a partially developed prospect.

(b) There is no known history of other nickel-copper mines in this district.

(c) See Appendix Nos. 2, 3, 4, & 5 attached to Form MF-103.

Par. 12 (b) (1 & 2) There is 5,500 tons indicated ore in the Friday Nickel Mine according to report of S. C. Creasey, Appendix No. 5, attached to Form MF-103.

Par. 13 A paved highway, No. U.S. 79, runs within 100 feet of the shaft. It is 100 miles by road to San Diego and 90 miles to Niland which would be the closest rail shipping points. Residence point would be Julian, 4 miles away.

Par. 14 Water may be obtained from springs near property sufficient for all purposes.

Par. 17 Old hoist house and bunkhouse in poor condition.

There is no equipment left on the property except the mine headframe.

Par. 12 This is a nickel-copper prospect that we wish to diamond drill and develop into a producing mine.

Form MF-103
(Revised June 1951)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Budget Bureau No. 42-R1035.1.

MF-103 Should Be Filed With General Technical Data Form MF-100

APPLICATION FOR AID FOR AN EXPLORATION PROJECT PURSUANT TO MINERAL ORDER 5, UNDER DEFENSE PRODUCTION ACT OF 1950

Not To Be Filled in by Applicant

Docket No. DMEA-2397
Metal or Mineral
Date Received 2-29-52
Amount $
Participation (Government %)

Name and address of applicant

MacAfee & Company
1210 James Oviatt Building
617 South Hill Street
Los Angeles 14, California

Date February 21, 1952

If you have already filed MF-100, give date filed herewith as Appendix of assistance requested Exploration Loan No. 6

DMA Docket Number (if available)

INSTRUCTIONS

Read Mineral Order 5, Regulations Governing Government Aid in Defense Projects, before completing this application. Submit four copies each, of the signed application form, General Technical Data Form MF-100, and answers to questions as specified, to Defense Minerals Administration, Department of the Interior, Washington 25, D. C., or to the nearest field executive office thereof, with your name and address on each sheet of the application and all accompanying papers. If you have previously filed MF-100, it is not necessary to file it again. However, you should indicate in space provided above the type of assistance previously applied for (loans, procurement contracts, etc.) and DMA Docket Number, if available. *When a question is inapplicable it should be so stated in the form.* Additional sheets should be attached in answering any questions or in supplying additional information. IF YOU CANNOT ANSWER A QUESTION, SO STATE.

1. (*a*) Give a description of the real property that will be in any way involved in the exploration project, including any existing mine or operating property.

   (*b*) If you are not the owner of the property, submit a copy of the lease, purchase option, or other agreements under which you are authorized to operate the property with each copy of your application.

   (*c*) Give the legal description of the exact parcel, plot, or area upon which the exploration is to be conducted.

   NOTE: (1) If both areas are the same, so state. The only obligation to repay the Government is from or not earnings from any commercial discovery made in the area specified in (*c*) above in which the exploration is to be conducted, and the expenditure of funds which may be charged as costs of the project must be limited to that area or to work necessary to perform the exploration in that area.

   (2) If applicant is not the owner of the property or if there are any liens or encumbrances against the property, copy of agreements of claimants, lienors, encumbrances, and lessors subordinating their interests in the property to the interest of the Government under the Exploration Project Contract will be required for attachment to the Contract.

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2. (*a*) What metals or minerals do you expect to find?

   (*b*) Furnish statement of the geologic features of your property, giving type of ore deposit and reasons for expecting to find commercial ore bodies. Illustrate with maps or sketches. If you have a geologic or engineering report, or assay maps showing width and grade, please send them with application, stating whether or not you wish to have them returned.

The information requested in questions 3, 4, 5, 6, 7, 8, and 9 below should be answered specifically and in detail, as this information will be attached to and incorporated as part of the Exploration Project Contract, if such contract is entered into with you by the Government.

ANSWER EACH QUESTION ON SEPARATE SHEETS OF PAPER AND SUBMIT A COPY OF EACH ANSWER FOR EACH COPY OF YOUR APPLICATION.

3. (*a*) Describe fully the proposed work and give the total cost of the project.

   (*b*) State the time required to start the project and to complete it.

4. Submit a map or sketch of the property involved showing a plan (and cross section, if needed) of the present mine workings and the *location of the proposed exploration work* as related to geologic features, such as contacts, veins, ore-bearing beds, etc.

5. Furnish an itemized list of existing facilities, buildings, installations, and fixtures with a statement of the cost of any necessary rehabilitation or repairs to put into useful and operable condition.

6. Furnish a detailed list of additional facilities, buildings, and fixtures to be purchased, installed, or erected by you, with the estimated cost of each item.

7. Furnish a detailed list of operating equipment, separated into items to be—

   (*a*) Rented

   (*b*) Purchased

   (*c*) Furnished by you

   with the rental, purchase price, or depreciation of each item, as the case may be, to be charged as a cost of the project.

8. Furnish an itemized schedule of labor, by numbers and classes (miners, muckers, etc.) and of supervisors by numbers and positions, with the maximum wages or salaries to be paid to each.

9. Furnish a detailed list with estimated cost of each item for materials, supplies, engineering, assaying, accounting, power, water, utilities, and any other items not provided for above.

10. (*a*) How much are you prepared to invest in the proposed project?

    (*b*) Is this amount sufficient to pay your part of the cost of the project, in accordance with the regulations on Government participation (Sec. 9 of MO–5)?

11. State any conditions or circumstances regarding the property not sufficiently brought out by the foregoing questions.

CERTIFICATION

The undersigned company, and the official executing this certification on its behalf, hereby certify that the information contained in this form and accompanying papers is correct and complete to the best of their knowledge and belief.

MacAfee & Company
(Name of company)

By [signature]
(Signature of authorized official)

February 21, 1952
(Date)

Partner
(Title)

Title 18, U. S. Code (Crimes), Section 1001, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

U. S. GOVERNMENT PRINTING OFFICE 16—64067-2

CABLE ADDRESS MACAFEE TELEPHONE TRINITY 5939

MACAFEE AND COMPANY

MINE • MILL AND INDUSTRIAL PLANT REPRESENTATION

12TH FLOOR • JAMES OVIATT BUILDING • 617 SOUTH OLIVE STREET • LOS ANGELES 14 • CALIFORNIA

ENGINEERING DEPARTMENT

U. S. DEPARTMENT OF THE INTERIOR

DEFENSE MINERALS ADMINISTRATION

Referring to From MF-103 (Revised June 1951) the following notations apply to the paragraphs as enumerated in this form:

Par. 1 (a) The real property consists of 50.58 acres consisting of 10.58 acres owned in fee and 2 and a fraction mining claims contiguous, as follows -- "that portion of the Southwest Quarter of the Southwest Quarter of Section 15, Township 13 South Range 4 East, San Bernardino Meridian, County of San Diego, State of California, described as follows: "Commencing at the Northwest corner of the Southwest Quarter of the Southwest Quarter of said Section 15; thence South along the West line thereof, 28 rods thereon at right angles, East 56 rods; thence at right angles North 28 rods to a point in the North line of said Southwest Quarter of the Southwest Quarter of said Section 15; thence West along said North line, 56 rods to point of commencement." This parcel of land contains 10.58 acres owned in fee.

"The Friday Extension No.1 Mining Claim
Friday Extension No. 2 Mining Claim
Friday Extension Fraction Mining Claim
totalling 40 acres, located in the Northwest Quarter of the Southwest Quarter of Section 15, Township 13 South, Range 4 East, San Bernardino Meridian, in the Cleveland National Forest Mining District, in San Diego County, California."

The Attached plot plan, Appendix No. 1, Geologic - Topographic and Claim Map, Drawing FNM-1, shows the location of the property.

The location and workings of the Friday Nickel Mine are shows on the plot plan and the Exploration Map, Drawing FNM-2.

Par. 1 (b) We are the owners of the fee property and assignees of the mining claims above listed. There are no liens or encumbrances against these properties.

Par. 1 (c) The property on which the exploration work is to be conducted is the same as that described legally in Par. 1 (a).

Par. 2 (a) We expect to find nickel, copper, cobalt and small amounts of platinum, in massive pyrrhotite ore bodies.

(b) Attached you will find copies of the following engineering and geological reports on this property:

Appendix No. 2. Original report on Geology and Nickel Mineralization of the Julian-Cuyamaca Area, San Diego County, California. By C. S. Creasey, Geologist, Geological Survey, United States Department of the Interior, November 1945.

Appendix No. 3. Report on the Friday Nickel Mine, San Diego County, California, October 8, 1942, by C. F. Tolman and Z. K. Melcon, Stanford University for Henry J. Kaiser Company.

Appendix No. 4. General Report on the Friday Mine and the Nickel-Norite Batholith of the Cuyamaca Area, San Diego County, California, by A. H. Heller.

Appendix No. 5. California Journal of Mines and Geology, State Mineralogists Report Vol. 42, No. 1, January 1946. Photostatic copy of Section 2 - Geology and Nickel Mineralization of the Julian Cuyamaca Area, San Diego County, California, by S. C. Creasey.

Par. 3 (a) Proposed work and total cost of the project are as follows --

1 - We propose, for Step 1, to drill 1 vertical hole and 8 radiating holes from the bottom of the vertical shaft at the 170 ft. level or thereabouts, 6 radiating holes from the shaft at the 132 ft. level, and 4 vertical holes all as shown on the Geologic and Exploration Maps FNM-1 and FNM-2.

These holes are for the purpose of checking the known ore occurances in the underground workings and those indicated by former diamond drilling. These holes will also give an idea of the extent of the known ore body and the indicated ore bodies with a comparatively low capital expenditure. The aim is to connect up the indicated ore bodies with the known ore body so an intelligent mining program can be laid out to fully explore and block out the ore in this mine.

2 - For Step 2, we propose to drill 20 vertical holes from the surface to define the limits of the ore body or ore bodies beyond that expected to be indicated from the radial drilling in step one.

3 - The radial drilling in Step 1 and the vertical drilling in Step 2 will give good indications of the extent, depth and location of the ore bodies, then Step 3, the sinking of the shaft to the 200 ft. level or deeper and the driving of development drifts and crosscuts will be undertaken, to block out the ore into definite reserves. It is estimated a total of 500 feet of drifting and cross cutting will be required.

In order to proceed with Step 1, it will be necessary to do some repair work on the shaft timbers and clean out the bottom of the vertical shaft for the drill set-up. The 132 ft. level station will also have to be re-timbered and made safe.

The hoist and compressor were stolen from the shaft during the war and it is presumed that the hoisting cage was dropped to the bottom of the shaft. The ladders are gone below the 132 ft. level so thishas not been ascertained.

It is proposed to buy a 100 cu. ft. portable gasoline driven compressor, a tugger air hoist, cable and a bucket, and a jack hammer with accessory equipment, to clean out the shaft, enlarge the 132 ft. station and cut a station at the 170 ft. level which is the bottom of the vertical shaft. This will be necessary before the diamond drilling from the shaft locations can be undertaken.

For Step 3, a gasoline driven hoist for the bucket and cage will have to be installed, which will facilitate the hoisting for the shaft sinking and underground exploration work.

A schedule of the drill holes follows --

SCHEDULE OF DRILL HOLES
Step. # 1

Hole	Number	Description	Length	Total	Est.Drill Time	Est.Cost @ $4 ft.
A	1	Vertical - bottom of shaft	200'	200'	30 hr.	$800
B to I inc.	7	Inclination 45° from bottom of shaft, radial on 45° circle	280' ea	1960'	270 "	7840
G	1	Inclination 22½° from bottom of shaft	280'	280'	40 "	1120
J to O inc.	6	Inclination 15° from 132' level of shaft radial on 60° circle	270'ea.	1620'	220 "	6480
P - S	4	Vertical holes from surface	370'ea.	1480'	210 "	5920
		Totals		5540'	770 hr. 97 days	$22,160
		Step # 2				
	20	Vertical drill holes average	250'ea.	5000'	84 days	20,000
				10,540'	181 days	$42,160

The overall project cost estimates are as follows: --

Diamond Drilling Step 1 - 5,540 ft. @ $4.00/ft.	$22,160
Diamond Drilling Step 2 - 5000 ft. @ $4.00/ft.	20,000
Repair of existing facilities	1,980
Purchased equipment for Step 1	11,297
Purchased equipment for Step 3	4,058
Labor and supervision	38,720
Material and supplies	7,519
Assaying and Analytical work	21,835
Consulting engineering fees	6,400
Travel, hotel, meals, etc.	1,600
Los Angeles office overhead for accounting, telephone, etc.	1,200
	$ 126,769

Par. 3 (b) The time required to start and complete the project is estimated as follows --

Repair work on the shaft and preparation for underground diamond drilling can start as soon as the project is approved and the loan granted.

It is estimated that the project will require 8 months to complete.

Par. 4 Maps

The following maps are attached as Appendix No. 1 --

Friday Nickel Mine - Geologic - Topographic and Claim Map
Drawing No. FNM - 1

Friday Nickel Mine - Exploration Map
Drawing No. FNM - 2

Par. 5 Existing Facilities

	Est. Cost of Repairs
Wooden Headframe	$ 200
Hoist & Compressor House	350
Bunkhouse	750
Shaft Timbers	500
	1,800
Contingencies 10%	180
Total	$ 1,980

Par. 6 No additional facilities, buildings or fixtures to be purchased, installed or erected under this program.

Par. 7 Operating Equipment.

(a) No operating equipment to be rented except the diamond drill which will be a contract basis of $4.00/ft drilled, with equipment and labor furnished by the contractor.

(b) Purchased equipment

Project Step 1

Quantity	Item	Cost
1	105 cu. ft. IR Compressor gasoline driven	$3,550
1	1000 lb. pull single drum IR air hoist	642
250 ft.	5/8" x 6-19 hoisting cable	65
1	30" sheave with bearings	60
1	1000 lb. steel sinking bucket	75
1	Bell system 250 ft.	30
1	Rock drill IR #40	345
1	IR Jack leg	195
1	15 gal. water tank with manifold	74
1	Line oiler	29
200 ft.	3/4" air hose with couplings	110
200 ft.	1/2" water hose with couplings	125
1	Lot of connections	15
2 sets	Jack rods 2'7", 5'3", 7'10" & 10'6"	175
4 sets	Carset Carbide bits 1 3/8", 1 1/2" & 1 5/8" gage	255
1	2000 Watt Kohler electric light plan	796
1	Lot of wiring sockets, switches & lights	150
1	500 gal. water tank	65
1	3/4 Ton Ford pick-up truck	2,025
1	Acetylene welding outfit	175
1	Hand forge with blacksmith tools	65
1	60 lb. Anvil	24
1	Lot of hand tools, picks, shovels, saws, etc.	150
1	Vise	30
1	3/4" electric drill with set of bits	85
		10,270
	Contingencies 10%	1,027
		$11,297

Project Step 2

No additional equipment required.

Project Step 3

Quantity	Item	Cost
1	2000 lb. pull gasoline hoist	$750
2	16 cu. ft. mine cars	500
1000 ft.	12 lb. mine rail with bolts, spikes & fish plates 4.5 tons @ $190	855
1	Rail binder	29
1000 ft.	2" black iron pipe, T & C with valves & fittings	400
1	Jack bit grinder	155
1	Lot camp furniture, stoves, beds, chairs, etc.	1,000
		3,689
	Contingencies 10%	369
		$4,058

Par. 8 Labor.

Quantity	Classification	Rate
1	Diamond drill operator	furnished by diamond drilling contractor.
1	Diamond drill helper	
2	Hoist man	@ $20.75/8 hr. shift, including insurance & compensation
2	Miners	@ $19.80/8 hr. shift, including insurance & compensation
2	Muckers	@ $19.00/8 hr. shift, including insurance & compensation
1	Superintendent	@ $750.00/mo., including insurance & compensation
1	Engineer (Surveying & sampling)	@ $600.00/ month.

Payroll per month

2	Hoist men	@ 1080/mo x 8 mo.	$8640
2	Mixers	@ 1020/mo x 8 mo.	8160
2	Muckers	@ 950/mo. x 8 mo.	7600
1	Superintendent	@ 750/mo. x 8 mo.	6000
1	Engineer	@ 600/mo x 8 mo.	4800
			$35,200
	Contingent labor 10%		3,520
			$38,720

Par. 9 Operating Costs --

Quantity	Item	Cost
5000 bd. ft.	Mine timber, lagging, wedges, etc.	$1000
150 lb.	Tie rods for shaft timbers	75
5 kegs	Nails	60
2	Steel muck sheets	50
	Carbide, powder, fuse, caps	2450
	Gasoline, oil, grease	1600
400	6' diamond drill core boxes	1600
		6,835
	Contingencies 10%	684
		$7,519

Assaying

1100	assays for nickel @ $5.00	5,500
1100	" " copper @ 2.50	2,750
200	" " cobalt @ 7.50	1,500
200	" " platinum @ 5.00	1,000
100	" " iron @ 3.50	350
100	" " sulfur @ 5.00	500
50	Spectrographic Analyses @ 35.00	1,750
25	Rock classifications @ 100.00	2,500
20	Mineralogical classifications @ 200.00	4,000
		$19,850
	Contingent analyses 10%	1,985
	Total	$21,835

Consulting Engineering Fees 8 days/mo. @ $100 x 8 mo.	6,400
Travel from Los Angeles to Julian & misc. meals, hotel, etc.	1,600
Los Angeles Office overhead for accounting, etc. @ $150.00/mo.	1,200
Total	$9,200

Par. 10 (a) We are prepared to invest 10%, or $12,677 in the project.

(b) This amount is sufficient to pay our part of the cost of the project in accordance with Sec. 9 of MO-5.

Par. 11 We believe the foregoing questions and answers cover all conditions and circumstances pertinent to this property and project.

GEOLOGY AND NICKEL MINERALIZATION OF THE JULIAN-CUYAMACA AREA, SAN DIEGO COUNTY, CALIFORNIA*

By S. C. Creasey **
United States Department of the Interior, Geological Survey

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SUMMARY AND RECOMMENDATIONS

The Julian-Cuyamaca area is in the San Diego Mountains, one of the Peninsular Ranges of southern California. It lies in San Diego County, about 3 miles south of Julian, and approximately 60 miles northeast of San Diego. The area was mapped, and its nickel mineralization studied, from March to June, 1944; the work was part of the U. S. Geological Survey's program of strategic mineral investigations.

The only mine in the area is the old Friday nickel mine, and the only other openings are a few shallow prospect pits and trenches, and five short diamond-drill holes. The original Friday shaft, sunk on an outcrop of gossan containing a few dollars per ton in gold, was abandoned and now is covered by dump material, but a later shaft, south of the old one, was accessible in 1944. Partly oxidized sulfide minerals were found on the 132-foot level and more massive sulfides on the 180-foot level, which is the lowest in the mine.

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** Geologist, Geological Survey, United States Department of the Interior.

APPENDIX No. 5

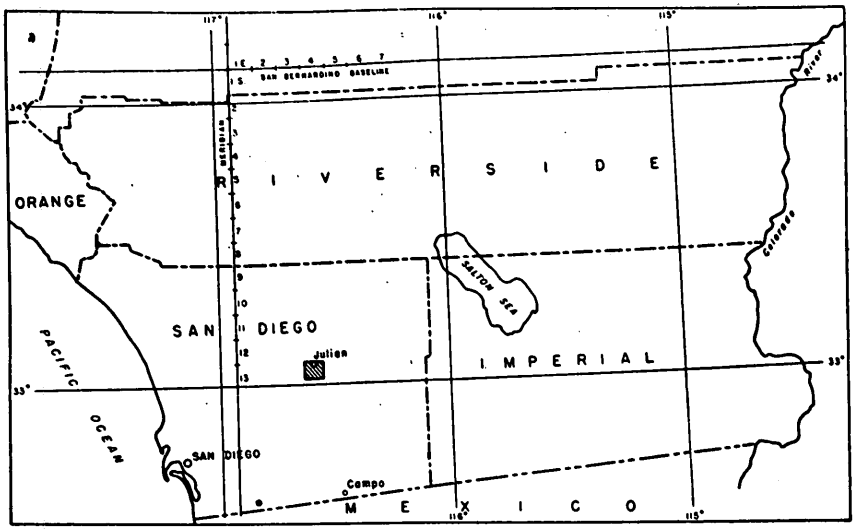

FIG. 1. Index map showing location of the Julian-Cuyamaca area, San Diego County, California.

Three major rock units are recognized in the area: the Julian schist, probably of Triassic age; the Stonewall quartz diorite, which is intrusive into the schist; and the Cuyamaca gabbro group, which is younger than the quartz diorite. The rocks in this group range from gabbro and norite, to periodotite and pyroxenite. The Friday mine contains the only body of sulfides exposed in the area, though gossan outcrops and float in the Inspiration Point and Pine Hills salients of the Cuyamaca gabbro group indicate other mineralized zones of unknown but probably small size.

The mineralized zone at the Friday mine is irregular in shape. Where exposed it is from 6 feet to over 20 feet wide and 55 feet long; its depth has not been fully determined. Assuming an average width of 15 feet and a length of 55 feet, there is estimated to be approximately 5,000 tons of indicated ore in a block between the 132- and 180-foot levels of the Friday shaft. Below the 180-foot level the ore body contains about 90 tons of inferred ore per foot of depth for a limited distance. The average for all assays from both oxidized and unoxidized rock is about 2.0 percent Ni, but the sulfide ore will probably average between 2.5 and 3.0 percent nickel and between 0.5 and 1.0 percent copper. As much as 0.15 percent cobalt is found in some of the massive sulfide and the sulfate resulting from oxidation of the ore, but the average cobalt content is not known. The sulfide minerals recognized in the Friday deposit are pyrrhotite, pentlandite, violarite (NiS_2), pyrite, and chalcopyrite.

Samples of gossan from the dump of the Friday mine and from the Inspiration Point area in the Pine Hills contain from .03 to 1.45 percent nickel.

Additional small bodies of nickel ore may be found by further exploration, but the remoteness from railways would make it difficult to mine economically nickel deposits of small mine tonnage, and the known occurrences of ore give little hope of developing economically large low-

grade reserves, such as would justify the construction of a mill. The area would merit further study, however, if at any time in the future a general investigation of the nickel resources of the country were undertaken.

Before diamond drilling, trenching, or underground exploration are undertaken, the area should be further explored by geophysical methods, keeping in mind particularly the possible influence of magnetic materials locally concentrated in the soil.

INTRODUCTION

Location

The Julian-Cuyamaca area is in the San Diego Mountains, one of the Peninsular Ranges in southern California. It is 3 miles south of Julian, San Diego County, and approximately 60 miles northeast of San Diego, California. State highway 79 passes through the northeast corner of the area, and maintained oiled county roads serve the central and western parts. The nearest railroad station is at El Cajon, California, about 45 miles from Julian on the main road to San Diego.

Scope of Work

The field work in the Julian-Cuyamaca area was done by the writer and Robert M. Hutchinson from March 3 to the first of June, 1944. Using a triangulation network for control, approximately one square mile extending from south of the Friday mine north to Inspiration Point was mapped by plane table (pl. 3). In addition, 9 square miles, which includes the northern one-fourth of the intrusive Cuyamaca gabbro group and the adjacent schist and quartz diorite, were mapped in less detail on aerial photographs (pl. 2). Detailed mapping is difficult because of thick brush and local dense stands of evergreen and deciduous trees. In addition, the rocks comprising the Cuyamaca gabbro group are deeply weathered, and the only outcrops consist of residual boulders in a matrix of soil and rock fragments.

Acknowledgments

B. S. Butler visited the party and gave many helpful suggestions on the field work, and P. J. Shenon advised regarding general geophysical problems connected with nickel deposits. The Geological Survey laboratory in Washington, D. C., made all assays, mineral determinations, and magnetic separations of soil samples. Mineral determinations were by Charles Milton and nickel determinations by F. S. Grimaldi. The writer is indebted to Helen Cannon, M. D. Crittenden, and C. A. Anderson for critical reading of the manuscript.

Previous Geologic and Geophysical Work

Calkins (16), who visited the Julian area in 1916, described briefly the regional geology and the underground workings and mineralization of the Friday mine. Tolman and Rogers (16) studied a suite of sulfide specimens from the Friday mine. In summary they state, "In the Friday deposit we have the following sequence of events: (1) The crystallization of olivine, pyroxenes, and plagioclase. (2) A slight development of hornblende by magmatic alteration. (3) The formation of pyrrhotite, pentlandite, and chalcopyrite in the order named by

the replacement of the above mentioned silicates. (4) The development of tremolite as a hydrothermal mineral and the development of pentlandite of a second generation in cracks in pyrrhotite. (5) The extensive development of calcite and marcasite veinlets." Hudson (22) mapped the geology of the Julian district during 1917 to 1919 on a scale of one inch equals one mile. His report emphasizes areal geology but includes a description of the Friday mine and a discussion of the genesis of the ore, which he believed to be of syngenetic magmatic origin. Donnelly (34), who mapped the Julian district in the summers of 1932 and 1933, emphasized the economic importance of the gold-bearing quartz veins but only briefly mentioned the Cuyamaca gabbro and associated nickel mineralization.

Two private reports on the Friday mine were available to the writer, one by C. F. Tolman and Z. K. Melcon, and the other by H. J. Fraser. Melcon, during his examination of the Friday mine and the adjacent area, sampled the underground workings and systematically made qualitative soil analyses around the mine. Fraser, using a Schmidt-type vertical magnetometer, made a brief geophysical study of the area around the Friday mine and Inspiration Point.

GEOLOGY

Julian Schist

The Julian schist is the oldest rock in the area. Fairbanks (93), on the basis of lithologic correlation with formations in the Santa Ana Mountains containing a Triassic fauna, and Hudson (22, pp. 188-200), who found a Triassic ammonite, designated the Julian schist to be of Triassic age. In 1914, Merrill (14, p. 12) assigned the name of "Julian group" to the crystalline schists in San Diego County and cited the schists near Julian as typical, especially of the mica schists. Subsequently, Hudson gave the formation name, Julian schist, to the rocks in the Julian area.

The Julian schist crops out over a known length of more than 12 miles and a width ranging from three-quarters of a mile to 1½ miles. It is a meta-sedimentary series composed chiefly of quartz-mica schists, quartzite, and locally of a relatively coarse-grained quartz-biotite gneiss that is in places very similar to the gneissoid phase of the younger Stonewall quartz diorite. The quartz-biotite gneiss may be an injection gneiss or possibly a meta-tuff. The degree of metamorphism is moderate, corresponding to the "biotite grade," but local areas of more intense metamorphism are indicated by two localities of mica-sillimanite schist.

The quartz-mica schists, the most abundant metamorphic rocks, are of three types; quartz-biotite schists, quartz-biotite-muscovite schists, and quartz-muscovite schists, listed in order of abundance. They have a strong schistosity which is roughly parallel to the original bedding wherever the latter is discernible in adjacent quartzite members. Quartz and feldspar are always present, and commonly they make up about half of the rock.

The quartzites are in lenses of variable length and thickness ranging from less than one foot to over 500 feet, as shown in the quartzite zone 1500 feet west of Inspiration Point. Muscovite-quartz schists usually are associated with the quartzite. Relic sedimentary structures such as cross bedding are visible in some of the quartzites.

No nickel mineralization is known to occur in the main mass of Julian schist; however, nickel mineralization and gossan are in Cuyamaca gabbro adjacent to schist inclusions in the Friday mine and near coordinate 7500N—10000E (pl. 3). Julian schist is the host rock for part of the gold-bearing quartz veins in the Julian district.

Stonewall Quartz Diorite

The Stonewall quartz diorite is a unit of the large mass of granitic rock that comprises much of the Peninsular Range in San Diego County. Because of the uncertain age relations of similar rocks in adjacent areas, a new formation name was given to it by Hudson (22, p. 19) after Stonewall Peak, which is composed of this quartz diorite. The Stonewall quartz diorite intrudes the Julian schist and is probably of Mesozoic age. It is a host rock for gold-bearing quartz veins in the Julian district but is not known to contain nickel deposits.

The Stonewall quartz diorite is composed of biotite, quartz, feldspar, and commonly a little sulfide, probably pyrite. Hudson reports the feldspar to be predominantly plagioclase, varying from albite to andesine, with subordinate amounts of orthoclase. In the Julian-Cuyamaca area the quartz diorite is locally gneissoid, and, where it approaches a true biotite gneiss in texture and structure, it is difficult to separate from the coarse-grained para-gneiss of the Julian schist.

Cuyamaca Gabbro Group [1]

The Cuyamaca gabbro, originally described as the "Cuyamaca basic intrusive" (Hudson 22, p. 193), is the youngest formation in the area and is intrusive into the Julian schist and Stonewall quartz diorite. The outline of the intrusive complex is irregular, but in general it is elongate to the north with the length about three times the average width; its areal extent is about 25 square miles. Approximately the northern one-fourth of the Cuyamaca gabbro was mapped.

The principal rock types comprising the Cuyamaca gabbro, as determined by hand-lens examination, are peridotite, pyroxenite, norite, gabbro, lamprophyre dikes, and related rocks. Hypersthene diorites and augite diorites were reported from the area by Hudson (22, p. 193) on the basis of microscopic determination of the feldspar composition. Fine-grained lamprophyre dikes are common and some of them are large, but it was not feasible to map them because of poor outcrops. Plagioclase feldspar, olivine, augite, hypersthene, and brown hornblende, in varying proportions, constitute over 90 percent of these rocks. In addition, the rocks contain as much as three percent pyrrhotite, a little magnetite, and a trace of green spinel. Uralite (?), a secondary amphibole, commonly occurs as reaction rims around olivine and pyroxenes.

The Cuyamaca gabbro was subdivided in the field on the estimated content of feldspar, and, where possible, further subdivisions were based on the ferromagnesian minerals. Other members might be separated on textural differences with additional mapping. The subdivisions are purely arbitrary, and the units are generalized and include exceptions, as the contacts are necessarily gradational and arbitrarily placed.

[1] After this paper was in proof, Merriam published an article in which he used the term "San Marcos gabbro" for the rocks that include the Cuyamaca gabbro group herein described. (Merriam, R. 46; see also Hurlbut, C. S., Jr. 35, and Miller, F. S. 37, 38.)

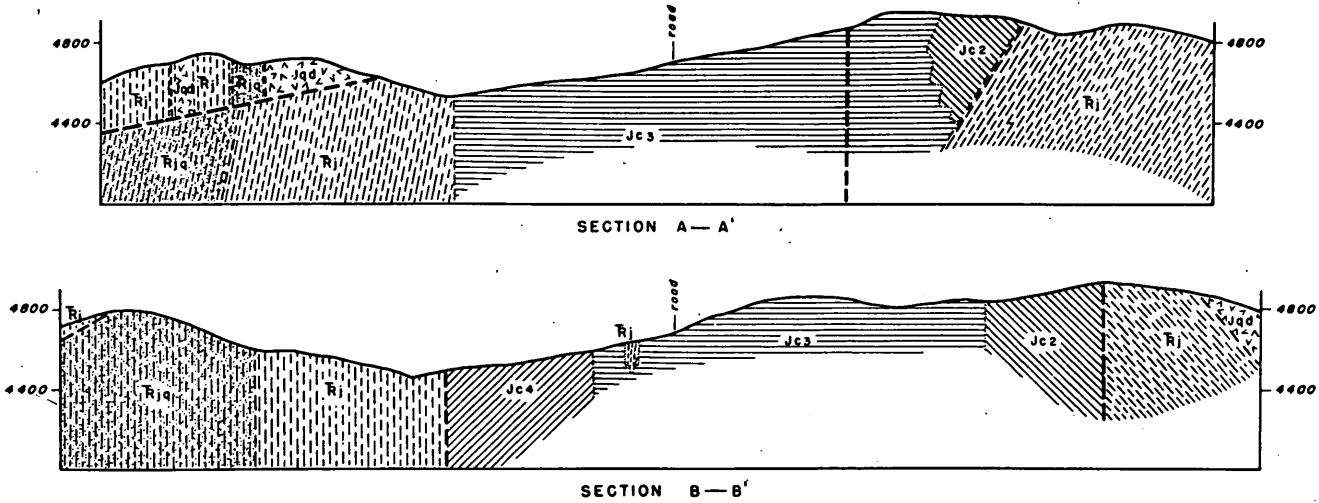

Fig. 2. Geologic sections, Friday mine—Inspiration Point area.

An area from Inspiration Point south almost to the Friday mine, indicated on the 400-scale map (pl. 3) by the overlay pattern, was differentiated because of the alteration of the ferromagnesian minerals, chiefly olivine and pyroxene. These minerals are partly to completely altered to fibrous, light green amphibole, presumably uralite, but the parent minerals commonly can be recognized as residual cores. This alteration is not uniform, being most complete at Inspiration Point and least complete along the ridges to the southeast. As nearly as can be determined by hand lens examination, the mineralogical composition of these rocks prior to the alteration of the ferromagnesian minerals to uralite (?) was similar to the normal gabbros and norites. Residual hypersthene, olivine, and brown hornblende enclosing other mineral grains are common and in some places are found in the same hand specimen. This altered area also contains the most gossan outcrops, float, and chlorite-talc rock. The association suggests that there may be a genetic relationship between the widespread rock alteration, which is not found extensively elsewhere in the region, and the later nickel mineralization.

Except for the uralite (?), which is probably of deuteric origin, the ferromagnesian mineral present apparently does not signify any difference in the parent magma but depends on the completeness of reaction. Where conditions were favorable for free exchange of elements and slow cooling of the magma, augite and hypersthene are the most abundant, whereas in other areas where the necessary reactions were impeded for one reason or another, olivine predominates. Local zones in the magma, however, were richer in iron and magnesium and are represented by the peridotites and mafic norites and gabbros.

Rocks Containing Less than 15 Percent Feldspar

The mafic norites and gabbros, pyroxenites, and peridotites constitute the phase of Cuyamaca gabbro containing less than 15 percent feldspar. They occur in three areas located (pl. 2): (1) northwest of the Friday mine, (2) the northern end of Inspiration Point, and (3) the western edge of Pine Hills, and they are all in salients extending into the schist and quartz diorite. The nickel-mineralized zone in the Friday mine and the gossan float near Pine Hills are associated, in part at least, with rocks of this composition.

The area extending northwest from the Friday mine is the largest of the three and is defined more clearly than the others by a sharp intrusive contact on the north and west between rocks of this phase and those containing over 40 percent feldspar. The rock is composed predominately of olivine and pyroxene, less than 15 percent feldspar, a small amount of amphibole, and here and there pyrrhotite, which composes up to 3 percent of the rock. Hudson (22, p. 200) reported peridotite from the 180-foot level of the Friday mine. The pyroxenes are black augite and brown to pink hypersthene, and the amphibole is brown hornblende in large crystals enclosing smaller grains of olivine, pyroxene, and feldspar. Olivine, although abundant and easily recognized, commonly has coronas of a light green mineral.

The Inspiration Point area is the smallest of the three. It lies roughly parallel to the contact between the Cuyamaca gabbro and schist country rock and less than 300 feet from it. The rocks of this area, being within the zone of uralitic (?) alteration, are partly to completely

altered to the light green fibrous amphibole. In the northern end of the area, the original mafic minerals appear to be wholly destroyed, but in the eastern and central sections the alteration is incomplete, leaving residual cores of olivine and pyroxene.

The rocks in the Pine Hills area are similar in appearance to those in the area near the Friday mine. The ratio of dark to light minerals is about the same in both areas, but the area near Pine Hills contains more olivine and less pyroxene. The contact of the Pine Hills area is gradational into the phase of Cuyamaca gabbro containing from 15 to 40 percent feldspar.

Rock Containing from 15 to 40 Percent Feldspar

The rock containing from 15 to 40 percent feldspar includes the intermediate types of the Cuyamaca gabbro. In general, the texture is similar to the more mafic types and is a little coarser than the rocks richer in feldspar. Black augite and brown hornblende containing inclusions of other minerals are the most abundant mafic minerals, and pyrrhotite is common in amounts up to 3 percent of the rock. The general distribution of these rocks is similar to that of the rocks containing less than 15 percent feldspar, both groups occurring in salients that extend into the country rock. Gossans occur in rocks of this phase in the Inspiration Point salient.

Rock Containing Over 40 Percent Feldspar

The phase of the Cuyamaca gabbro containing over 40 percent feldspar contains the most gossan outcrops and float and shows the greatest variation in rock texture and mineral composition. Its areal extent is at least five times that of any other member. The most persistent ferromagnesian minerals are hypersthene and brown hornblende with inclusions, yet augite and olivine are common, although not always present. Here and there hybrid phases occur near the contact with the Julian schist and the Stonewall quartz diorite. They are characterized by a high feldspar content, the presence of biotite, and little or no olivine or pyroxene. According to Hudson, some of these hybrid rocks contain a little free quartz.

The small isolated bodies near Deer Lake are slightly different from the average. They consistently contain from 40 to 50 percent feldspar and many brown hornblende crystals as large as 4 inches in length, but in other respects they are similar to the rocks in the salient to the southeast. The rocks cropping out along Cedar Creek show considerable range in grain size and variation in texture, such as the large brown hornblende crystals containing inclusions.

The member of the Cuyamaca gabbro at the southern end of the Inspiration Point salient was separated from the phase containing over 40 percent feldspar because of the consistent mineral composition, texture, and percentage of light and dark minerals. It is composed of 60-70 percent feldspar, approximately 25-35 percent olivine, locally a little pink hypersthene and brown hornblende, and from a trace to 3 percent pyrrhotite.

Pegmatite Dikes

Pegmatite dikes are common in all types of rocks, especially the Stonewall quartz diorite. Most of the dikes, being small and discontinuous, are represented by a single outcrop. Orthoclase and quartz

with some black tourmaline are the principal minerals in most of the dikes, but a few of the dikes contain muscovite nests. The largest and most continuous pegmatites are shown on plate 3.

The genetic association of the pegmatites was not determined with assurance because of the small size of the area mapped. However, the pegmatites may be of two ages related in part to the Stonewall quartz diorite and in part to the Rattlesnake granite, which is exposed several miles southeast of the area covered by this report and is thought by Hudson (22, p. 208) to be essentially contemporaneous with the Cuyamaca gabbro group. Presumably, the pegmatites found in the Cuyamaca gabbro would be related to this granite, whereas the pegmatites in the older rocks could be related to either the Stonewall quartz diorite or the Rattlesnake granite.

Lacustrine Deposit

The lacustrine deposit, as exposed in deep gullies, consists of interbedded sedimentary strata of varying composition and texture, including peat beds. The thickness of lake beds exposed in the gullies is estimated at 75 feet, but the total thickness is unknown. Presumably the lake was formed in Quaternary time by an upthrown fault block that dammed a small stream. Subsequent erosion cut a steep-walled canyon through the fault block, and the lake drained.

Colluvium and Alluvium

The areas mapped as colluvium and alluvium contain no outcrops and are composed of soil transported as much as several hundred feet from the source rock and of stream-deposited sediments. The alluvium and colluvium in sections 7, 8, 17, and 18 occur in an area of gently rolling hills separated by grassy fields and meandering streams of low gradient. This grassy upland, which is extensively utilized for fruit orchards and stock raising, lies at a higher elevation than much of the more rugged country and may represent the remnant of an older erosion surface.

Structure

The structural history of the Julian-Cuyamaca area includes folding, faulting, and intrusion. The recognizable folding is limited to the Julian schist and the gneissoid parts of the quartz diorite, but faults, with at least two periods of movement, cut all three units.

In general, the foliation in the Julian schist, which is parallel to the original bedding, and in the gneissoid Stonewall quartz diorite is parallel to the contact of the Cuyamaca gabbro; however, local areas with discordant contacts are common. As a result of this general parallelism, the salients of Cuyamaca gabbro are bounded by folds in the schist and gneissoid diorite. Such folds are clearly developed around the Pine Hills salient and the salient in sections 16 and 17. The schist, changing abruptly in dip from north to south at the boundary between sections 7 and 8, is overturned around Pine Hills. It cannot be stated positively, without mapping a larger area of Julian schist, whether the folding in the schist resulted from force of intrusion or whether the Cuyamaca was intruded into the axes of preexisting folds. The writer favors the former explanation as Hudson's map does not indicate any folds of comparable size in the schist except in the vicinity of the Cuyamaca gabbro.

Because of poor outcrops and uniform lithology of the Julian schist, the existence of faults is difficult to establish. All of the faults found are in or near the Inspiration Point salient, which was mapped in more detail with the hope of finding structures that might be important in the localization of ore bodies of epigenetic origin. Undoubtedly many faults could be found in other areas by more detailed mapping. The faults have high-angle dips and strike northeast as do the more important fractures in the Friday mine, and some of the faults have at least two periods of movement separated in time by the intrusion of the gabbro. The amount of movement preceding the intrusion of the gabbro is unknown, but undoubtedly it was greater than the post-gabbro movement, which has a strike-slip displacement ranging from about 300 to about 1500 feet. The two periods of movement on the fault exposed in the center of section 16 are established clearly by the wide quartzite band that is present in the Julian schist north of the fault. The quartzite band is not present in the offset part of the schist south of the fault. The distribution of the schist, quartz diorite, and gabbro along the faults in section 15 is also strongly indicative of two periods of faulting.

Because these faults were active both before and after the intrusion of the gabbro and are similar to breaks in the Friday mine that appear, in part, to control the mineralization, they merit consideration as a possible controlling factor in localization of ore, if further exploration or prospecting is planned for the area. Whether or not mineralization has occurred along them is not known, but the age and attitude of the faults are favorable.

FRIDAY NICKEL MINE

History and Development

The Friday nickel mine, which is owned by E. H. A. Andrews, 2716 84th Place, Inglewood, California; Raymond Jacobs, Julian, California; and associates, consists of one patented claim and the adjacent 80 acres to the north. The date of the first exploration on the gossan outcrop of the Friday mine is not known but was probably in the 1880's. Prior to 1918, the Friday Mining Company sank a shaft on the gossan outcrop, which contained a few dollars per ton in gold. This original shaft was abandoned, and the site now is covered by dump material; but a later shaft, located south of the old one, was accessible in 1944. Development work (pl. 4) consists of a 160-foot vertical shaft with a 55-degree incline extending from the bottom of the shaft to the 180-foot level. About 132 feet from the collar of the shaft a 105-foot drift runs to the northeast. At 65 feet from the shaft on the 132-foot level a 14-foot crosscut extends to the south, and at 105 feet a 17-foot crosscut extends to the northwest ending in a winze to the 180-foot level. The 180-foot level consists partly of a 144-foot drift running northeast. At the face of the drift a 48-degree incline follows the schist for a distance of 25 feet. About 67 feet from the incline that joins the shaft, short stub crosscuts extend north and south, and at 100 feet, a 10-foot crosscut extends to the south. A winding crosscut 105 feet from the incline runs northward 59 feet to the winze from the 132-foot level and extends 18 feet past it.

The shaft encountered the hanging wall of the schist at 112 feet and the footwall at 137 feet. The 132-foot level starts within schist and at 32 feet from the shaft reaches the schist footwall which follows the

drift for 33 feet and then bends sharply to the south. The drift from the shaft on the 180-foot level follows the schist inclusion for its entire length. Both the hanging wall and footwall contacts of the schist are faults from which splits or branches pass into the schist and gabbro. On the 132-foot level, mineralized rock is exposed for 55 feet along the drift, starting at a point 65 feet from the shaft and continuing to the winze to the 180-foot level; but on the 180-foot level it occurs only in the vicinity of the winze. A small tourmaline-bearing pegmatite dike, an irregular pegmatite mass, and one lamprophyre dike are exposed on the 180-foot level.

The present owners sank five diamond-drill holes on the property, but no assay records or logs are available. Two short holes were drilled from the workings of the Friday mine; one in the bottom of the shaft, one in the bottom of the winze, and two holes from the surface near the shaft. According to a reliable source, one of the surface holes was abandoned because of mechanical difficulties. No information is available on the other. Mr. E. H. A. Andrews reported the hole drilled in the bottom of the winze penetrated sulfide minerals averaging 2.26 percent nickel. He did not state the length or the attitude of the hole, but by necessity the hole must have been nearly vertical. According to Mr. Andrews, material from the hole drilled from the bottom of the shaft contained no nickel for the first 10 feet, but from 10 to 50 feet averaged 2.16 percent nickel.

Mineralization

The mineralized zone in the Friday mine is an irregular body striking about N. 75° E., and dipping steeply northward. It was formed by replacement of the Cuyamaca gabbro along fractures on the north side of an inclusion of schist that nearly parallels the ore in strike but dips about 60 degrees southward. The ore was observed in direct contact with the schist only on the 132-foot level.

Oxidation appears to be nearly complete from the surface to the 132-foot level, although soluble sulfates on the walls of that level suggest that some sulfides still may be present above it. Pockets of residual sulfides were observed on the 132-foot level near the winze to the 180-foot level and near the first crosscut to the south. These become larger and more abundant downward, but the maximum depth to which oxidation extends is unknown as some oxidation was observed in the ore stope at a depth of 173 feet. The mine does not reach the water table.

The true limits of the mineralized body can not be determined from the workings on the 132-foot level, which follows near the footwall of the mineralized zone for a little over 40 feet, then turns sharply and cuts across to the hanging wall. At the end of the drift, (section C-C′, plate 4), the width exposed is 22 feet, but only one wall is visible, hence the true width is somewhat greater. The ore is exposed along this level for 55 feet, which probably can be considered the true length of the ore shoot as the drift originally continued northeastward but was backfilled to its present termination. On the 180-foot level the ore body has been stoped, and the lagged crosscut extends through the backfill. However, in the ore stope, only 7 feet above the 180-foot level, the ore is from 6 to 9 feet wide, and both walls are exposed. The length of the body on this level is unknown, as the ore continues both east and west from the stope

which is only 32 feet long. Thus the ore body is wedge shaped in vertical section, tapering from a thickness of 22 feet or more on the 132-foot level to from 6 to 9 feet in the ore stope; it has a length of 55 feet on the 132-foot level and is somewhat longer than 32 feet on the 180-foot level. The body may widen below the 180-foot level following steep-dipping fractures.

The oxidized part of the ore body in the Friday mine is considerably lower in grade than the original sulfides. This may be due, in part at least, to leaching, which would produce the nickel-bearing sulfates observed on the walls of the 132-foot level. A grab sample of the sulfates assayed 11.75 percent iron, 0.10 percent copper, 0.15 percent cobalt, and 1.98 percent nickel. The mineralogical composition of the material is not known, but it is probably a mixture.

Observations made on the 132-foot level in the winze and in the ore stope seem to indicate that the ore is controlled partly by northeast-striking, high-angle fractures. The mineralized zone along the drift on the 132-foot level follows an indistinct mineralized fracture, and in the winze to the 180-foot level it follows a mineralized fracture which bounds the ore on the north as far down as the ore stope. On the 180-foot level west of the winze, the mineralized rock spreads to the north along the footwall of a fracture that dips 55 degrees and intersects the steep fracture in the winze (pl. 4, sec. C-C′). The south wall of the ore stope is bounded by a high-angle mineralized fracture. The strikes of these fractures nearly parallel the strike of the schist inclusion, but the dips are either steeper or in the opposite direction; consequently, they intersect the schist. Because of the difference in the physical properties of the schist and the mafic igneous rock, it seems reasonable to suppose that the fractures are deflected along the schist forming slips parallel to the foliation for at least a short distance, thereby creating a trap for mineralizing solutions.

Origin

Sulfide-bearing solutions, rising along the fractures, apparently ponded where the fractures intersected the schist. There the ponded solutions, reacting with the wallrock, formed an irregular replacement sulfide body in which the amount of replacement varies from place to place depending on such variable factors as intensity of fracturing, permeability, temperature, and pressure. The solutions were undoubtedly low in silica as shown by the absence of quartz and new silicates in the mineralized zone. Evidence is absent of volatiles other than a little water. However, weak hydrothermal alteration locally has produced chlorite and clay minerals along fractures and the contacts of the schist and the gabbro, and the fibrous green amphibole may have formed in this manner. Microscopic study of the wall rocks would be necessary before the degree of the alteration could be known fully. Apparently, the mineralizing solutions were fluid, high in sulfides, and comparatively low in water, but whether or not they could be called hydrothermal is debatable. Minerals that typically are formed in abundance by hydrothermal activity are absent.

Mineralogy

The sulfides from the mineralized zone in the Friday mine were identified by polished sections and x-ray pattern. The opaque minerals

present are: pyrrhotite, pentlandite, violarite, pyrite, chalcopyrite, and magnetite. Pyrrhotite is the most abundant mineral.

Pyrrhotite occurs as large crystals poikilitically enclosing other minerals. Violarite, identified optically and by x-ray pattern, is noticeably pink or violet compared to the brownish pyrrhotite. The pyrite present is a crystallized FeS_2 gel, and is finely divided showing a banded gel-like structure. It is very hard, a pale brassy yellow color, and occurs in vein-like structures in pyrrhotite. It is less stable chemically than ordinary pyrite, which may explain partly the rapid oxidation of the sulfides on exposure to air and water. The pyrite may be nickel-bearing.

Hydromagnesite, identified by x-ray, optical, and chemical methods, occurs as minute hollow spheres in the sulfides. Its major constituent is magnesium, and minor constituents are nickel and traces of copper, calcium, iron, and silica.

Reserves and Grade

The mineralized body in the Friday mine probably averages from 2.5 percent to 3.0 percent nickel, the actual grade depending on the extent and degree of oxidation in the unexposed parts of the mineralized zone. The average of all assays made from samples from oxidized and unoxidized localities is about 2.0 percent nickel. This figure can be considered safely as the minimum grade. Partly oxidized mineralized rock averages roughly 2.5 percent nickel, and unoxidized massive sulfides contain as much as 3.6 percent nickel.

The small number of copper assays precludes an accurate estimate of the average copper content. Copper is common in the massive sulfides as chalcopyrite and in the oxidized zone probably as a sulfate. From the assays available and the amount of copper observed in the underground workings, the copper content of the mineralized zone is estimated to be from 0.5 percent to 1.0 percent. As much as 0.15 percent cobalt is present in the massive sulfides and the soluble sulfates. The maps of the underground workings contain assays for the entire mineralized zone (pl. 4).

Assuming an average width of 15 feet and length of 55 feet and 9 cubic feet per ton of mineralized rock, approximately 5000 tons of indicated ore are between the back of the 132-foot and the floor of the 180-foot levels. Of this about one-sixth already has been mined. In addition, 90 tons of inferred ore per foot of depth may be assumed to a limited depth below the 180-foot level.

MINERALIZATION IN OTHER AREAS

In areas away from the Friday mine, sulfide bodies are indicated by gossans that contain relic structures like those in unaltered massive sulfides in the Friday mine, leaving little doubt that the gossans, in part, were derived from sulfides such as those found in the mine. Surface mapping located six gossan outcrops and five float areas, of which five of the outcrops and four of the float areas are within the Inspiration Point salient and one outcrop and one float area are within the Pine Hill salient. The gossan outcrops are exposed only by small prospect pits and trenches; in two localities they are exposed in more than one pit. Shallow trenching probably would expose gossans in

many of the float areas, which consist of weathered gossan boulders lying on the surface. The deep weathering conceivably could mask entirely the presence of gossans, as friable gossans could not be expected to crop out strongly where igneous rocks do not. The size of the gossan outcrops and the amount of gossan float may not indicate accurately the size of the area mineralized.

The nickel content of the gossan varies widely. Six gossan samples were assayed, three from Inspiration Point, two from Pine Hills, and one from the dump of the Friday mine. Table 1 gives the location and nickel content of the samples.

Table 1—Assays of gossan samples

Location	*Coordinates*	*Percent nickel*
Friday Mine	6000N-8000E	0.73
Inspiration Point	10090N-7240E	0.16
Inspiration Point	10000N-7070E	1.45
Inspiration Point	8900N-8080E	0.01
Pine Hills	SW¼NE¼ sec. 13	0.16
Pine Hills	SE¼SE¼ sec. 13	0.03

Chlorite-talc rocks occur locally in the same areas as the gossans, indicating some hydrothermal action.

GEOPHYSICAL INTERPRETATIONS

Geophysical studies made prior to the present investigation outlined several magnetic highs near the Friday mine and one at Inspiration Point. No "highs," however, were indicated over known gossan outcrops at Inspiration Point or over the sulfide body in the mine, and no gossan float or outcrops were found in the area of magnetic highs near the mine. Because of this unusual relation between the location of the magnetic highs and known sulfide occurrences, possible explanations for the magnetic highs other than sulfide bodies were sought. At first the difference in magnetic susceptibility of the various phases of Cuyamaca gabbro suggested a possible explanation, as surface mapping showed the largest high near the Friday mine to be almost entirely within an area of the most basic rock type. However, B. S. Butler during his visit to the area discovered that the top soil contained an appreciable amount of dark red material identified by Charles Milton of the Survey laboratory as maghemite. Although the amount varies from place to place, maghemite was found in every place tested, not only in the Friday mine-Inspiration Point area but in numerous other places within the Cuyamaca gabbro. Maghemite is more abundant in the Friday mine-Inspiration Point area than most other places, but this is probably owing to the occurrence of more mafic rocks. In general, the areas of more mafic rocks overlain by a deep red soil contain the most maghemite. Samples of soil derived from the most mafic phase of the Cuyamaca gabbro near the Friday mine and at Inspiration Point contained 4 and 5 percent respectively of maghemite, and samples of decomposed rock from directly beneath the soil samples contained 5 and 1 percent maghemite.

Because magnetic methods lack depth control, slightly magnetic material near the surface might produce the same effect on the magnetometer as a more magnetic body at depth. Certainly, maghemite has a high magnetic susceptibility. It remains to be determined whether

sufficient quantities of it concentrated in the soil directly beneath a magnetometer conceivably could give readings comparable to those which have been obtained, and whether varying amounts of maghemite could explain the variation in the readings obtained from the different magnetometer stations.

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Form MF-100
(May 1951)

U. S. DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Form approved.
Budget Bureau No. 42-R1026.

GENERAL TECHNICAL DATA
FOR USE UNDER THE
DEFENSE PRODUCTION ACT OF 1950

NOT TO BE FILLED IN BY APPLICANT

Docket No. _____

Date received _____

MacAfee & Company
1210 James Oviatt Building
617 South Olive Street
Los Angeles 14, California

Name and address of applicant

Date February 21, 1952

INSTRUCTIONS

This form is to be filed with Defense Minerals Administration, Department of the Interior, Washington 25, D. C. It should be accompanied by appropriate application form when a specific type of Government assistance is requested, in the form of (1) loan, (2) purchase contract, (3) Government guarantee of a private loan, (4) priorities or allocation of mining equipment, and maintenance, repair and operating supplies, and (5) other forms of Government assistance that might arise under the Act. Submit four (4) signed copies of the form and accompanying papers. Name and address should be stamped or typed on each sheet of this form and all accompanying papers. *When a question is inapplicable it should be so stated on the form.* Additional sheets may be attached in answering any questions or in supplying additional information. (IF YOU CANNOT ANSWER A QUESTION, SO STATE.) If a question is answered elsewhere indicate where answered. It is not necessary to answer it again.

GENERAL TECHNICAL DATA

Supply the following information on separate sheets, arranged, numbered, and lettered as indicated:

1. Materials produced:
   (*a*) What are the chief mine, mill, or smelter products?
   (*b*) What are the byproducts, if any?
2. Name(s) and type(s) of mine(s), mill(s), smelter(s), refinery(ies), pit(s), quarry (ies), drilling operation(s). Include old names of property, if any. Show extent of workings, including the following:
   (*a*) Linear feet of shafts.
   (*b*) Linear feet of drifts and crosscuts.
   (*c*) Linear feet of tunnels or adits.
   (*d*) Linear feet of other mine openings (explain briefly).

   Indicate whether mine is flooded or not. Describe any pumping problems. Give size or productive capacity.
3. For each operation listed above supply the following:
   (*a*) Distance and direction from nearest town and shipping point.
   (*b*) Mining district.
   (*c*) Township, Section, Range.
   (*d*) County, State.
4. (*a*) State whether or not property is now in operation, and if in operation, by whom operated.
   (*b*) Are you operating this property as:
   - ☐ Owner.
   - ☐ Lessee.
   - ☐ Contractor.
5. Number of years in production _____

   If not in production or operation, estimated date when production will begin _____
6. Experience of operators:

   Describe the mining and general business experience of (*a*) the applicant, and (*b*) the person or persons who manage the project.
7. History:
   (*a*) Give a statement, as complete as possible, of previous exploration, development, operation, and production of property, with reasons for suspension of operation.
   (*b*) State briefly the known history and production of adjoining and neighboring properties.
   (*c*) Furnish any available (private) reports that may apply to this application, including results of mine examinations, recommended exploration and development, and metallurgical investigations.

APPENDIX No. 6

8. Names and addresses of Officers, Directors, or Partners, and in addition thereto, the five largest stockholders if applicant is a corporation.

Name and Address (a)	Official Title (If officer is also director indicate by "D") (b)	Total of Annual Salary, Commissions, Bonuses, Etc., Received From Applicant and Affiliates During Last Fiscal Year (c)	Estimated Net Worth Outside of Interest in Applicant (d)	Number of Shares Held in Applicant Corporation: Common (e)	Number of Shares Held in Applicant Corporation: Preferred (f)	Life Insurance Carried for Benefit of Applicant: Amount (g)	Life Insurance Carried for Benefit of Applicant: Net Cash Surrender Value After Loans (h)
Donald B. MacAfee	Partner	-0-	$75,000			-0-	
3110 La Suvida Drive							
Hollywood 28, California							
Merrill W. MacAfee	Partner	-0-	$53,000			-0-	
3901 Edgehill Drive							
Los Angeles 8, California							
	Total		x x x x x			x x x x x	x x x x x

If more lines are needed continue on separate sheet.

9. Capital Stock Issues:

For Corporate Applicants

Item	Authorized (a)	Outstanding (b)	Par Value (c)	Number of Shares Outstanding (d)	Dividend Rate Last Paid* (e)
Common stock	$	$	$		
Preferred stock	$	$	$		

INAPPLICABLE

*Indicate period covered.

10. Production:

Item	Kind of Product (a)	1948 Total (b)	1949 Total (c)	1950 Total (d)	Present Average Monthly (e)
1. Quantity of product mined or quarried (Short, long, metric tons; barrels; pounds; etc.)					
2. Quantity of product processed (specify unit of measure and type of process)					
3. Quantity and grade of product sold or shipped (specify units of measure)					

INAPPLICABLE

11. Do you contemplate a change in the present average monthly rate of production? If so, state estimated maximum monthly production and basis of change.

INAPPLICABLE

12. Ore or Mineral Reserves:

(a) Describe the ore or mineral deposit briefly. Accompany the application by any available report on the geology and ore reserves.

See Appendix Nos. 2, 3, 4, & 5 attached to Form MF 103

(*b*) If deposit is other than placer:

(1) Submit assay plans and/or sections showing location and size of proved (measured) and probable (indicated) ore or mineral reserve.

(2) State the tonnage (indicate type of ton) and grade of each class of ore reserve, as above, and show how computed. Tabulated total ore reserve as follows: There is 5,500 tons indicated ore in the Friday Nickel Mine according to Report of Sylvis Creasey, Appendix No. 5, attached to Form MF-103

Ore or Mineral Reserve	Estimated Tons (a)	Metal or Mineral Content Per Ton (Grade) (b)	Gross Value Per Ton (c)	Recoverable Unit Value Per Ton (d)	Estimated Cost of Production Per Ton (e)
Measured (proved)					
Indicated (probable)					

(*c*) If placer: INAPPLICABLE

(1) Give estimated total yardage and average marketable mineral content of each deposit.

(2) Submit map showing location of placer deposit and surrounding area, with all test holes or pits. Submit logs of each hole and test pit with depth and average value of each.

(3) Describe gravel, stating whether fine, medium or coarse; loose, tight, cemented, or frozen, and whether it contains stumps or boulders more than 1 foot in diameter; if so, how large, and in what proportion.

(4) Describe bedrock, giving type (granite, sandstone, shale, etc.) and state whether it is hard or soft, smooth, uneven or rough.

(5) Describe overburden, stating whether loose, tight, or cemented; fine or coarse textured; furnish estimate of average thickness and total amount.

(6) Tabulate the reserves using the form outlined above for ore or mineral reserves.

13. Access Roads:

Give road distances to shipping, supply and residence points, stating kind and condition of roads.

14. Water Supply:

State source and quantity of water available for operations and whether sufficient for all seasons of year.

15. Power: INAPPLICABLE

State amount of power used, rate per hour, and source thereof.

16. Labor: INAPPLICABLE

State number and classes (miners, muckers, millmen, etc.) of men employed during a recent representative payroll period.

17. Equipment and Facilities:

Describe present equipment on the property, including buildings. (State condition.) List major pieces of equipment now owned or controlled and in serviceable condition available for this operation.

18. Are there any particular conditions or circumstances affecting your operations that are not described above? If so, explain.

CERTIFICATION

The undersigned company, and the official executing this certification on its behalf, hereby certify that the information contained in this form and accompanying papers is correct and complete to the best of their knowledge and belief.

MacAfee & Company
(Name of company)

By [signature]
(Signature of authorized official)

February 21, 1952
(Date)

Partner
(Title)

Title 18, U. S. Code (Crimes), Section 1001, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

U. S. GOVERNMENT PRINTING OFFICE 16—63792-1

Form MF-103
(Revised June 1951)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Budget Bureau No. 42-R1035.1.

MF-103 Should Be Filed With General Technical Data Form MF-100

APPLICATION FOR AID FOR AN EXPLORATION PROJECT PURSUANT TO MINERAL ORDER 5, UNDER DEFENSE PRODUCTION ACT OF 1950

Not To Be Filled in by Applicant

Docket No. .....
Metal or Mineral .....
Date Received .....
Amount $.....
Participation (Government %)
.....

MacAfee & Company
1210 James Oviatt Building
617 S. Olive Street
Los Angeles 14, California

Name and address of applicant

Date February 21-1952

If you have already filed MF-100, give date filed enclosed, type of assistance requested exploration loan,

DMA Docket Number (if available) .....

INSTRUCTIONS

Read Mineral Order 5, Regulations Governing Government Aid in Defense Projects, before completing this application. Submit four copies each, of the signed application form, General Technical Data Form MF-100, and answers to questions as specified, to Defense Minerals Administration, Department of the Interior, Washington 25, D. C., or to the nearest field executive office thereof, with your name and address on each sheet of the application and all accompanying papers. If you have previously filed MF-100, it is not necessary to file it again. However, you should indicate in space provided above the type of assistance previously applied for (loans, procurement contracts, etc.) and DMA Docket Number, if available. *When a question is inapplicable it should be so stated in the form.* Additional sheets should be attached in answering any questions or in supplying additional information. IF YOU CANNOT ANSWER A QUESTION, SO STATE.

1. (*a*) Give a description of the real property that will be in any way involved in the exploration project, including any existing mine or operating property.

   (*b*) If you are not the owner of the property, submit a copy of the lease, purchase option, or other agreements under which you are authorized to operate the property with each copy of your application.

   (*c*) Give the legal description of the exact parcel, plot, or area upon which the exploration is to be conducted.

   NOTE: (1) If both areas are the same, so state. The only obligation to repay the Government is from the net earnings from any commercial discovery made in the area specified in (*c*) above in which the exploration is to be conducted, and the expenditure of funds which may be charged as costs of the project must be limited to that area or to work necessary to perform the exploration in that area.

   (2) If applicant is not the owner of the property or if there are any liens or encumbrances against the property, copy of agreements of claimants, lienors, encumbrances, and lessors subordinating their interests in the property to the interest of the Government under the Exploration Project Contract will be required for attachment to the Contract.

2. (*a*) What metals or minerals do you expect to find?

   (*b*) Furnish statement of the geologic features of your property, giving type of ore deposit and reasons for expecting to find commercial ore bodies. Illustrate with maps or sketches. If you have a geologic or engineering report or assay maps showing width and grade, please send them with application, stating whether or not you wish to have them returned.

The information requested in questions 3, 4, 5, 6, 7, 8, and 9 below should be answered specifically and in detail, as this information will be attached to and incorporated as part of the Exploration Project Contract, if such contract is entered into with you by the Government.

ANSWER EACH QUESTION ON SEPARATE SHEETS OF PAPER AND SUBMIT A COPY OF EACH ANSWER FOR EACH COPY OF YOUR APPLICATION.

3. (*a*) Describe fully the proposed work and give the total cost of the project.

   (*b*) State the time required to start the project and to complete it.

4. Submit a map or sketch of the property involved showing a plan (and cross section, if needed) of the present mine workings and the *location of the proposed exploration work* as related to geologic features, such as contacts, veins, ore-bearing beds, etc.

5. Furnish an itemized list of existing facilities, buildings, installations, and fixtures with a statement of the cost of any necessary rehabilitation or repairs to put into useful and operable condition.

6. Furnish a detailed list of additional facilities, buildings, and fixtures to be purchased, installed, or erected by you, with the estimated cost of each item.

7. Furnish a detailed list of operating equipment, separated into items to be—

   (*a*) Rented

   (*b*) Purchased

   (*c*) Furnished by you none

   with the rental, purchase price, or depreciation of each item, as the case may be, to be charged as a cost of the project.

8. Furnish an itemized schedule of labor, by numbers and classes (miners, muckers, etc.) and of supervisors by numbers and positions, with the maximum wages or salaries to be paid to each.

9. Furnish a detailed list with estimated cost of each item for materials, supplies, engineering, assaying, accounting, power, water, utilities, and any other items not provided for above.

10. (*a*) How much are you prepared to invest in the proposed project?

    (*b*) Is this amount sufficient to pay your part of the cost of the project, in accordance with the regulations on Government participation (Sec. 9 of MO–5)?

11. State any conditions or circumstances regarding the property not sufficiently brought out by the foregoing questions.

CERTIFICATION

The undersigned company, and the official executing this certification on its behalf, hereby certify that the information contained in this form and accompanying papers is correct and complete to the best of their knowledge and belief.

MacAfee & Company
(Name of company)

By Donald B. MacAfee
(Signature of authorized official)

February 21-1952
(Date)

Partner
(Title)

Title 18, U. S. Code (Crimes), Section 1001, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

U. S. GOVERNMENT PRINTING OFFICE 16—64067-2

CABLE ADDRESS MACAFEE

TELEPHONE TRINITY 5939

MACAFEE AND COMPANY

MINE • MILL AND INDUSTRIAL PLANT REPRESENTATION

12TH FLOOR • JAMES OVIATT BUILDING • 317 SOUTH OLIVE STREET • LOS ANGELES 14 • CALIFORNIA

ENGINEERING DEPARTMENT

February 20, 1952

Defense Minerals Exploration Administration
of the Defense Minerals Administration, D.P.A.
General Services Building
Washington, D. C.

Gentlemen: Subject: Friday Nickel Mine

Attached herewith you will find "Application for Aid for an Exploration Project pursuant to Mineral Order 5, under Defense Production Act of 1950", Form MF-103 and General Technical Data Form MF-100, fully executed with all required exhibits.

Summarizing this exploration project for your consideration, we would say that —

1. The attached reports by eminent engineers, such as Mr. S. G. Creasey of the U.S.G.S., Dr. C. F. Tolman, Professor of Geology, Stanford University, and Mr. A. M. Heller of the Scandinavian Nickel Corp., indicate excellent probabilities of developing a substantial tonnage of nickel ore with proper exploration work at the Friday Nickel Mine.

2. Mr. Basil Prescott, eminent geologist, (now retired from practice) kindly consented to study these reports and our proposed exploration maps and programs and stated the following conclusions —

   a. The Friday Nickel ore body is of high temperature magnetic segregation origin.

   b. The source of the sulfide mineralization is the very basic core of the gabbro intrusion.

c. The ore is intrusive into the softer acidic norite and schist.

d. The ore will occur as irregular bodies or masses, emanating from continuous pipes, originating in the basic gabbro core of the intrusion.

e. These pipes or intrusive ore channels will be continuous to their source.

f. The grade of the sulfide ore in nickel and copper will remain uniform at about 3% Ni and 1% Cu wherever found and throughout the ore bodies and pipes, to the source of the ore in the basic gabbro.

g. There will probably be several pipes from the basic gabbro and a number of ore bodies offshot from these pipes may be expected.

h. The drilling and exploration program proposed is sound.

3. We propose to do 10,540 feet of diamond drilling, deepen the shaft to 200 feet and do 500 feet of underground drifting and cross cutting.

4. We propose to spend $126,769 on this work and supply 10%, or $12,677, as our contribution.

5. We hope to develop 100,000 tons of ore containing 6,000,000 lbs. of nickel, 2,000,000 lbs. of copper, and 300,000 lbs. of cobalt.

6. The exploration program is estimated to take 8 months.

We request favorable consideration of this application.

Yours very truly,

MacAFEE & COMPANY

by Donald G. MacAfee
Donald G. MacAfee

dg/v/

MACAFEE AND COMPANY

FRIDAY NICKEL MINE

Table of Contents

Cover Letter	Text
Additional Information to Questions on Form MF-103	Text
Drawings FNM-1 and FNM-2	Appendix No. 1
Report by S. C. Greasey	Appendix No. 2
Report by C. F. Tolman	Appendix No. 3
Report by A. H. Noller	Appendix No. 4
Photostatic copy of Section 2, Geology and Nickel Mineralization of the Julian-Cuyamaca Area, San Diego County, California	Appendix No. 5
DMA Form MF-100, General Technical Data and Attachments	Appendix No. 6

CABLE ADDRESS MACAFEE TELEPHONE TRINITY 5939

MacAFEE AND COMPANY

MINE • MILL AND INDUSTRIAL PLANT REPRESENTATION

12TH FLOOR • JAMES OVIATT BUILDING • 617 SOUTH OLIVE STREET • LOS ANGELES 14 • CALIFORNIA

ENGINEERING DEPARTMENT

U. S. DEPARTMENT OF THE INTERIOR

DEFENSE MINERALS ADMINISTRATION

Referring to Form MF-103 (Revised June 1951) the following notations apply to the paragraphs as enumerated in this form:

Par. 1 (a) The real property consists of 20.58 acres consisting of 10.58 acres owned in fee and 2 and a fraction mining claims contiguous, as follows — "that portion of the Southwest Quarter of the Southwest Quarter of Section 15, Township 13 South Range 4 East, San Bernardino Meridian, County of San Diego, State of California, described as follows: "Commencing at the Northwest corner of the Southwest Quarter of the Southwest Quarter of said Section 15; thence South along the West line thereof, 28 rods thereon at right angles, East 56 rods; thence at right angles North 28 rods to a point in the North line of said Southwest Quarter of the Southwest Quarter of said Section 15; thence West along said North line, 56 rods to point of commencement." This parcel of land contains 10.58 acres owned in fee.

"The Friday Extension No.1 Mining Claim
Friday Extension No. 2 Mining Claim
Friday Extension Fraction Mining Claim
totalling 40 acres, located in the Northwest Quarter of the Southwest Quarter of Section 15, Township 13 South, Range 4 East, San Bernardino Meridian, in the Cleveland National Forest Mining District, in San Diego County, California."

The Attached plot plan, Appendix No. 1, Geologic - Topographic and Claim Map, Drawing FNM-1, shows the location of the property.

The location and workings of the Friday Nickel Mine are shown on the plot plan and the Exploration Map, Drawing FNM-2.

Par. 1 (b) We are the owners of the fee property and assignees of the mining claims above listed. There are no liens or encumbrances against these properties.

Par. 1 (c) The property on which the exploration work is to be conducted is the same as that described legally in Par. 1 (a).

Par. 2 (a) We expect to find nickel, copper, cobalt and small amounts of platinum, in massive pyrrhotite ore bodies.

(b) Attached you will find copies of the following engineering and geological reports on this property:

Appendix No. 2. Original report on Geology and Nickel Mineralization of the Julian-Cuyamaca Area, San Diego County, California. By C. S. Creasey, Geologist, Geological Survey, United States Department of the Interior, November 1945.

Appendix No. 3. Report on the Friday Nickel Mine, San Diego County, California, October 8, 1942, by C. W. Tolman and Z. K. Malcom, Stanford University for Henry J. Kaiser Company.

Appendix No. 4. General Report on the Friday Mine and the Nickel-Merite Batholith of the Cuyamaca Area, San Diego County, California, by A. H. Heller.

Appendix No. 5. California Journal of Mines and Geology, State Mineralogists Report Vol. 42, No. 1, January 1946. Photostatic copy of Section 2 - Geology and Nickel Mineralization of the Julian Cuyamaca Area, San Diego County, California, by S. C. Creasey.

Par. 3 (a) Proposed work and total cost of the project are as follows —

1 – We propose, for Step 1, to drill 1 vertical hole and 8 radiating holes from the bottom of the vertical shaft at the 170 ft. level or thereabouts, 6 radiating holes from the shaft at the 132 ft. level, and 4 vertical holes all as shown on the Geologic and Exploration Maps F304-1 and F304-2.

These holes are for the purpose of checking the known ore occurrences in the underground workings and those indicated by former diamond drilling. These holes will also give an idea of the extent of the known ore body and the indicated ore bodies with a comparatively low capital expenditure. The aim is to connect up the indicated ore bodies with the known ore body so an intelligent mining program can be laid out to fully explore and block out the ore in this mine.

2 – For Step 2, we propose to drill 20 vertical holes from the surface to define the limits of the ore body or ore bodies beyond that expected to be indicated from the radial drilling in step one.

3 – The radial drilling in Step 1 and the vertical drilling in Step 2 will give good indications of the extent, depth and location of the ore bodies, then Step 3, the sinking of the shaft to the 200 ft. level or deeper and the driving of development drifts and crosscuts will be undertaken, to block out the ore into definite reserves. It is estimated a total of 500 feet of drifting and cross cutting will be required.

In order to proceed with Step 1, it will be necessary to do some repair work on the shaft timbers and clean out the bottom of the vertical shaft for the drill set-up. The 132 ft. level station will also have to be re-timbered and made safe.

The hoist and compressor were stolen from the shaft during the war and it is presumed that the hoisting cage was dropped to the bottom of the shaft. The ladders are gone below the 132 ft. level so this has not been ascertained.

It is proposed to buy a 190 cu. ft. portable gasoline driven compressor, a tugger air hoist, cable and a bucket, and a jack hammer with accessory equipment, to clean out the shaft, enlarge the 132 ft. station and cut a station at the 170 ft. level which is the bottom of the vertical shaft. This will be necessary before the diamond drilling from the shaft locations can be undertaken.

For Step 3, a gasoline driven hoist for the bucket and cage will have to be installed, which will facilitate the hoisting for the shaft sinking and underground exploration work.

A schedule of the drill holes follows —

SCHEDULE OF DRILL HOLES
Step. # 1

Hole	Number	Description	Length	Total	Est. Drill Time	Est. Cost @ $4 ft.
A	1	Vertical - bottom of shaft	200 '	200'	30 hr.	$800
B to I inc.	7	Inclination 45° from bottom of shaft, radial on 45° circle	280' ea.	1960'	270 "	7840
G	1	Inclination 22½° from bottom of shaft	280'	280'	40 "	1120
J to O inc.	6	Inclination 15° from 122' level of shaft radial on 60° circle	270' ea.	1620'	220 "	6480
P - S	4	Vertical holes from surface	370' ea.	1480'	210 "	5920
		Totals		5540'	770 hr. 97 days	$22,160
		Step # 2				
	20	Vertical drill holes average	250' ea.	5000'	84 days	20,000
				10,540'	181 days	$42,160

The overall project cost estimates are as follows: —

Diamond Drilling Step 1 - 5,540 ft. @ $4.00/ft.	$22,160
Diamond Drilling Step 2 - 5000 ft. @ $4.00/ft.	20,000
Repair of existing facilities	1,980
Purchased equipment for Step 1	11,297
Purchased equipment for Step 3	4,058
Labor and supervision	38,720
Material and supplies	7,519
Assaying and Analytical work	21,835
Consulting engineering fees	6,400
Travel, hotel, meals, etc.	1,600
Los Angeles office overhead for accounting, telephone, etc.	1,200
	$ 126,769

Par. 3 (b) The time required to start and complete the project is estimated as follows —

Repair work on the shaft and preparation for underground diamond drilling can start as soon as the project is approved and the loan granted.

It is estimated that the project will require 8 months to complete.

Par. 4 Maps

The following maps are attached as Appendix No. 1 —

Friday Nickel Mine - Geologic - Topographic and Claim Map
Drawing No. FNM - 1

Friday Nickel Mine - Exploration Map
Drawing No. FNM - 2

Par. 5 Existing Facilities

	Est. Cost of Repairs
Wooden Headframe	$ 200
Hoist & Compressor House	350
Bunkhouse	750
Shaft Timbers	500
	1,800
Contingencies 10%	180
Total	$ 1,980

Par. 6 No additional facilities, buildings or fixtures to be purchased, installed or erected under this program.

Par. 7 Operating Equipment.

(a) No operating equipment to be rented except the diamond drill which will be a contract basis of $4.00/ft drilled, with equipment and labor furnished by the contractor.

(b) Purchased equipment

Project Step 1

Quantity	Item	Cost
1	185 cu. ft. IR Compressor gasoline driven	$3,550
1	3000 lb. pull single drum IR air hoist	642
250 ft.	5/8" x 6-19 hoisting cable	65
1	30" sheave with bearings	60
1	1000 lb. steel mucking bucket	75
1	Bell system 250 ft.	30
1	Rock drill IR #40	345
1	IR Jack leg	185
1	15 gal. water tank with manifold	74
1	Line oiler	29
200 ft.	3/4" air hose with couplings	110
200 ft.	1/2" water hose with couplings	125
1	Lot of connections	15
2 sets	Jack rods 2'7", 5'3", 7'10" & 10'6"	175
4 sets	Carset Carbide bits 1 3/8", 1 1/2" & 1 5/8" gage	255
1	2000 Watt Kohler electric light plan	796
1	Lot of wiring sockets, switches & lights	150
1	500 gal. water tank	65
1	3/4 Ton Ford pick-up truck	2,025
1	Acetylene welding outfit	175
1	Hand forge with blacksmith tools	65
1	60 lb. Anvil	24
1	Lot of hand tools, picks, shovels, saws, etc.	150
1	Vise	30
1	3/4" electric drill with set of bits	85
		10,270
	Contingencies 10%	1,027
		$11,297

Project Step 2

No additional equipment required.

Project Step 3

Quantity	Item	Cost
1	2000 lb. pull gasoline hoist	$750
2	16 cu. ft. mine cars	500
1000 ft.	12 lb. mine rail with bolts, spikes & fish plates 4.5 tons @ $190	855
1	Rail bender	29
1000 ft.	2" black iron pipe, T & C with valves & fittings	400
1	Jack bit grinder	155
1	Lot camp furniture, stoves, beds, chairs, etc.	1,000
		3,689
	Contingencies 10%	369
		$4,058

Par. 8 Labor.

Quantity	Classification	Rate
1	Diamond drill operator)	furnished by diamond drilling contractor.
1	Diamond drill helper)	
2	Hoist man	@ $20.75/8 hr. shift, including insurance & compensation
2	Miners	@ $19.00/8 hr. shift, including insurance & compensation
2	Muckers	@ $19.00/8 hr. shift, including insurance & compensation
1	Superintendent	@ $750.00/mo., including insurance & compensation
1	Engineer (Surveying & sampling)	@ $600.00/ month.

Payroll per month

2	Hoist man	@ 1080/mo x 8 mo.	$8640
2	Miners	@ 1020/mo x 8 mo.	8160
2	Muckers	@ 950/mo. x 8 mo.	7600
1	Superintendent	@ 750/mo. x 8 mo.	6000
1	Engineer	@ 600/mo x 8 mo.	4800
			$35,200
	Contingent labor 10%		3,520
			$38,720

Par. 9 Operating Costs —

Quantity	Item	Cost
5000 bd. ft.	Mine timber, lagging, wedges, etc.	$1000
150 lb.	Tie rods for shaft timbers	75
5 kegs	Nails	80
2	Steel muck sheets	50
	Carbide, powder, fuse, caps	2450
	Gasoline, oil, grease	1600
400	6' diamond drill core boxes	1600
		6,835
	Contingencies 10%	684
		$7,519

Assaying

1100	assays for nickel @ $5.00	5,500
1100	" " copper @ 2.50	2,750
200	" " cobalt @ 7.50	1,500
200	" " platinum @ 5.00	1,000
100	" " iron @ 3.50	350
100	" " sulfur @ 5.00	500
50	Spectrographic Analyses @ 35.00	1,750
25	Rock classifications @ 100.00	2,500
20	Mineralogical classifications @ 200.00	4,000
		$19,850
	Contingent analyses 10%	1,985
	Total	$21,835

Consulting Engineering Fees 8 days/mo. @ $100 x 8 mo.	6,400
Travel from Los Angeles to Julian & misc. meals, hotel, etc.	1,600
Los Angeles Office overhead for accounting, etc. $150.00/mo.	1,200
Total	$9,200

Par. 10 (a) We are prepared to invest 10%, or $12,677 in the project.

(b) This amount is sufficient to pay our part of the cost of the project in accordance with Sec. 9 of MO-5.

Par. 11 We believe the foregoing questions and answers cover all conditions and circumstances pertinent to this property and project.

GEOLOGY AND NICKEL MINERALIZATION of the JULIAN-CUYAMACA AREA, SAN DIEGO, CALIFORNIA

By
S. C. CREASEY

UNITED STATES DEPARTMENT OF THE INTERIOR, GEOLOGICAL SURVEY
November, 1945

APPENDIX No. 2

Summary and Recommendations

The Julian-Cuyamaca area is in the San Diego Mountains of the Peninsular Ranges in southern California. It is in San Diego County, three miles south of Julian, California, and approximately 60 miles northeast of San Diego, California.

The Julian-Cuyamaca area was mapped and the nickel mineralization studied from March to June, 1944, as part of the U. S. Geological Survey's program of strategic mineral investigations.

The only exploratory work that has been done in the area consists of shallow prospect pits and trenches, the old Friday nickel mine, and five short diamond drill holes. The Friday shaft was sunk on a gossan outcrop containing a few dollars per ton in gold. The original shaft was abandoned, and the site is now covered by dump material. A new shaft located south of the old one was accessible in 1944. Partly oxidized sulfide minerals were found on the 132-foot level and more massive sulfides on the 180-foot level at the bottom of the workings.

Three major rock units are recognized in the area, the Julian schist of probable Triassic age, the Stonewall quartz diorite intrusive into the schist, and the Cuyamaca gabbro which is the youngest rock and the host rock of the nickel mineralization. The Friday nickel mine contains the only exposed body of sulfide mineralization in the area. A number of gossan outcrops and float in the Inspiration Point and Pine Hills salients of the Cuyamaca gabbro indicate other mineralized zones of unknown but probable small size. The nickel-bearing sulfide bodies in the Friday mine as well as the gossans are all associated with the more basic units of the Cuyamacagabbro, which ranges from gabbro to more basic rocks such as peridotite, norite, or pyroxenite.

The mineralized body of the Friday mine is irregular in shape, but consists of a zone from 6 to over 20 feet wide and 55 feet long where exposed. The depth of Mineralization is not fully explored. Assuming an average width of 15 feet and a length of 55 feet, there is estimated to be approximately 5,000 tons of indicated ore in a block between the 132 and 180-foot levels of the Friday shaft. In addition 90 tons of inferred ore per foot of depth may be assumed to a limited depth below the 180-foot level. The average of all assays from both oxidized and unoxidized rock is about 2.00 Ni, but the body in the Friday mine will probably average 2.50 to 3.00% Ni and 0.5 to 1.00% Cu. As much as 0.15% Co is found in the massive sulfides and in sulfates resulting from oxidation of the ore, but the average cobalt content is not known.

Gossan samples from the Inspiration Point area, Pine Hills, and from the Friday mine dump range in nickel content from .03 to 1.45%.

The sulfide minerals recognized in the Friday deposit are pyrrhotite, pentlandite, violarite, pyrite and chalcopyrite.

Although no further geologic or exploratory work is recommended in this area as a war project, this negative recommendation is not intended to indicate that there is no chance of finding minable sized bodies of nickel ore but rather is made because of the time required for such exploration and the unfavorable geographic location for small tonnage nickel deposits. Sufficient reserves would have to be developed to justify construction of mill facilities, and the nature of the known ore occurrences are not encouraging for the quick development of large low-grade reserves. The area, however, merits further work in any long-range program concerned with the nickel resources of the country.

Before diamond drilling or other methods of exploration and development are started, it is believed that the area should be further explored by geophysical methods, keeping in mind particularly the possible influence of magnetic material found concentrated in the soil in certain areas. Previous geophysical results may have been partly or entirely vitiated by not recognizing the possible influence of maghemite concentrated in the soil. In any further geologic project where time is a less urgent factor, the entire body of the Cuyamaca gabbro should be mapped in detail, including near-by areas in which gold deposits have been found.

SCOPE OF WORK

The field work in the Julian-Cuyamaca area was done by the writer and Robert M. Hutchinson from March 3, 1944, to the first of June. Mr. B. S. Butler visited the party and gave many helpful suggestions on the field work, and Mr. P. J. Shenon advised regarding general geophysical problems connected with nickel deposits. The Geological Survey laboratory in Washington, D. C., made all assays, mineral determinations, and magnetic separations of soil samples. Mineral determinations were by Charles Milton and nickel determinations by F. S. Grimaldi. Comments on the effect of maghemite on the magnetometer are by Charles Milton and H. C. Spicer.

The Julian-Cuyamaca area is covered by thick brush and locally by dense stands of evergreen and deciduous trees. The basic rocks are deeply weathered, and the only outcrops consist of residual boulders in a weathered matrix. Approximately one square mile extending from south of the Friday mine north to Inspiration Point was mapped by plane table. A triangulation network was established for control. An additional nine square miles was mapped in less detail on aerial photographs. This mapping, illustrated on a planimetric base, includes the northern one-fourth of the Cuyamaca gabbro and the adjacent schist and quartz diorite.

Previous Geologic and Geophysical Work

Frank Calkins 1/ visited the Julian area in 1916. He described briefly the regional geology and the underground workings and mineralization of the Friday mine. C. F. Tolman and A. Rogers 2/ studied a suite of sulfide specimens from the Friday mine. In summary they state, "The formation of pyrrhotite, pentlandite, and chalcopyrite in the order named by replacement of the abovementioned silicates." Frank Hudson 3/ mapped the geology of the Julian district on a scale of one inch equals one mile during 1917 to 1919. Hudson emphasized aerial geology, but he included a description of the Friday mine and a discussion of the genesis of the ore, which he believed to be of syngenetic magmatic origin. Maurice Donnelly 4/ mapped the Julian district in the summer of 1932 and 1933. He emphasized the economic importance of the gold bearing quartz veins and only briefly mentioned the Cuyamaca gabbro and associated nickel mineralization.

Two private reports were available to the writer on the Friday mine, one by C. F. Tolman and Z. K. Melcon, another by H. J. Fraser. Z. K. Melcon examined the Friday mine and the adjacent area for the Kaiser interests. He sampled the underground workings and systematically made a qualitative soil analysis around the Friday mine. A copy of Melcon's soil analysis map is included in the report. H. J. Fraser examined the mine for Sheldon Fay, who held an option on the Friday mine and Inspiration Point for a short period in 1939. Mr. Fraser, using a Schmidt-type vertical magnetometer, made a brief geophysical study of the area around the Friday mine and Inspiration Point. The results of Fraser's examination are included in the maps accompanying this report.

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1) Calkins, F.D., Molybdenite and nickel ore in San Diego County, California: U.S. Geol. Survey Bull. 640, 1916.

2) Tolman, C. F., and Rogers, A., A study of the magmatic sulfide ores: Leland Stanford Junior University Publications, 1916.

3) Hudson, F. S., Geology of the Cuyamaca Region of California: Univ. of Calif. Pub., Geol. Sciences, vol. 13, no.6, pp. 175-252, 1922.

4) Donnelly, M. , Geology and mineral deposits of the Julian district, San Diego Co., California: Calif. Jour. of Mines and Geology, vol. 30, No.4, pp. 331-370, 1934.

Location and Development

The Julian-Cuyamaca area is in the San Diego mountains of the Peninsular Ranges in southern California. It is in San Diego County, northeast of San Diego, California, State highway 79 passes through the northeast corner of the area, and maintained oiled country roads serve the central and western parts of the area. The nearest railroad station is at El Cajon, California, which is about 45 miles from Julian on the main road to San Diego.

The date of the first exploration work on the gossan outcrop of the Friday mine is not known but was probably in the 1880's. Prior to 1918, Mr. B. Sterne, the president of the Friday Mining Company, sank a shaft on the gossan outcrop which contained a few dollars per ton in gold. This original shaft was abandoned, and the site now is covered by dump material. A new 180-ft. shaft, located south of the old one, was accessible in 1944. The Friday mine, developed through this shaft, contains about 440 feet of workings on two levels which are separated by a vertical distance of 48 feet. Partly oxidized sulfide minerals were found in the upper or 132-foot level and more massive sulfides on the 180-foot level. The present owners, Mr. E. H. A. Andrews, 2716 84th Place, Inglewood, California, and associates, acquired the property in 1939. They reopened the shaft and drifts, installed a small hoist, and made the mine accessible for examination.

Five diamond drill holes were sunk in the Friday mine-Inspiration Point area; however, complete and reliable information on the results of the drilling could not be obtained. Of the five diamond drill holes, two were drilled from the workings of the Friday mine, two from the surface near the mine, and one from the surface at Inspiration Point. No information was obtained on the results of the holes drilled from the surface. The two holes drilled from the Friday mine were reported to have penetrated nickel mineralization, but no assay records or logs are available.

Geology

The Julian-Cuyamaca district contains, besides Quaternary alluvium, three major rock units, Julian schist, Stonewall quartz diorite, and Cuyamaca gabbro. The Julian schist, a meta-sedimentary series of probable Triassic age, is the oldest. The Stonewall quartz diorite is intrusive into the Julian schist. It is probably of Jurassic age and may be correlative to part of the Sierra Nevada granitic intrusions. The Cuyamaca gabbro is the youngest rock and is the host rock for the mineralization in the Friday mine and the gossans of Inspiration Point and Pine Hills. The age of the Cuyamaca gabbro is not known, but it may be post-Triassic and pre-Cretaceous, following shortly after the Stonewall quartz diorite.

Lacustrine alluvium: The lacustrine alluvium is a small lake deposit which is well exposed by deep gullies. Interbedded layers of the gullies is estimated to be about 75 feet; the total thickness is unknown. Presumably the lake was formed by an upthrown fault block that dammed a small stream. Subsequent erosion cut a steep-walled canyon through the fault block and the lake drained after over 75 feet of sediment was deposited.

Colluvium and alluvium: The physiography of the area in which the colluvium and alluvium occur consists of gently rolling hills of low relief separated by grassy fields. These grassy uplands of low relief may represent remnants of an older erosion surface.

The areas mapped as colluvium and alluvium contain no outcrops and are composed in part of stream deposited sediments and in part of soil transported a few hundreds of feet from the source rock.

Julian schist ; On the basis of lithologic correlation with formations in the Santa Ana mountains containing a Triassic fuana, and one Triassic ammonite found by Hudson, the Julian schist was designated by Fairbanks 1) and Hudson 2) to be of Triassic age. In 1914, Merrill 3) assigned the name of "Julian group" to the crystalline schists in San Diego County and cited the schists near Julian as typical, especially of the mica schists. Subsequently, Hudson 4) gave the formation name, Julian schist, to the schists in the Julian-Cuyamaca area. The areal extent of the Julian schist is undetermined, but it has a known length of over 12 miles, and width ranging from three-quarters of a mile to $1\frac{1}{2}$ miles.

The Julian schist is a meta-sedimentary unit composed chiefly of quartz mica schists, quartzite, and locally of a relatively coarse-grained quartz biotite gneiss that is often very similar to the gneissoid phase of the Stonewall quartz diorite. The quartz biotite gneiss may be an injection gneiss in part or possibly a meta tuff. The degree of metamorphism is moderate, corresponding to the "biotite grade". Local areas of more intense metamorphism are indicated by two localities of mica-sillimanite schist.

The quartz mica schists are the most abundant. They have a strong fissility which is roughly parallel to the original bedding wherever discernible. The mica is usually biotite, sometimes biotite and muscovite, and, locally in quartz rich schists, predominately muscovite.

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1) Fairbanks, H. W., California State Mineralogists Report (XI), 1893.
2) Hudson, op. cit., pp. 188-190.
3) Merrill, F., J. H., Geology and Mineral Resources of San Diego and Imperial Counties; Calif. State Min. Bur., p. 12, 1914.
4) Hudson, op. cit.

Quartz and feldspar are always present, often comprising about half the rock. Short irregular quartz stringers are common.

The quartzites are in lenses of variable thic kness and length. The thickness varies from less than one foot to over 500 feet, as shown in the quartzite zone 1500 feet west of Inspiration Point. The muscovite quartz schists usually are associated with the quartzites. Relic sedimentary structures such as cross bedding are sometimes visible in the quartzites. These structures indicate that the foliation is roughly parallel to the original bedding in the dediments.

No nickel mineralization is known to occur in the main mass of Julian schist; however, nickel mineralization and gossan are in Cuyamaca gabbro adjacent to schist inclusions in the Friday mine and near coordinate 7500 N.--10000 E. (pl.2). Julian schist is the host rock for part of the gold-bearing quartz veins in the Julian District.

Stonewall quartz diorite: The Stonewall quartz diorite is part of the large mass of granitic rock that comprises a large part of the Peninsular Ranges in San Diego County. The name, Stonewall quartz diorite, was given by Hudson 1) after Stonewall Peak which is composed of the quartz diorite. Lack of information on the age relations of similar rocks in adjacent areas is the basis for assigning a formation name in the Julian area. It is possible that future work will show the Stonewall quartz diorite is not a small, separate entity, but is an integral part of a large plutonic intrusive. The Stonewall quartz diorite is the host rock for gold-bearing quartz veins in the Julian District, but no nickel mineralization is known to occur in it.

The Stonewall quartz diorite is composed of biotite, quartz, feldspar. Hudson reports the feldspar to be predominately plagioclase, varying from albite to andesine, with subordinate amounts of orthoclase. In the Julian-Cuyamaca area the quartz diorite is locally gneissoid approaching a true biotite gneiss in texture and structure. The gneissoid quartz diorite is difficult to separate in some places from the coarse grained para-gneiss of the Julian schist. The Stonewall quartz diorite commonly contains a little sulfide, presumable pyrite.

Cuyamaca gabbro: The first known description of the basic intrusives of the Julian-Cuyamaca area was by Hudson who called this group of basic rocks the "Cuyamaca basic intrusive". Because "Cuyamaca basic intrusive" is not consistant with the U. S. Geological Survey's system of rock nomenclature, this group of basic rocks will be referred to as the Cuyamaca gabbro in this report.

The Cuyamaca gabbro, intrusive into the Julian schist and Stonewall quartz diorite, is the youngest rock formation in the area. The outline of the intrusive complex is irregular but in general it is elongate to the north with the length about three times the average width; its areal extent is about 25 square miles. Approximately the northern one-fourth of the basic intrusive was mapped.

The principal rock types comprising the Cuyamaca gabbro

1) Hudson, op. cit. p.19

include peridotite, pyroxenites, norites, gabbros, lamprophyre dikes, and related rocks, as determined by hand lens examination. Plagioclase feldspar, olivine, augite, hypersthene, and brown hornblende, in varying proportions, constitute over 90% of the minerals in these rocks. In addition, the rocks contain as much as 3% pyrrhotite, a little magnetite, and a trace of green spinel. Uralite (?), a secondary amphibole, commonly occurs as reaction rims around olivine and pyroxenes. Hudson 1), on the basis of microscopic determination of the feldspar composition, reported hypersthene and augite diorites from the area. Fine grained lamprophyre dikes are common and some of them are large. Mapping them was not practical because of poor outcrops.

The cuyamaca gabbro was subdivided and mapped in the field primarily on the basis of the estimated content of feldspar, and, where possible, further subdivisions were based on the ferromagnesian minerals. The basis of subdivision is purely arbitrary. The several units are generalized and include exceptions, as the contacts are necessarily gradational and arbitrarily placed. Additional work may indicate the possibility of further subdivision on the basis of texture. The mapping was designed to give a general picture of the most important rock variations.

An area from Inspiration Point south almost to the Friday mine, indicated on the 400 scale map (pl. 2) by the colored overlay pattern, was separated on the basis of the alteration of the ferromagnesian minerals. The area is distinguished by the partial to complete alteration of olivine and pyroxenes to fibrous, light green amphibole, presumably uralite. This alteration is not uniform, being most complete at Inspiration Point and least complete along the ridges to the southeast. The parent minerals, olivine and pyroxene, often occur as residual cores. As near as can be determined by hand lens examination, the mineralogic composition of the rock previous to alteration of the ferromagnesian minerals to uralite (?) was similar to the normal gabbros and norites. Residual hypersthene, olivine, and poikilitic brown hornblende are common, and commonly found in the same hand specimen. This suggests that the local area has undergone a period of alteration, possibly late magmatic, not found extensively elsewhere in the Julian-Cuyamaca area. The significance of the alteration is not known positively, but the altered area does contain the most gossan outcrops, float, and chloritetalc rock. This association is suggestive of possible genetic relationship between the alteration and the later mineralization.

Except for the uralite (?), the kind of ferromagnesian mineral apparently does not signify any difference in the parent magma; it represents the completeness of reaction. Where conditions were favorable for free exchange of elements and slow cooling of the magma, augite and hypersthene are the most abundant. In other areas where the necessary reactions were impeded for one reason or another, olivine predominates. Local zones in the magma, however, were richer in iron and magnesium and are represented by the peridotites and basic norites and gabbros.

<u>0-15% feldspar rock</u>: The intrusive rock containing 0-15% feldspar phase includes the very basic norites and gabbros and the pyroxenites. The locations of the three areas mapped are, (1) northwest of the Friday mine, (2) the northern end of Inspiration Point, and (3) the western edge of Pine Hills in the Y.M.C.A. camp area. All these

1) Hudson, op.cit. p.193

areas of more basic rock are in salients extending into the schist and quartz diorite country rock.

The area extending northwest from the Friday mine is the largest and most clearly defined of the three. The intrusive contact on the north and west is sharp. The Friday mine is at least partly in the basis rock as Hudson 1) reported periodotite from the 180-foot level. The rock is composed predominately of olivine and pyroxene, 0-15% feldspar, a trace of amphibole, and here and there traces of pyrrhotite which rarely composes as much as 3% of the rock. The olivines commonly have coronas of a light green mineral. The pyroxenes are black augite and brown to pink hypersthene, and the recognizable amphiboles are large crystals of brown hornblende enclosing smaller grains of olivine, pyroxene, and feldspar.

The basis body at Inspiration Point is partly to completely altered to the light green fibrous amphibole, tentatively called uralite. The northern end is almost completely altered whereas in the central and eastern parts the reaction was incomplete, leaving residual cores of olivine and pyroxene.

The basis body at Pine Hills is similar to that at the Friday mine but contains more olivine and less pyroxene. It grades into the next phase containing 16-40% feldspar, whereas the Friday mine body changes abruptly to rock containing 50-70% feldspar.

The nickel mineralization in the Friday mine and the gossan float near Pine Hills are associated, in part at least, with rocks of this phase.

<u>16-40% feldspar rock</u>: The 16-40 feldspar rock includes the intermediate types of the Cuyamaca gabbro. In general, the texture is similar to the more basic types and is a little coarser than the rocks richer in feldspar. Black augite and brown hornblende containing inclusion of other minerals are common. Pyrrhotite is common, comprising as much as 3% of the rock in some outcrops. The general distribution of these rocks is similar to the more basic rocks, both groups occurring in the salients. Gossans occur in rocks of this phase in the Inspiration Point salient.

<u>Rock with Over 40% feldspar</u>: The phase of the Cuyamaca gabbro containing more than 40% feldspar covers the greatest area and contains the greatest variation in texture and mineral composition. The most persistent ferromagnesian minerals are hypersthene and brown hornblende containing other mineral grains; augite and olivine are common, but not always present. Here and there hybrid phases are common near the contact with the Julian schist and the Stonewall quartz diorite. They are characterized by a high feldspar content, the presence of biotite, and little or no olivine or pyroxenes. Hudson reports that some of these hybrid rocks contain a little free quartz.

The small isolated bodies near Deer Lake are slightly different from the average. They consistently contain 40-50% feldspar and many brown hornblende crystals as much as 4 inches in diameter. Otherwise they are similar to the rocks in the salient to the southwest.

1) Hudson, op. cit., p. 200

The rocks along Cedar Creek show considerable range in grain size and in texture. The brown hornblende crystals enclosing other grains are common but are not always present. With more detailed work, subdivisions on texture might be possible.

This phase of the Cuyamaca gabbro contains the most gossan outcrops and float; however, this association may not have any genetic significance. If the mineralization is related to structure by the law of probability the most gossans should occur in this phase as the greatest proportion of the Cuyamaca gabbro falls within this division.

One body containing over 40% feldspar was mapped separately on the basis of the ferromagnesian minerals. This body is at the southern end of Inspiration Point salient. It is composed of 60-70% feldspar, approximately 25-35% olivine, and from a trace to 8% pyrrhotite. Locally it contains a little pink hypersthene and brown hornblende with inclusions. The mineral composition and texture are uniform throughout the body.

Pegmatite dikes: Pegmatite dikes are common in all types of rocks, especially the Stonewall quartz diorite. Most of the dikes are small and discontinuous and are commonly represented by a single outcrop. They are composed of orthoclase, quartz, commonly black tourmaline, and uncommonly a few muscovite nests. The largest and more continuous pegmatites are shown on the 1000 scale map (pl.1).

The genetic association of the pegmatites was not determined with assurance because of the small size of the area mapped. However, the pegmatites may be of two ages related in part to the Stonewall quartz diorite and in part to the Rattlesnake granite. Hudson 1) thinks that his Rattlesnake granite, which is exposed several miles southeast of the area covered by this report, is essentially contemporaneous with the Cuyamaca gabbro. Presumably, the pegmatites found in the Cuyamaca gabbro would be related to this granite, whereas the pegmatites in the older rocks could be related to either the Stonewall quartz diorite or the Rattlesnake granite.

Structure

The structural history of the Julian-Cuyamaca area includes folding, faulting, and intrusion. The recognizable folding is limited to the Julian schist and the gneissoid parts of the quartz diorite. Faults with at least two periods of movement cut all three units. The Stonewall quartz diorite is intrusive into the Julian schist, and the Cuyamaca gabbro is intrusive into both the quartz diorite and the schist.

In general, the foliation in both the Julian schist and the gneissoid Stonewall quartz diorite is parallel to the contact of the Cuyamaca gabbro; however, locally the Cuyamaca commonly cross-cuts this foliation. As a result of this general parallelism, the salients of Cuyamaca are bounded by folds in the schist and gneissoid diorite. Such folds are clearly developed around the Pine Hills salient and the salient in sections 16 and 17. On the evidence

1) Hudson, Op. cit. p. 208

that the foliation is roughly parallel to the original bedding, the schists are overturned around Pine Hills; the direction of dip in the schist changes abruptly from north to south at the section line between sections 7 and 8. It cannot be stated positively, without mapping a larger area of Julian schist, whether the folding in the schist is the result of the force of intrusion of the Cuyamaca or whether the Cuyamaca was intruded into the axes of pre-existing folds. The writer believes that the intrusion of the Cuyamaca caused the folding, because Hudson's map does not indicate any comparable folds in the schist except in the vicinity of the basic intrusion.

Because of poor outcrops and the lack of characteristic lithology in the Julian schist, the existence of faults is difficult to establish. The Friday mine-Inspiration Point area was mapped in more detail with the hope of finding structures that might be important in the localization of ore bodies of epigenetic origin. All the faults found are in or near the Inspiration Point salient. Undoubtedly many more faults are present in other areas that could be found by more detailed mapping. All the faults are high angle and strike northeast as do the more important fractures in the Friday mine. The faults have at least two periods of movement, post-Cuyamaca and pre-Cuyamaca intrusion. The post-Cuyamaca movement was small; the amount of pre-Cuyamaca movement is not known, but undoubtedly it was larger. The two periods of movement are clearly shown by the fault striking through the center of section 16 and into section 15. The Julian schist in section 16 north of the fault contains a quartzite band at least 500 feet thick that is not present in the offset part of the schist south of the fault. The distribution of the schist, quartz diorite, and basic intrusive along the fault in section 15 is strongly indicative of two periods of faulting.

Because these faults were active in both pre-Cuyamaca and post-Cuyamaca time and are similar to breaks in the Friday mine that appear in part to control the mineralization, these faults merit consideration, if further exploration or prospecting is planned for the area. Whether or not mineralization has occurred along them is not known, but the age and attitude of the faults are favorable.

Mineralization

The Friday mine (pl.4) contains the only exposed zone of sulfide mineralization in the Julian-Cuyamaca area. Numerous gossan outcrops and float in the Inspiration Point and Pine Hills salients indicate other mineralized zones of unknown size, probably small. All the gossan localities and the Friday mine are in salients of the Cuyamaca gabbro and within 600 feet of the intrustive contact.

Friday nickel mine: The only massive sulfide mineralization in the area is in the Friday mine. The 132-foot level is parly oxidized with residual sulfides near the winze to the 180-foot level and near the first crosscut to the south. Early reports indicate that sulfides were more common when the drift was first opened about thirty years ago. The depth of oxidation is not known, but partial oxidation extends to the 180-foot level. Soluble sulfates deposited on the walls of the 132-foot level by descending water indicates that some sulfides are present above the level. The mine does not reach the water table.

The mineralized body is irregular in outline. It is on the footwall side of an inclusion of schist but only contacts the schist on the 132-foot level east of the shaft. The drift on the 132-foot level originally continued for a short distance past its present termination. Presumably, the drift passed through the mineralized rock; the barren part subsequently has been filled with broken rock. The winze marks the northern boundary of mineralization. Thus on the 132-foot level the length of the mineralization is 55 feet east and the width is over 22 feet. Part of the mineralized zone on the 180-foot level was stoped and the stope later was filled and lagged. However, in the ore stope, which is only 7 feet above the 180-foot level, the mineralized zone is from 6 to 9 feet wide and over 32 feet long. The actual length of the ore body, exposed on the 132-foot level, is 55 feet, and the actual width, exposed in the ore stope, is from 6 to 9 feet. This indicates that the outline in plan of the ore body above the 180-foot level has been determined roughly. Although the size of the ore body pinches from the 132-foot level to the ore stope, the geology indicates it could widen at the next fault intersection, and the diamond drill hole in the winze suggests that it continues below the 180-foot level.

Assuming an average width of 15 feet and length of 55 feet and 9 cubic feet per ton of mineralized rock, approximately 5000 tons of "indicated ore" are between the back of the 132-foot and the floor of the 180-foot levels. Of this about one-sixth already has been mined. In addition, 90 tons of "inferred ore" per foot of depth lies below the 180-foot level.

The grade of the nickel mineralization in the oxidized part of the mine does not truly represent the original nickel content. Leaching of an unknown amount of nickel by descending waters is shown by the bluish green sulfates deposited by evaporation on the walls of the underground workings. A grab sample of the sulfates assayed, 11.75% Fe, 0.10% Cu, 0.15% Co. and 1.98% Ni. The composition of the sulfate material is not known; it is probably a mixture rather than a pure substance.

The average of all assays, consisting of samples from oxidized and unoxidized localities, is about 2.00% Ni. This figure can be considered safely as the minimum grade. Partly oxidized mineralized rock averages roughly 2.50% Ni, and unoxidized massive sulfides contain as much as 3.60% Ni. The mineralized body in the Friday mine will probably average from 2.50% to 3.00% Ni, the actual grade depending on the extent and degree of oxidation in the unexposed parts of the mineralized zone. The small number of copper assays precludes an accurate estimate of the average copper content. Copper is common in the massive sulfides as Chalcopyrite and in the oxidized zone probably as a sulfate. From the workings, the copper content of the mineralized zone is estimated to be from 1.5% to 1.00% Cu. As much as 0.15% Co is present in the massive sulfides and the soluble sulfates. Whether or not a zone of secondary enrichment occurs at the water table is not known. The maps of the underground workings contain assays for the entire mineralized zone (pl.4).

The geology on the 132-foot lever, in the winze, and in the ore stope seems to indicate that the ore is controlled partly by north-

east striking high-angle fractures. The mineralized zone along the drift on the 132-foot level follows an indistinct mineralized fracture that has two small stopes along the footwall. The winze to the 180-foot level follows a mineralized fracture which bounds the mineralization on the north side as far down as the ore stope. In the ore stope west of the winze, the mineralized rock spreads to the north along the footwall of a less steeply inclined high-angle fracture that intersects the steep fracture in the winze (pl. 4, sec. C-C'). The south wall of the ore stope is bounded by a high-angle mineralized fracture. The strikes of these fractures are about parallel to the strike of the schist inclusion, but the dips are either steeper or in the opposite direction; consequently, the intersect the schist. Because of the difference in the physical properties between the schist and basic igneous rock, it seems reasonable to suppose the fractures are deflected into the schist forming slips parallel to the foliation for at least a short distance, thereby creating a trap for mineralizing solutions.

Ascending sulfide-bearing solutions, rising along the fractures, apparently ponded along the fractures below the schist and at the intersection of the schist and fractures. The ponded solutions, reacting with the wallrock, formed irregular replacement sulfide bodies. The amount of replacement differs from place to place, probably depending on such variable factors as intensity of fracturing, tight and open fractures, temperature, and pressure. The chemical composition of the mineralizing solutions is unknown. However, the solutions were undoubtedly very low in silica as shown by the absence of quartz and new silicates in the mineralized zone. Evidence of volatiles other than a little water is absent. The wall rocks locally are altered slightly by hydrothermal action to clay minerals and chlorite along fractures and along the contacts of the schist and basic intrusive rock. The fibrous green amphibole present may have formed by hydrithermal action. Microscopic study of the wall rocks would be necessary before the degree and mineralogy of the alterations are known fully. Whether or not the mineralizing solutions can be called hydrothermal is debatable. Apparently they were fluid, high in sulfides, and comparatively low in water. Other volatile constituents commonly associated with hydrothermal activity apparently were absent.

<u>Other areas</u>: Surface indications of hydrothermal action are chlorite-talc rocks, probably formed by alteration of basic rocks, and gossans. Relic textures in some of the gossans are like those in the unaltered sulfides from the Friday mine, leaving little doubt that the gossans, in part, were derived from sulfides similar to those found in the mine. Surface mapping located six gossan outcrops and five float areas. Five of the outcrops and four of the float areas are in the Inspiration Point salient of basic intrusive rock, and one outcrop and one float area are on the eastern edge of the Pine Hills salient (pl.2). All of the outcrops are in small prospect pits and trenches; they cannot be traced on the surface. In two localities gossans are exposed in more than one pit. The float areas consist of weathered gossan boulders lying on the surface; shallow trenching probably would expose gossan in place in most of the float areas. The deep weathering conceivably could mask entirely the presence of gossans, as friable gossans could not be expected to crop out strongly where igneous rocks do not; consequently, the size of the gossan outcrops and the amount of gossan float

may not indicate accurately the size of the area mineralized. The nickel content of the gossans varies widely. Six gossan samples were assayed, three from Inspiration Point, two from Pine Hills and one from the dump of the Friday Mine. Table 1 gives the location and nickel content of the samples.

Table 1

Assays of gossan samples

Location	Coordinates	Percent nickel
Friday mine	6000N - 8000E	0.73
Inspiration Point	10090N - 7240E	0.16
Inspiration Point	10000N - 7070E	1.45
Inspiration Point	8900N- 8080E	0.01
Pine Hills	SW¼, NE¼, Sec. 13	0.16
Pine Hills	SE¼, SE¼, Sec. 13	0.03

Mineralogy: The sulfides from the mineralized zone in the Friday mine were identified chiefly by polished sections and x-ray pattern. The opaque minerals present are: Pyrrhotite, pentlandite, pyrite, chalcopyrite and magnetite. Pyrrhotite is the most abundant mineral.

Pyrrhotite occurs as large crystals poikilitically enclosing other minerals. Violarite, identified optically and by x-ray pattern, is noticeably pink or violet compared to the brownish pyrrhotite. The pyrite present is a crystallized FeS_2 gel, and is essentially finely divided showing a banded gel-like structure. It is very hard, a pale brassy yellow color. It occurs in vein-like structures in pyrrhotite. It is less stable chemically than ordinary pyrite which may explain partly the rapid oxidation of the sulfides on exposure to air and water. The pyrite may be nickel bearing.

Hydromagnesite, identified by x-ray, optical and chemical methods, occurs as minute hollow spheres in the sulfides. Its major constituent is Mg; minor constituents are nickel and traces of copper, calcium, iron and silica.

Both the violarite and the pyrite have been variously identified as follows:

		Violarite	Pyrite
Calkins	1916	"Polydmite"	"Pyrite"
Lindgren and Davy	1924	"violarite"	"pyrite"
Hudson	1922	"plydmite?"	not mentioned
Tolman and Rogers	1916	"pentlandite"	"marcasite"
Buddington	1924	"not pentlandite-bravoite?"	"marcasite"
Short and Shannon	1930	violarite	"probably pyrite"
Schneiderhohn-Ramdohr	1931	violarite-bravoite!	
Milton-Axelrod	1944	violarite	pyrite

Friday nickel mine

The Friday nickel mine, held by E.H.A. Andrews, 2716 - 84th Place, Inglewood, California; Raymond Jacobs, Julian, California, and associates; consists of one patented claim and the adjacent 80 acres to the north. Development work (pl.4) consists of a 160-foot vertical shaft with a 55 degree incline extending from the bottom of the shaft to the 180-foot level. About 132 feet from the collar of the shaft a 105-foot drift runs to the northeast. At 65 feet from the shaft on the 132-foot level a 14-foot crosscut extends to the south, and at 105-feet a 17-foot crosscut extends to the northwest ending in a winze to the 180-foot level. The 180-foot level consists of a 144-foot drift running northeast. At the face of the drift a 48 degree incline follows the schist for a distance of 25 feet. About 67 feet from the incline that joins the shaft, short stub crosscuts extend north and south, and at 100 feet, a 10-foot crosscut extends to the south. A winding crosscut 105 feet from the incline runs 59 feet to the raise to the 132-foot level and extends 18 feet past it.

The shaft encountered the hanging wall of the schist at 112 feet and the foot wall at 137 feet. The 132-foot level starts in schist and reaches the footwall 32 feet from the shaft. The footwall of the schist bends sharply to the south 65 feet from the shaft, and the first oxidized sulfide mineralization appears. The drift on the 180-foot level follows the schist inclusion with no indication of sulfide mineralization. The only mineralization on the 180-foot level is in the vicinity of the raise to the 132-foot level. Both the hanging wall and footwall of the schist are faulted. Splits from these faults pass into the schist and the basic rock. On the 180-foot level several small tourmaline pegmatites and one irregular-shaped pegmatite mass occur in the basic rock and schist. One true lamprophyre dike is near the face of the drift on the 180-foot level.

Complete and reliable information on the results of diamond drilling could not be obtained. The present owners drilled two short holes from the workings of the Friday mine; one in the bottom of the shaft, one in the bottom of the winze, and two holes from the surface near the shaft. According to a reliable source, one of the surface holes was abandoned because of mechanical difficulties, and no information is available on the other. Mr. E.H.A. Andrews reported the hole drilled in the bottom of the winze penetrated sulfide mineralization averaging 2.26% nickel. He did not state the length or the altitude of the hole, although by necessity the hole must have been nearly vertical. According to Mr. Andrews, the hole drilled from the bottom of the shaft encountered no mineralization for the first 10 feet, but from 10 to 50 feet averaged 2.16% nickel. The hole was vertical.

Soil Analysis

The private report by C. F. Tolman and Z.K. Melcon contains a soil analysis of the immediate area around the Friday mine. Soil samples were taken on 100-foot centers and qualitative analyses were

made. Six strengths of nickel content were recorded as follows: very strong, strong, good, fair, weak and negative. By this method three areas containing "very strong" and "strong" tests were outlined (plate 2). The area over the Friday mine sulfide body is not included in any of these areas.

Ten samples of rock and soil, from the same localities as Tolman's and Melcon's soil samples, were taken to determine (1) the amount of nickel in the soil and (2) the ratio of nickel in the soil to nickel in the nearest rock outcrop. The results, shown in table 2, suggest that the soil contains no significant nickel concentrations over the nickel content of the near by igneous rock. Surface geology revealed no gossans in the area of "nickel highs" as outlined by Tolman and Melcon.

Table 2

Location	Kind of Sample	Percent Nickel	Qualitative Test for Ni by Tolman & Melcon
450 N-500 W	soil	0.11	very strong
250 N-500 W	"	0.07	fair
850 N-600W	"	0.07	very strong
" "	rock	0.05	
950 N-500 W	soil	0.06	strong
" "	rock	0.06	
450 N-800 W	soil	0.05	good
" "	rock	0.04	
350 N-700 W	soil	0.03	negative
" "	rock	0.02	

Geophysical Exploration

In 1939, H. J. Fraser, of the California Institute of Technology made a brief geophysical study of the area around the Friday mine and Inspiration Point for Sheldon Fay. Mr. Fraser, using a Schmidt-type vertical magnetometer, ran grid traverses over both the Friday mine and Inspiration Point areas. The approximate positions of his traverses for the Friday mine area, and contour maps and profiles for his magnetic highs for both the Friday mine and Inspiration Point areas are illustrated on plate 2.

Four magnetic high zones were found by Mr. Fraser's examination, three in the vicinity of the Friday mine and one at Inspiration Point. The three zones near the Friday mine are northwest, northeast and southeast of the shaft. According to Mr. Fraser, each of the zones is individually distinct, and the results of exploration on the one zone would not prove or disprove the possibilities for mineralization in other zones. Although Mr. Fraser does not claim the magnetic highs positively indicate ore, he recommends five or six diamond drill holes to check the magnetic highs of the Friday mine and Inspiration Point areas.

Mr. Fraser's ability as a geophysist is highly respected, but geological work in the vicinity of the Friday mine suggests the magnetic highs may not be caused by sulfide bodies. Although outcrops are not plentiful, no exposures of gossan or gossan float were found in the areas of magnetic highs around the Friday mine. This in conjunction with the lack of a "high" over the known sulfide body in the Friday mine and the largest gossan outcrop at Inspiration Point caused the writer to look for some explanation other than sulfide bodies for the magnetic highs. Surface mapping showed the largest high, N. 30 W. of the Friday mine, to be almost entirely within an area of the most basic rock type.

At first the difference in the magnetic susceptibility of the various phases of the Cuyamaca gabbro suggested a possible explanation for the magnetic highs. However, Mr. B. S. Butler, during his visit to the project in June, discovered the top soil of the basic rock contained an appreciable amount of dark red magnetic material which has been identified by Charles Milton of the Survey laboratory as Maghemite. Maghemite is almost universally present throughout the Friday mine-Inspiration Point area, but the amount varies from place to place. In general the redder the soil and the more basic the rock, the higher is the maghemite content of the soil. Maghemite is not limited to the Friday mine and Inspiration Point area; numerous other places within the Cuyamaca gabbro were tested, and all contained at least a trace and many contained an appreciable amount of maghemite.

Because a horse-shoe magnet extracted more maghemite from the top few inches of soil than from the decomposed rock one to three feet below the soil, four samples were taken to determine the amount of maghemite in the top soil and decomposed rock below the top soil. Two samples were taken from the magnetic high at Inspiration Point. Sample A, 1' x 1' x 1½" deep, was taken from the top soil. Then a pit 1½ feet deep was dug and Sample B, 1' x 1' x 1½" deep, was collected . In the same way Samples C and D were collected from the magnetic high northwest of the Friday mine. The samples were sent to the Survey laboratory in Washington where they were crushed to 80 mesh and all the magnetic material separated by an electro-magnet. The part picked up by an alnico magnet was removed, and from the selected part, the part picked up by a hand magnet was extracted. The results shown in table 3 are inconclusive.

Table 3

Percent of magnetic material in Samples A,B,C,D.

	A	B	C	D
Picked up by a hand horse-shoe magnet.	2	1/4	2	1/4
Not picked up by horse-shoe magnet but picked up by alnico magnet.	2	4-3/4	2-3/4	1/2
Total magnetic material picked up by hand magnets, on 80 mesh material, Approx. values	4	5	5	1

The problem of the effect of maghemite on magnetometer readings was referred to the physical laboratory in Washington, D. C. Mr. Cecil Spicer replied that in order to make a careful magnetic survey of an area, the magnetic susceptibility of the various rock units underlying the area should be determined. It is also necessary, according to Mr. Spicer, that no near surface material of sufficiently high susceptibility be present to obscure the magnetic response of more deeply buried formation that is being sought. Because magnetic methods lack depth control, slightly magnetic material near the surface might produce the same effect on the magnetometer as the more magnetic body at depth. Certainly, maghemite has a high magnetic susceptibility. It remains to be determined whether sufficient quantities of it concentrated in the soil directly beneath a magnetometer conceivably could give readings comparable to those obtained by Mr. Fraser, and whether the varying amounts of maghemite could explain the variation in the readings obtained from the different magnetometer stations.

Recommendations and conclusions

The Friday mine-Inspiration Point area has little or no chance of becoming a war producer. Consequently, no further work is recommended by the U. S. Geological Survey or by the U. S. Bureau of Mines. However, the property merits further work in any long range program concerned with determining the nickel resources of the United States.

The negative recommendation is not made because there is no chance of developing minable sized bodies of nickel ore, but rather because finding them is problematical, and in view of the time required for exploration and development, this property has little chance of becoming a war producer. There is no readily available water supply or labor. The geographic location is unfavorable for successful operation of a small tonnage nickel deposit, and the writer did not see any geological evidence on the surface indicating a large low-grade deposit. No custom mill or smelter is close enough for low cost treatment of nickel ore. Presumably sufficient ore reserves should be developed to justify a mill before mining could be considered.

Before diamond drilling could be started, the area should be studied by geophysical methods which would be hindered by the problems discussed under the section on geophysical exploration. However, in the event of an acute nickel shortage, the area should be reconsidered. Diamond drilling in the Friday mine might develop a moderate tonnage, in order of magnitude of from 10,000 to 20,000 tons, of ore grading about 2.00% nickel. Drilling to test the better gossan outcrops near Inspiration Point would have some chance of penetrating nickel mineralization; the poor exposures do not justify an estimate of the size and grade of the mineralized zone that might be found, although the chances are in favor of small tonnage.

The surface geology in the Friday mine-Inspiration Point area and the mapping of the underground geology in the Friday mine, indicate, but do not prove, that the mineralized bodies are small and widely spaced. The delineation of the length and width of the mineralized zone in the Friday mine, the small areal extent of the gossan outcrops, and the lack of gossan float around gossan outcrops are all suggestive of small

bodies, although the friable character of the gossan undoubtedly limits the surface exposure to some extent.

Further geologic work in the Friday mine-Inspiration Point area would probably not result in much additional information. The regional map indicates that detailed work is not warranted in other places already examined except for the gossan occurrences near Pine Hills. However, this area does not appear as favorable for mineralization as the Friday mine-Inspiration Point area.

The property has merit as a project in a long-range program aimed at determining the nickel resources of the United States. Under such a project where time is not an important factor, the entire Cuyamaca gabbro should be mapped in detail. Possibly the mapping should be extended to include the gold mines which are nearby. The decision on geophysical work should be postponed until the conclusion of the geologic mapping.

REPORT ON

THE FRIDAY NICKEL MINE

SAN DIEGO COUNTY, CALIFORNIA

by

C. F. Tolman

and

Z. K. Melcon

Stanford University
October 8, 1942

APPENDIX No. 3

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V. COPY

LETTER OF TRANSMITTAL

October 8, 1942

Mr. Ralph E. Knight, Manager
Henry J. Kaiser Company
Development & Engineering Division
Bank of America Building
Oakland, California

Dear Mr. Knight:

I submit herewith a report on data collected during the examination of the Friday Nickel Mine, San Diego County, California.

The examinations consisted of mapping and sampling the portions of the underground workings open to inspection. Portions of the drifts and shafts were tightly lagged and of course could not be inspected.

The second portion of the examination consisted of sampling the weathered rock in place just beneath the surface soil. A delicate test for nickel was applied to all these samples, and these tests were plotted on a coordinate map using symbols to indicate the intensity of the red color indicating the presence of nickel, and hence indirectly the quantity of nickel in the sample.

The next step would be to test by geophysical methods the distribution of the magnetic ore bodies of nickeliferous pyrrhotite.

The third step would be to drill the deposits with reference to the results of these two types of investigation.

The fourth step would be underground development guided by the results of all the above mentioned types of investigation.

Respectfully submitted,

/s/ C. F. Tolman
C. F. TOLMAN

cft/eb

INTRODUCTION

SUMMARY OF IMPORTANT DATA

by

C. F. Tolman

The writer first became acquainted with the Friday property when making, in conjunction with Dr. Austin F. Rogers, Professor of Mineralogy, Stanford University, a microscopic study of the typical nickel-sulfid ores from all over the world.[1]

The Friday Mine furnished the only typical pyrrhotite-pentlandite[2] ore, that is, ore of the Sudbury type, found in western United States.

When requested to study their nickel ore situation for the Henry J. Kaiser Company, Development and Engineering Division, the writer turned to the Friday Mine as a possible source of nickel.

This mine was opened up in the early '80's by gold prospectors who were attracted by the "gossan outcrop" above the sulfid ore. "Gossan" or "iron" outcrops often carry gold,

[1] Tolman, Cyrus Fisher, Jr. and Rogers, A. F., " A Study of the Magmatic Sulfid Ores", Leland Stanford Jr. Univ. Pub., Univ. Ser: 76 pp. 20 pls, 7 figs (1916).

[2] The composition of pentlandite is (Fe, Ni)S.

and this surface material of the Friday Mine was tested by the old timers and found to contain small amounts of gold.

Prior to the World War I, Mr. Stearns, President of the Friday Mining Company, sunk a shaft below the oxidized material and encountered nickel-bearing sulfid ore. This discovery was of considerable scientific interest and he sent specimens to the writer for identification. Later he opened up a small lens of high grade nickel-bearing sulfid ore and made some test shipments to Norway.

However, with the close of the war came the close of prospecting for minerals like nickel, and the property was abondoned and the workings were allowed to cave.

In 1939 the present owners, Mr. E.H.A. Andrews and Mr. Berton D. Nichols acquired the property, opened up the old shaft and drifts, installed a hoisting plant and made the property available for examination.

Mr. Andrews rented a drill and attempted to put in a few random drill holes. The first 80 feet of drilling was very difficult because of the broken and oxidized character of the superficial material. Apparently no records were kept and information is quite sketchy. He gave us from memory the data which is plotted on Map I. This information, if reliable, indicates a considerable extension of the ore lens beyond the present workings.

An option on the property for the Henry J. Kaiser Company, Development and Engineering Division, was negotiated

August 12 and 13, 1942 by Mr. Ralph Knight, and lease was signed on September 21, 1942. A copy of the lease appears as Appendix I.

Mr. Melcon was sent to inspect and sample the mine and made a report dated August 21, 1942. The Geologic and assay maps accompanying this first report are attached to his present report.

The possible occurrence of the ore as scattered lenses of nickeliferous pyrrhotite along contacts between included schist fragments and the intrusive norite, would make the drilling for such lenses quite hazardous unless other data were discovered to indicate the location of such lenses. For that reason the writer instructed Mr. Melcon to sample weathered rock in place and make delicate chemical tests for nickel on samples collected using dimethy-glyoxine. These tests were made on 100 foot coordinates with intermediate tests along road cuts and on good outcrops.

These tests show a concentration of nickel in certain portions of this area. The tests do not extend over the entire area covered in the lease, nor were they extended until barren reactions were encountered.

The present data is sufficient, however, to indicate a concentration of nickel within the areas of good tests.

The next development should be the application of geophysical methods for locating the magnetic pyrrhotitic ore bodies below ground surface. Pyrrhotite is strongly magnetic and hence geophysical methods are suited for the location of

these magnetic ore bodies. Apparently magnetite is not concentrated in appreciable amounts in the norite and may not interfere with the tests, and hence there is a good chance for the magnetic survey to give important data ragarding the location of these ore bodies.

After such a survey is made the property could be drilled in accordance with data obtained from the chemical and geophysical surveys.

After this drilling is finished exploration from the underground workings could be continued profitably to explore and develop the known lens of nickel ore and to intersect other lenses that may be encountered in drilling.

THE FRIDAY MINE

by

C. F. Tolman

&

Z. K. Melcon

Location

The Friday Mine is about 4 miles southeast of Julian, San Diego County, California, lying 60 miles northeast of San Diego. The mine shaft and buildings are only 200 feet south of the state highway connecting Julian and Cuyamaca Reservoir.

Communication

An excellent mountain highway which is a part of the state highway system leads to the mine, and fairly easy access to most of the area covered in this report is to be had from this road. The nearest rail point is Lakeside, the terminus of a branch line of the Southern Pacific from San Diego, 36 miles from the property.

Power

There is a power line about 1 mile from the property but its capacity is insufficient for the requirements of extensive mining and metallurgical installations.

Water

Although there are no developments of underground water in the immediate vicinity of the Friday Mine, it is reasonable to

assume that a sufficient water supply for mining and metallurgical operations may be made available at reasonable cost, inasmuch as the average annual precipitation for the district is over 30 inches, and there are many wells in Julian and on surrounding farms. The mine itself is dry.

Topography

The region in which the Friday mine and adjacent properties lie is mountainous, but not rugged. The slopes are smooth and rarely exceed 25° in steepness. These gently slopes are covered with a shallow residual soil formed by weathering of the underlying rock in place, and holes a few feet deep encountered weathered country rock in place.

Climate and Vegetation

There are two seasons, namely, a wet and a dry. The total annual precipitation exceeds 30 inches, of which a small part is snow. Snow, however, does not remain long on the ground. Snowfalls of as much as 18 inches are reported. The climate, in short, is excellent and will offer no hindrance to mining operations.

The vegetation is abundant, consisting chiefly of pine and oak, less of cedar with manzanita and other shrub-like growth. The stands of pine should furnish rough timber for the mine.

History

The Friday claim is reported to have been located in 1885.

The mine itself was originally opened for gold, and some gold actually was recovered. Further exploration exposed what was thought to be a copper deposit. Later nickel was detected in the ore and assays indicated satisfactory nickel values. The several early nickel analyses available are given in the section on chemical analyses at the end of this report.

It is reported that Mr. Stearnes, President of the Friday Mining Company, operated the mine and made two shipments of ore, valuable for this nickel content, to Norway during World War I.

From then on the mine was idle until 1939 when it was acquired by the present owners who cleaned out the shaft, timbered the caved portions of the drifts and shaft, and made the workings accessible.

The present owners also made several diamond drill holes which are shown on Map I. Unfortunately the data available on these holes are very meager.

General Geology

The Friday claim and the adjacent properties are located in the northeasternmost part of a considerable area of basic igneous rocks, chiefly gabbro and norite which outcrop in adjoining portions of the Ramona and Cuyamaca Quadrangles. This area is known as the Julian Mining District.

These basic rocks are considered the youngest (excluding minor bodies of dike rocks) in the district, intruding the older granitic rocks and the still older metamorphic rocks - chiefly

poorly consolidated quartz-mica schists of varying character. In this report the basic rocks are termed gabbro-norite, although there are other rock varieties according to Hudson.[1]

The most important surface characteristic of the gabbro-norite intrusive is the intense red coloration developed in certain areas.

[1] Hudson F. S. "Geology of the Cuyamaca Region of California", Univ. Calif. Dept. Geol. Bull. Vol. 13, No.6, pp 175-252, June, 1922

The Properties in the Friday Mine Area

The ground under option by the company, in addition to the Friday Mine (10 acres) includes some 1000 acres adjoining and surrounding it. Of this ground only about 60 acres was covered in the present chemical investigation.

The surface features of the area are the heavily wooded and brushy slopes of a region that is mountainous, but not ruggeed. The slopes are smooth and do not much exceed 25 degrees. Outcrops of the country rock are few. The relief is approximately 500 feet.

Geology

Beneath the mantle of soil which usually is 1 to 1½ feet thick, the underlying gabbro-norite is thoroughly decomposed. In the mine workings decomposition is evident even at the 132 foot level. Jointing and fracturing to a large extent are absent. The numerous small dikes of dense basic rock, up to 4 or 5 inches in width, intersect and are more resistant to weathering than the gabbro-norite. Fragments of these rocks are prominent as float, as well as mixed with the soil.

The larger float boulders consist of gabbro-norite. The decomposed gabbro-norite varies in character from a thoroughly leached coffee colored limonitic residue retaining none of its original appearance, to rock preserving the essential texture of the original mass.

The feldspars are cloudy, the whole mass is stained

with iron, and clay has developed to a large degree. Below the soil exfoliation as well as mass decomposition has taken place. The soil is highly colored, ranging from pale, creamy buff to a deep brick red. As a rule the localities of deepest coloration gave the best indications of nickel.

The schist is cut by pegmatite dikes consisting of quartz and feldspar with black tourmaline. The schist bodies enclosed in the gabbro-norite are small as compared to the basic intrusive rocks and contacts between schist and gabbro-norite are located with certainty only at road cuts and in gullies, of which unfortunately there are few. The visible outcrops of schist are shown on Map III and the probably strike of the schist inclusions are shown by dotted lines.

The intense coloration of the soilfrom the gabbro-norite rocks has covered and masked the outcrops of the schist bodies, making impossible their delineation without detailed work.

The Friday Mine

Mine Plant

The surface improvements of the Friday Mine consist of a hoist building 14' x 24' housing hoist, hoist engine, compressor and receiver, and a 10' x 10' shack and a bunk house 12' x 22'. The hoist is a single drum with 5/8" cable, geared to a 10 h.p. Western Gas Engine. The compressor is a Gardner Rix 8" x 6". A 2" air line extends to the first mine level. All of the above equipment is in good running order.

Underground Workings.

There are two levels in the mine. (See Map II). Access to the workings is by a two compartment vertical shaft to the first or 132 foot level, and to the lower or 180 foot level by an incline continuation of the vertical shaft. These levels are also connected at their northeasterly extremities by a winze and follow fairly parallel courses along the norite-schist contact, averaging N 70°E, terminating at the winze and cross cuts. The total footage of mine workings, vertical and horizontal, is about 650 feet.

Some of the significant parts of the workings, notably the ground in the vicinity of the winze on the 180 foot level, are inaccessible because of timbering. However, it was possible to sample most of the footage that appeared to be mineralized. The geology and assays are shown on Map I, together with cross

sections. The 132 foot level is at or near the transition zone between sulfid and oxidized ore. In the winze near the 180 foot level oxidation is found only along fractures which have permitted the passage of surface waters.

The Orebody

The orebody is lenticular in shape and consists of norite carrying varying amounts of nickel-bearing pyrrhotite and some chalcopyrite. In the extreme case the ore consists wholly of sulfid minerals. It is of the magmatic sulfid type of which one of the most celebrated is the Sudbury nickel-copper deposit of Ontario, Canada.

Structure

The geology and structural features of the mine are relatively simple. The drifts of both levels follow the schist-norite contact, but whereas in the 132 foot level the schist forms the hanging wall, in the 180 foot level it is the footwall. Slickensides are abundant at the contacts, but alteration appears to be unimportant.

The footwall side of the schist on the 180 foot level has been explored only in the vicinity of the winze. Future work in the mine should be directed along that side of the schist on that level; on both the 132 foot and 180 foot levels drifts extending northeasterly from the winze might open more ore. Nothing is known regarding the ore body at the floor of the winze.

Sinking at that point might also show an extension in depth of the lens. Without the benefit of measurements on all sides of the orebody, the ore available in the mine is estimated at 6000 tons.

Drilling

Mr. Andrews attempted to personally drill the orebody but found drilling in oxidized material down to 70-80 feet very difficult. He kept no logs, preserved no cores, and does not have available results of assays. He wrote out the following "memory logs" for us.

Hole 1 - was drilled from the bottom of the shaft and encountered 10 feet of broken material and 54 feet of nickel sulfids.

Hole 3 - 240 feet west of shaft encountered 70 feet of broken rock and gossan, 42 feet of nickel-bearing norite and gossan, and 12 feet of oxidized nickel sulfid.

Hole 2 - to the north of the workings encountered 55 feet of leached material and 225 feet of nickel-bearing norite with 6 feet of heavy nickel sulfid.

Hole 3 - to the south of the workings penetrated norite carrying a trace of nickel.

Unfortunately the cores were removed and lost, and no assays are available, but the data, if reliable, would indicate that the ore lens penetrated in the workings may extend beyond the present workings, and underground development may indicate sufficient ore in this lens to justify mining operations.

The geology of the underground workings indicates that the strike of the ore lens is parallel to the schist-norite contacts. This relation should be considered in laying out the further underground exploration of this ore lens and the prospecting for other ore lenses.

The Chemical Sampling and Mapping

In order to determine, if possible, the presence of important nickel-bearing ground, the Friday Mine property (10 acres) and the areas surrounding it were prospected in the following manner.

Method of Sampling

The ground was laid out in 100 foot coordinates and samples taken at the intersections at depths varying from 1 to $1\frac{1}{2}$ feet. At these depths the underlying decomposed rock, in most cases, was reached. Samples were taken also from road cuts, from natural exposures in gullies, and from openings made in the past. The road cuts along the Julian-Cuyamaca road were especially valuable for sampling.

Method of Testing and Evaluating Samples

The samples thus obtained were tested for nickel in the field by the dimethyl-glyoxine test. In order to give relative values for the samples tested, approximately standard conditions for making the tests were maintained. These standard conditions were: 1. amount of sample used; 2. strength of acid; 3. time of treatment and 4. total amount of solution from which the test drop is obtained. Except for a number of the earlier samples, these conditions were met as closely aspossible.

The grade of a sample is based on the intensity of color developed in a given test. There are 5 positive grades - very strong,

strong, good, fair and weak.

In passing it must be mentioned that there are two variations to the dimethyl-glyoxine test. The test consists of bringing the nickel into solution by aqua regia, or hydrochloric acid. If the former is used the solution must be evaporated to dryness, the nitrate radical decomposed and driven off, and the mass redissolved by hydrochloric acid; if the latter is used, such proceedure need not be followed. In the present instance hydrochloric acid was used in all samples. Its solvent powers were adequate and the saving of time in making the test was very great.

With the nickel in solution in one variation of the test, a drop is placed on a test plate, one drop of saturated solution of tartaric acid is added, enough saturated solution of sodium carbonate to neutralize the acid (usually 3 drops is added), finally one drop of 1% solution of dimethyl-glyoxine in alcohol is added. A brownish-red coloration indicates nickel.

In the other variation of the test, one drop of the tartaric acid solution and one drop of the dimethyl-glyoxine solution are added. The addition of 2 or 3 drops of ammonia brings out a color varying from pink to deep red depending upon the amount of nickel present. It has been found that the test with ammonia is the more sensitive of the two. Consequently both tests were made on each sample. Those marked "weak" are the ones which were negative with sodium carbonate, but gave a distinct color with ammonia.

On the accompanying Map III, the results of the tests are plotted. The areas containing "very strong", "strong" and "good" are distinct from those containing "fair" and "weak" samples. It will be noted that there are very few negative samples. This may be due to the inclusion of particles of "float" which may have vitiated some samples, inasmuch as a number of tests on fresh gabbro-norite gave positive reactions for nickel. It was endeavored to eliminate all such "float" from the samples, but it was impossible to do so in some cases.

It is significant that there is a definite grouping of the stronger samples; likewise the weaker samples fall into a distinct group. Also in certain quarters there is a definite trend toward weaker and weaker samples.

The final objective of determining the boundaries of the entire nickel-bearing area was not attained. The contacts between schist and norite are definite boundaries (in the northwest and the southeast of area mapped). Yet schist bodies may constitute only an interruption in the nickel-bearing ground, and beyond their confines the nickel may again appear in the gabbro-norite. This is true of smaller bodies of schist which may be noted on the general surface map. The narrow schist zones form minor gaps in the nickel-bearing ground.

Description of the Samples

These samples which were limonitic in character, and hence, highly weathered and leached, gave the weakest test for

nickel. The samples which gave the strongest test included, in general, those underlying the soil of deepest coloration, and those which consisted of decomposed rock beneath the soil mantle containing a network of a white to greenish mineral tentatively identified as annabergite, or a similar exidized mineral of nickel. The presence of iron oxide was universal, and it was the dominant mineral in most of the samples. Many of the samples were clayey, others friable or loosely bound.

The samples were taken from the upper surface of the decomposed bedrock.

Discussion of Map III

The area of strong tests is colored intermediate red. It is the favorable area for further exploration. The better zones in this area are indicated by the contiguous groups of tests designated as "very strong", and these are colored dark red. Boundaries between these two are not shown on the map. The area showing weak tests is colored in light red. The poor tests in the vicinity of the workings are due to complete oxidation and leaching, and also to cover which prevented sampling of material in place.

Chemical Analyses of Friday Mine Ores

Analyses Taken During Early Developments

Some of these analyses are of picked samples and some are supposed to be of shipments. Data regarding type of samples are not now available.

September 12, 1913 - C. E. Anthony, San Diego, Analyst.

SiO	25.20
$Al_2 + Fe_2O_3$	42.24
As	2.28
S	5.50
Ni	22.05
Au	.16 oz/T
Ag	1.3 oz/T
Cu	2.4

This ore sample taken from the top and edge of ore-body when first struck at 125 foot level. Ore very black and oxidized and soft. When exposed in the air a short time, it became almost a powder.

December 23, 1913 - A. F. McAuliffe, Los Angeles, Analyst.

Fe	37.4
S	26.5
Ni	12.8
Co	None
Ag	"
Au	$4.90 per T.

Mr. McAuliffe was called to Peru before completing the analysis.

September 24, 1914 - U. S. Metals Refining Co., Chrome, N. J., Analysts

Fe	43.99
SiO_2	3.08
CaO	Trace
S	35.11
As	0.15
Ni	4.12
Cu	0.93

September 28, 1914 - Hartford Laboratory Co., Hartford, Conn., Analysts.

Ni	4.35
Cu	.49
Fe	44.16
S	36.63
Co	Trace
Mn	"

July 29, 1914 - U. S. Bureau of Mines, San Francisco, Analysts.

Ni	8.25

A metallic button obtained by smelting the ore through one heat in our brass furnace and in a flux of soda, etc., was also submitted and reported by the Bureau to contain:

Fe	66.8
Ni	22.6
Cu	.8
S	.4
As	.4

Other samples submitted were reported to contain from 4% to 7% nickel, with somewhat less than 1% copper and about 0.5% arsenic.

Another metallic button, secured as above, was submitted through the Johnson Electric Smelting, Inc., to Ledoux & Co., New York, and the following analysis given:

Ni	27.11%
Ag	0.48 oz.
Au	0.06 "
Pt	0.04 "

Sample Submitted by
Present Owner (1941)

September 11, 1941 - Dearborn Chemical Co., Chicago, Analysts.

SiO_2	4.80
Fe	37.65
Ni	4.34
Co	2.37
As	5.95
S	33.49

Samples Taken During
Examination

Our samples are plotted on the geologic and assay map (Map II).

GENERAL REPORT ON THE FRIDAY MINE AND THE NICKEL-NORITE BATHOLITH OF THE CUYAMACA AREA SAN DIEGO COUNTY, CALIFORNIA

BY

A. H. HELLER

APPENDIX No. 4

GENERAL REPORT ON THE FRIDAY MINE AND THE NICKEL-NORITE BATHOLITH OF THE CUYAMACA AREA SAN DIEGO COUNTY, CALIFORNIA

The writer after having checked into the past history of the Friday Mine and adjacent area, and after having made two examinations of the property, the first of which was in company of Mr. R. Burnham and Mr. R. Kellogg, believes that this mine and the Cuyamaca Batholitic area has possibilities of becoming one of major importance as a nickel producer.

The following is a general summary of the impressions gained as a result of the study made by the writer to date.

1. Similarity to Sudbury Deposits.

a.) A gravimetric segregation of nickel bearing ore, in the form of a massive pyrrohotite, from an original batholithic or latholithic magnatic intrusion.

b.) A concentration of the nickel bearing sulphides towards the lower or basic portion of this intrusion.

c.) A grade of ore which in nickel, iron, copper and precious metal content is similar to the average mine of the Sudbury region, and having the same type of minerals of these metals.

d.) A rim of granitic rocks surrounding the batholith, and separated therefrom by metamorphosed schistose sedimentaries around about one half of this rim.

e.) The presence of commercial deposits only around that portion of the rim where the schists occur.

f.) The occurrence of numerous embayments which have so far been necessary for the presence of marginal deposits of nickel bearing ore. At Julian, where the Friday Mine occurs in one, the embayments are larger and more pronounced than at Sudbury.

g.) Faulting at the point of contact of the massive sulphides and schistose or granitic rocks in much the same manner as the Carson Mine in the Sudbury District. At the Friday Mine faulting appears to have been more extensive and has brought previously more elevated portions of the inner basin norite in contact with and on the rim side of the massive sulphides.

h.) A norite which increases in pyrrohotite and sulphide content towards the rim or base of the batholith and decreases towards the center and more acidic portion.

i.) A lean pyrrhotite content on the marginal portion of the batholith where no neighboring schists are present.

j.) An area in which the present mines and prospects were originally started years ago as gold mines, were then explored for copper and years later were finally found to contain appreciable nickel values. This is a duplication of the history of the Sudbury District as well as the Lancaster, Pennsylvania deposit.

k.) The presence of a large amount of goswan of a character indicative of the presence of underlying massive pyrrhotite beds. There is a far larger proportion of gossan in the vicinity of the Friday Mine than around the best mines of the Sudbury District. This gossan from which practically all nickel and copper values have been leached extends to a depth of 50 feet.

2. <u>Past Work Conducted in the Area.</u> Although this area has attracted the attention of many prominent engineers and geologists in the past such as Mr. A. Locke and Prof. Frasier of Cal. Tech. who made very favorable recommendations on the area, no systematic or very extensive exploration work was ever carried out. In fact the only development work of any extent was all done prior to the present century, and then only for the purpose of seeking

copper and gold values above and to the sides of the massive sulphides which were found.

There are three publications covering the nickel bearing ores of this region, namely:

U.S.G.S. Bull. 640. (1916). By Calkins.
Origin of Ni Ore in Cuyamaca Region. F. S. Hudson,
U. of Cal., Pub. 1922.
Geological Map and Report, Cal. State Min. Bur. Report xxx.

In view of all the publicity and past favorable opinions rendered by government as well as private engineers it is surprising that no concerted effort has been made to explore and develop an area of this type which apparently holds so much promise. Why this was not done may be due to one or more of the following reasons:

a.) The working of the Friday Mine and its entire nickel orebody exposures were never, during the period of the last 30 years during which these reports were written, as available as they are today. When the works were entirely open previously the presence of nickel was not known.

b.) The average mining engineer unfamiliar with the occurrence of nickel but possibly fully acquainted with our basic metal deposits such as copper, lead and zinc, would ordinarily shy from a recommendation of development of a massive pyrrhotitic orebody which would not lend itself to concentration. In turn unless the engineer knew of the gravimetric magma origin of practically all nickel ores, he would be prone to consider the Friday as well as the Sudbury ores as being of secondary origin on first viewing them. Were the deposit secondary its extent in length as well as depth might be very limited as compared with one of primary origin, where the concentration was obtained for an immense magmatic body.

c.) The original Friday Mine covers only 10 acres of patented ground. When the presence of nickel was first discovered prices of adjacent land and

holdings soared beyond all reason, and made it prohibitive for any major development company to tie up sufficient acreage of doubtful merit to justify any extensive exploration or development program.

d.) The few companies that did a little work in the area in the past were of a promotional nature or had very limited means and were usually satisfied to hold a single prospect or a few acres. Had they gone through with their development and discovered additional bodies of nickel ore, they would have been faced with a metallurgical plant capital expenditure greater than it would have been their ability to raise.

3. Land Available. As stated previously the Friday Mine contains only 10 acres of patented land, however, the present mine is located close to the center of this small tract, and the ore body strikes with the long side of this rectangular tract which is twice as long as it is wide. The present owners have, however, under lease or option (with some locations) most of the adjacent acreage which can now be obtained under very reasonable terms and on option agreements. The writer believes that the only lands of immediate interest are those within the norite area containing extensive beds of gossan. These are confined to the north half of the batholith, and only within the embayments and at the rims of this north half. Besides the section and a half which is available in the immediate vicinity of the Friday mine, about three additional sections should be optioned before any large scale exploration or development is undertaken. As at Sudbury the favorable acreage is only a very small portion of the entire batholithic area.

4. Recommendations for Future Exploration and Development. The suggested procedure after the acquisition of the most important key lands would be as follows:

a.) To carry on a geological and geophysical survey, the results

of which may probably lead to the acquisition of additional holdings or the rejection of some already acquired. In the matter of geophysical work, the magnetometer so successful in the Sudbury area has already been tried in portions of the Julian district, with a result that a few diamond drill holes were sunk on magnetometer highs. The coring was done by inexperienced persons with the result that few cores were obtained, and these only in the barren norite. It was the opinion of the engineer in charge that the magnetometer highs represented a disseminated magnetite within the norite. The fact that a magnetometer low was obtained over the Friday massive sulphide orebody, where the writer found the pyrrhotite to be very magnetic leads him to believe that extensive polarization had taken place in the previous magnetometer work, and that the magnetometer lows may have been indicative of underlying orebodies, rather than the highs. All evidence points to the fact that in the vicinity of the Friday Mine there are two or more parallel orebodies that are separated by comparatively small thicknesses of barren material. Such a condition could readily account for polarization. Past work was carried out with a Hotchkiss Magnetometer. In any future work the more delicate and more reliable Askania Apparatus should be used, and the work placed in charge of an expert magnetometer operator.

As a check on magnetometer work it is recommended that a gravimeter or torsion balance be employed. Since these have been able to locate the depth of contact of such materials as sandstone and shales, where the difference in mass is comparatively slight, it should prove practical in locating the contact of massive sulphides and the lighter norite, schist or granite.

After sufficient data has been obtained from the geological and geophysical study, a diamond drill program would be in order to core and definitely locate the nickelbearing sulphides. Any favorable areas indicated

by geophysical work in the vicinity of the Friday Mine, could if not too far distant be explored from one or more of the levels of that mine.

In the Friday Mine itself a sufficient sized massive sulphide orebody has been contacted to warrant a definite immediate program of cross-cutting and drifting to determine the size and extent of this orebody. It appears quite evident that the work so far done has been outside and around but close to the boundaries of the nickel orebody, and that it would entail very little expense to open up and prove a substantial orebody in the Friday mine alone. Excessive faulting, and the presence of numerous intrusions, are such that a detailed geological picture of present underground conditions should be had before this underground development is undertaken.

5. Grade of Ore. As whole the nickel as well as copper values in the massive pyrrhotite are similar to those of Sudbury. It was the writer's intention to thoroughly sample the mine, notwithstanding that the main massive sulphide body had been crossed at only one point, and contacted on its hanging wall for only a short distance. The reason detailed sampling was not carried out on the few exposures available was because this ore when exposed to the air for only a short time was reported by Calkins of the U.S.G.S. and others to soon lose its nickel as well as copper content through oxidation. Since the present drifts and cross-cuts were run over 50 years ago, most of the massive pyrrhotite originally cut and exposed has changed long since to masses of limonite and ferrous sulphate crystals. In a few places one can still expose the massive sulphides, but not over sufficient width to warrant sampling. Sampling could best be undertaken by running core drill holes into the walls of the drifts which are either in contact with or close to the ore.

The writer deemed it sufficient at the start to first use the assays mentioned in Bull. 640, which were taken when the faces were fresh and run by the Dearborn Chemical and Ledoux & Co. These ran between 4 and 5% nickel with about one percent copper. After cleaning out the mine the present owners took seven samples, six of which were taken within the massive sulphide orebody or its oxidized portions. These averaged 2.04% nickel. On the writer's last visit to the property it was noted that one of these samples which ran 0.32% Ni was entirely oxidized and leached so that any present sampling is not representative of the original orebody. Samples taken from unoxidized portions of the dumps of stoped ore show nickel values greater than 5%. All evidence points to the fact, therefore, that the Friday Orebody values are similar in nickel content to the average of the Sudbury District, namely about 3%. Copper content is reported at 1% and Cobalt at about 0.35%, which if present in these amounts add appreciably to the value per ton. If we only consider the nickel value alone one would have an ore of about $20 per T.

Since the property was originally worked as a copper mine, and there is visible to the eye a fair percentage of chalcopyrite in most of the pyrrhotite on the main ore dump, copper might become quite a factor. The same is true of cobalt in that a cobalt bloom can be noted in most of the ore, and the Dearborn Chemical who analyzed a fair sample of the orebody when it was first struck obtained 2.37% cobalt and 4.34% nickel.

Traces up to fantastic values of precious metals have been reported, especially platinum. The presence of such metals as well as palladium would not be unusual in deposits of this type since in the Sudbury District the major profits in a few mines have come from the platinum and palladium values. The few spots in the Friday mine pointed out to the writer as having been places where fair platinum values were found, were

either within or on the border of intrusions, both pegmatites and dioritic norites.

Two core holes were drilled by the present owners, one at the 185 foot level in the bottom of the winze and north thru the dioritic-norite intrusion. The other was a vertical hole down thru the bottom of the shaft at the 135 foot level at the point where it inclines to the 185 level. The Winze core passed thru about 20 feet of dioritic norite reported to assay traces to 1½ oz. in pyrrhotite. These cores for a distance of 10 ft., the total additional distance cored beyond the intrusion, showed an average of 2.26% Ni. The question arises as to whether or not the nickel content would increase as it should in approaching the base of this norite block and whether the core hole was cross-cutting or going along the strike of the ore. In turn if this much nickel is present in disseminated sulphides, it would make a far more interesting and profitable proposition than anything had at Sudbury. The other core hole at the bottom of the shaft at the 135 ft. level also penetrated norite. The first 10 feet was blank but from there on to 50 feet below the 185' level the average was 2.16% Ni. and this was all in a norite.

The following is a general summary of all the assays which the writer was able to obtain or learn about. In most instances original certificates were available.

		%Ni.	%Cu.	%Co.	%Fe	%S.	Oz.Au.	Oz.Pt.	Oz.Ag.	%As.
ORES										
9/12/13.	C. E. Anthony S.D. Top edge first massive sulphide first struck on 125 level. High values obtained probably due to secondary enrichment.	22.95	2.4		42.24	5.5	0.16		1.3	2.28
12/23/13	McCauliffe, L.A.	12.8		None	37.4	26.5	0.25		None	
9/11/14	Dearborn Chem.Co.	4.34		2.37	37.6	35.5				5.95
9/21/14	U.S.Metals,N.J.	4.12	0.95		44.0	35.1				0.15
9/28/14	Hartford Lab.Conn.	4.35	.49	Tr	44.16	36.7				
7/29/14	U.S.Bur.Mines	8.25								

Between this period and 1941 a number of samples were taken by a party named Fay and run by Mecco Assayers, L. A. with averages of 0.50 to 8% nickel

Frasier of Caltech also took a number of samples which were sent east and averaged close to 3%. By this time the exposed ore had become heavily oxidized.

		%Ni.	%Cu.	%Co.	%Fe.	%S.	Oz.Au.	Oz.Pt.	Oz.Ag.	%As.
9/21/41.Bav.& Payne L.A.	#150	2.58%								
	#130	5.89								
2/8/41. B & P 135 Level	#3	4.11								
3/7/41 Core Samples	#1	Tr								
Eisenhauer, L.A.	#2	1.02								
No record of where	#3	1.39								
these cores were from	#4	0.58								
was available outside	#5	0.54								
of a statement they all	#6	0.42								
were in norite.	#7	1.43								
(#8 & 9 were from 143	#8	2.12								
to 220 ft. vert.core h.)	#9	1.11								
Dump Sample	#10	2.46								
Mine sampling by Jessup	#1	.40						Tr.		
This recent sampling was		1.23						None		
on ore which had	#3	1.98						0.16		
become heavily oxidized	#4	3.86						0.12		
	#5	2.97						0.27		
	#6	0.32						0.14		
	#7	1.88						Tr.		

In the last tabulated oxidized samples the Cobalt content is very low as compared with Dearborn Chemicals analysis when the orebody was first encountered, and the question arises as to whether or not cobalt has leached out more readily than the copper and nickel.

6. Orebodies. The present sulphide zone in the Friday Mine has a width at the only place it was cross-cut of close to 40 feet. Whether or not this happened to be one of the widest portions of this body is problematical. There has been no attempt to uncover the length of this orebody, and from surface indications it is probably a minimum of 500 feet, while if a true magmatic deposit uninterrupted by extensive horizontal faulting it could have an unbroken length of about 4000 ft. within its present embayment. One of the interesting features here is that the massive sulphides instead of contacting granitic or original schistose rocks on the footwall, are in contact with norite (although a small seam of recent schist is usually present at this contact), which indicates the foot-wall is a segment of the original

magmatic norite intrusion which originally was of higher altitude, and that its penetration should disclose additional sulphide enrichments, which would merely be part of the first gravimetric sheet of segregation. Further evidence of the worth of this theory is obtained from the fact that there exist at the surface numerous parallel pyrrhotitic gossans on the foot-wall side of the present orebody.

At one point on the foot-wall (the face of the 135' level) a dioritic-norite occurs, which evidently is a later intrusion, and which was determined by core drilling to have a width of only 20 ft. This dioritic material as well as a second adjacent gossan are exposed on the surface of the property near the road.

Of a total of over 400 ft. of development work in the Friday Mine less than 20% was in or contacting the main nickel orebody, although most of it paralleled it only a few feet distant. This procedure was followed because the then operators were searching for gold and copper, where the better enrichments of these metals were found to the side and above the main sulphide body rather than within it.

7. Metallurgy. The metallurgy of nickel ores occuring in massive pyrrhotite deposits has been fully worked out at Sudbury and consists essentially of first heap roasting and then smelting to a nickel copper matte, where sufficient silica must be brought in from outside sources to slag off the preponderance of iron which is actually the gangue of the ore.

There are many ores being concentrated today, merely because it is the usual and general practice, which would yield far greater profits provided they were directly smelted. It is a question of economics, and simple at that, to figure out whether or not it would be more profitable to smelt a run of mine ore and have the expense of melting a large bulk, or whether it would be more profitable to concentrate this into a small bulk,

which, however, would be attendant with a substantial milling charge as well as milling losses. In the case of nickel ores of the Sudbury type there is hardly any other alternative other than direct smelting. In 1916 the writer published an article in which he proved that on one property the returns received from smelting a 3% copper ore were greater than the returns (in each case net after costs) than that received after concentrating the ore and then smelting.

The fact that the Friday Mine ore decomposes so readily into sulphates whereby the nickel and copper values are quickly lost, (so much so that Calkins in U.S.G.S. Bull. 640 suggests that ore of the Friday Mine should neither be opened up or stored unless immediately ready for use), leads the writer to believe that a process could readily be worked out whereby the ore might be first mined and then exposed to the air for a short time. Oxidation and sulfatization could probably be assisted by fine crushing and the use of a weak acidified water. Would it not then be feasible to employ direct aqueous leaching and electrolytic or chemical precipitation of the nickel and copper (possibly cobalt which the writer is unfamiliar with).

If the precious metal values are such as to make it worth while to recover them the older smelting method would have to be employed, and if in turn a concentration of such precious metals is necessary by smelting means to make the effort worth while. There is, however, a possibility that precious metals may be in sufficient amounts that it would be feasible to even recover them from the leached reject which would consist principally of iron oxide in great bulk.

The iron content of pyrrhotitic orebodies has occasioned much comment as to why it should not be used directly for the manufacture of pig, since the percentage of iron contained in such ores is as a whole far

greater than the best iron ores which are mined solely for iron production. In present processes of nickel recovery nickel is removed from the iron only to be added later to iron to form an alloy. The past objection to iron recovery at Sudbury was that the ore contained too much copper, however, today for certain alloys copper is a benefit rather than a detriment. If the copper content of the Friday Mine ores is too high to make a commercial pig from the iron, it should be high enough to yield a profit from copper alone, and if low enuf there are good possibilities of utilizing the iron content of the ores.

Sulphur content is also a matter of economic importance, in that the pyrrhotite contains as much sulphur as the best pyritic ores which are mined and treated solely for acid production, and it seems a shame to waste the sulphur from these ores by heap roasting.

As a whole, however, questions of metallurgy are secondary to the ore deposit, and if the matter exists in sufficient commercial quantities, the metallurgy of even the most resistant ore can usually be worked out. It was thought pertinent, however, to present the above remarks, since not only do they have a bearing on past operations, but add materially to the value of the ore when developed.

8. Geological Notes. Certain ideas which the writer has on the geology of the Friday Mine and the Cuyamaca region have already been presented in this report. To these the following remarks can be added:

a.) There is no reason why the Friday mine, which has been the only one in this area which had any appreciable development, should have found or uncovered the best or the only portion of the nickel deposits in this area. There are just as good, if not better, pyrrhotitic gossans surrounding the Friday Mine as within the Friday property itself. In fact, there are better gossans on the Friday property than the one over the present exposed orebody.

b.) The errurrence of major concentrations within embayments is a matter on which little has been written or theories advanced. The writer believes, however, that this is due mainly to a greater cooling action by being adjacent to a larger proportion of originally cooler rocks when the batholith spread out, and that the pyrrhotite and accompanying nickel sulphides were then in a better medium for gravimetric separation than they would have been if cooled less quickly. Also the presence of metamorphosed bodies of schists and quartzites near the best concentrations may have had something to do with the rapidity of cooling as compared to an area where the magma was in contact with a more acidic and granite mass.

c.) Hudson, in his report (which was merely a student's thesis), brings up two matters which the writer does not agree with. The first is that towards the back and at the north end of the Friday embayment a concentration of nickel ore cannot be present because the dips are too steep, and one would not expect a magmatic concentration on such steep dips. In the first place the writer seriously doubts that any material in this region is today in exactly the same altitude and on the same slope as when the noritic intrusion occurred. This is clearly evidenced by the extensive faulting which is now discernable in the limited workings of the Friday mine. Secondly, the fact that the Friday orebody itself dips at angles of 65 to 85 degrees belies the fact that similar conditions could not today exist elsewhere in this area. The other point which the writer disagrees with is Hudson's picture of the Friday orebody as more or less of a small lenticular mass. In the first place no development work has shown more than one side of the limits of this orebody, and secondly, since Hudson agrees that this is a gravimetric magmatic segregation it should be continuous around the original edge of the norite, and should have no limit as to depth until the base or bed of the intrusion is reached.

d.) The Cuyamaca norite batholith covers an area of about 25 square miles, being small as compared with the Sudbury lacolith. The Cuyamaca intrusion was originally of far greater extent as evidenced by the more resistant and more acidic central portion of the norite which now sticks up at far higher elevations than the rim of the present remains. One cannot without a detailed geological study determine to any degree of accuracy what remaining portions of this intrusion were the original sides or base of this immense flow, however, it is evidenced here and proved at Sudbury that those portions in contact with the metamorphic bodies hold the best chance of containing commercial orebodies, and this is confined to the north half and in an area covering not more than 4 square miles.

9. Since the Julian District is fairly well known to most engineers we are giving data as to location, climate, topography, transportation, etc., at this portion or end of the report in order to bring out the more pertinent facts relative to the orebody and economics first.

The Friday property lies about 3 miles south of Julian, San Diego County and about the same distance north of Cuyamaca Lake. The property in turn is about 65 miles north-east of San Diego, and a good paved highway traverses the holdings.

The elevation is approximately 5000 feet, receives a substantial rainfall in the winter with occasional show falls of short duration. Although there is no free running water on the Friday holdings, there is an ample supply for all mining purposes a short distance away. The district is fairly open, with rolling hills, is heavily timbered, with a timber supply ample for all ordinary development purposes, although the trees seldom exceed 12" in diameter.

At the present time the property is equipped with a modern bunk and cook house and has a well built head frame and corrugated iron hoist house.

Par. 1 (a) The chief mine products will be nickel & copper

(b) The byproducts will be cobalt and platinum

APPENDIX No. 6

Par. 2. Friday Nickel Mine.

(a) There is 180 linear feet of shaft on the Friday Nickel Mine

(b) There are 380 linear feet of drifts and crosscuts in the Friday Nickel Mine

(c) There are no tunnels or adits

(d) There is a 40 linear foot raise in the Friday Nickel Mine. The mine is dry and no water is indicated in the workings so far.

Par. 3 (a) The Friday Nickel Mine is located 4 miles southeast from the town of Julian and 60 miles northeast from San Diego which would be the closest rail shipping point.

(b) Cleveland National Forest Mining District.

(c) T 13 S, R 4 E S B M

(d) San Diego County, California

Par. 4 (a) The property is not now in operation.

(b) We are the owners of this property.

Par. 5 The property has no production record.

Par. 6 (a & b) The partnership of MacAfee & Company, Consulting Engineers, is comprised of D. B. MacAfee and M. W. MacAfee.

D. B. MacAfee has had 25 years of successful mining and business experience connected with mining.

M. W. MacAfee has had 28 years of successful mining and business experience connected with mining.

The project will be managed by MacAfee & Company under the joint direction of the partners.

Par. 7 (a) See Appendix No. 2, 3, 4, & 5 attached to Form MF-103.

The property is still only a partially developed prospect.

(b) There is no known history of other nickel-copper mines in this district.

(c) See Appendix Nos. 2, 3, 4, & 5 attached to Form MF-103.

Par. 12 (b) (1 & 2) There is 5,500 tons indicated ore in the Friday Nickel Mine according to report of S. C. Creasey, Appendix No. 5, attached to Form MF-103.

Par. 13 A paved highway, No. U.S. 79, runs within 100 feet of the shaft. It is 100 miles by road to San Diego and 90 miles to Niland which would be the closest rail shipping points. Residence point would be Julian, 4 miles away.

Par. 14 Water may be obtained from springs near property sufficient for all purposes.

Par. 17 Old hoist house and bunkhouse in poor condition.

There is no equipment left on the property except the mine headframe.

Par. 18 This is a nickel-copper prospect that we wish to diamond drill and develop into a producing mine.

400

Docket
Surname
Rutledge
Martin

APR 26 1954

Mr. Dudley Cornell
Attorney at Law
First National Bank Building
Albuquerque, New Mexico

Re: Docket No. DMEA 2397 - Nickel
MacAfee and Company
Friday mine
San Diego County, California

Dear Mr. Cornell:

This will acknowledge your letter of April 21, 1954, requesting a review of the above-docketed application for exploration assistance, denied March 31, 1952, to ascertain if under the new DMEA Order-1 Amended, dated March 23, 1954, the subject application may be reactivated.

It will be necessary for your company to submit a revised application for exploration assistance on the subject property. Application Forms, 1F-103, for aid in an exploration project are enclosed for use in making such a request.

In reviewing the subject docket, it was noted that Mr. Donald B. MacAfee, in his letter of April 15, 1952, stating that arrangements had been made for private financing, requested the return of several reports that had been attached to the original application. The revised request for exploration assistance, therefore, should be supported by these same reports and all other pertinent data with particular attention to the results of any work by your company since the date of the original application.

Sincerely yours,

C. O. Mittendorf

Administrator

Enclosures

FARutledge:foc
cc to: Docket
Code 400
Ft. Reg. 3
Adm. Reading File
H. W. Davis, USBM
Phillip Guild, USGS

R.C.G.

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

1012 Flood Building
870 Market Street
San Francisco 2, Calif.

April 19, 1954

Mr. Dudley Cornell
Attorney At Law
First National Bank Building
Albuquerque, New Mexico

Re: Docket DMEA-2397X
Friday Nickel Mine
San Diego, California

Dear Mr. Cornell:

In reply to your letter dated April 16, 1954, concerning the captioned DMEA Docket, I suggest that you write Mr. C. O. Mittendorf, Administrator, Defense Minerals Exploration Administration, Department of the Interior, Washington 25, D. C., asking him to reactivate your application in view of DMEA Order 1 - Amended, dated March 23, 1954, or suggest what action you should take to accomplish that purpose.

Sincerely yours,

H. C. Miller
Executive Officer
DMEA Field Team, Region III

Copy to: DMEA, Washington, D. C.
Roscoe Smith, USGS

DUDLEY CORNELL
ATTORNEY AT LAW
FIRST NATIONAL BANK BLDG.
ALBUQUERQUE, NEW MEXICO

April 21, 1954

Defense Minerals Administration
RECEIVED
APR 23 1954

Mr. C. O. Mittendorf, Administrator
Defense Minerals Exploration Administration
Department of the Interior
Washington 25, D. C.

Re: Docket DMEA-2397X
Friday Nickel Mine
San Diego, California

Dear Mr. Mittendorf:

I recently called at your regional office in San Francisco to request reactivation of our application upon the Friday Nickel Mine in San Diego County, California, under the provisions of the new DMEA Order 1 - Amended, dated March 23, 1954. Mr. H. C. Miller suggests that I write your office direct.

Please review the above docket, and advise whether this matter can be reopened, or whether you desire a new application in view of the DMEA Order 1 - Amended.

Very truly yours,

DUDLEY CORNELL

DC:vr

400

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

1012 Flood Building
870 Market Street
San Francisco 2, Calif.

April 19, 1954

Mr. Dudley Cornell
Attorney At Law
First National Bank Building
Albuquerque, New Mexico

Re: Docket DMEA-2397X
Friday Nickel Mine
San Diego, California

Dear Mr. Cornell:

In reply to your letter dated April 16, 1954, concerning the captioned DMEA Docket, I suggest that you write Mr. C. O. Mittendorf, Administrator, Defense Minerals Exploration Administration, Department of the Interior, Washington 25, D. C., asking him to reactivate your application in view of DMEA Order 1 - Amended, dated March 23, 1954, or suggest what action you should take to accomplish that purpose.

Sincerely yours,

H. C. Miller
Executive Officer
DMEA Field Team, Region III

Copy to: DMEA, Washington, D. C.
Roscoe Smith, USGS

DEFENSE MATERIALS PROCUREMENT AGENCY
WASHINGTON 25, D. C.

December 5, 1952

Dmea-2397x
DMA-479

Mr. Donald B. MacAfee
MacAfee and Company
617 South Olive Street
Los Angeles 14, California

Dear Mr. MacAfee:

Since examining the Friday Nickel Mine, Mr. James S. Wroth and I have conferred with the Defense Minerals Exploration Administration concerning the exploration of this prospect according to the plans that we discussed - that is, to drive cross-cuts at two locations on the 132-foot level and at the end of the 180-foot level to determine the width of the ore body, to be followed by cross-cuts in the shaft on both the 132- and 180-foot levels and at the east end of the 180-foot level.

The Defense Minerals Exploration Administration advises us that they would be glad to consider a proposal from you on this type of underground exploration.

Inasmuch as nickel is very critical, this agency is interested in seeing this exploration and development work done on the property, and we would like to be advised if you still plan on conducting this exploration work.

Mr. Wroth and I wish to extend our thanks for the courtesies extended to us while in California.

Sincerely yours,

Paul Pesonen

Paul E. Pesonen, Chief
Iron and Nickel Ores Branch

PEPesonen:md
Copy to: Mr. Selfridge, DMEA
Mr. Pesonen
DMPA Control Center

Copy retained 400

Docket 400
FILE COPY
SURNAME:

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

NOV 12 1952

Mr. Tom Lyon, Director
Domestic Expansion Division
Defense Materials Procurement Agency
Washington 25, D. C.

Re: Docket No. DMEA 2397 - Nickel
MacAfee and Company
Friday Mine
San Diego, California

Dear Mr. Lyon:

This is in response to your letter of October 23 transmitting a copy of Mr. Wroth's report on the subject mine.

In February of this year, MacAfee and Company submitted an application for exploration aid in the amount of $126,769.00 which involved a program seemingly much too ambitious and too costly since all available reliable information suggested that the reserve target was small and not large.

The application included such items as diamond drilling of the area without regard to possible structure; consulting, superintendence and engineering at $800.00, $750.00 and $600.00 a month respectively with a labor force of only 8 men which included 2 diamond drillers and 2 hoistmen; and an item for analytical work, all out of proportion for the intended exploration.

Because (1) the literature suggested that the partly exposed sulphide body was seemingly limited in extent, (2) of the lack of a readily available water supply, (3) of the unfavorable geographic location for the successful operation of a small tonnage nickel operation, (4) of the lack of any nearby beneficiation or metallurgical facilities to handle such a type of sulphide, and (5) of the questioning of the competence of the applicant, the application was denied.

As mentioned in the literature and reports, the mine was first opened as a gold mine and later was explored for copper. The presence of nickel was known at an early date and further exploration was carried out to determine the extent and grade of the nickel

mineralization. It is reported that two small shipments of nickel ore, mined at depth, were made to Norway. Evidently, at that time, the operators were convinced that the operation would not be profitable.

Creasey, in his report, estimates that the Friday mine contained an estimated reserve of 5,000 tons of indicated ore between the 132 and 180 foot levels, approximately 17 percent of which had already been mined. He based his estimate on the assumption that the mineralization did not extend westward on the 132 foot level and that the 55 foot ore length opened on that level could probably be considered the true length of the ore shoot since the northeastward trending drift had been backfilled to its present termination. At the east end of the 132 foot level, the ore is at least 22 feet in width with only one wall exposed. On the 180 foot level directly below the sulphide has been mined but in the stope just 7 feet above the level, Creasey reports the mineralization is only from 6 to 9 feet in width with both walls exposed, a fact not mentioned by Mr. Wreth in his report. The length on the 180 foot level is not known since there is ore at both ends of the 30 foot stope.

Study of Creasey's report and maps shows that the sulphide body is localized on the footwall side of a horse of schist in the gabbro. The schist decreases rapidly in width with depth and seemingly the sulphide does also in the vicinity of the east winze between the levels. It would appear that the size of the schist horses would have a bearing on the size of the sulphide bodies.

There could be a remote possibility that the mineralization on the 132 foot level extends westward north of the level. A drill hole from the bottom of the shaft, for which no data are available, is reported as containing no nickel for the first 10 feet but from 10 to 50 feet, it is said to have averaged 2.16 percent nickel. In 1939, when the hole and 4 other were drilled, nickel was worth 35 cents a pound and copper 10.4 cents a pound. Thus, the ore would have had a gross value of approximately $16.00 a ton at that time if one assumes the copper content averaged 0.5 percent. If the values reported in the drill hole are present, it would seem that they might represent a different sulphide body since the described one seemingly dips to the north.

Sections C-C' of both maps Nos. 1 and 2 show some difference in width of the sulphide body, partly due to the difference in the direction of the section. Creasey's section indicates the possibility

of the body increasing in width with depth. It would seem that the future of the prospect might depend on depth rather than on lateral extension along the upper level. It would seem that the proposed crosscuts to the north on both levels at section C-C' would have little value since Creasey's map shows gabbro in the faces if only in the upper part on the lower level.

The width of the mineralization at section B-B' could be determined by drilling more cheaply and quickly and any difference of results obtained by drilling compared to what might have been obtained by crosscutting would probably have little effect on the overall picture.

During the studies of the assays, it was noted that No. 11 was given as 0.57 percent nickel at the place where the sample was taken and 5.7 in the table. If the former figure is correct, it would lower the average from 1.9 to 1.6 percent. Odds would favor the lower figure.

In his report, Mr. Wroth states that the MacAfee Company plans to rehabilitate the mine workings. Should it do so DMEA would not be adverse to considering a reasonable exploration program that might consist of two stages, the first including the drilling of 4 or 5 large core drill holes northward from the 180 foot level and the second including some drifting and/or sinking.

It would appear that a hole at the shaft would be warranted to check the reported hole. A horizontal or slightly down hole from the crosscut at Section B-B' would check the width there and indicate any rake of the sulphide body to the northeast. Two or 3 holes off the crosscut at Section C-C' should determine lateral extension to the east and width below the level. If the mine is not rehabilitated, possibly three surface holes north of the levels would give sufficient information regarding depth and lateral extension beyond the present showing.

GCSelfridge'lm
11/4/52

Sincerely yours,

C. O. Mittendorf (for) J.H. 11-12-52

Administrator

cc: Admn. Reading File
Docket
H. W. Davis, USBM
T. P. Thayer, USGS
Field Team Reg. III
G. C. Selfridge

DEFENSE MATERIALS PROCUREMENT AGENCY
WASHINGTON 25, D. C.

OCT 23 1952

Mr. C. O. Mittendorf
Administrator
Defense Minerals Exploration Administration
Department of the Interior
Washington 25, D. C.

DMEA 2397-Ni (denied)

Subject: Friday Nickel Mine, San Diego County, California

Dear Mr. Mittendorf:

Enclosed is copy of a report by Mr. James S. Wroth, Consultant to this agency, on the Friday Nickel Mine, San Diego County, California.

As the underground workings were not accessible and, owing to the lack of surface exposures, Mr. Wroth's report was based upon the reports and geological investigations of the U. S. Geological Survey and the State of California Department of Natural Resources.

The underground development work which was conducted in search of gold mineralization indicates a nickel-copper bearing zone, the samples from which average 1.90 percent nickel. This development work apparently penetrated the nickel zone in only one dimension, so that the three other dimensions are not known, but it is apparent that limited initial exploration will outline this orebody, and it is recommended that this exploration be conducted to determine the extent and quality of the orebody.

Sincerely yours,

Tom Lyon

Tom Lyon, Director
Domestic Expansion Division

Enclosure

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
OCT 23 1952

JAMES S. WROTH
602 Prospect Street
Westfield, New Jersey

September 15, 1952

Mr. Howard I. Young, Deputy Administrator
Defense Materials Procurement Agency
Washington 25, D. C.

Dear Mr. Young:

Attached hereto please find my report on the Friday Nickel Mine in San Diego County, California.

This property was visited by me on August 31 and September 1, in company with Mr. Paul E. Pesonen of your staff. We were accompanied by Mr. Merrill W. MacAfee and his geologist, Mr. E. H. A. Andrews.

The underground workings were inaccessible but we made a careful inspection of the surface to check as well as could be done the information in the excellent reports available.

Yours respectfully,

James S. Wroth

James S. Wroth

JAMES S. WROTH
602 Prospect Street
Westfield, New Jersey

REPORT ON

THE FRIDAY NICKEL MINE

San Diego County, California

September 15, 1952

SUMMARY

An occurrence of nickel bearing pyrrhotite ore has been disclosed by mine workings originally driven to prospect for gold. This ore occurs near the margin of a gabbro area intrusive into schist and diorite and has been localized along a fault contact between the gabbro and an inclusion of schist enclosed in the gabbro. Mine workings are inaccessible but excellent reports and maps are available. These records indicate that the nickel bearing material occurs in a lens or "shoot" that has been exposed on one side only, over a length of about 50 feet. The size, width, length, attitude and trend of this possible ore body are as yet undetermined. Former sampling, believed to be reliable shows that the limited exposure of ore averages 1.90% nickel.

The ore has been followed on the 132-foot level for approximately 50 feet and appears to be about 22 feet wide. On this level, the ore is completely oxidized. On the 180-foot level, a small stope is 30 feet long in sulphide ore. There is some reason to believe that the ore comes into the 132-foot level from the west on the ~~hanging~~ wall side so that this ore exposure is "open" on both ends. foot

RECOMMENDATION

Refer to accompanying Plan No. 1.

I recommend exploration of the present underground exposures by underground work as follows:

- cross cuts at 2 locations on the 132-foot level and at the end of the 180-foot level cross cut as shown in black ink on Map No. 1, to determine the width of the ore body;

- The above to be followed by cross cuts from the shaft on both the 132-foot and 180-foot levels, and at the

east end of the 180-foot level to determine the persistence of the ore in length.

This work should give valuable information with regard to the width, attitude and trend of the ore body and might well be followed by a limited footage of drifting at points to be determined by the results of cross cutting.

At this stage the situation should be carefully reviewed and a new program formulated or further work discontinued.

The DMEA representatives in San Francisco have recommended diamond drilling from the 180-foot level, shown in orange crayon on Map No. 1, but I recommend cross cutting instead of drill holes since the importance of nickel warrants the extra cost.

The owner of the property, MacAfee & Co., should revise its application for an exploration loan to provide for the above recommended exploratory work. The MacAfee Company proposes to rehabilitate and re-equip the property so that only the exploratory cross cuts will be done under a DMEA contract.

* * * * * * * *

THE FRIDAY NICKEL MINE

This report is based on a field inspection of the property and on information obtained from the following sources, copies of which are on file with the DMEA in Washington, D.C.

1 - California Journal of Mines and Geology, State Mineralogists Report, Vol. 42, January, 1946, "Geology and Nickel Mineralization of the Julian-Cuyamaca Area, San Diego County, California" by S. C. Creasey, U.S. Geological Survey, November, 1945.

2 - Report on the Friday Nickel Mine, San Diego County, California by C. F. Tolman and Z. K. Melcon (Stanford University), October, 1942. This report was made for Henry J. Kaiser.

3 - Application of MacAfee and Company, February 21, 1952, for exploration loan of $126,796.00, DMEA - No. 2397, accompanied by maps, reports (including the above) and other data. This application was denied as was a revised application for $10,000.00 for diamond drilling.

This report is accompanied by the following maps:

No. 1 - Photostatic copy of Geologic Plan and Sections from report by S. C. Creasey, June, 1944;

No. 2 - Photostatic copy of plan showing Geology and Assays by Z. K. Melcon, August 20, 1942.

GENERAL

The Friday Nickel Mine is located 4 miles south of the town of Julian, in the SW¼ of the SW¼ of Sec. 15, T. 13 S., R. 4 E., San Diego County, California. The shaft is about 100 feet off the state highway to San Diego.

The property consists of 50.58 acres. It is under option to MacAfee and Company, 617 South Olive Street, Los Angeles, Calif.

The Friday Mine and the occurrence of nickel mineralization in the area have been well described as Creasy and Tolman in the references given and in the application for an exploration loan.

The mine was first opened in the 1880's as a gold prospect. An old shaft, now caved, encountered nickel bearing oxidized material with but low grade gold values. The present shaft and workings were driven prior to 1914. The mine was reopened in 1939 and some diamond drilling was done of which no records have been preserved but which encountered sulphides containing nickel. Due to lack of records, this drilling is of little value in determining the nature and extent of the ore occurrence. In 1942, the property was taken under option by Henry J. Kaiser and the Tolman report was made. The U.S. Geological Survey made a careful study of the area in 1944, the results of which were published in 1946.

GENERAL GEOLOGY (Summarized from the Creasey report)

Quartz-mica schist has been intruded by quartz diorite and these formations, in turn, have been intruded by gabbro, various phases of which cover a large area. Iron stained gossans occur in the more basic areas of the gabbro in salients of the gabbro into the other rocks. These gossans occasionally carry low grade nickel values. Three such gossans are known in the area of which the Friday Mine gossan is the largest and most extensive and is the only one where sulphides have been found. Narrow, irregular and discontinuous quartz-feldspar pegmatite dykes with some tourmaline are common.

The minerals in the ore body at the Friday Mine include: pyrrhotite, pentlandite, violarite, pyrite, chalco pyrite and magnetite. The sulphides oxidize rapidly on exposure to air and water. The ore is mildly radioactive.

MINE WORKINGS

The mine is opened by a vertical shaft 160 feet in depth from which a 55 degree incline extends to a depth of 180 feet. Drifts have been run at depths of 132 and 180 feet as shown on the accompanying plans.

ORE OCCURRENCE

The nickel bearing material as exposed in the mine workings is shown on the accompanying plans. As can be seen from the plan, this occurrence is exposed on one side only. There is some indication that this ore extends to the west and north of the shaft on the 132-foot level and that the north wall of the ore has not been reached on this level. Whether this occurrence is a small lens or "pod" of ore lying along a fault zone or whether it is a more continuous ore body with but one side exposed has not been determined. The size, width, length, attitude and trend of the ore exposure are still unknown. The grade of the ore from former sampling, 1.9% nickel, and the strategic importance of nickel, assuredly warrants enough exploration work to determine the possible importance of this ore showing.

The reports state that the ore on the 132-foot level is almost completely oxidized but that sulphides are exposed on the 180-foot level. The dump material is almost completely oxidized as a result of exposure to the air for many years. However, fragments of hard sulphide ore can be found in the soft dump material. A small dump of "ore" is separate from the main shaft dump. Samples from these dumps were taken, as follows:

No. 1.	Coarse sulphide ore from ore dump
No. 2	Same
No. 3	Fine soft limonite from ore dump
No. 4	Coarse sulphide ore from shaft dump

These samples were sent to the Bureau of Mines laboratory in Reno for analysis. Returns are not yet available but will be reported when received. These returns are not especially significant nor are they necessary for the completion of this report. They represent picked samples of dump material and their only value is to confirm in a general way the results reported from previous sampling.

The arithmetical average of the 16 samples taken by Tolman and Melcon is 1.9% nickel. The three samples taken by Creasey for the U.S. Geological Survey also average 1.9% nickel. This sampling is indicatige of the probable grade of the ore now showing and that may be found by exploration, although if clean sulphides are found in depth, the grade may be better than that of the oxidized and leached material.

Using 5.70 for sample # 11 ; it is also weighted avg.
Using 0.57 " " " " arithmetic avg. is 1.57%
" " " " " " weighted " " 1.59%

SUMMARY AND RECOMMENDATIONS

With respect to the Friday Mine, my summary and recommendations are given at the beginning of this report.

MINERALIZATION IN OTHER AREAS

Reference has been made to other gossan outcrops in the general area of the Friday Mine. Two others have been noted, viz: at Pine Hills, 3 miles west of the Friday Mine, and at Inspiration Point, three-quarters of a mile north of the Friday Mine. These are similar but smaller than the Friday Mine gossan.

It is my feeling that no further investigation of the Pine Hills and Inspiration Point areas should be undertaken until exploration work in the Friday mine has proved or disproved the occurrence of a mineable and economically exploitable ore body in that mine. Favorable results from exploration in the Friday Mine would justify further study of the other gossan areas.

I submit below the results of surface sampling in these areas as reported by Creasey:

	% Nickel
Friday Mine	0.73
Inspiration Point	0.16
" "	1.45
" "	0.01
Pine Hills	0.16
" "	0.03

Respectfully submitted,

James S. Wroth

James S. Wroth

San Francisco, Calif.
September 15, 1952

NOTE:

Since the report was written, returns from the samples referred to on page four have been received from the Bureau of Mines laboratory in Reno, Nevada and are as follows:

Sample No.	Ni,%	Cu,%	U,%	Oz Au/T	Oz Ag/T
1	2.15	1.23	*0.005	Trace	Trace
2	2.20	0.94	*0.005	Trace	Trace
3	0.18	0.95	*0.005	0.005	0.20
4	2.36	0.57	*0.005	Trace	Trace

Note: * Less than

Wash
demos

FILE COPY
SURNAME:

Selfridge
Lenmond
Hayes
Schlumpf

XPLORATION

JUN 3 1952

Mr. H. C. Miller, Executive Officer
DMEA Field Team, Region III
1012 Flood Building
870 Market Street
San Francisco 2, California

Re: Docket No. DMEA 2397X - Nickel
McAfee and Company
Friday Nickel Mine
San Diego County, California

Dear Mr. Miller:

This is in reply to your memorandum of May 21, 1952, regarding reconsideration of the denial of the application for exploration assistance for the subject property.

At the present time we do not believe that the property warrants exploration assistance in any amount because all of the available information suggests that the reserve target is small and not large. It appears likely that the proposed drilling would only change the presently inferred tonnage to indicated. It would take many times the very optimistic reserve of 100,000 tons postulated by the applicant to justify the construction of a mine plant and smelter. In summation, the available geologic information is too negative to warrant exploration assistance by the Administration and, therefore, we believe that our denial is valid and so should remain.

Sincerely yours,

C. O. Mitten

Acting Administrator
Defense Minerals Exploration
Administration

GCSelfridge:ls
5/28/52

cc: Docket
Admn Reading File
Field Team, Region 3
G. C. Selfridge
H. . Davis, USBM
T. P. Thayer, USGS

Feed
Team
likes

OFFICE OF THE ADMINISTRATOR

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

Office of
Executive Officer
DMEA Field Team
Region III

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAY 26 1952

1012 Flood Building
870 Market Street
San Francisco 2, Calif.

May 21, 1952

denied

Memorandum

To: C. O. Mittendorf, Acting Administrator, Defense Minerals Exploration Administration, Washington, D. C.

From: Executive Officer, DMEA Field Team, Region III

Subject: Docket DMEA-2397X (Nickel), Friday Mine, San Diego County, California

On March 7, we received a preliminary copy of the subject application for an exploration loan from your office. This application was reviewed by the Region III field team, and in a letter to the applicant requesting additional information, we stated we felt the outlying program was much too ambitious and too costly, and that a program involving in the neighborhood of $10,000 probably would be adequate and even liberal.

On March 31, you wrote to the applicant directly informing him that his application is denied.

Applicant has now written us that he has received your letter of denial and is wondering if his application would be reconsidered on the basis of a $10,000 loan as was suggested by the field team. In other words, the applicant will accept a $10,000 loan, if granted.

In discussions with Mr. Bailey of the Geological Survey and Mr. A. C. Johnson, Chief, Mining Division, Region III, Bureau of Mines, I learned that both are of the opinion that a reconsideration of the denial is warranted as work done by the Geological Survey, especially by Mr. C. H. Sanburg some years ago, indicated that there might be a possibility of finding some additional nickel ore at the Friday Nickel Mine through some exploration efforts. Between the Geological Survey and the Bureau of Mines, the Government has very complete data on the property which indicates that a $10,000 loan might be warranted.

The program originally proposed by the applicant was clear out of line, but the field team proposes drilling probably six holes from underground stations as per the attached sketch. We believe that such a program has merit and is justified.

Kindly let me know what you think about this proposal of ours.

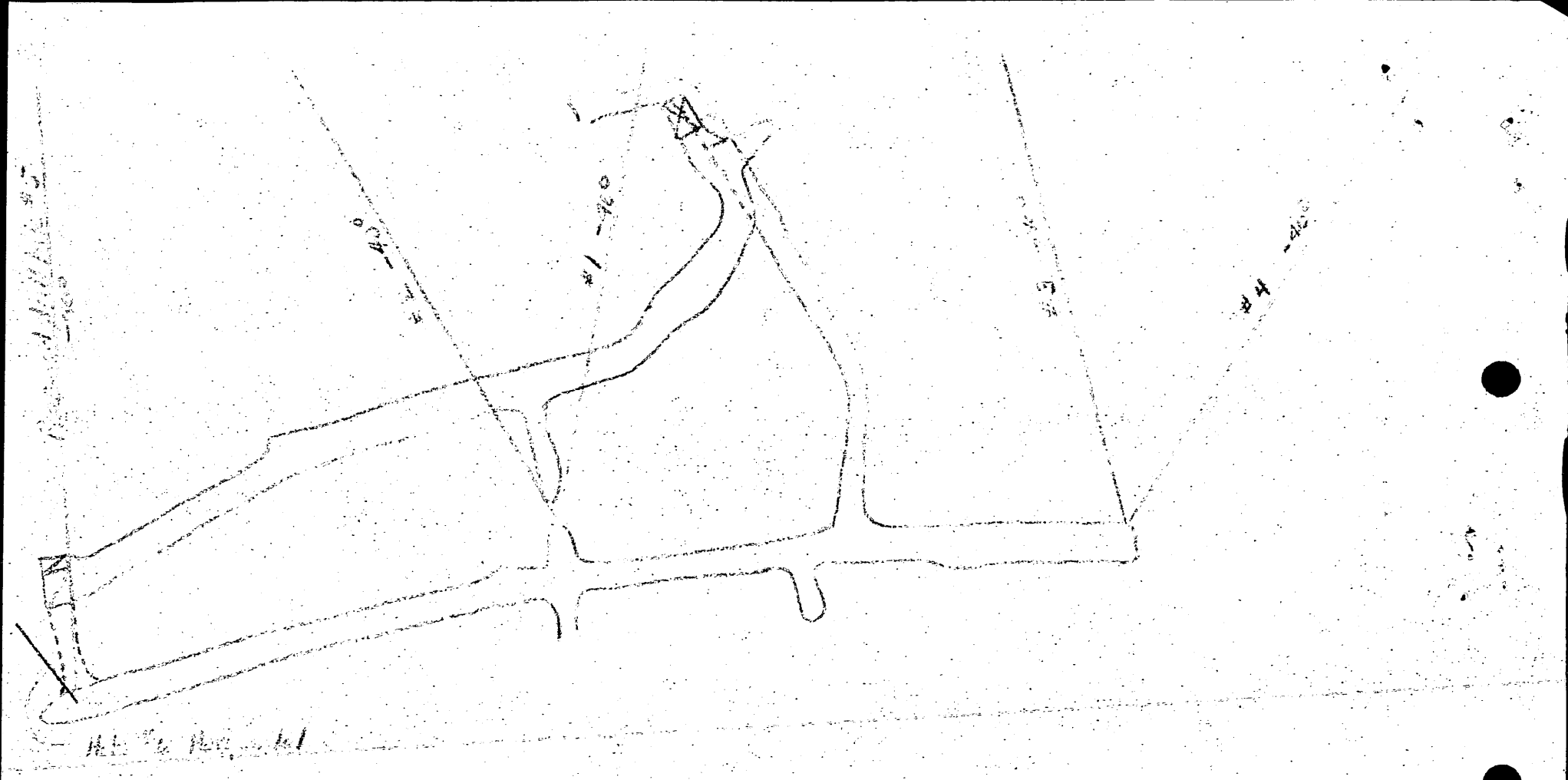
We are holding our copy of the docket until we hear from you.

H. C. Miller
Executive Officer
DMEA Field Team, Region III

Attachment

Copy to: E. H. Bailey, USGS

Finley Mobile Mine



Fredey Mahle Mine

Chapman
Cotton

FILE COPY
Surname:
DMEA

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
WASHINGTON 25, D. C.

DMEA 2397

Mittendorf

MAY - 1 1952

Dear Clint:

I have your letter of April 8, 1952, concerning the Friday Nickel Mine located in San Diego County, California.

We are both in agreement that it is important to develop nickel production, if at all possible, in the United States. However, in the case of the Friday Nickel Mine, it does not appear that additional exploration would discover or develop an orebody of sufficient size and grade to be commercial.

The orebodies of this mine appear to be relatively small and widely spaced. If they were fully developed, they would not warrant the cost of the facilities necessary for exploitation and recovery of the various metals in the ore. There is no market for nickel ores in the United States, nor facilities for recovering nickel from ores. For your information I am enclosing copy of a memorandum by Mr. C. O. Mittendorf, Acting Administrator, DMEA, concerning the Friday Nickel Mine.

If I can be of further assistance in this matter, please call on me.

Sincerely yours,

(Sgd.) Oscar L. Chapman

Secretary of the Interior

Hon. Clinton P. Anderson
United States Senate
Washington 25, D. C.

Enclosure

FEJohnson/bih/pa

cc: Secy's Reading File
Admrs. Reading File
Mails & Files, DMEA

Mr. Selfridge
FE Johnson

FILE COPY
SURNAME:
DMEA

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

April 18, 1952

Memorandum

To: Secretary of the Interior

From: C. O. Mittendorf, Acting Administrator
Defense Minerals Exploration Administration

Subject: DMA Docket No. 2397 (Nickel-Copper)
McAfee and Company
Friday Nickel Mine
San Diego County, California

The application of McAfee and Company for aid for an Exploration Project on the Friday Nickel Mine in the amount of $126,769 was denied on March 31, 1952.

The Friday Nickel Mine was first opened up as a gold mine prior to 1900 and later was explored for copper. The presence of nickel was known at an early date and further exploration was carried out to determine the extent and grade of the nickel mineralization. It is reported that some gold production was made from the oxidized outcrop and that two small shipments of nickel ore, mined at depth, were made to Norway. Evidently, the Operators were convinced that these operations would not be profitable. This mine has been examined several times by various private companies, as well as by state and national agencies.

The available information indicates that small scattered lenses of nickel and copper-bearing iron sulphides probably occur in this area. The workings of the Friday Nickel Mine have partially explored a small irregular body of massive iron sulphides containing nickel and copper, but indicate a very limited tonnage per foot of depth. A report by the U. S. Geological Survey published in 1945 gives approximately 5,000 tons of indicated ore in a block between the 132 and 180 foot levels of the Friday shaft, part of which had already been mined at the time of the Survey's examination. It was estimated that the orebody contains about 90 tons of inferred ore per foot of depth for a limited distance below the 180 foot level. The Survey also estimated that by Diamond drilling a moderate tonnage of 10,000 to 20,000 tons of ore averaging about 2% nickel might be developed in the Friday mine.

The applicant proposes a drilling program which he hopes will find about 100,000 tons of ore containing about 3% nickel, 2% copper and 0.3% cobalt. The Survey estimates that the small mineralized body in the Friday Mine will probably average 2.50% to 3.00% Ni and 0.5% to 1.00% Cu. As much as 0.15% Cobalt is found but the average content is unknown according to the Survey.

However, if 100,000 tons of ore of the grade applicant hopes to find were developed, it would require a mining plant and smelting facilities in order to recover the nickel and copper. There are no markets or smelting facilities in the United States for nickel ore of this grade. A tonnage of 100,000 tons would be insignificant towards the quantity of ore required to justify the construction of a mine plant and smelter.

Geologically, the chance of developing minable sized bodies of nickel ore is problematical and there is no evidence indicating the existence of a large low grade deposit.

Since geologically it appears improbable that the proposed program would make a significant discovery or development, the application was denied.

C. O. Mittendorf

Acting Administrator

FEJohnson/bih

cc to: Docket
Admr's Reading File
Mr. Selfridge
FEJohnson

COPY

UNITED STATES SENATE

Committee on
Agriculture and Forestry

April 8, 1952

Honorable Oscar Chapman
Secretary of the Interior
Washington, D. C.

Re: D.M.E.A. Docket No. 2397
Friday Nickel Mine
San Diego County, Calif.

Dear Mr. Secretary:

I am advised that the above application for an exploratory loan of approximately $125,000 is now pending in your Defense Minerals Division. One of the parties making the application is an old friend of mine whom I have known to be interested in miningfor many years.

He advises me that this property contains a small body of proven ore carrying two percent to three percent nickel, and that there is a good possibility that core drilling and additional exploration might uncover an ore body of sufficient size to make a commercial mine.

Since there is not a single property being operated today as a producer of nickel within the continental limits of the United States, it would appear to be a matter of importance to develop nickel production if at all possible. In addition to nickel, this ore is reported to contain sulphur, copper and cobalt - all strategic minerals.

In view of the circumstances, I would appreciate being personally advised of the disposition of the pending application.

Sincerely yours,

Signed: Clint

Clinton P. Anderson

memo to Leonard to Sen. Anderson

2473

ALLEN J. ELLENDER, LA., CHAIRMAN
CLYDE R. HOEY, N. C.
OLIN D. JOHNSTON, S. C.
SPESSARD L. HOLLAND, FLA.
CLINTON P. ANDERSON, N. MEX.
JAMES O. EASTLAND, MISS.
HUBERT H. HUMPHREY, MINN.
GEORGE D. AIKEN, VT.
MILTON R. YOUNG, N. DAK.
EDWARD J. THYE, MINN.
JAMES P. KEM, MO.
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KARL E. MUNDT, S. DAK.

C. M. MOUSER, CHIEF CLERK

United States Senate

COMMITTEE ON
AGRICULTURE AND FORESTRY

April 8, 1952

NOTED
O. L. C.
SECRETARY

INTERIOR DEPT.
☆ RECEIVED ☆
APR 10 1952
☆ OFFICE OF ☆
THE SECRETARY

INTERIOR DEPT.
SECRETARY'S
MAIL CENTER
APR 10 1952
RECEIVED

Honorable Oscar Chapman
Secretary of the Interior
Washington, D. C.

Re: D.M.E.A. Docket No. 2397 - denied 3/31/52.
Friday Nickel Mine
San Diego County, Calif.

INTERIOR DEPT.
SECRETARY'S
MAIL CENTER
APR 14 1952
TO MINES

Dear Mr. Secretary:

I am advised that the above application for an exploratory loan of approximately $125,000 is now pending in your Defense Minerals Division. One of the parties making the application is an old friend of mine whom I have known to be interested in mining for many years.

He advises me that this property contains a small body of proven ore carrying two percent to three percent nickel, and that there is a good possibility that core drilling and additional exploration might uncover an ore body of sufficient size to make a commercial mine.

Since there is not a single property being operated today as a producer of nickel within the continental limits of the United States, it would appear to be a matter of importance to develop nickel production if at all possible. In addition to nickel, this ore is reported to contain sulphur, copper and cobalt - all strategic minerals.

In view of the circumstances, I would appreciate being personally advised of the disposition of the pending application.

Sincerely yours,

Clint

Clinton P. Anderson

CPA:lm

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
APR 14 1952

FILE COPY
SURNAME:

200

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

MacAfee and Company
12th Floor - James Oviatt Building
617 South Olive Street
Los Angeles 14, California

Attention: Mr. Donald B. MacAfee

Gentlemen:

This will acknowledge your letter dated April 15, 1952 addressed to C. O. Mittendorf, Acting Administrator, requesting the four copies submitted on the Friday Nickel Mine, Docket No. 2397X. In accordance with your request the four copies, together with other material on the Friday Mine, are returned herewith.

Sincerely yours,

cc
4/23

Robert E. Adams
Administrative Officer
Defense Minerals Exploration
Administration

Enclosures

REAdams/meb
4-23-52
cc to: Adm.Reading File
Mails & Files Br.

CABLE ADDRESS MACAFEE

TELEPHONE TRINITY 5939

MACAFEE AND COMPANY

MINE • MILL AND INDUSTRIAL PLANT REPRESENTATION

12TH FLOOR • JAMES OVIATT BUILDING • 617 SOUTH OLIVE STREET • LOS ANGELES 14 • CALIFORNIA

ENGINEERING DEPARTMENT

April 15, 1952

C. O. Mittendorf
Acting Administrator
Defense Minerals Exploration Administration
United States Department of the Interior
Washington 25, D.C.

Re: Docket No. 2397X - Nickel
Friday Mine
San Diego County, California

Dear Mr. Mittendorf:

We have your communication of March 31 in which you advised us that our application for an exploration loan has been denied.

We wish to thank you for your courtesy in reviewing this application and would appreciate your returning the four (4) copies, if possible, we sent you on the Friday Nickel Mine in as much as we have made arrangements for private financing.

Yours very truly,

MAC AFEE & COMPANY

Donald B. MacAfee

DBM:f
cc: Mr. Dudley Cornell, Attorney at Law, Albuquerque, New Mexico

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
APR 21 1952

FILE COPY 400
SURNAME:

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

Brewer
Selfridge
Hedges
Kaye
Hightower

MAR 31 1952

MacAfee and Company
12th Floor, James Oviatt Bldg.
617 South Olive Street
Los Angeles 14, California

Re: Docket No. 2397X - Nickel
Friday Mine
San Diego County, California

Gentlemen:

Your application for aid for an exploration project together with other information referring to the subject property available to us in Washington have been most carefully reviewed.

Our review, while noting a small amount of known and inferred ore, indicates that, geologically, there is little likelihood of making a significant mineral discovery. We regret, therefore, to inform you that your application is denied.

We wish to thank you for your interest in the Defense Minerals Program, and for your effort in this instance.

Sincerely yours,

C. O. Mittendorf (for) - P.H. 3-31-52

Acting Administrator
Defense Minerals Exploration
Administration

QLBrewer'lm
3/27/52

cc: Admn. Reading File
Docket
H. W. Davis, USBM
T. P. Thayer, USGS
Field Team Reg. III
G. C. Selfridge
Q. L. Brewer

STANDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

TO : Acting Administrator, DMEA DATE: March 27, 1952

FROM : Iron and Ferro-Alloy Division, DMEA

SUBJECT: Denial of exploration project in the amount of $126,769.00
Docket No. DMEA 2397X - Nickel
MacAfee and Company
Friday Mine
San Diego County, California

The denial of the subject application by this Division is based on the following information:

1. The country rock of the area in question is the Triassic "Julian" schist which was initially invaded by the "Stonewall" quartz diorite, and later both were intruded by the "Cuyamaca" gabbro. The gabbro is the host rock of the nickel mineralization. The known ore body was exposed on the surface at the Friday mine where a 180-foot shaft and some 200 feet of drifts on the 132-foot and 180-foot levels have partially explored the ore body. Analyses by various examiners at various times show the following values: nickel, 2.0 to 3.0 per cent; copper, 0.5 to 1.00 per cent; cobalt, probably 0.10 per cent; platinum and gold are noted in small amount. The minerals making up the heavy sulphide mineralization are pyrrhotite, pentlandite, pyrite, chalcopyrite and violarite.

2. There have been several attempts by private enterprise to discover sufficient ore of economic grade at the Friday mine in the past 25 years. The area was also examined by Tolman of Stanford University (1942), by the California Division of Mines in co-operation with the U. S. Geological Survey (1944), and by A. H. Heller, who cites other examinations by A. Locke and Prof. Frasier (California Institute of Technology) and further notes USGS Bulletin 640 (1916), and "Origin of Nickel Ore in Cuyamaca Region" by F. S. Hudson, University of California publication (1922).

3. Tolman suggests magnetometer work followed by diamond drilling; Heller states that this was done with negative results (page 5).

4. Refer to "Appendix No. 3" - being 2 maps prepared by Z. K. Melcon in 1942. The diamond drill holes noted thereon show certain data as to the rock intersected and the thickness of the "nickel sulfide". This data is from the memory of the driller, who saved no cores and kept no records. (See page 2, Tolman's report.)

5. Tolman (1942) says the ores are of the Sudbury type (page 1 and 12) (ie, magmatic segregation) while the U. S. Geological Survey (Creasey) as published by the California Division of Mines (page 26),

Note
break
"off cuff"
remarks

says that the deposits are "an irregular replacement sulphide body" formed by ponded sulphide-bearing solutions reacting with the wall rock. Obviously, both these theories cannot at the same place be true. If the latter be true, then fissuring will control ore deposition; if the former, then magmatic segregation phenomena should be sought. The applicant herein is quoting both theories at the same time apparently believing that an excess of verbiage will obscure the scarcity of intelligence.

6. On page 17 of Creasey's report (USGS) (1944), it is noted: "The Friday mine - Inspiration Point area has little or no chance of becoming a war-producer. Consequently no further work is recommended by the U. S. Geological Survey or the U. S. Bureau of Mines" - - - - - - "However, in the event of an acute nickel shortage, the area should be reconsidered". - - - "Diamond drilling in the Friday mine might develop a moderate tonnage, in order of magnitude of from 10,000 to 20,000 tons of ore grading about 2 per cent nickel".

7. The applicant lists an expected development of 100,000 tons of ore (5 to 10 times as great as the above given amounts) at 1.50 per cent nickel; 1 per cent copper and 0.15 per cent cobalt.

8. The proposed plan of exploration is to drill what amounts to a circular cylinder of ground 500 feet in diameter and 370 deep, with the existing shaft as center. There are to be 19 drill holes in and/or through this cylinder. The total volume of this cylinder is about 12,000,000 tons, of which the applicant hopes 100,000 or 1/120 will be ore.

   The geometric drilling pattern signifies that the applicant has no knowledge of the geologic occurrence of the ore, and only hopes to find ore within 250 feet of the shaft wherein is the only known ore occurrence.

9. The Commodity Division of the U. S. Geological Survey recommends denial; the Commodity Division of the U. S. Bureau of Mines notes the absence of smelting facilities; says the project does not merit the proposed loan, but a small loan might be considered.

G. C. Selfridge

G. C. Selfridge, Chief
Iron and Ferro-Alloy Division

Docket 400

FILE COPY
SURNAME:

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

Acting Administrator, DMEA

March 27, 1952

Brewer
Selfridge.

Iron and Ferro-Alloy Division, DMEA

Denial of exploration project in the amount of $126,769.00
Docket No. DMEA 2397X - Nickel
MacAfee and Company
Friday Mine
San Diego County, California

yes. in R.v.R.

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George C. Selfridge

G. C. Selfridge, Chief
Iron and Ferro-Alloy Division

QLBrewer'lm
3/27/52

cc: Admn. Reading File
Docket
G. C. Selfridge
Q. L. Brewer

IN REPLY REFER TO:

G-MD-TPT

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

March 17, 1952

Memorandum

To: George C. Selfridge, DMEA

From: T. P. Thayer Thayer

Subject: DMEA 2397 Nickel MacAfee & Co., San Diego County

The applicant proposes diamond drilling at the Friday mine, from the surface and underground, to delineate sulfide ores averaging 2-3 percent nickel and somewhat less copper, irregularly scattered in gabbro. The project, set up on a step basis, would involve 10,540 feet of diamond drilling, some deepening of a shaft and 500 feet of drifting and cross-cutting. Estimated cost is $126,769, of which the applicant would provide 10 percent.

The Geological Survey report by S. C. Creasey is the latest available, and discusses the findings of earlier reports by other qualified geologists. Creasey indicates control of sulfide ore bodies by fractures and inclusions of older rocks, and says (p. 17) he "did not see any geologic evidence on the surface indicating a large low-grade deposit." Creasey estimated reserves at 5000 tons of indicated ore between the 132 and 180 foot levels and 90 tons per foot of depth below the 180 foot level, probably averaging 2-3 percent Ni and 0.5 to 1 percent Cu, with some Co.

The large ore body indicated on the applicant's Exploration Map (FNM-2) appears to be postulated on spots of sulfides encountered in a few drill holes for which no assay data are given. The speciousness of this interpretation is shown by the fact that barren gabbro exposed on the 180 level is included as inferred ore. The statements by Mr. Basil Prescott regarding origin, form and character of the deposits do not have any more basis in fact than the exploration map.

The system of radial holes would yield less information per exploration dollar than holes drilled from the surface, or distributed along the drifts. The estimates of ore to be found indicate maximum possible grades, rather than average that seems probable.

The cost estimates are padded in an unconscionable manner with respect to supervision, assaying, and analytical work. An operation with 8 workmen scarcely needs a $750/mo. superintendent and $600/mo. engineer, plus $1,000 a month for a consulting engineer. The provision

1 copy to file

for assaying is out of this world with $8,250 for spectrographic and mineralogical work, 100 analyses for sulfur and iron at $850, and 200 analyses for platinum at $1,500. The necessary rock classifications could be made by a $400 a month geologist in half a day.

The application should be denied on the grounds of improbability of making a significant discovery by the proposed program, which has little resemblance to the exploration recommended by Creasey. The probability of finding workable deposits of sulfide ore in the Friday mine alone is too small to merit Government participation. The estimates for supervision, assaying and similar items show that the applicants have no appreciation of proper procedures in exploration, and would not be competent to execute a reasonable program.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

March 14, 1952

Memorandum

To: George C. Selfridge, Defense Minerals Exploration Administration

From: H. W. Davis, Bureau of Mines

Subject: Docket No. DMEA-2397 - application of MacAfee & Company for $126,769 to explore nickel deposits in San Diego County, California.

The subject property has been reported on by S. C. Creasy of the U. S. Geological Survey, by Tolman and Melcon for Henry J. Kaiser Co., and by A. H. Heller.

According to Creasy, the chance of developing minable sized bodies of nickel ore is problematical, there is no readily available water supply, the geographic location is unfavorable for successful operation of a small tonnage nickel deposit, and surface geological evidence did not indicate a large low-grade deposit. No custom mill or smelter is close enough for low-cost treatment of nickel ore.

It is stated by the applicant that it hopes to develop 100,000 tons of ore containing 6,000,000 pounds of nickel, 2,000,000 pounds of copper, and 300,000 pounds of cobalt. Obviously, this tonnage is not large enough to justify a smelter. Nevertheless, these quantities of metals would make a significant contribution toward the Nation's supplies were a smelter available to treat the ores from the scattered sulfide deposits in the Western United States and Alaska, no one of which is large enough to justify a smelter. However, in the absence of such a smelter, it is not believed that the project merits an exploration loan of $126,769 at this time. The project might have merit in a long-range program aimed at determining the nickel resources of the United States and, consequently, a small exploration loan should be considered for this purpose.

H. W. Davis

H. W. Davis

1 Copy to file

DMEA-2397

DUDLEY CORNELL
ATTORNEY AT LAW
FIRST NATIONAL BANK BLDG.
ALBUQUERQUE, NEW MEXICO

February 26, 1952

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
FEB 29 1952

Defense Minerals Exploration
Administration of the Defense
Minerals Administration, D.P.A.,
General Services Building,
Washington, D. C.

Gentlemen:

Subject: Friday Nickel Mine.

Enclosed herewith are four copies of application upon form MF-103 together with Technical Data Form MF-100 for exploration loan for the Friday Nickel Mine, San Diego County, California.

Please advise your docket and file number, and we will appreciate it very much if you will expedite this application as we understand nickel is very high on the list of critical minerals.

Very truly yours,

DUDLEY CORNELL,
Attorney.

DC:mk

Encls: 4 cc appln

CABLE ADDRESS MACAFEE

TELEPHONE TRINITY 5939

MACAFEE AND COMPANY

MINE • MILL AND INDUSTRIAL PLANT REPRESENTATION

12TH FLOOR • JAMES OVIATT BUILDING • 617 SOUTH OLIVE STREET • LOS ANGELES 14 • CALIFORNIA

ENGINEERING DEPARTMENT

February 20, 1952

Defense Minerals Exploration Administration
of the Defense Minerals Adminstration, D.P.A.
General Services Building
Washington, D. C.

Gentlemen: Subject: Friday Nickel Mine

Attached herewith you will find "Application for Aid for an Exploration Project pursuant to Mineral Order 5, under Defense Production Act of 1950", Form MF-103 and General Technical Data Form MF-100, fully executed with all required exhibits.

Summarizing this exploration project for your consideration, we would say that --

1. The attached reports by eminent engineers, such as Mr. S. C. Creasey of the U.S.G.S., Dr. C.F. Tolman, Professor of Geology,Stanford University, and Mr. A. H. Heller of the Scandinavian Nickel Corp., indicate excellent probabilities of developing a substantial tonnage of nickel ore with proper exploration work at the Friday Nickel Mine.

2. Mr. Basil Prescott, eminent geologist, (now retired from practice) kindly consented to study these reports and our proposed exploration maps and programs and stated the following conclusions --

   a. The Friday Nickel Ore body is of high temperature magnetic segregation origin.

   b. The source of the sulfide mineralization is the very basic core of the gabbro intrusion.

c. The ore is intrusive into the softer acidic norite and schist.

d. The ore will occur as irregular bodies or masses, emanating from continuous pipes, originating in the basic gabbro core of the intrusion.

e. These pipes or intrusive ore channels will be continuous to their source.

f. The grade of the sulfide ore in nickel and copper will remain uniform at about 3% Ni and 1% Cu wherever found and throughout the ore bodies and pipes, to the source of the ore in the basic gabbro.

g. There will probably be several pipes from the basic gabbro and a number of ore bodies offshot from these pipes may be expected.

h. The drilling and exploration program proposed is sound.

3. We propose to do 10,540 feet of diamond drilling, deepen the shaft to 200 feet and do 500 feet of underground drifting and cross cutting.

4. We propose to spend $126,769 on this work and supply 10%, or $12,677, as our contribution.

5. We hope to develop 100,000 tons of ore containing 6,000,000 lbs. of nickel, 2,000,000 lbs. of copper, and 300,000 lbs. of cobalt.

6. The exploration program is estimated to take 8 months.

We request favorable consideration of this application.

Yours very truly,

MacAFEE & COMPANY

By Donald B. MacAfee
Donald B. MacAfee

dbm/v

EXPLORATION

Subject: DMEA-2397
Re: Exploration Loan
March 3, 1952
Friday Nickel Mine

Mr. Donald B. MacAfee
MacAfee & Company
1210 James Oviatt Building
617 South Hill Street
Los Angeles 14, California

My dear Mr. MacAfee:

This will acknowledge receipt of your application dated February 26, 1952 for a loan under the Defense Production Act of 1950.

Your application was assigned Docket Number DMEA-2397 and referred to the Iron and Ferro-Alloys Division.

Kindly refer to DMEA-2397 in any future correspondence relating to your application.

Sincerely yours,

R. E. ADAMS

Robert E. Adams
Acting Administrative Officer

7862

DMEA-2397

E ADDRESS MACAFEE

TELEPHONE TRINITY 5939

MACAFEE AND COMPANY

MINE • MILL AND INDUSTRIAL PLANT REPRESENTATION

12TH FLOOR · JAMES OVIATT BUILDING · 617 SOUTH OLIVE STREET · LOS ANGELES 14 · CALIFORNIA

ENGINEERING DEPARTMENT

February 20, 1952

Defense Minerals Exploration Administration
of the Defense Minerals Adminstration, D.P.A.
General Services Building
Washington, D. C.

Gentlemen: Subject: Friday Nickel Mine

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Defense Minerals Administration
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MACAFEE AND COMPANY

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g. There will probably be several pipes from the basic gabbro and a number of ore bodies offshot from these pipes may be expected.

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4. We propose to spend $126,769 on this work and supply 10%, or $12,677, as our contribution.

5. We hope to develop 100,000 tons of ore containing 6,000,000 lbs. of nickel, 2,000,000 lbs. of copper, and 300,000 lbs. of cobalt.

6. The exploration program is estimated to take 8 months.

We request favorable consideration of this application.

Yours very truly,

MacAFEE & COMPANY

By Donald B. MacAfee

Donald B. MacAfee

dbm/v

100,000 tons
3% Ni, 1% Cu .3 Co

Form MF-103
(Revised June 1951)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Budget Bureau No. 42-R1035.1.

MF-103 Should Be Filed With General Technical Data Form MF-100

APPLICATION FOR AID FOR AN EXPLORATION PROJECT PURSUANT TO MINERAL ORDER 5, UNDER DEFENSE PRODUCTION ACT OF 1950

Not To Be Filled in by Applicant

Docket No. DMEA-2397
Metal or Mineral
Date Received 2-29-52
Amount $
Participation (Government %)

Name and address of applicant

MacAfee & Company
1210 James Oviatt Building
617 South Hill Street
Los Angeles 14, California

Date February 21, 1952

If you have already filed MF-100, give date filed herewith as Appendix of assistance requested Exploration Loan No. 6

DMA Docket Number (if available)

INSTRUCTIONS

Read Mineral Order 5, Regulations Governing Government Aid in Defense Projects, before completing this application. Submit four copies each, of the signed application form, General Technical Data Form MF-100, and answers to questions as specified, to Defense Minerals Administration, Department of the Interior, Washington 25, D. C., or to the nearest field executive office thereof, with your name and address on each sheet of the application and all accompanying papers. If you have previously filed MF-100, it is not necessary to file it again. However, you should indicate in space provided above the type of assistance previously applied for (loans, procurement contracts, etc.) and DMA Docket Number, if available. *When a question is inapplicable it should be so stated in the form.* Additional sheets should be attached in answering any questions or in supplying additional information. IF YOU CANNOT ANSWER A QUESTION, SO STATE.

1. (*a*) Give a description of the real property that will be in any way involved in the exploration project, including any existing mine or operating property.

   (*b*) If you are not the owner of the property, submit a copy of the lease, purchase option, or other agreements under which you are authorized to operate the property with each copy of your application.

   (*c*) Give the legal description of the exact parcel, plot, or area upon which the exploration is to be conducted.

   NOTE: (1) If both areas are the same, so state. The only obligation to repay the Government is from the net earnings from any commercial discovery made in the area specified in (*c*) above in which the exploration is to be conducted, and the expenditure of funds which may be charged as costs of the project must be limited to that area or to work necessary to perform the exploration in that area.

   (2) If applicant is not the owner of the property or if there are any liens or encumbrances against the property, copy of agreements of claimants, lienors, encumbrances, and lessors subordinating their interests in the property to the interest of the Government under the Exploration Project Contract will be required for attachment to the Contract.

2. (*a*) What metals or minerals do you expect to find?

   (*b*) Furnish statement of the geologic features of your property, giving type of ore deposit and reasons for expecting to find commercial ore bodies. Illustrate with maps or sketches. If you have a geologic or engineering report, or assay maps showing width and grade, please send them with application, stating whether or not you wish to have them returned.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
FEB 29 1952

16—64067-2

The information requested in questions 3, 4, 5, 6, 7, 8, and 9 below should be answered specifically and in detail, as this information will be attached to and incorporated as part of the Exploration Project Contract, if such contract is entered into with you by the Government.

ANSWER EACH QUESTION ON SEPARATE SHEETS OF PAPER AND SUBMIT A COPY OF EACH ANSWER FOR EACH COPY OF YOUR APPLICATION.

3. (*a*) Describe fully the proposed work and give the total cost of the project.

   (*b*) State the time required to start the project and to complete it.

4. Submit a map or sketch of the property involved showing a plan (and cross section, if needed) of the present mine workings and the *location of the proposed exploration work* as related to geologic features, such as contacts, veins, ore-bearing beds, etc.

5. Furnish an itemized list of existing facilities, buildings, installations, and fixtures with a statement of the cost of any necessary rehabilitation or repairs to put into useful and operable condition.

6. Furnish a detailed list of additional facilities, buildings, and fixtures to be purchased, installed, or erected by you, with the estimated cost of each item.

7. Furnish a detailed list of operating equipment, separated into items to be—

   (*a*) Rented

   (*b*) Purchased

   (*c*) Furnished by you

   with the rental, purchase price, or depreciation of each item, as the case may be, to be charged as a cost of the project.

8. Furnish an itemized schedule of labor, by numbers and classes (miners, muckers, etc.) and of supervisors by numbers and positions, with the maximum wages or salaries to be paid to each.

9. Furnish a detailed list with estimated cost of each item for materials, supplies, engineering, assaying, accounting, power, water, utilities, and any other items not provided for above.

10. (*a*) How much are you prepared to invest in the proposed project?

    (*b*) Is this amount sufficient to pay your part of the cost of the project, in accordance with the regulations on Government participation (Sec. 9 of MO–5)?

11. State any conditions or circumstances regarding the property not sufficiently brought out by the foregoing questions.

CERTIFICATION

The undersigned company, and the official executing this certification on its behalf, hereby certify that the information contained in this form and accompanying papers is correct and complete to the best of their knowledge and belief.

MacAfee & Company
(Name of company)

By [signature]
(Signature of authorized official)

February 21, 1952
(Date)

Partner
(Title)

Title 18, U. S. Code (Crimes), Section 1001, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

U. S. GOVERNMENT PRINTING OFFICE 16—64067-2

CABLE ADDRESS MACAFEE TELEPHONE TRINITY 5939

MACAFEE AND COMPANY

MINE • MILL AND INDUSTRIAL PLANT REPRESENTATION

12TH FLOOR • JAMES OVIATT BUILDING • 617 SOUTH OLIVE STREET • LOS ANGELES 14 • CALIFORNIA

ENGINEERING DEPARTMENT

U. S. DEPARTMENT OF THE INTERIOR

DEFENSE MINERALS ADMINISTRATION

Referring to From MF-103 (Revised June 1951) the following notations apply to the paragraphs as enumerated in this form:

Par. 1 (a) The real property consists of 50.58 acres consisting of 10.58 acres owned in fee and 2 and a fraction mining claims contiguous, as follows -- "that portion of the Southwest Quarter of the Southwest Quarter of Section 15, Township 13 South Range 4 East, San Bernardino Meridian, County of San Diego, State of California, described as follows: "Commencing at the Northwest corner of the Southwest Quarter of the Southwest Quarter of said Section 15; thence South along the West line thereof, 28 rods thereon at right angles, East 56 rods; thence at right angles North 28 rods to a point in the North line of said Southwest Quarter of the Southwest Quarter of said Section 15; thence West along said North line, 56 rods to point of commencement." This parcel of land contains 10.58 acres owned in fee.

"The Friday Extension No.1 Mining Claim
Friday Extension No. 2 Mining Claim
Friday Extension Fraction Mining Claim
totalling 40 acres, located in the Northwest Quarter of the Southwest Quarter of Section 15, Township 13 South, Range 4 East, San Bernardino Meridian, in the Cleveland National Forest Mining District, in San Diego County, California."

The Attached plot plan, Appendix No. 1, Geologic - Topographic and Claim Map, Drawing FNM-1, shows the location of the property.

The location and workings of the Friday Nickel Mine are shows on the plot plan and the Exploration Map, Drawing FNM-2.

Par. 1 (b) We are the owners of the fee property and assignees of the mining claims above listed. There are no liens or encumbrances against these properties.

Par. 1 (c) The property on which the exploration work is to be conducted is the same as that described legally in Par. 1 (a).

Par. 2 (a) We expect to find nickel, copper, cobalt and small amounts of platinum, in massive pyrrhotite ore bodies.

(b) Attached you will find copies of the following engineering and geological reports on this property:

Appendix No. 2. Original report on Geology and Nickel Mineralization of the Julian-Cuyamaca Area, San Diego County, California. By C. S. Creasey, Geologist, Geological Survey, United States Department of the Interior, November 1945.

Appendix No. 3. Report on the Friday Nickel Mine, San Diego County, California, October 8, 1942, by C. F. Tolman and Z. K. Meleen, Stanford University for Henry J. Kaiser Company.

Appendix No. 4. General Report on the Friday Mine and the Nickel-Norite Batholith of the Cuyamaca Area, San Diego County, California, by A. H. Heller.

Appendix No. 5. California Journal of Mines and Geology, State Mineralogists Report Vol. 42, No. 1, January 1946. Photostatic copy of Section 2 - Geology and Nickel Mineralization of the Julian Cuyamaca Area, San Diego County, California, by S. C. Creasey.

Par. 3 (a) Proposed work and total cost of the project are as follows --

1 - We propose, for Step 1, to drill 1 vertical hole and 8 radiating holes from the bottom of the vertical shaft at the 170 ft. level or thereabouts, 6 radiating holes from the shaft at the 132 ft. level, and 4 vertical holes all as shown on the Geologic and Exploration Maps FRM-1 and FRM-2.

These holes are for the purpose of checking the known ore occurances in the underground workings and those indicated by former diamond drilling. These holes will also give an idea of the extent of the known ore body and the indicated ore bodies with a comparatively low capital expenditure. The aim is to connect up the indicated ore bodies with the known ore body so an intelligent mining program can be laid out to fully explore and block out the ore in this mine.

2 - For Step 2, we propose to drill 20 vertical holes from the surface to define the limits of the ore body or ore bodies beyond that expected to be indicated from the radial drilling in step one.

3 - The radial drilling in Step 1 and the vertical drilling in Step 2 will give good indications of the extent, depth and location of the ore bodies, then Step 3, the sinking of the shaft to the 200 ft. level or deeper and the driving of development drifts and crosscuts will be undertaken, to block out the ore into definite reserves. It is estimated a total of 500 feet of drifting and cross cutting will be required.

In order to proceed with Step 1, it will be necessary to do some repair work on the shaft timbers and clean out the bottom of the vertical shaft for the drill set-up. The 132 ft. level station will also have to be re-timbered and made safe.

The hoist and compressor were stolen from the shaft during the war and it is presumed that the hoisting cage was dropped to the bottom of the shaft. The ladders are gone below the 132 ft. level so thishas not been ascertained.

It is proposed to buy a 100 cu. ft. portable gasoline driven compressor, a tugger air hoist, cable and a bucket, and a jack hammer with accessory equipment, to clean out the shaft, enlarge the 132 ft. station and cut a station at the 170 ft. level which is the bottom of the vertical shaft. This will be necessary before the diamond drilling from the shaft locations can be undertaken.

For Step 3, a gasoline driven hoist for the bucket and cage will have to be installed, which will facilitate the hoisting for the shaft sinking and underground exploration work.

A schedule of the drill holes follows —

SCHEDULE OF DRILL HOLES
Step. # 1

Hole	Number	Description	Length	Total	Est. Drill Time	Est. Cost @ $4 ft.
A	1	Vertical - bottom of shaft	200 "	200'	30 hr.	$800
B to I inc.	7	Inclination 45° from bottom of shaft, radial on 45° circle	280' ea	1960'	270 "	7840
G	1	Inclination 22½° from bottom of shaft	280'	280'	40 "	1120
J to O inc.	6	Inclination 15° from 132' level of shaft radial on 60° circle	270' ea.	1620'	220 "	6480
P - S	4	Vertical holes from surface	370' ea.	1480'	210 "	5920
		Totals		5540'	770 hr. 97 days	$22,160
		Step # 2				
	20	Vertical drill holes average	250' ea.	5000'	84 days	20,000
				10,540'	181 days	$42,160

The overall project cost estimates are as follows: —

Diamond Drilling Step 1 - 5,540 ft. @ $4.00/ft.	$22,160
Diamond Drilling Step 2 - 5000 ft. @ $4.00/ft.	20,000
Repair of existing facilities	1,980
Purchased equipment for Step 1	11,297
Purchased equipment for Step 3	4,058
Labor and supervision	38,720
Material and supplies	7,519
Assaying and Analytical work	21,835
Consulting engineering fees	6,400
Travel, hotel, meals, etc.	1,600
Los Angeles office overhead for accounting, telephone, etc.	1,200
	$ 126,769

Par. 3 (b) The time required to start and complete the project is estimated as follows —

Repair work on the shaft and preparation for underground diamond drilling can start as soon as the project is approved and the lean granted.

It is estimated that the project will require 8 months to complete.

Par. 4 Maps

The following maps are attached as Appendix No. 1 —

Friday Nickel Mine - Geologic - Topographic and Claim Map
Drawing No. FNM - 1

Friday Nickel Mine - Exploration Map
Drawing No. FNM - 2

Par. 5 Existing Facilities

	Est. Cost of Repairs
Wooden Headframe	$ 200
Hoist & Compressor House	350
Bunkhouse	750
Shaft Timbers	500
	1,800
Contingencies 10%	180
Total	$ 1,980

Par. 6 No additional facilities, buildings or fixtures to be purchased, installed or erected under this program.

Par. 7 Operating Equipment.

(a) No operating equipment to be rented except the diamond drill which will be a contract basis of $4.00/ft drilled, with equipment and labor furnished by the contractor.

(b) Purchased equipment

Project Step 1

Quantity	Item	Cost
1	105 cu. ft. IR Compressor gasoline driven	$3,550
1	1000 lb. pull single drum IR air hoist	642
250 ft.	5/8" x 6-19 hoisting cable	65
1	30" sheave with bearings	60
1	1000 lb. steel sinking bucket	75
1	Bell system 250 ft.	30
1	Rock drill IR #40	345
1	IR Jack leg	195
1	15 gal. water tank with manifold	74
1	Line oiler	29
200 ft.	3/4" air hose with couplings	110
200 ft.	1/2" water hose with couplings	125
1	Lot of connections	15
2 sets	Jack rods 2'7", 5'3", 7'10" & 10'6"	175
4 sets	Carset Carbide bits 1 3/8", 1 1/2" & 1 5/8" gage	255
1	2000 Watt Kohler electric light plan	796
1	Lot of wiring sockets, switches & lights	150
1	500 gal. water tank	65
1	3/4 Ton Ford pick-up truck	2,025
1	Acetylene welding outfit	175
1	Hand forge with blacksmith tools	65
1	60 lb. Anvil	24
1	Lot of hand tools, picks, shovels, saws, etc.	150
1	Vise	30
1	3/4" electric drill with set of bits	85
		10,270
	Contingencies 10%	1,027
		$11,297

Project Step 2

No additional equipment required.

Project Step 3

Quantity	Item	Cost
1	2000 lb. pull gaseline hoist	$750
2	16 cu. ft. mine cars	500
1000 ft.	12 lb. mine rail with belts, spikes & fish plates 4.5 tons @ $190	855
1	Rail binder	29
1000 ft.	2" black iron pipe, T & C with valves & fittings	400
1	Jack bit grinder	155
1	Lot camp furniture, stoves, beds, chairs, etc.	1,000
		3,689
	Contingencies 10%	369
		$4,058

Par. 8 Labor.

Quantity	Classification	Rate
1	Diamond drill operator)	furnished by diamond drilling
1	Diamond drill helper)	contractor.
2	Hoist man	@ $20.75/8 hr. shift, including insurance & compensation
2	Miners	@ $19.80/8 hr. shift, including insurance & compensation
2	Muckers	@ $19.00/8 hr. shift, including insurance & compensation
1	Superintendent	@ $750.00/mo., including insurance & compensation
1	Engineer (Surveying & sampling)	@ $600.00/ month.

Payroll per month

2	Hoist men	@ 1080/mo x 8 mo.	$8640
2	Mixers	@ 1020/mo x 8 mo.	8160
2	Muckers	@ 950/mo. x 8 mo.	7600
1	Superintendent	@ 750/mo. x 8 mo.	6000
1	Engineer	@ 600/mo x 8 mo.	4800
			$35,200
	Contingent labor 10%		3,520
			$38,720

Par. 9 Operating Costs —

Quantity	Item	Cost
5000 bd. ft.	Mine timber, lagging, wedges, etc.	$1000
150 lb.	Tie rods for shaft timbers	75
5 kegs	Nails	60
2	Steel muck sheets	50
	Carbide, powder, fuse, caps	2450
	Gasoline, oil, grease	1600
400	6' diamond drill core boxes	1600
		6,835
	Contingencies 10%	684
		$7,519

Assaying

1100	assays for nickel @ $5.00	5,500
1100	" " copper @ 2.50	2,750
200	" " cobalt @ 7.50	1,500
200	" " platinum @ 5.00	1,000
100	" " iron @ 3.50	350
100	" " sulfur @ 5.00	500
50	Spectrographic Analyses @ 35.00	1,750
25	Rock classifications @ 100.00	2,500
20	Mineralogical classifications @ 200.00	4,000
		$19,850
	Contingent analyses 10%	1,985
	Total	$21,835

500

1500

10,800
8,000
18,800

Consulting Engineering Fees 8 days/mo. @ $100 x 8 mo.	6,400
Travel from Los Angeles to Julian & misc. meals, hotel, etc.	1,600
Los Angeles Office overhead for accounting, etc. @ $150.00/mo.	1,200
Total	$9,200

Par. 10 (a) We are prepared to invest 10%, or $12,677 in the project.

(b) This amount is sufficient to pay our part of the cost of the project in accordance with Sec. 9 of MO-5.

Par. 11 We believe the foregoing questions and answers cover all conditions and circumstances pertinent to this property and project.

Form MF-100
(May 1951)

U. S. DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Form approved.
Budget Bureau No. 42-R1026.

GENERAL TECHNICAL DATA FOR USE UNDER THE DEFENSE PRODUCTION ACT OF 1950

NOT TO BE FILLED IN BY APPLICANT

Docket No. DMEA-2397

Date received 2-29-52

Office of County
[illegible]
617 South Olive Street
Los Angeles 14, California

Name and address of applicant

Date February 21, 1952

INSTRUCTIONS

This form is to be filed with Defense Minerals Administration, Department of the Interior, Washington 25, D. C. It should be accompanied by appropriate application form when a specific type of Government assistance is requested, in the form of (1) loan, (2) purchase contract, (3) Government guarantee of a private loan, (4) priorities or allocation of mining equipment, and maintenance, repair and operating supplies, and (5) other forms of Government assistance that might arise under the Act. Submit four (4) signed copies of the form and accompanying papers. Name and address should be stamped or typed on each sheet of this form and all accompanying papers. *When a question is inapplicable it should be so stated on the form.* Additional sheets may be attached in answering any questions or in supplying additional information. (IF YOU CANNOT ANSWER A QUESTION, SO STATE.) If a question is answered elsewhere indicate where answered. It is not necessary to answer it again.

GENERAL TECHNICAL DATA

Supply the following information on separate sheets, arranged, numbered, and lettered as indicated:

1. Materials produced:
   (*a*) What are the chief mine, mill, or smelter products?
   (*b*) What are the byproducts, if any?
2. Name(s) and type(s) of mine(s), mill(s), smelter(s), refinery(ies), pit(s), quarry (ies), drilling operation(s). Include old names of property, if any. Show extent of workings, including the following:
   (*a*) Linear feet of shafts.
   (*b*) Linear feet of drifts and crosscuts.
   (*c*) Linear feet of tunnels or adits.
   (*d*) Linear feet of other mine openings (explain briefly).

   Indicate whether mine is flooded or not. Describe any pumping problems. Give size or productive capacity.
3. For each operation listed above supply the following:
   (*a*) Distance and direction from nearest town and shipping point.
   (*b*) Mining district.
   (*c*) Township, Section, Range.
   (*d*) County, State.
4. (*a*) State whether or not property is now in operation, and if in operation, by whom operated.
   (*b*) Are you operating this property as:
   - ☐ Owner.
   - ☐ Lessee.
   - ☐ Contractor.
5. Number of years in production _____

   If not in production or operation, estimated date when production will begin _____
6. Experience of operators:

   Describe the mining and general business experience of (*a*) the applicant, and (*b*) the person or persons who manage the project.

   DEPARTMENT OF THE INTERIOR
   Defense Minerals Administration
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7. History:
   (*a*) Give a statement, as complete as possible, of previous exploration, development, operation, and production of property, with reasons for suspension of operation.
   (*b*) State briefly the known history and production of adjoining and neighboring properties.
   (*c*) Furnish any available (private) reports that may apply to this application, including results of mine examinations, recommended exploration and development, and metallurgical investigations.

16—63792-2

APPENDIX No. 6

8. Names and addresses of Officers, Directors, or Partners, and in addition thereto, the five largest stockholders if applicant is a corporation.

Name and Address (a)	Official Title (If officer is also director indicate by "D") (b)	Total of Annual Salary, Commissions, Bonuses, Etc., Received From Applicant and Affiliates During Last Fiscal Year (c)	Estimated Net Worth Outside of Interest in Applicant (d)	Number of Shares Held in Applicant Corporation: Common (e)	Number of Shares Held in Applicant Corporation: Preferred (f)	Life Insurance Carried for Benefit of Applicant: Amount (g)	Life Insurance Carried for Benefit of Applicant: Net Cash Surrender Value After Loans (h)
[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	
[illegible]							
[illegible]							
[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	
[illegible]							
[illegible]							
	Total		x x x x x			x x x x x	x x x x x

If more lines are needed continue on separate sheet.

9. Capital Stock Issues:

For Corporate Applicants

Item	Authorized (a)	Outstanding (b)	Par Value (c)	Number of Shares Outstanding (d)	Dividend Rate Last Paid* (e)
Common stock	$ [illegible]	$ [illegible]	$		
Preferred stock	$	$	$		

*Indicate period covered.

10. Production:

Item	Kind of Product (a)	1948 Total (b)	1949 Total (c)	1950 Total (d)	Present Average Monthly (e)
1. Quantity of product mined or quarried (Short, long, metric tons; barrels; pounds; etc.)	[illegible]	[illegible]	[illegible]		
2. Quantity of product processed (specify unit of measure and type of process)					
3. Quantity and grade of product sold or shipped (specify units of measure)					

11. Do you contemplate a change in the present average monthly rate of production? If so, state estimated maximum monthly production and basis of change. [illegible]

12. Ore or Mineral Reserves:

(a) Describe the ore or mineral deposit briefly. Accompany the application by any available report on the geology and ore reserves.

(*b*) If deposit is other than placer:

(1) Submit assay plans and/or sections showing location and size of proved (measured) and probable (indicated) ore or mineral reserve.

(2) State the tonnage (indicate type of ton) and grade of each class of ore reserve, as above, and show how computed. Tabulated total ore reserve as follows:

TOTAL ORE OR MINERAL RESERVES

Ore or Mineral Reserve	Estimated Tons (a)	Metal or Mineral Content Per Ton (Grade) (b)	Gross Value Per Ton (c)	Recoverable Unit Value Per Ton (d)	Estimated Cost of Production Per Ton (e)
Measured (proved)					
Indicated (probable)					

(*c*) If placer:

(1) Give estimated total yardage and average marketable mineral content of each deposit.

(2) Submit map showing location of placer deposit and surrounding area, with all test holes or pits. Submit logs of each hole and test pit with depth and average value of each.

(3) Describe gravel, stating whether fine, medium or coarse; loose, tight, cemented, or frozen, and whether it contains stumps or boulders more than 1 foot in diameter; if so, how large, and in what proportion.

(4) Describe bedrock, giving type (granite, sandstone, shale, etc.) and state whether it is hard or soft, smooth, uneven or rough.

(5) Describe overburden, stating whether loose, tight, or cemented; fine or coarse textured; furnish estimate of average thickness and total amount.

(6) Tabulate the reserves using the form outlined above for ore or mineral reserves.

13. Access Roads:

Give road distances to shipping, supply and residence points, stating kind and condition of roads.

14. Water Supply:

State source and quantity of water available for operations and whether sufficient for all seasons of year.

15. Power:

State amount of power used, rate per hour, and source thereof.

16. Labor:

State number and classes (miners, muckers, millmen, etc.) of men employed during a recent representative payroll period.

17. Equipment and Facilities:

Describe present equipment on the property, including buildings. (State condition.) List major pieces of equipment now owned or controlled and in serviceable condition available for this operation.

18. Are there any particular conditions or circumstances affecting your operations that are not described above? If so, explain.

CERTIFICATION

The undersigned company, and the official executing this certification on its behalf, hereby certify that the information contained in this form and accompanying papers is correct and complete to the best of their knowledge and belief.

(Name of company)

By (Signature of authorized official)

February 21, 1952
(Date)

(Title)

Title 18, U. S. Code (Crimes), Section 1001, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

U. S. GOVERNMENT PRINTING OFFICE 16—63792-1

Par. 1 (a) The chief mine products will be nickel & copper

(b) The byproducts will be cobalt and platinum

APPENDIX No. 6

Par. 2. Friday Nickel Mine.

(a) There is 180 linear feet of shaft on the Friday Nickel Mine

(b) There are 380 linear feet of drifts and crosscuts in the Friday Nickel Mine

(c) There are no tunnels or adits

(d) There is a 40 linear feet raise in the Friday Nickel Mine. The mine is dry and no water is indicated in the workings so far.

Par. 3 (a) The Friday Nickel Mine is located 4 miles southeast from the town of Julian and 60 miles northeast from San Diego which would be the closest rail shipping point.

(b) Cleveland National Forest Mining District.

(c) T 13 S, R 4 E S B M

(d) San Diego County, California

Par. 4 (a) The property is not now in operation.

(b) We are the owners of this property.

Par. 5 The property has no production record.

Par. 6 (a & b) The partnership of MacAfee & Company, Consulting Engineers, is comprised of D. B. MacAfee and M. W. MacAfee.

D. B. MacAfee has had 25 years of successful mining and business experience connected with mining.

M. W. MacAfee has had 28 years of successful mining and business experience connected with mining.

The project will be managed by MacAfee & Company under the joint direction of the partners.

Par. 7 (a) See Appendix No. 2, 3, 4, & 5 attached to Form MF-103.

The property is still only a partially developed prospect.

(b) There is no known history of other nickel-copper mines in this district.

(c) See Appendix Nos. 2, 3, 4, & 5 attached to Form MF-103.

Par. 12 (b) (1 & 2) There is 5,300 tons indicated ore in the Friday Nickel Mine according to report of S. C. Creasey, Appendix No. 5, attached to Form MF-143.

Par. 13 A paved highway, No. U.S. 79, runs within 100 feet of the shaft. It is 100 miles by road to San Diego and 90 miles to Niland which would be the closest rail shipping points. Residence point would be Julian, 4 miles away.

Par. 14 Water may be obtained from springs near property sufficient for all purposes.

Par. 17 Old hoist house and bunkhouse in poor condition.

There is no equipment left on the property except the mine headframe.

Par. 18 This is a nickel-copper prospect that we wish to diamond drill and develop into a producing mine.

Form MF-100
(May 1951)

U. S. DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Form approved.
Budget Bureau No. 42-R1026.

GENERAL TECHNICAL DATA FOR USE UNDER THE DEFENSE PRODUCTION ACT OF 1950

NOT TO BE FILLED IN BY APPLICANT

Docket No. DMEA-2397

Date received 2-29-52

14

Name and address of applicant

Date February 21, 1952

INSTRUCTIONS

This form is to be filed with Defense Minerals Administration, Department of the Interior, Washington 25, D. C. It should be accompanied by appropriate application form when a specific type of Government assistance is requested, in the form of (1) loan, (2) purchase contract, (3) Government guarantee of a private loan, (4) priorities or allocation of mining equipment, and maintenance, repair and operating supplies, and (5) other forms of Government assistance that might arise under the Act. Submit four (4) signed copies of the form and accompanying papers. Name and address should be stamped or typed on each sheet of this form and all accompanying papers. *When a question is inapplicable it should be so stated on the form.* Additional sheets may be attached in answering any questions or in supplying additional information. (IF YOU CANNOT ANSWER A QUESTION, SO STATE.) If a question is answered elsewhere indicate where answered. It is not necessary to answer it again.

GENERAL TECHNICAL DATA

Supply the following information on separate sheets, arranged, numbered, and lettered as indicated:

1. Materials produced:
   (*a*) What are the chief mine, mill, or smelter products?
   (*b*) What are the byproducts, if any?
2. Name(s) and type(s) of mine(s), mill(s), smelter(s), refinery(ies), pit(s), quarry (ies), drilling operation(s). Include old names of property, if any. Show extent of workings, including the following:
   (*a*) Linear feet of shafts.
   (*b*) Linear feet of drifts and crosscuts.
   (*c*) Linear feet of tunnels or adits.
   (*d*) Linear feet of other mine openings (explain briefly).

   Indicate whether mine is flooded or not. Describe any pumping problems. Give size or productive capacity.
3. For each operation listed above supply the following:
   (*a*) Distance and direction from nearest town and shipping point.
   (*b*) Mining district.
   (*c*) Township, Section, Range.
   (*d*) County, State.
4. (*a*) State whether or not property is now in operation, and if in operation, by whom operated.
   (*b*) Are you operating this property as:
   - ☐ Owner.
   - ☐ Lessee.
   - ☐ Contractor.
5. Number of years in production _____

   If not in production or operation, estimated date when production will begin _____
6. Experience of operators:
   Describe the mining and general business experience of (*a*) the applicant, and (*b*) the person or persons who manage the project.
7. History:
   (*a*) Give a statement, as complete as possible, of previous exploration, development, operation, and production of property, with reasons for suspension of operation.
   (*b*) State briefly the known history and production of adjoining and neighboring properties.
   (*c*) Furnish any available (private) reports that may apply to this application, including results of mine examinations, recommended exploration and development, and metallurgical investigations.

16—63792-2

APPENDIX No. 6

8. Names and addresses of Officers, Directors, or Partners, and in addition thereto, the five largest stockholders if applicant is a corporation.

Name and Address (a)	Official Title (If officer is also director indicate by "D") (b)	Total of Annual Salary, Commissions, Bonuses, Etc., Received From Applicant and Affiliates During Last Fiscal Year (c)	Estimated Net Worth Outside of Interest in Applicant (d)	Number of Shares Held in Applicant Corporation		Life Insurance Carried for Benefit of Applicant	
				Common (e)	Preferred (f)	Amount (g)	Net Cash Surrender Value After Loans (h)
[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	
[illegible]							
[illegible]							
[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	
[illegible]							
[illegible]							
	Total		x x x x x			x x x x x	x x x x x

If more lines are needed continue on separate sheet.

9. Capital Stock Issues:

For Corporate Applicants

Item	Authorized (a)	Outstanding (b)	Par Value (c)	Number of Shares Outstanding (d)	Dividend Rate Last Paid* (e)
Common stock	$	$	$		
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*Indicate period covered.

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Item	Kind of Product (a)	1948 Total (b)	1949 Total (c)	1950 Total (d)	Present Average Monthly (e)
1. Quantity of product mined or quarried (Short, long, metric tons; barrels; pounds; etc.)					
2. Quantity of product processed (specify unit of measure and type of process)					
3. Quantity and grade of product sold or shipped (specify units of measure)					

11. Do you contemplate a change in the present average monthly rate of production? If so, state estimated maximum monthly production and basis of change.

12. Ore or Mineral Reserves:

(a) Describe the ore or mineral deposit briefly. Accompany the application by an available report on the geology and ore reserves.

(*b*) If deposit is other than placer

(1) Submit assay plans and/or sections showing location and size of proved (measured) and probable (indicated) ore or mineral reserve.

(2) State the tonnage (indicate type of ton) and grade of each class of ore reserve, as above, and show how computed. Tabulated total ore reserve as follows:

TOTAL ORE OR MINERAL RESERVES

Ore or Mineral Reserve	Estimated Tons (a)	Metal or Mineral Content Per Ton (Grade) (b)	Gross Value Per Ton (c)	Recoverable Unit Value Per Ton (d)	Estimated Cost of Production Per Ton (e)
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Indicated (probable)					

(*c*) If placer:

(1) Give estimated total yardage and average marketable mineral content of each deposit.

(2) Submit map showing location of placer deposit and surrounding area, with all test holes or pits. Submit logs of each hole and test pit with depth and average value of each.

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13. Access Roads:

Give road distances to shipping, supply and residence points, stating kind and condition of roads.

14. Water Supply:

State source and quantity of water available for operations and whether sufficient for all seasons of year.

15. Power:

State amount of power used, rate per hour, and source thereof.

16. Labor:

State number and classes (miners, muckers, millmen, etc.) of men employed during a recent representative payroll period.

17. Equipment and Facilities:

Describe present equipment on the property, including buildings. (State condition.) List major pieces of equipment now owned or controlled and in serviceable condition available for this operation.

18. Are there any particular conditions or circumstances affecting your operations that are not described above? If so, explain.

CERTIFICATION

The undersigned company, and the official executing this certification on its behalf, hereby certify that the information contained in this form and accompanying papers is correct and complete to the best of their knowledge and belief.

(Name of company)

By _____ (Signature of authorized official)

February 21, 1952
(Date)

(Title)

Title 18, U. S. Code (Crimes), Section 1001, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

U. S. GOVERNMENT PRINTING OFFICE 16—63792-1

Par. 1 (a) The chief mine products will be nickel & copper

(b) The byproducts will be cobalt and platinum

APPENDIX No. 6

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(c) T 13 S, R 4 E S B M

(d) San Diego County, California

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(b) We are the owners of this property.

Par. 5 The property has no production record.

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D. B. MacAfee has had 25 years of successful mining and business experience connected with mining.

M. W. MacAfee has had 28 years of successful mining and business experience connected with mining.

The project will be managed by MacAfee & Company under the joint direction of the partners.

Par. 7 (a) See Appendix No. 2, 3, 4, & 5 attached to Form MF-103.

The property is still only a partially developed prospect.

(b) There is no known history of other nickel-copper mines in this district.

(c) See Appendix Nos. 2, 3, 4, & 5 attached to Form MF-103.

Par. 12 (b) (1 & 2) There is 5,500 tons indicated ore in the Friday Nickel Mine according to report of S. C. Greaney, Appendix No. 5, attached to Form MF-102.

Par. 13 A paved highway, No. U.S. 79, runs within 100 feet of the shaft. It is 100 miles by road to San Diego and 80 miles to Niland which would be the closest rail shipping points. Residence point would be Julian, 4 miles away.

Par. 14 Water may be obtained from springs near property sufficient for all purposes.

Par. 17 Old hoist house and bunkhouse in poor condition.

There is no equipment left on the property except the mine headframe.

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Form MF-103
(Revised June 1951)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Budget Bureau No. 42-R1035.1.

MF-103 Should Be Filed With General Technical Data Form MF-100

APPLICATION FOR AID FOR AN EXPLORATION PROJECT PURSUANT TO MINERAL ORDER 5, UNDER DEFENSE PRODUCTION ACT OF 1950

Not To Be Filled in by Applicant

Docket No. DMEA-2397
Metal or Mineral
Date Received 2-29-52
Amount $
Participation (Government %)

Name and address of applicant

MacAfee & Company
1210 James Oviatt Building
617 South Hill Street
Los Angeles 14, California

Date February 21, 1952

If you have already filed MF-100, give date filed herewith as Appendix of assistance requested Exploration Loan No. 6

DMA Docket Number (if available)

INSTRUCTIONS

Read Mineral Order 5, Regulations Governing Government Aid in Defense Projects, before completing this application. Submit four copies each, of the signed application form, General Technical Data Form MF-100, and answers to questions as specified, to Defense Minerals Administration, Department of the Interior, Washington 25, D. C., or to the nearest field executive office thereof, with your name and address on each sheet of the application and all accompanying papers. If you have previously filed MF-100, it is not necessary to file it again. However, you should indicate in space provided above the type of assistance previously applied for (loans, procurement contracts, etc.) and DMA Docket Number, if available. *When a question is inapplicable it should be so stated in the form.* Additional sheets should be attached in answering any questions or in supplying additional information. IF YOU CANNOT ANSWER A QUESTION, SO STATE.

1. (*a*) Give a description of the real property that will be in any way involved in the exploration project, including any existing mine or operating property.

   (*b*) If you are not the owner of the property, submit a copy of the lease, purchase option, or other agreements under which you are authorized to operate the property with each copy of your application.

   (*c*) Give the legal description of the exact parcel, plot, or area upon which the exploration is to be conducted.

   NOTE: (1) If both areas are the same, so state. The only obligation to repay the Government is from the net earnings from any commercial discovery made in the area specified in (*c*) above in which the exploration is to be conducted, and the expenditure of funds which may be charged as costs of the project must be limited to that area or to work necessary to perform the exploration in that area.

   (2) If applicant is not the owner of the property or if there are any liens or encumbrances against the property, copy of agreements of claimants, lienors, encumbrances, and lessors subordinating their interests in the property to the interest of the Government under the Exploration Project Contract will be required for attachment to the Contract.

2. (*a*) What metals or minerals do you expect to find?

   (*b*) Furnish statement of the geologic features of your property, giving type of ore deposit and reasons for expecting to find commercial ore bodies. Illustrate with maps or sketches. If you have a geologic or engineering report, or assay maps showing width and grade, please send them with application, stating whether or not you wish to have them returned.

The information requested in questions 3, 4, 5, 6, 7, 8, and 9 below should be answered specifically and in detail, as this information will be attached to and incorporated as part of the Exploration Project Contract, if such contract is entered into with you by the Government.

ANSWER EACH QUESTION ON SEPARATE SHEETS OF PAPER AND SUBMIT A COPY OF EACH ANSWER FOR EACH COPY OF YOUR APPLICATION.

3. (*a*) Describe fully the proposed work and give the total cost of the project.

   (*b*) State the time required to start the project and to complete it.

4. Submit a map or sketch of the property involved showing a plan (and cross section, if needed) of the present mine workings and the *location of the proposed exploration work* as related to geologic features, such as contacts, veins, ore-bearing beds, etc.

5. Furnish an itemized list of existing facilities, buildings, installations, and fixtures with a statement of the cost of any necessary rehabilitation or repairs to put into useful and operable condition.

6. Furnish a detailed list of additional facilities, buildings, and fixtures to be purchased, installed, or erected by you, with the estimated cost of each item.

7. Furnish a detailed list of operating equipment, separated into items to be—

   (*a*) Rented

   (*b*) Purchased

   (*c*) Furnished by you

   with the rental, purchase price, or depreciation of each item, as the case may be, to be charged as a cost of the project.

8. Furnish an itemized schedule of labor, by numbers and classes (miners, muckers, etc.) and of supervisors by numbers and positions, with the maximum wages or salaries to be paid to each.

9. Furnish a detailed list with estimated cost of each item for materials, supplies, engineering, assaying, accounting, power, water, utilities, and any other items not provided for above.

10. (*a*) How much are you prepared to invest in the proposed project?

    (*b*) Is this amount sufficient to pay your part of the cost of the project, in accordance with the regulations on Government participation (Sec. 9 of MO–5)?

11. State any conditions or circumstances regarding the property not sufficiently brought out by the foregoing questions.

CERTIFICATION

The undersigned company, and the official executing this certification on its behalf, hereby certify that the information contained in this form and accompanying papers is correct and complete to the best of their knowledge and belief.

MacAfee & Company
(Name of company)

By [signature]
(Signature of authorized official)

February 21, 1952
(Date)

Partner
(Title)

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
FEB 28 1952

Title 18, U. S. Code (Crimes), Section 1001, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

U. S. GOVERNMENT PRINTING OFFICE 16—64067-2

CABLE ADDRESS MACAFEE

TELEPHONE TRINITY 5939

MACAFEE AND COMPANY

MINE • MILL AND INDUSTRIAL PLANT REPRESENTATION

12TH FLOOR · JAMES OVIATT BUILDING · 617 SOUTH OLIVE STREET · LOS ANGELES 14 · CALIFORNIA

ENGINEERING DEPARTMENT

U. S. DEPARTMENT OF THE INTERIOR

DEFENSE MINERALS ADMINISTRATION

Referring to From MF-103 (Revised June 1951) the following notations apply to the paragraphs as enumerated in this form:

Par. 1 (a) The real property consists of 50.58 acres consisting of 10.58 acres owned in fee and 2 and a fraction mining claims contiguous, as follows -- "that portion of the Southwest Quarter of the Southwest Quarter of Section 15, Township 13 South Range 4 East, San Bernardino Meridian, County of San Diego, State of California, described as follows: "Commencing at the Northwest corner of the Southwest Quarter of the Southwest Quarter of said Section 15; thence South along the West line thereof, 28 rods thereon at right angles, East 56 rods; thence at right angles North 28 rods to a point in the North line of said Southwest Quarter of the Southwest Quarter of said Section 15; thence West along said North line, 56 rods to point of commencement." This parcel of land contains 10.58 acres owned in fee.

"The Friday Extension No.1 Mining Claim
Friday Extension No. 2 Mining Claim
Friday Extension Fraction Mining Claim
totalling 40 acres, located in the Northwest Quarter of the Southwest Quarter of Section 15, Township 13 South, Range 4 East, San Bernardino Meridian, in the Cleveland National Forest Mining District, in San Diego County, California."

The Attached plot plan, Appendix No. 1, Geologic - Topographic and Claim Map, Drawing FNM-1, shows the location of the property.

The location and workings of the Friday Nickel Mine are shows on the plot plan and the Exploration Map, Drawing FNM-2.

Par. 1 (b) We are the owners of the fee property and assignees of the mining claims above listed. There are no liens or encumbrances against these properties.

Par. 1 (c) The property on which the exploration work is to be conducted is the same as that described legally in Par. 1 (a).

Par. 2 (a) We expect to find nickel, copper, cobalt and small amounts of platinum, in massive pyrrhotite ore bodies.

(b) Attached you will find copies of the following engineering and geological reports on this property:

Appendix No. 2. Original report on Geology and Nickel Mineralization of the Julian-Cuyamaca Area, San Diego County, California. By C. S. Creasey, Geologist, Geological Survey, United States Department of the Interior, November 1945.

Appendix No. 3. Report on the Friday Nickel Mine, San Diego County, California, October 8, 1942, by C. F. Tolman and Z. K. Melcon, Stanford University for Henry J. Kaiser Company.

Appendix No. 4. General Report on the Friday Mine and the Nickel-Norite Batholith of the Cuyamaca Area, San Diego County, California, by A. H. Heller.

Appendix No. 5. California Journal of Mines and Geology, State Mineralogists Report Vol. 42, No. 1, January 1946. Photostatic copy of Section 2 - Geology and Nickel Mineralization of the Julian Cuyamaca Area, San Diego County, California, by S. C. Creasey.

Par. 3 (a) Proposed work and total cost of the project are as follows --

1 - We propose, for Step 1, to drill 1 vertical hole and 8 radiating holes from the bottom of the vertical shaft at the 170 ft. level or thereabouts, 6 radiating holes from the shaft at the 132 ft. level, and 4 vertical holes all as shown on the Geologic and Exploration Maps FNM-1 and FNM-2.

These holes are for the purpose of checking the known ore occurances in the underground workings and those indicated by former diamond drilling. These holes will also give an idea of the extent of the known ore body and the indicated ore bodies with a comparatively low capital expenditure. The aim is to connect up the indicated ore bodies with the known ore body so an intelligent mining program can be laid out to fully explore and block out the ore in this mine.

2 - For Step 2, we propose to drill 20 vertical holes from the surface to define the limits of the ore body or ore bodies beyond that expected to be indicated from the radial drilling in step one.

3 - The radial drilling in Step 1 and the vertical drilling in Step 2 will give good indications of the extent, depth and location of the ore bodies, then Step 3, the sinking of the shaft to the 200 ft. level or deeper and the driving of development drifts and crosscuts will be undertaken, to block out the ore into definite reserves. It is estimated a total of 500 feet of drifting and cross cutting will be required.

In order to proceed with Step 1, it will be necessary to do some repair work on the shaft timbers and clean out the bottom of the vertical shaft for the drill set-up. The 132 ft. level station will also have to be re-timbered and made safe.

The hoist and compressor were stolen from the shaft during the war and it is presumed that the hoisting cage was dropped to the bottom of the shaft. The ladders are gone below the 132 ft. level so thishas not been ascertained.

It is proposed to buy a 100 cu. ft. portable gasoline driven compressor, a tugger air hoist, cable and a bucket, and a jack hammer with accessory equipment, to clean out the shaft, enlarge the 132 ft. station and cut a station at the 170 ft. level which is the bottom of the vertical shaft. This will be necessary before the diamond drilling from the shaft locations can be undertaken.

For Step 3, a gasoline driven hoist for the bucket and cage will have to be installed, which will facilitate the hoisting for the shaft sinking and underground exploration work.

A schedule of the drill holes follows --

SCHEDULE OF DRILL HOLES
Step. # 1

Hole	Number	Description	Length	Total	Est.Drill Time	Est.Cost @ $4 ft.
A	1	Vertical - bottom of shaft	200 '	200'	30 hr.	$800
B to I inc.	7	Inclination 45° from bottom of shaft, radial on 45° circle	280' ea	1960'	270 "	7840
G	1	Inclination 22½° from bottom of shaft	280'	280'	40 "	1120
J to O inc.	6	Inclination 15° from 132' level of shaft radial on 60° circle	270'ea.	1620'	220 "	6480
P - S	4	Vertical holes from surface	370'ea.	1480'	210 "	5920
		Totals		5540'	770 hr. 97 days	$22,160
		Step # 2				
	20	Vertical drill holes average	250'ea.	5000'	84 days	20,000
				10,540'	181 days	$42,160

The overall project cost estimates are as follows: --

Diamond Drilling Step 1 - 5,540 ft. @ $4.00/ft.	$22,160
Diamond Drilling Step 2 - 5000 ft. @ $4.00/ft.	20,000
Repair of existing facilities	1,980
Purchased equipment for Step 1	11,297
Purchased equipment for Step 3	4,058
Labor and supervision	38,720
Material and supplies	7,519
Assaying and Analytical work	21,835
Consulting engineering fees	6,400
Travel, hotel, meals, etc.	1,600
Los Angeles office overhead for accounting, telephone, etc.	1,200
	$ 126,769

Par. 3 (b) The time required to start and complete the project is estimated as follows --

Repair work on the shaft and preparation for underground diamond drilling can start as soon as the project is approved and the loan granted.

It is estimated that the project will require 8 months to complete.

Par. 4 Maps

The following maps are attached as Appendix No. 1 --

Friday Nickel Mine - Geologic - Topographic and Claim Map
Drawing No. FNM - 1

Friday Nickel Mine - Exploration Map
Drawing No. FNM - 2

Par. 5 Existing Facilities

	Est. Cost of Repairs
Wooden Headframe	$ 200
Hoist & Compressor House	350
Bunkhouse	750
Shaft Timbers	500
	1,800
Contingencies 10%	180
Total	$ 1,980

Par. 6 No additional facilities, buildings or fixtures to be purchased, installed or erected under this program.

Par. 7 Operating Equipment.

(a) No operating equipment to be rented except the diamond drill which will be a contract basis of $4.00/ft drilled, with equipment and labor furnished by the contractor.

(b) Purchased equipment

Project Step 1

Quantity	Item	Cost
1	105 cu. ft. IR Compressor gasoline driven	$3,550
1	1000 lb. pull single drum IR air hoist	642
250 ft.	5/8" x 6-19 hoisting cable	65
1	30" sheave with bearings	60
1	1000 lb. steel sinking bucket	75
1	Bell system 250 ft.	30
1	Rock drill IR #40	345
1	IR Jack leg	195
1	15 gal. water tank with manifold	74
1	Line oiler	29
200 ft.	3/4" air hose with couplings	110
200 ft.	1/2" water hose with couplings	125
1	Lot of connections	15
2 sets	Jack rods 2'7", 5'3", 7'10" & 10'6"	175
4 sets	Carset Carbide bits 1 3/8", 1 1/2" & 1 5/8" gage	255
1	2000 Watt Kohler electric light plan	796
1	Lot of wiring sockets, switches & lights	150
1	500 gal. water tank	65
1	3/4 Ton Ford pick-up truck	2,025
1	Acetylene welding outfit	175
1	Hand forge with blacksmith tools	65
1	60 lb. Anvil	24
1	Lot of hand tools, picks, shovels, saws, etc.	150
1	Vise	30
1	3/4" electric drill with set of bits	85
		10,270
	Contingencies 10%	1,027
		$11,297

Project Step 2

No additional equipment required.

Project Step 3

Quantity	Item	Cost
1	2000 lb. pull gasoline hoist	$750
2	16 cu. ft. mine cars	500
1000 ft.	12 lb. mine rail with bolts, spikes & fish plates 4.5 tons @ $190	855
1	Rail binder	29
1000 ft.	2" black iron pipe, T & C with valves & fittings	400
1	Jack bit grinder	155
1	Lot camp furniture, stoves, beds, chairs, etc.	1,000
		3,689
	Contingencies 10%	369
		$4,058

Par. 8 Labor.

Quantity	Classification	Rate
1	Diamond drill operator	furnished by diamond drilling contractor.
1	Diamond drill helper	
2	Hoist man	@ $20.75/8 hr. shift, including insurance & compensation
2	Miners	@ $19.80/8 hr. shift, including insurance & compensation
2	Muckers	@ $19.00/8 hr. shift, including insurance & compensation
1	Superintendent	@ $750.00/mo., including insurance & compensation
1	Engineer (Surveying & sampling)	@ $600.00/ month.

Payroll per month

2	Hoist men	@ 1080/mo x 8 mo.	$8640
2	Mixers	@ 1020/mo x 8 mo.	8160
2	Muckers	@ 950/mo. x 8 mo.	7600
1	Superintendent	@ 750/mo. x 8 mo.	6000
1	Engineer	@ 600/mo x 8 mo.	4800
			$35,200
	Contingent labor 10%		3,520
			$38,720

Par. 9 Operating Costs —

Quantity	Item	Cost
5000 bd. ft.	Mine timber, lagging, wedges, etc.	$1000
150 lb.	Tie rods for shaft timbers	75
5 kegs	Nails	60
2	Steel muck sheets	50
	Carbide, powder, fuse, caps	2450
	Gasoline, oil, grease	1600
400	6' diamond drill core boxes	1600
		6,835
	Contingencies 10%	684
		$7,519

Assaying

1100	assays for nickel @ $5.00	5,500
1100	" " copper @ 2.50	2,750
200	" " cobalt @ 7.50	1,500
200	" " platinum @ 5.00	1,000
100	" " iron @ 3.50	350
100	" " sulfur @ 5.00	500
50	Spectrographic Analyses @ 35.00	1,750
25	Rock classifications @ 100.00	2,500
20	Mineralogical classifications @ 200.00	4,000
		$19,850
	Contingent analyses 10%	1,985
	Total	$21,835

Consulting Engineering Fees 8 days/mo. @ $100 x 8 mo.	6,400
Travel from Los Angeles to Julian & misc. meals, hotel, etc.	1,600
Los Angeles Office overhead for accounting, etc. @ $150.00/mo.	1,200
Total	$9,200

Par. 10 (a) We are prepared to invest 10%, or $12,677 in the project.

(b) This amount is sufficient to pay our part of the cost of the project in accordance with Sec. 9 of MO-5.

Par. 11 We believe the foregoing questions and answers cover all conditions and circumstances pertinent to this property and project.

DMEA-2397

MACAFEE AND COMPANY

FRIDAY NICKEL MINE

Table of Contents

Cover Letter	Text
Additional Information to Questions on Form MF-103	Text
Drawings FRN-1 and FRN-2	Appendix No. 1
Report by S. C. Creasey	Appendix No. 2
Report by C. F. Tolman	Appendix No. 3
Report by A. H. Heller	Appendix No. 4
Photostatic copy of Section 2, Geology and Nickel Mineralization of the Julian-Cuyamaca Area, San Diego County, California	Appendix No. 5
DMA Form MF-100, General Technical Data and Attachments	Appendix No. 6

DMEA-2397

MACAFEE AND COMPANY

FRIDAY NICKEL MINE

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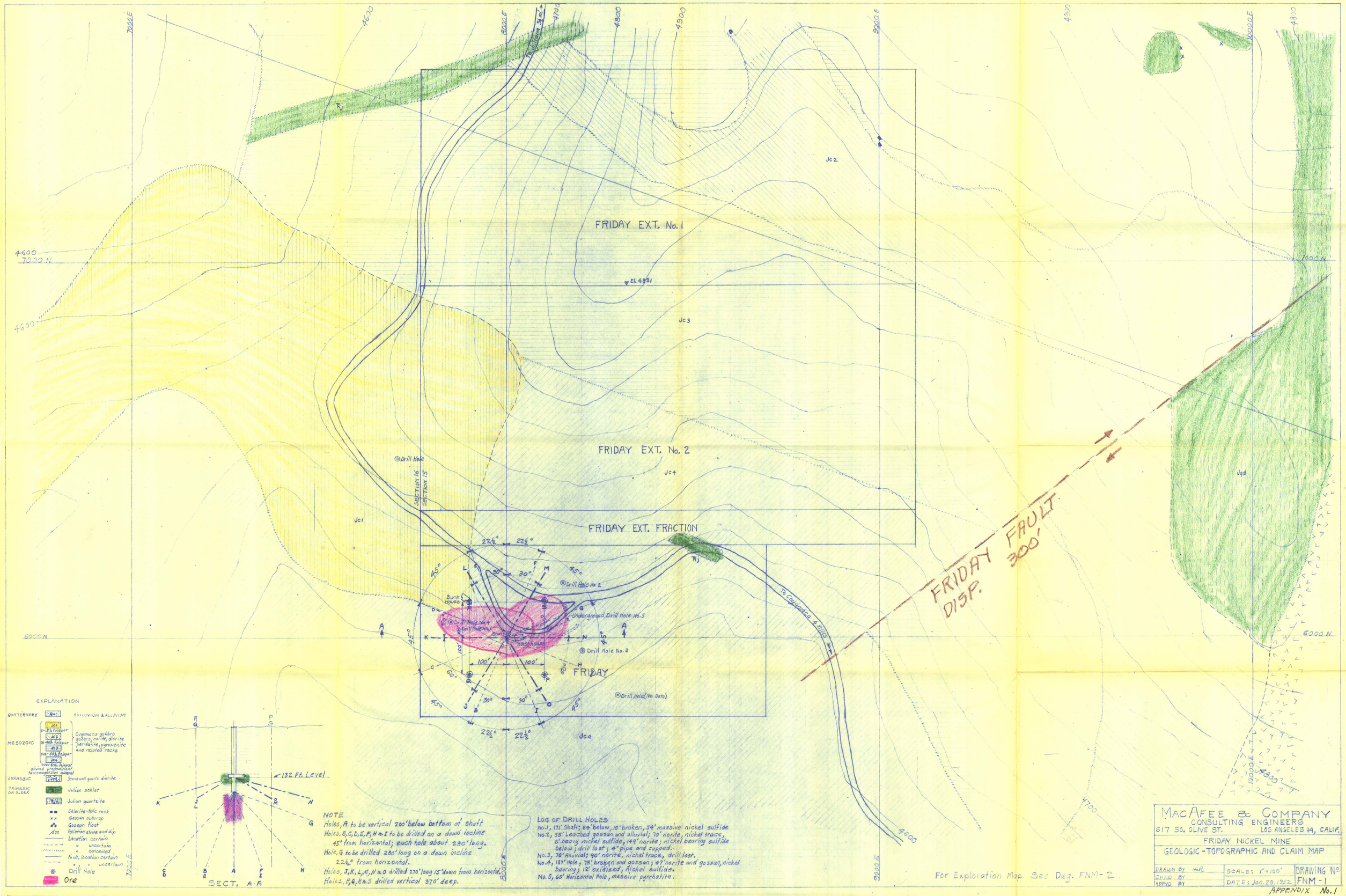
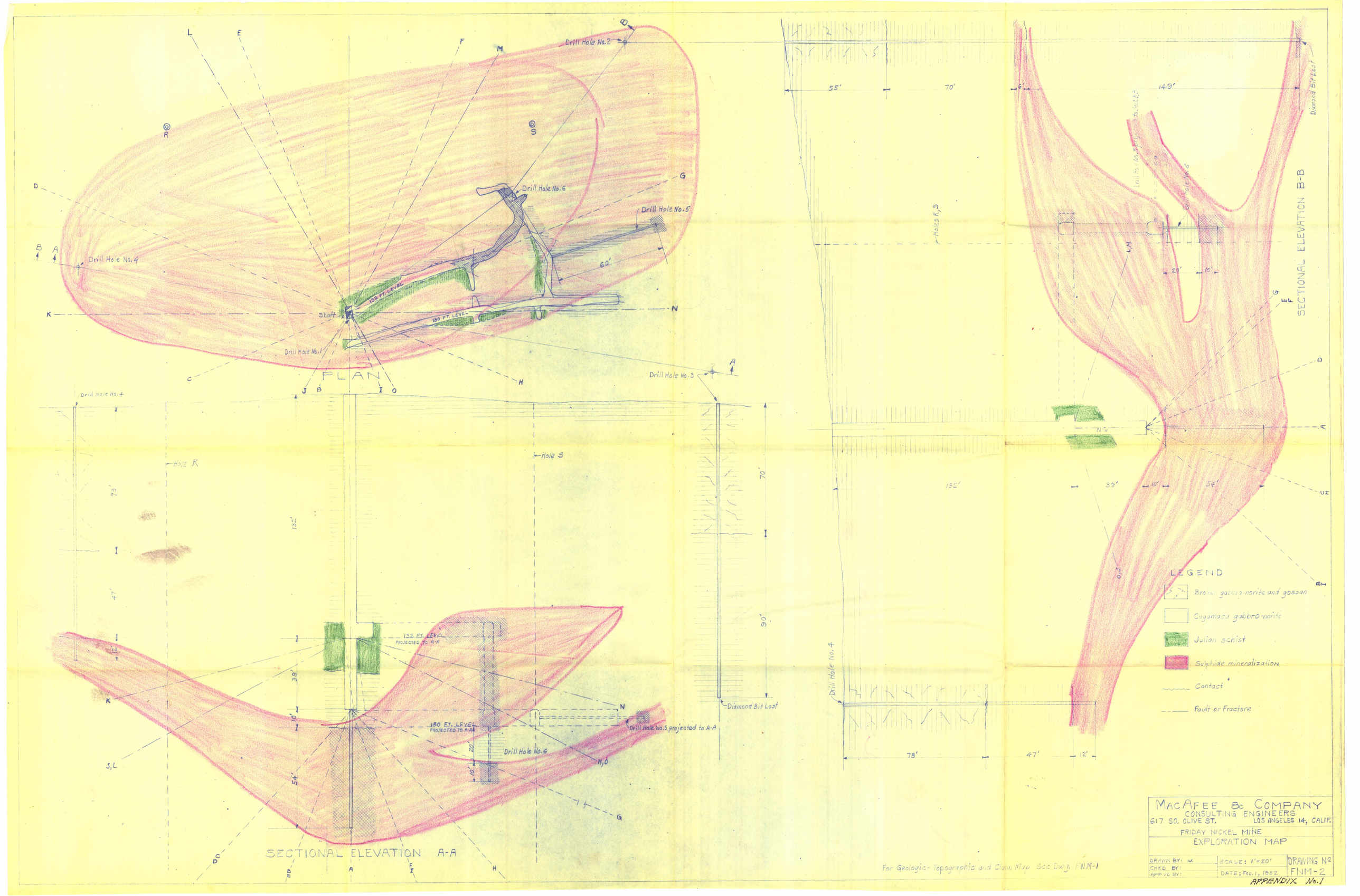

FRIDAY EXT. No. 1
FRIDAY EXT. No. 2
FRIDAY EXT. FRACTION
FRIDAY
FRIDAY FAULT
DISP. 300'
To Cuyamaca 4 Miles
To Julian 3½ mi.
Jc1
Jc2
Jc3
Jc4
Jad
RJ
Drill Hole
Drill Hole No. 2
Drill Hole No. 3
Drill Hole No. 4
Drill Hole No. 5
Drill Hole (No Data)
Underground Drill Hole No. 5
Bunk House
Hoist House
Blast
SECTION 16
SECTION 15
El. 4931
4600
4700
4800
4900
7000 E
8000 E
9000 E
10000 E
7000 N
6000 N
100'
60°
45°
30°
22½°
EXPLANATION
QUATERNARY
Qal
COLLUVIUM & ALLUVIUM
MESOZOIC
Jc1 0-5% feldspar
Jc2 5-40% feldspar
Jc3 over 40% feldspar
Jc4 over 60% feldspar olivine predominant ferromagnesian mineral
Cuyamaca gabbro, gabbro, norite, diorite serpentite, peridotite and related rocks
JURASSIC
Jad
Stonewall quartz diorite
TRIASSIC OR OLDER
Julian schist
Julian quartzite
Chlorite-talc rock
Gossan outcrop
Gossan float
Foliation strike and dip
Location certain
" uncertain
" concealed
Fault, location certain
" " uncertain
Drill Hole
Ore
SECT. A-A
132 Ft. Level
NOTE
Holes, A to be vertical 200' below bottom of shaft
Holes, B, C, D, E, F, H & I to be drilled on a down incline 45° from horizontal; each hole about 280' long.
Hole, G to be drilled 280' long on a down incline 22½° from horizontal.
Holes, J, K, L, M, N & O drilled 270' long 15° down from horizontal.
Holes, P, Q, R & S drilled vertical 370' deep.
LOG OF DRILL HOLES
No. 1, 171' Shaft; 64' below, 10' broken, 54' massive nickel sulfide
No. 2, 55' Leached gossan and alluvial; 70' norite, nickel trace, 6' heavy nickel sulfide, 149' norite; nickel bearing sulfide below; drill lost; 4" pipe and capped.
No. 3, 70' Alluvial; 90' norite, nickel trace, drill lost.
No. 4, 137' Hole; 78' broken and gossan; 47' norite and gossan, nickel bearing; 12' oxidized, nickel sulfide.
No. 5, 60' Horizontal Hole, massive pyrrhotite.
For Exploration Map See Dwg. FNM-2
MacAFEE & COMPANY
CONSULTING ENGINEERS
617 SO. OLIVE ST. LOS ANGELES 14, CALIF.
FRIDAY NICKEL MINE
GEOLOGIC-TOPOGRAPHIC AND CLAIM MAP
DRAWN BY MWC
CHKD BY
APPVD BY
SCALE: 1" = 100'
DATE: Jan. 29, 1952
DRAWING No. FNM-1
APPENDIX No. 1


PLAN
Drill Hole No. 1
Drill Hole No. 2
Drill Hole No. 3
Drill Hole No. 4
Drill Hole No. 5
Drill Hole No. 6
Shaft
132 FT. LEVEL
180 FT. LEVEL
60'
SECTIONAL ELEVATION A-A
132 FT. LEVEL PROJECTED TO A-A
180 FT. LEVEL PROJECTED TO A-A
Drill Hole No. 5 projected to A-A
Drill Hole No. 6
Diamond Bit Lost
Hole R
Hole S
Hole K,S
Drill Hole No. 4
SECTIONAL ELEVATION B-B
Drill Hole No. 5
Drill Hole No. 6
Diamond Bit Lost
LEGEND
Broken gabbro-norite and gossan
Cuyamaca gabbro-norite
Julian schist
Sulphide mineralization
Contact
Fault or Fracture
For Geologic-Topographic and Claim Map See Dwg. FNM-1
MacAFEE & COMPANY
CONSULTING ENGINEERS
617 SO. OLIVE ST. LOS ANGELES 14, CALIF.
FRIDAY NICKEL MINE
EXPLORATION MAP
DRAWN BY:
CHKD. BY:
APPVD. BY:
SCALE: 1"=20'
DATE: Feb. 1, 1952
DRAWING Nº FNM-2
APPENDIX No. 1

FRIDAY MINE

SAN DIEGO CO., CALIF.

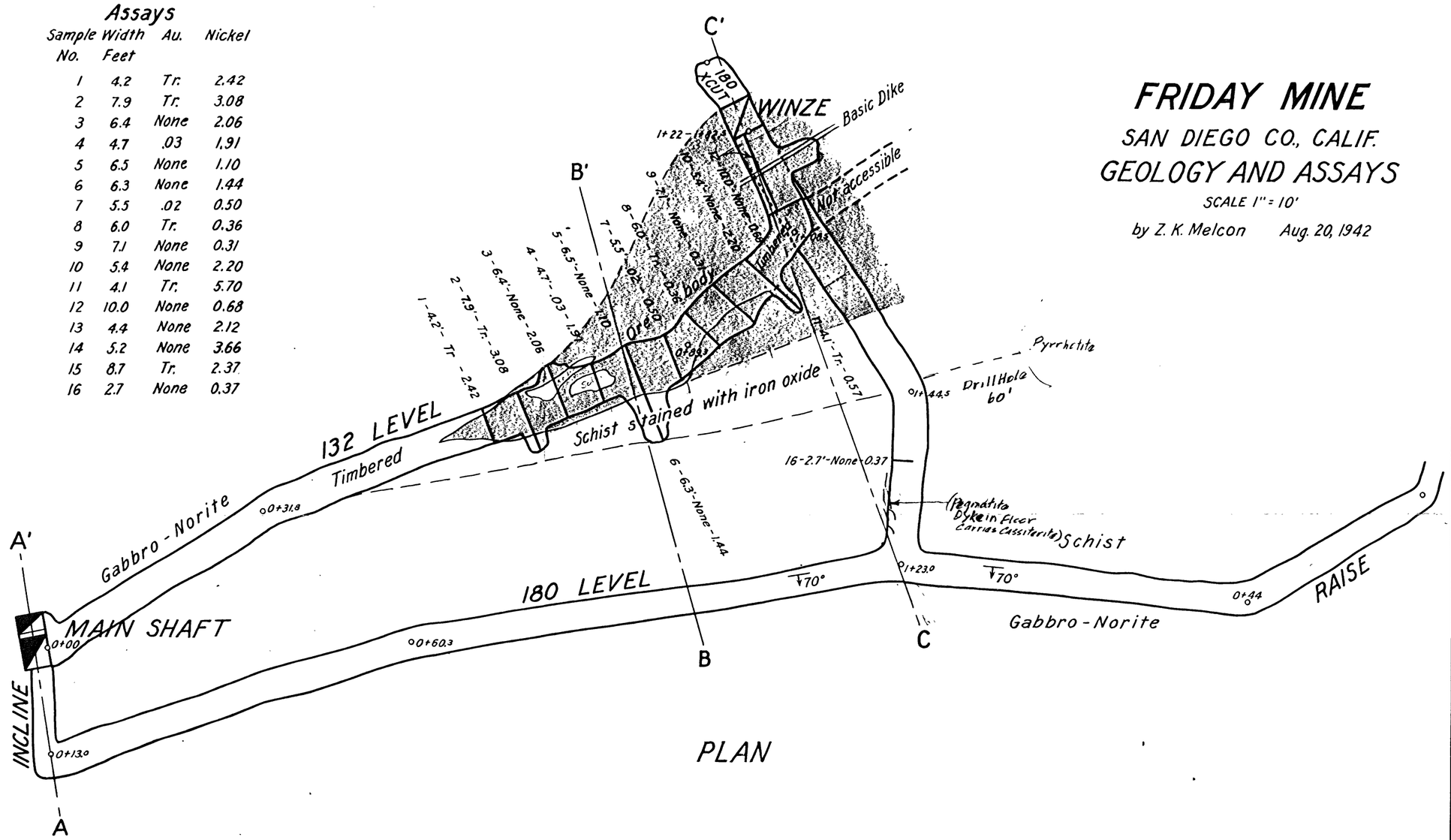
GEOLOGY AND ASSAYS

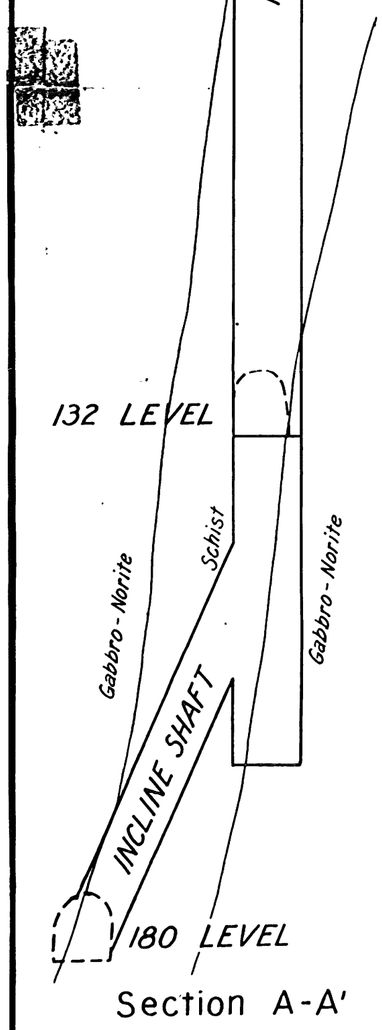
SCALE 1" = 10'

by Z. K. Melcon Aug. 20, 1942

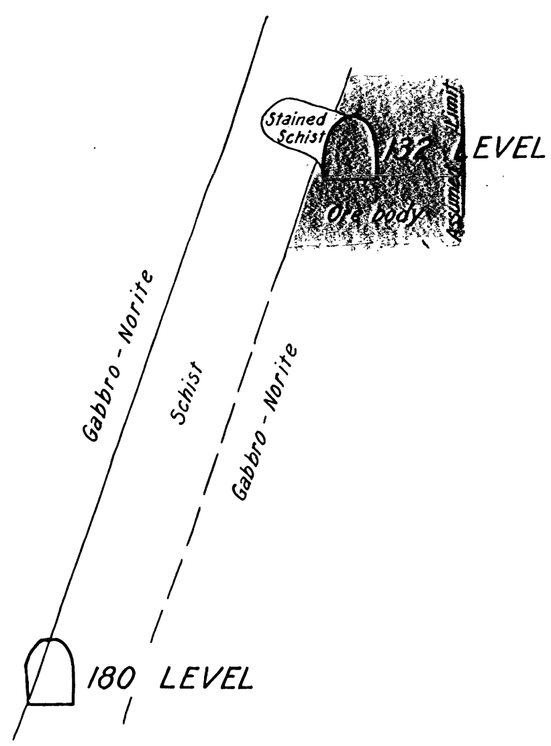
Assays

Sample No.	Width Feet	Au.	Nickel
1	4.2	Tr.	2.42
2	7.9	Tr.	3.08
3	6.4	None	2.06
4	4.7	.03	1.91
5	6.5	None	1.10
6	6.3	None	1.44
7	5.5	.02	0.50
8	6.0	Tr.	0.36
9	7.1	None	0.31
10	5.4	None	2.20
11	4.1	Tr.	5.70
12	10.0	None	0.68
13	4.4	None	2.12
14	5.2	None	3.66
15	8.7	Tr.	2.37
16	2.7	None	0.37

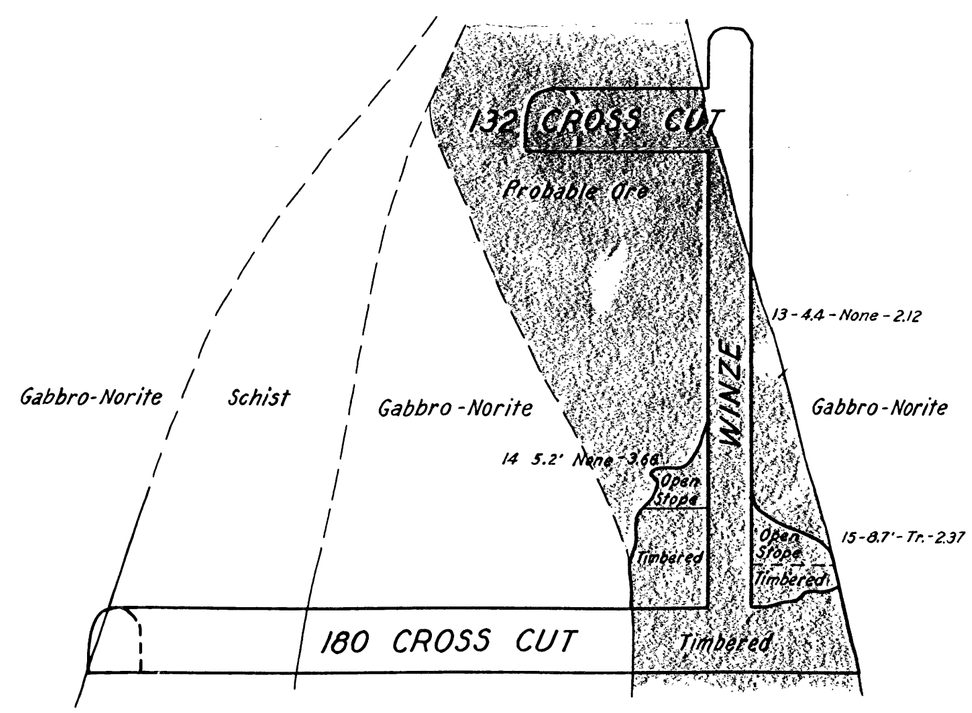




Section A-A'

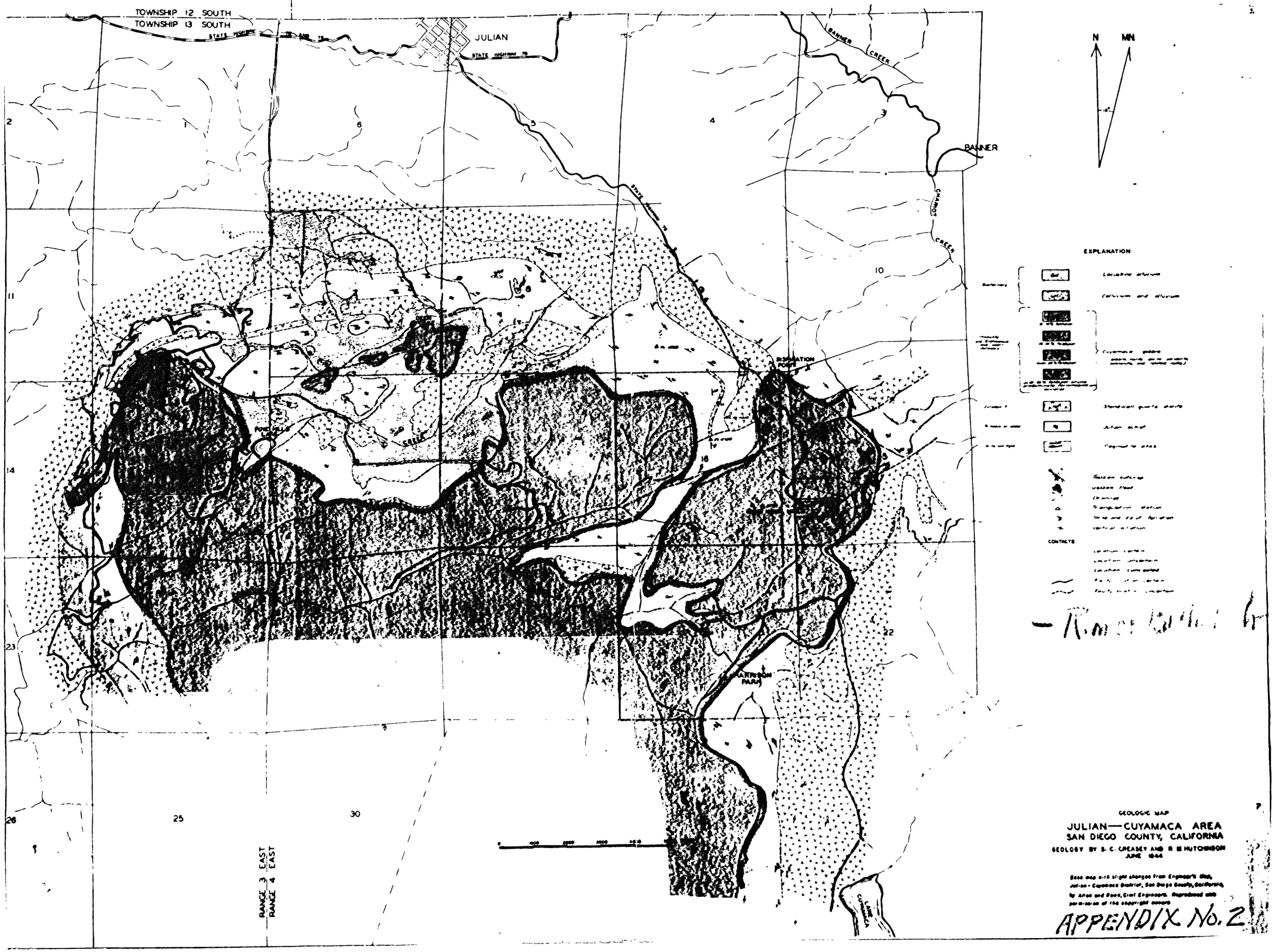


Section B-B'



Section C-C'

APPENDIX No. 3



APPENDIX No. 2

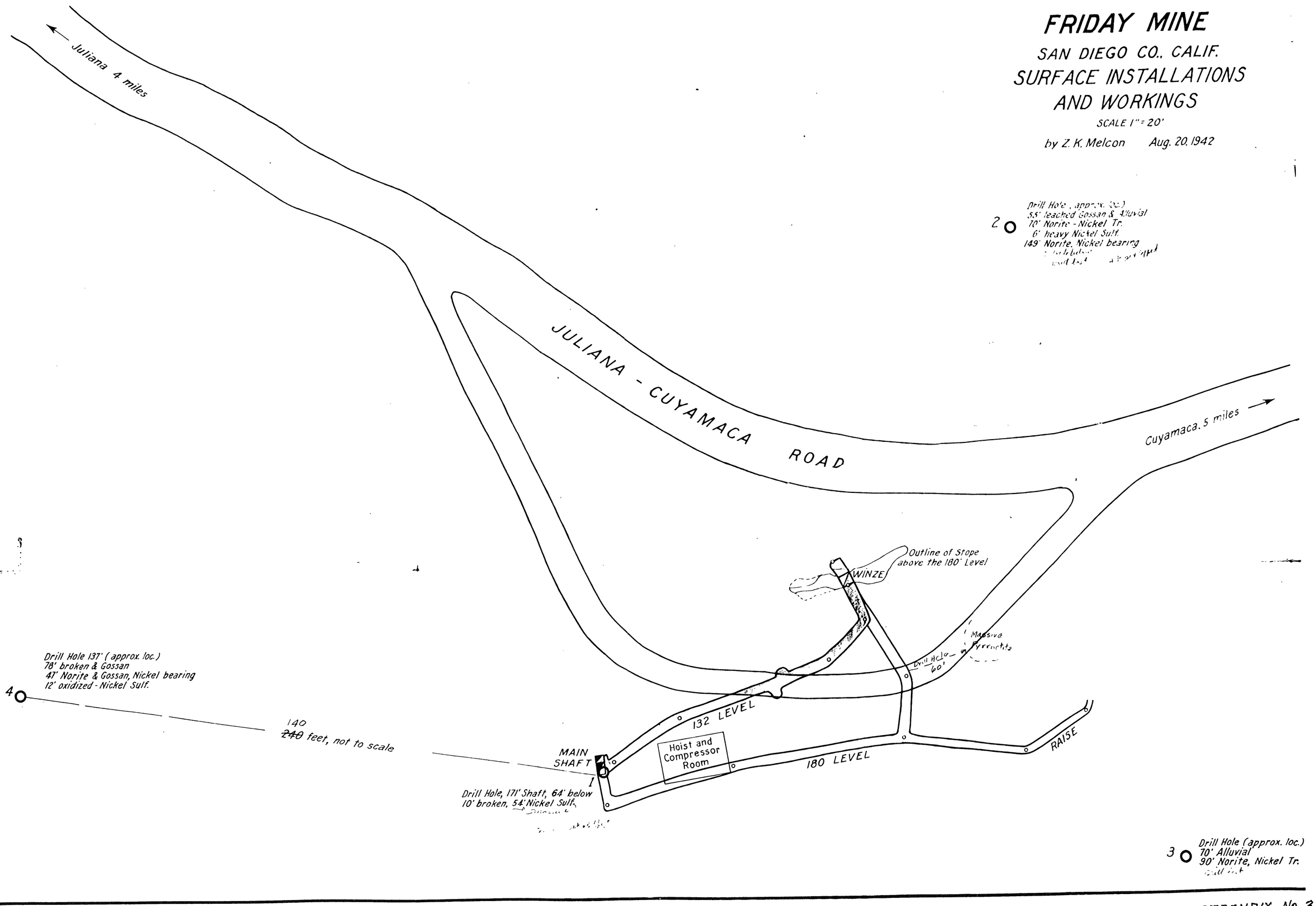
FRIDAY MINE

SAN DIEGO CO., CALIF.

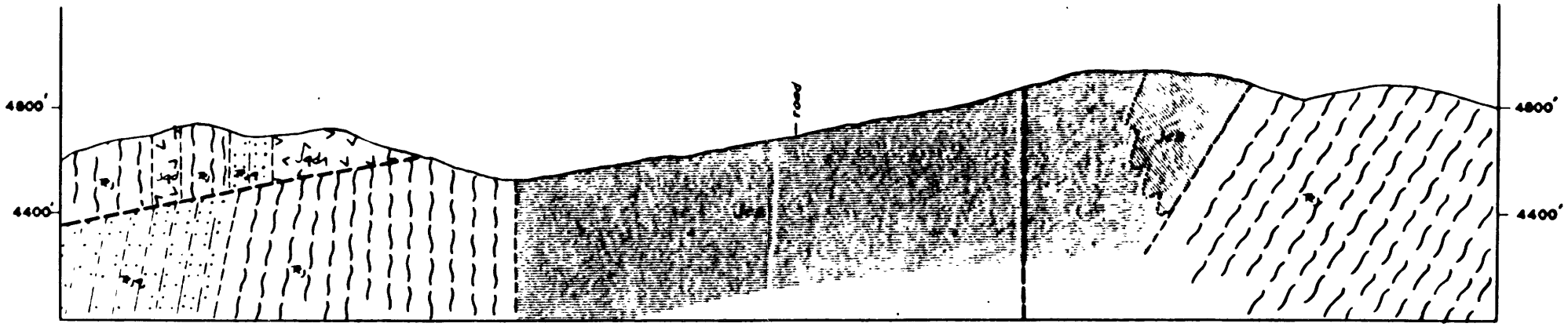
SURFACE INSTALLATIONS AND WORKINGS

SCALE 1" = 20'

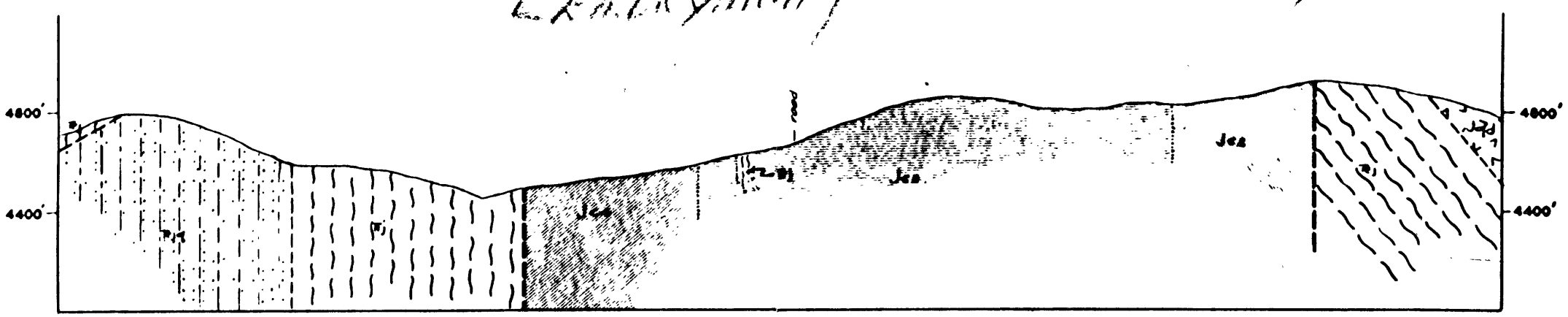
by Z. K. Melcon Aug. 20, 1942



APPENDIX No. 3



SECTION A——A'



SECTION B——B'

0 400 800 1200 1600 2000 FEET

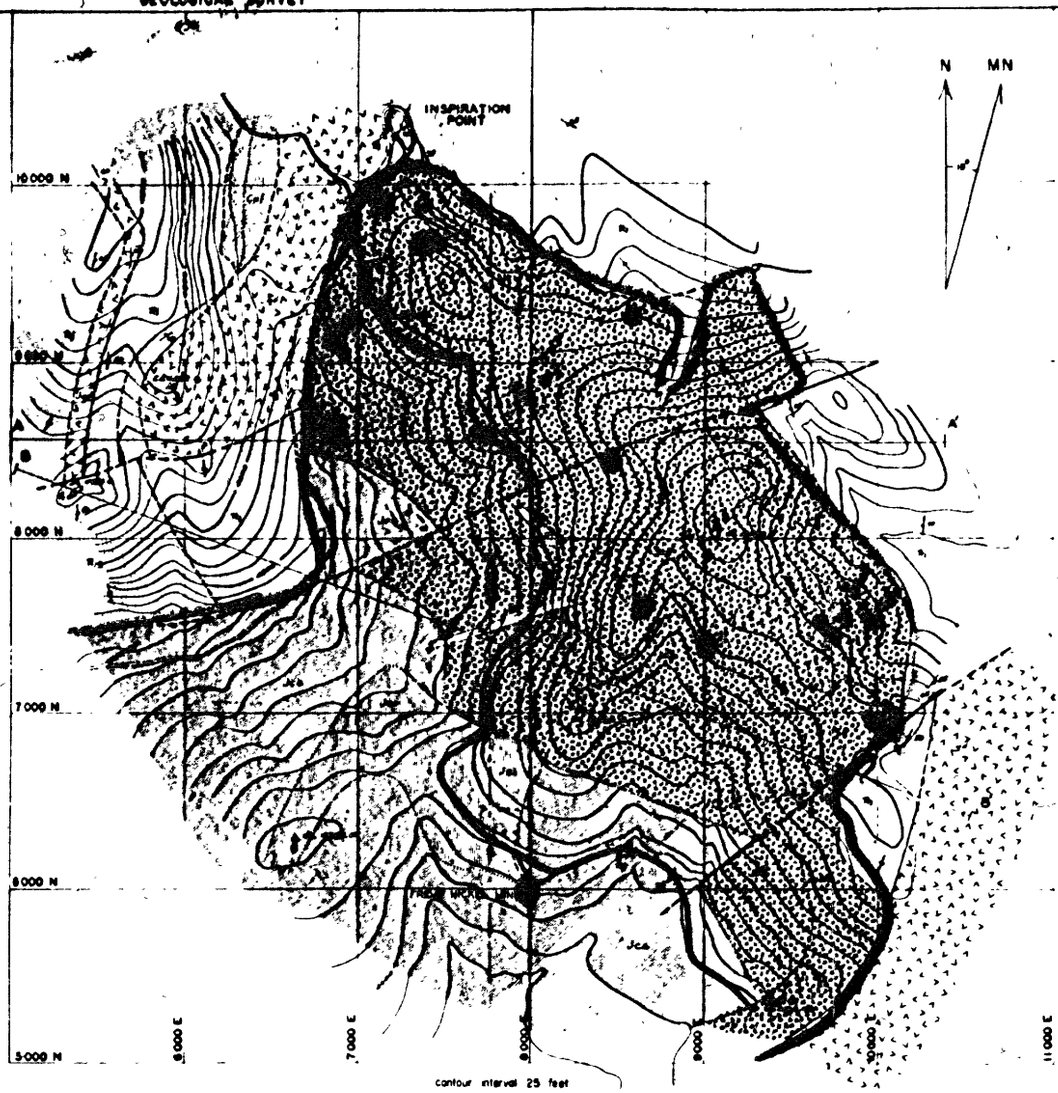
CROSS SECTIONS

FRIDAY MINE—INSPIRATION POINT AREA
NEAR JULIAN
SAN DIEGO COUNTY, CALIFORNIA

APPENDIX No. 2.

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STRATEGIC MINERALS INVESTIGATIONS
PRELIMINARY MAP
PLATE 2



EXPLANATION

Cal — Calcium and alkali

Jd1

Jd2

Jd3

Jd4

Jd — Cretaceous diabase

Stumpy gray dacite

Julian schist

Chlorite talc rock

Gossan outcrop

Gossan float

Prospect pit and trench

Triangulation station

Strike and dip of foliation

CONTACTS

Location certain

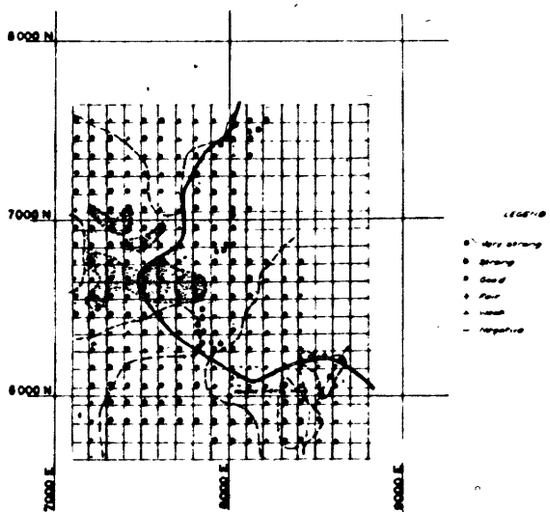
Location uncertain

Location concealed

Fault, location certain

Fault, location uncertain

Lithophysae



SURFACE SAMPLES AND QUALITATIVE TESTS

AFTER C. R. TOLMAN AND Z. K. MELCON

0 400 800 1200 1600 2000 FEET

GEOLOGIC AND TOPOGRAPHIC MAP

SOIL ANALYSIS MAP

FRIDAY MINE—INSPIRATION POINT AREA

NEAR JULIAN

SAN DIEGO COUNTY, CALIFORNIA

TOPOGRAPHY AND GEOLOGY BY

S. G. CREASEY AND R. M. HUTCHINSON

JUNE 1944

APPENDIX No. 2

FRIDAY MINE

SAN DIEGO COUNTY, CALIFORNIA

SURFACE SAMPLES AND QUALITATIVE TESTS

By Z. K. MELCON G. D. MILLER, Assistant

SCALE 1 INCH = 100 FEET

September 30, 1942

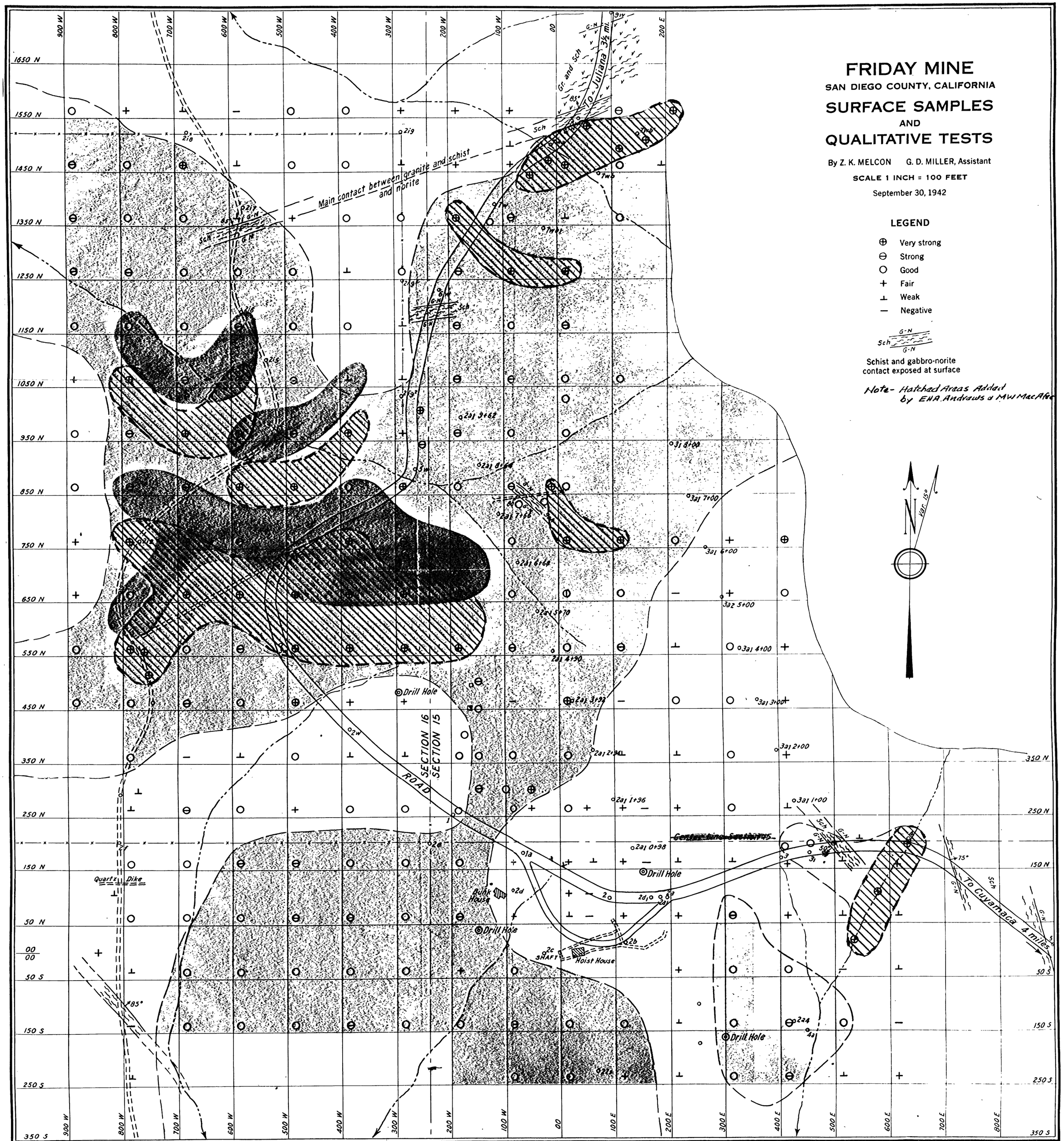
LEGEND

- ⊕ Very strong
- ⊖ Strong
- O Good
- + Fair
- ⊥ Weak
- — Negative

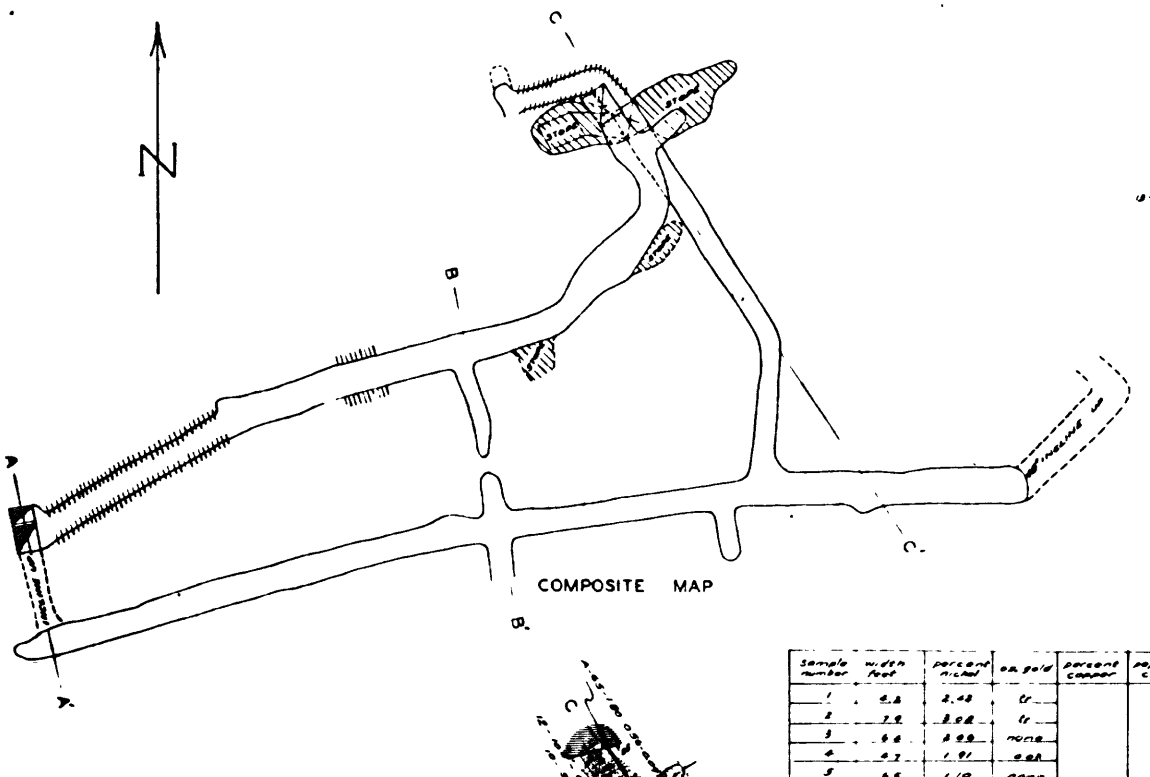
Sch G-N G-N

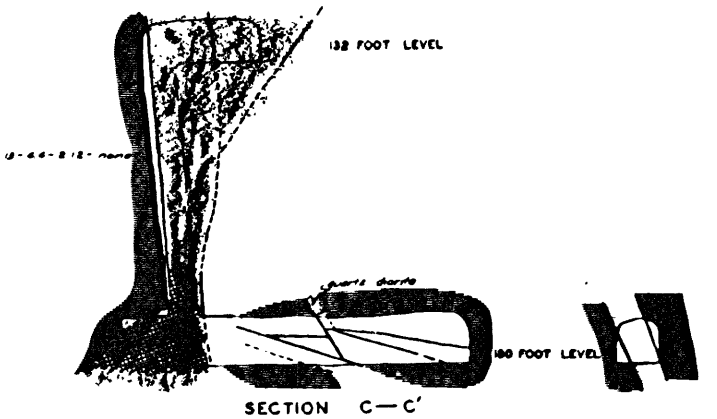
Schist and gabbro-norite contact exposed at surface

Note- Hatched Areas Added by EHA Andrews & MW MacAfee



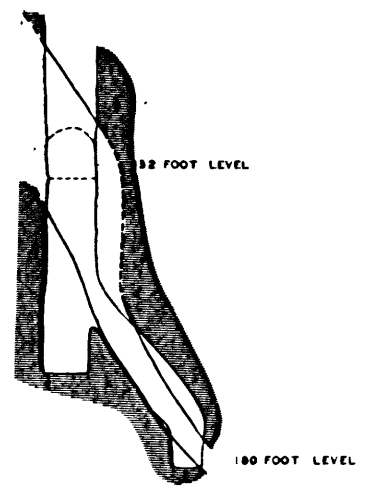
APPENDIX No. 3





Sample number	width feet	percent nickel	oz. gold	percent copper	percent cobalt
1	6.6	2.48	tr		
2	7.9	3.08	tr		
3	6.6	2.99	none		
4	4.3	1.91	0.01		
5	6.8	1.10	none		
6	6.3	1.46	none		
7	5.5	0.50	0.02		
8	6.0	0.56	tr		
9	7.1	0.51	none		
10	5.8	2.20	none		
11	4.1	5.70	tr		
12	10.0	0.68	none		
13	4.4	2.12	none		
14	5.2	3.06	none		
15	8.7	2.37	tr		
16	8.7	0.37	none		
A	6.5	1.86		0.50	0.09
B	3.5	0.28		1.51	0.03
C	9.0	3.69		0.76	0.16

Samples 13 from a private report by C. F. Mason and J. E. Hatch
1 to 16 C by the U. S. Geological Survey

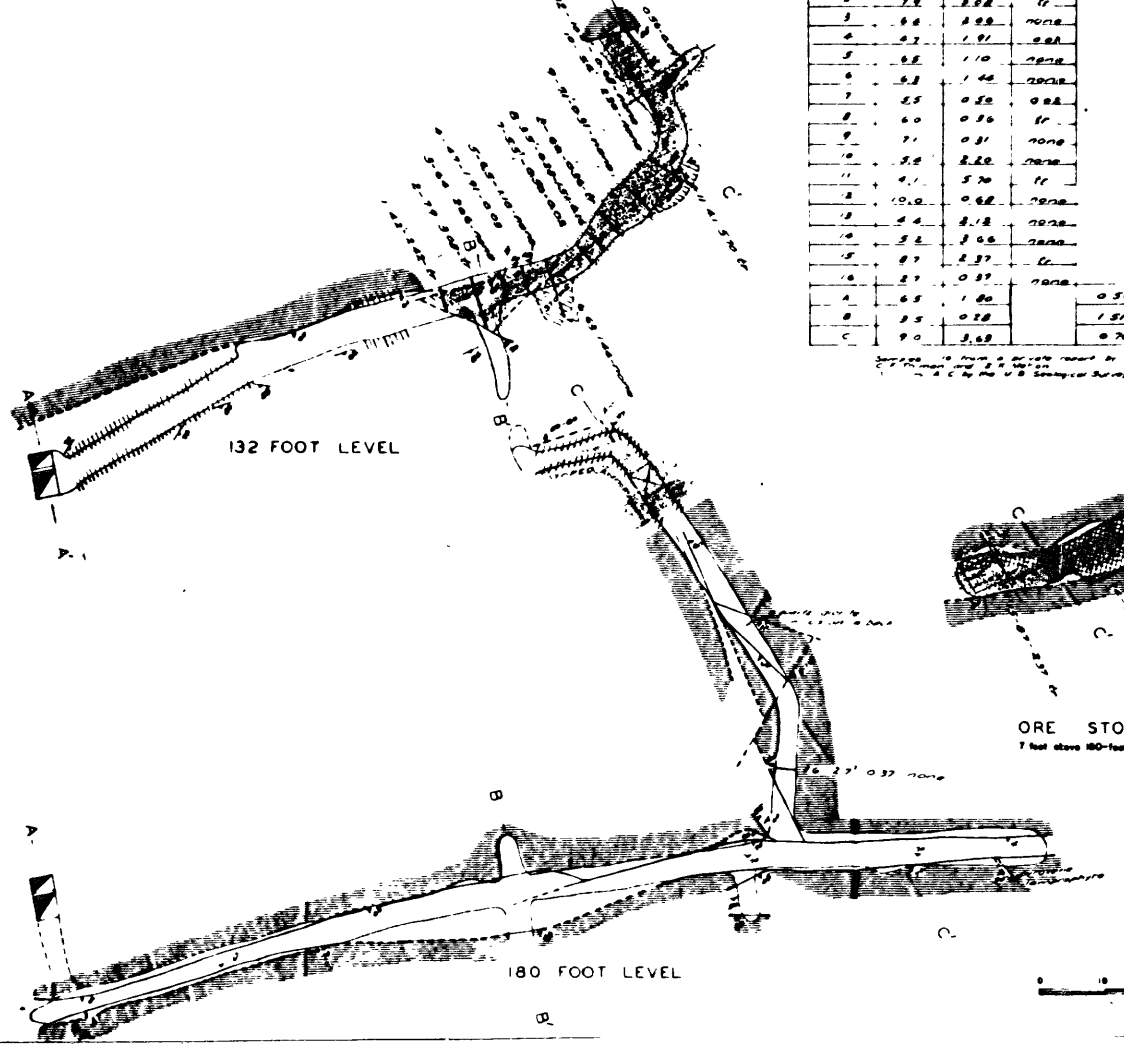


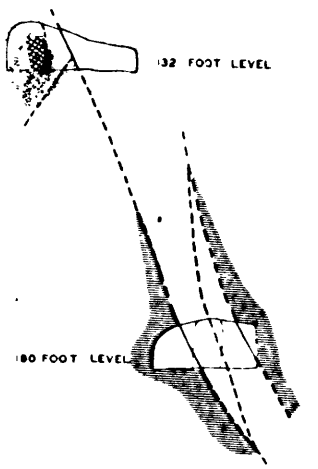
EXPLANATION

- Cryptomelane pipes
- Julian schist
- Sulfide mineralization
- Gossan from the oxidation of sulfides
- Side sagging on drift
- Side and back sagging on drift
- Channel sample
- Joint
- Fault or fracture

ASSAY DATA

Assays listed in order of sample number include length, percent nickel, oz. gold, percent copper, percent cobalt. No copper or cobalt assays for samples 1-16. No gold assays for samples A-C.

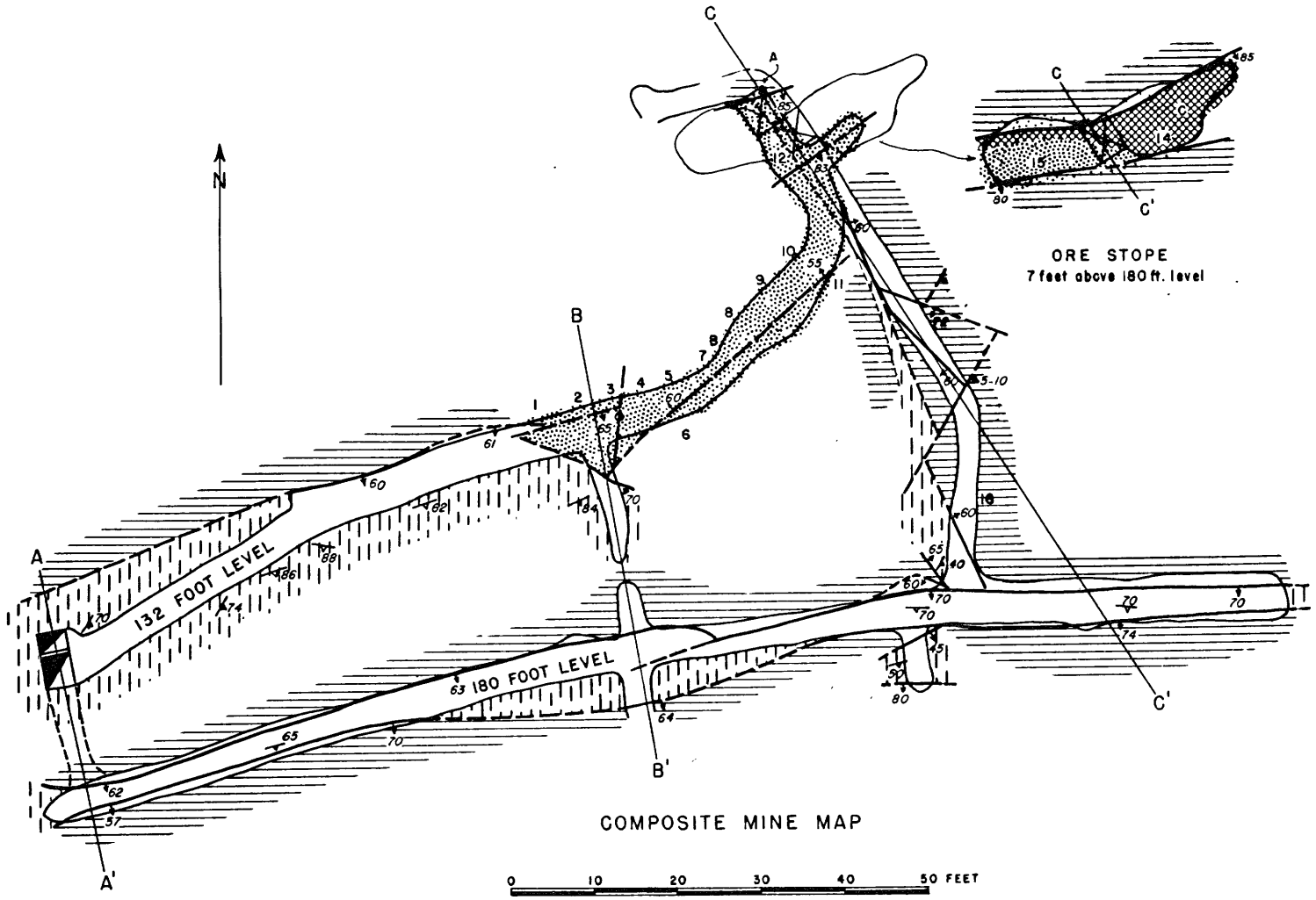




0 10 20 30 40 50 FEET

GEOLOGIC MAP
FRIDAY NICKEL MINE
NEAR JULIAN
SAN DIEGO COUNTY, CALIFORNIA
BY S. C. CREASEY — R. M. HUTCHINSON
JUNE 1944

APPENDIX No. 2



COMPOSITE MINE MAP

SAMPLE ASSAY DATA

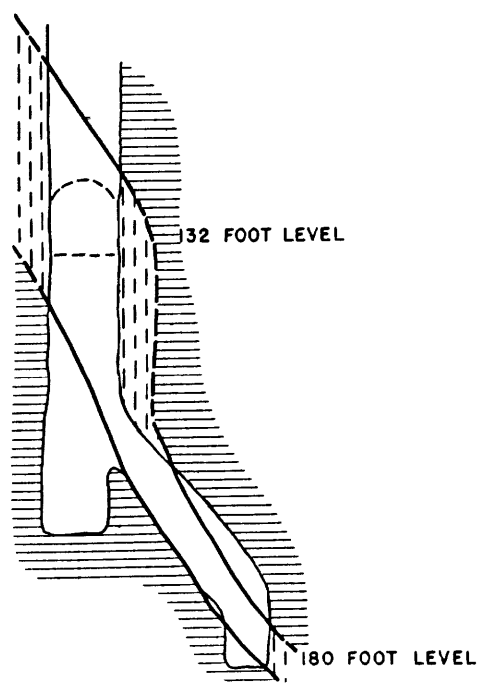
Sample Number	Width feet	Nickel %	Gold oz.	Copper %	Cobalt %
1	4.2	2.42	tr		
2	7.9	3.08	tr.		
3	6.4	2.06	none		
4	4.7	1.91	0.03		
5	6.5	1.10	none		
6	6.3	1.44	none		
7	5.5	0.50	0.02		
8	6.0	0.36	tr.		
9	7.1	0.31	none		
10	5.4	2.20	none		
11	4.1	5.70	tr.		
12	10.0	0.68	none		
13	4.4	2.12	none		
14	5.2	3.66	none		
15	8.7	2.37	tr.		
16	2.7	0.37	none		
A	6.5	1.80		0.56	0.09
B	3.5	0.28		1.51	0.03
C	9.0	3.63		0.76	0.16

Samples 1 to 16 from a private report by C. F. Tolman and Z. K. Melcon
Samples A–C by U.S. Geological Survey

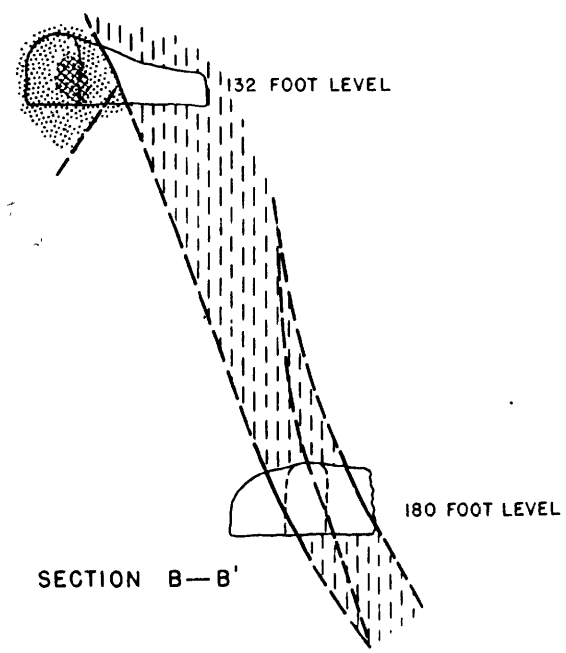
GEOLOGIC MAP AND SECTIONS
FRIDAY MINE
NEAR JULIAN

SAN DIEGO COUNTY, CALIFORNIA

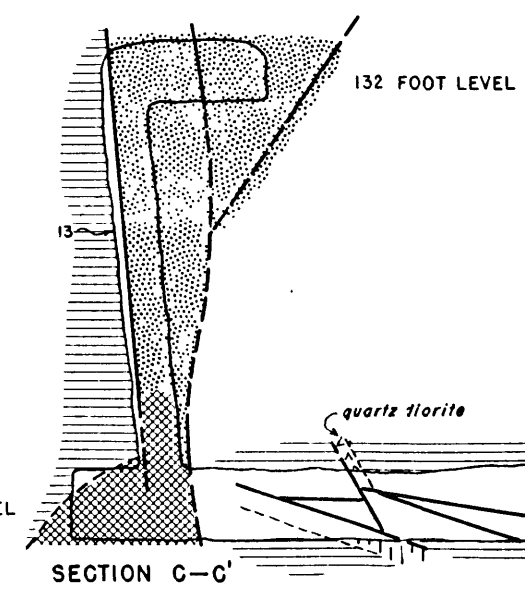
GEOLOGY BY S.C. CREASEY & R.M. HUTCHINSON
JUNE 1944



SECTION A—A'



SECTION B—B'

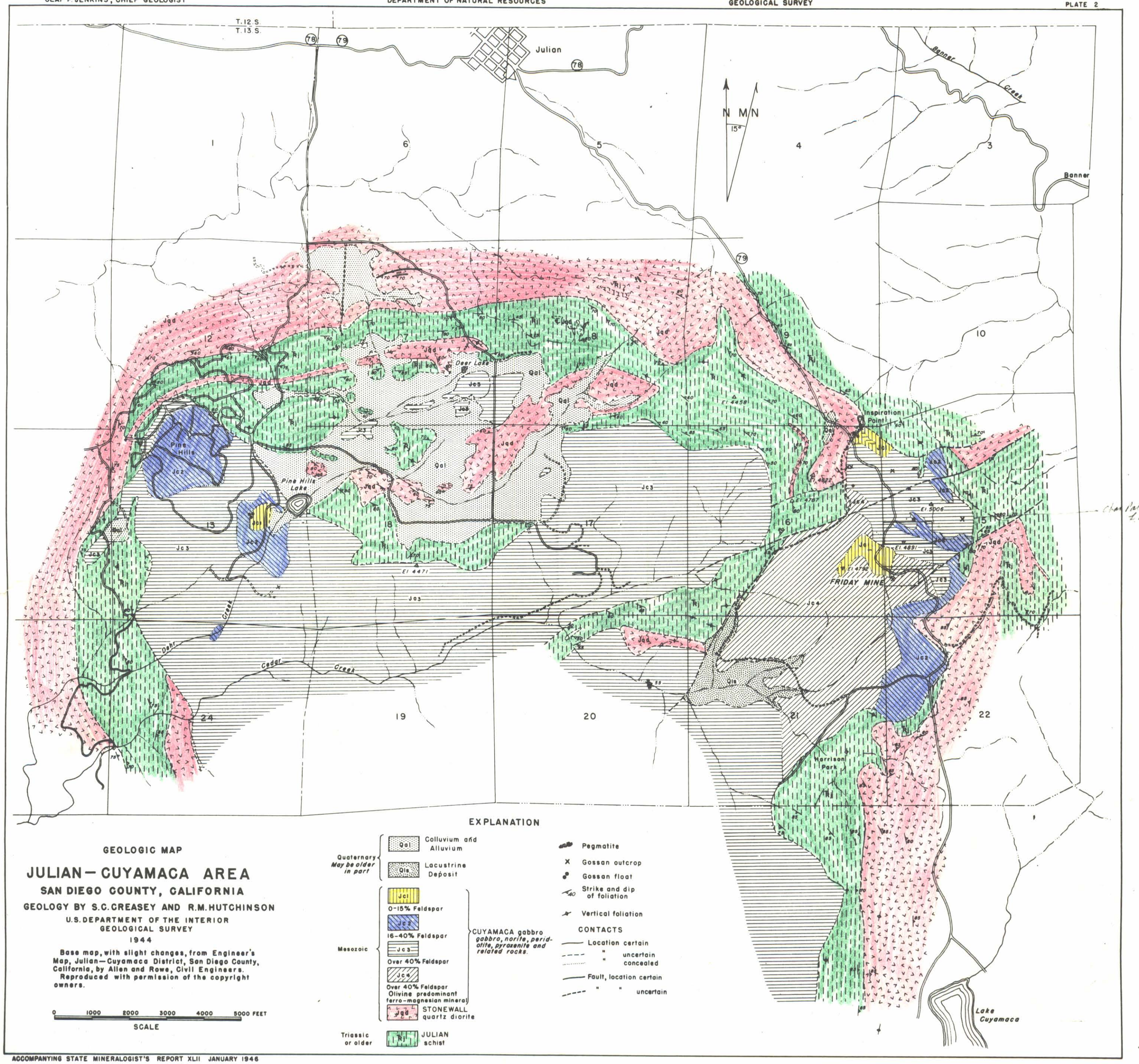


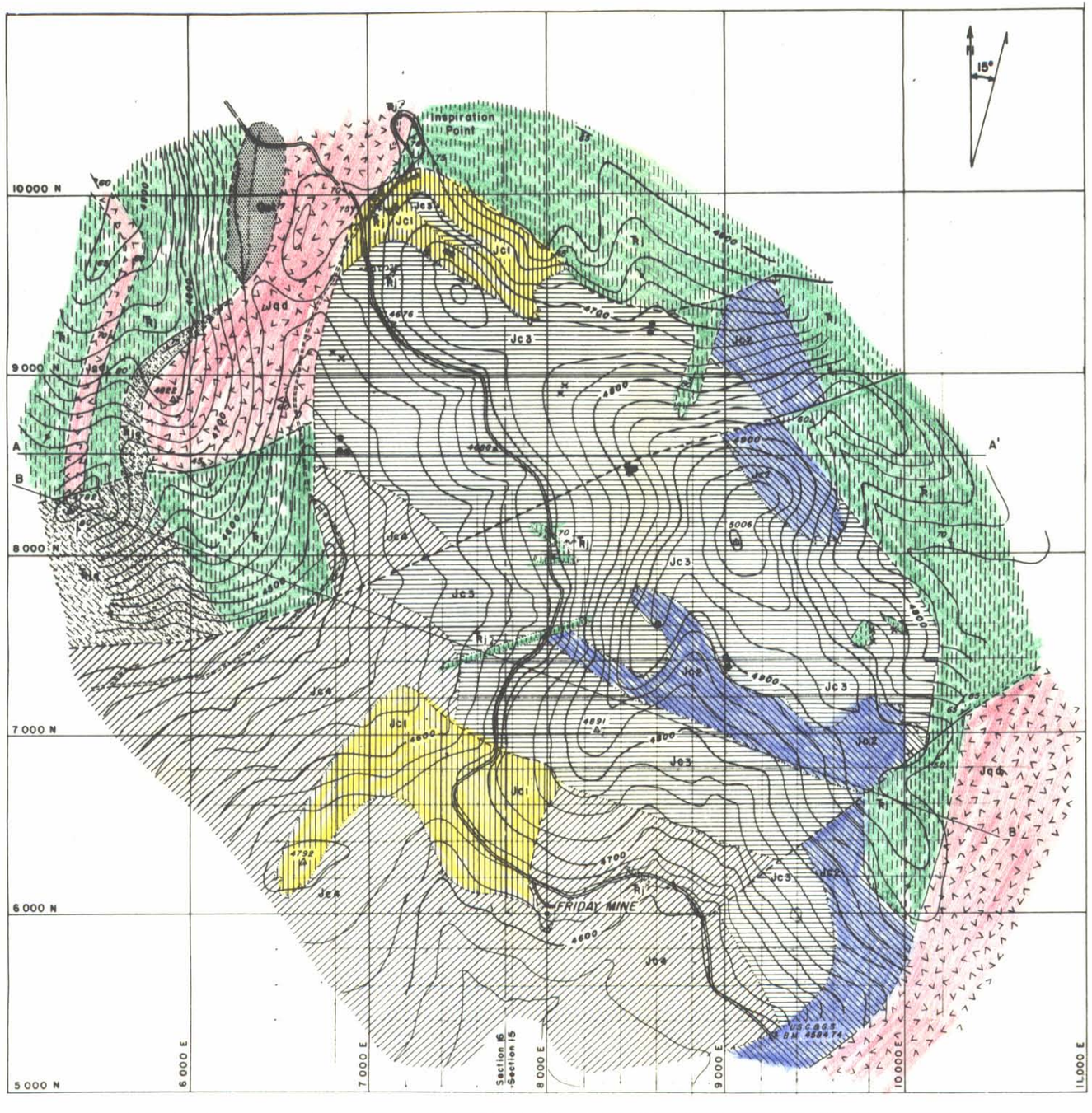
SECTION C—C'

EXPLANATION

- Cuyamaca gabbro
- Julian schist
- Sulphide mineralization
- Gossan from oxidation of sulphides
- Contact
- Fault or fracture

APPENDIX No. 2


T.12.S.
T.13.S.
Julian
Banner
Banner Creek
N M N
15°
Deer Lake
Pine Hills
Pine Hills Lake
Inspiration Point
FRIDAY MINE
Harrison Park
Lake Cuyamaca
Dehr Creek
Cedar Creek
Jc2
Jc3
Jc4
Jgd
Ri
Qal
Qls
EXPLANATION
Quaternary
May be older in part
Qal Colluvium and Alluvium
Qls Lacustrine Deposit
Mesozoic
Jc1 0-15% Feldspar
Jc2 16-40% Feldspar
Jc3 Over 40% Feldspar
Jc4 Over 40% Feldspar Olivine predominant ferro-magnesian mineral
CUYAMACA gabbro
gabbro, norite, peridotite, pyroxenite and related rocks.
Jgd STONEWALL quartz diorite
Triassic or older
Ri JULIAN schist
Pegmatite
Gossan outcrop
Gossan float
Strike and dip of foliation
Vertical foliation
CONTACTS
Location certain
" uncertain
" concealed
Fault, location certain
" " uncertain
GEOLOGIC MAP
JULIAN—CUYAMACA AREA
SAN DIEGO COUNTY, CALIFORNIA
GEOLOGY BY S.C. CREASEY AND R.M. HUTCHINSON
U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
1944
Base map, with slight changes, from Engineer's Map, Julian—Cuyamaca District, San Diego County, California, by Allen and Rowe, Civil Engineers.
Reproduced with permission of the copyright owners.
0 1000 2000 3000 4000 5000 FEET
SCALE



GEOLOGIC AND TOPOGRAPHIC MAP

FRIDAY MINE—INSPIRATION POINT AREA

NEAR JULIAN

SAN DIEGO COUNTY, CALIFORNIA

TOPOGRAPHY AND GEOLOGY BY
S.C. CREASEY AND R.M. HUTCHINSON
JUNE 1944

EXPLANATION

QUATERNARY	Qal (Qal)	Colluvium and alluvium.
MESOZOIC	Jc1 (Jc1) 0–15% feldspar; Jc2 (Jc2) 16–40% feldspar; Jc3 (Jc3) over 40% feldspar; Jc4 (Jc4) over 40% feldspar, olivine predominant ferromagnesian mineral.	Cuyamaca gabbro — gabbro, norite, diorite, peridotite, pyroxenite, and related rocks.
Jurassic	Jqd (Jqd)	Stonewall quartz diorite
Triassic or older	Rj (Rj)	Julian schist
"	Rjq (Rjq)	Julian quartzite
		Chlorite-talc rock
	xx	Gossan outcrop
		Gossan float
	70	Foliation strike and dip

CONTACTS

- Location certain
- " uncertain
- " concealed
- Fault, location certain
- " " uncertain

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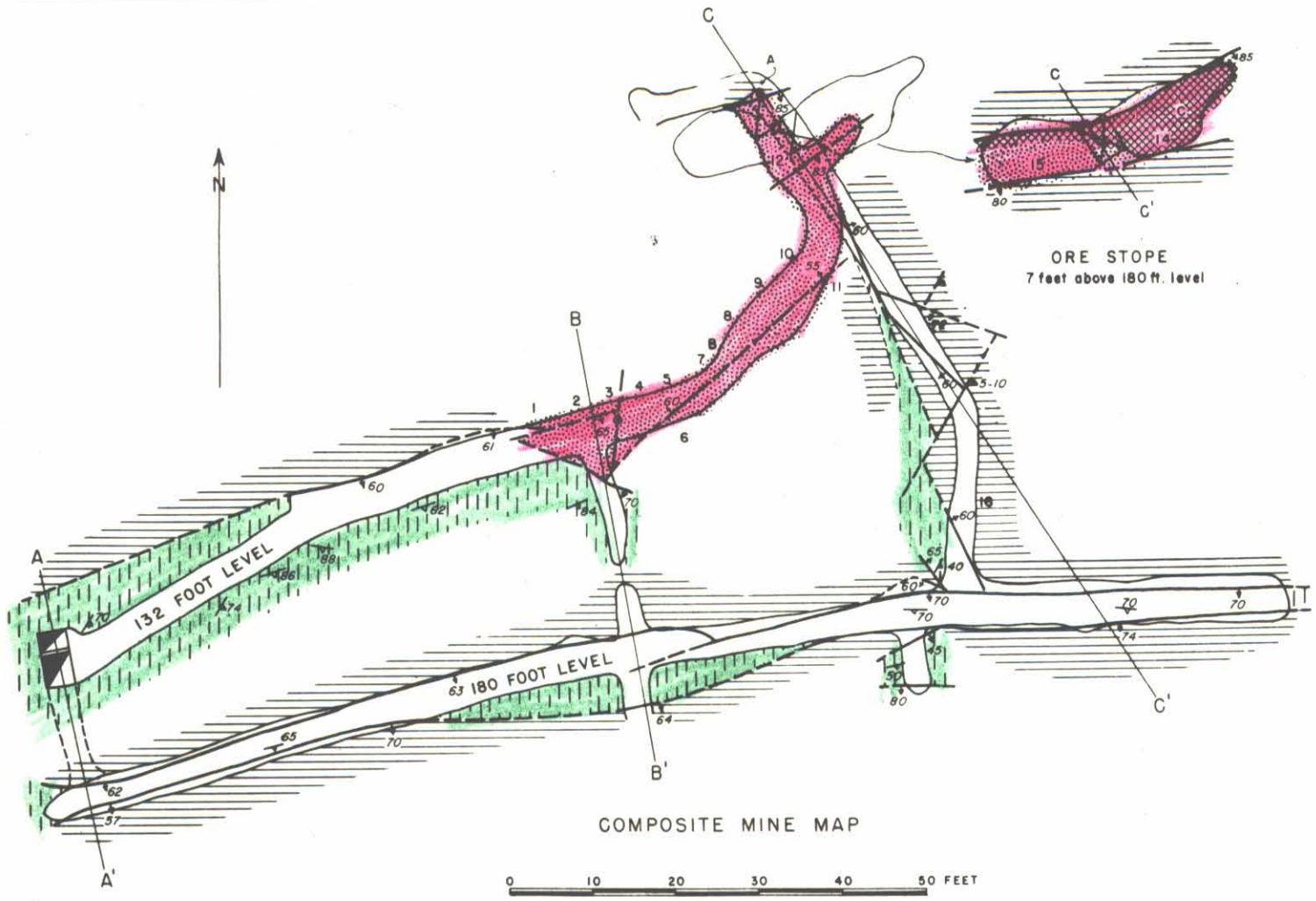


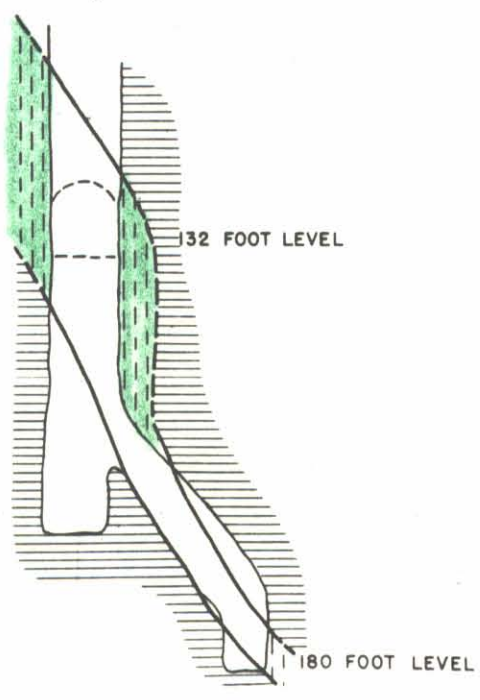
COMPOSITE MINE MAP

SAMPLE ASSAY DATA

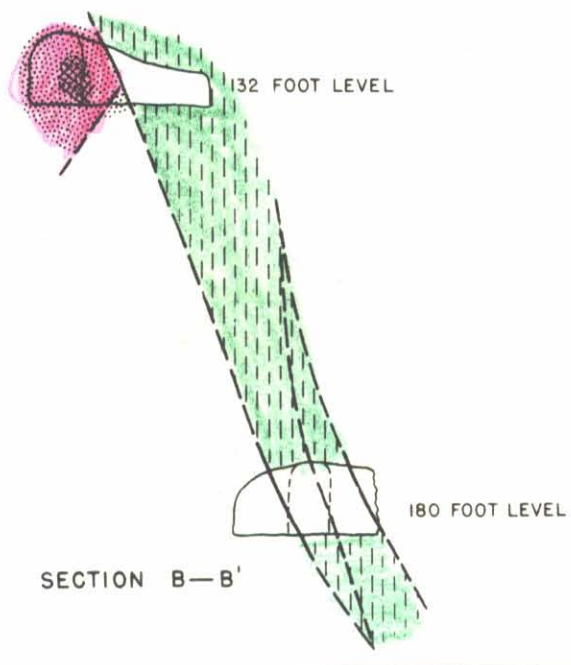
Sample Number	Width feet	Nickel %	Gold oz.	Copper %	Cobalt %
1	4.2	2.42	tr.		
2	7.9	3.08	tr.		
3	6.4	2.06	none		
4	4.7	1.91	0.03		
5	6.5	1.10	none		
6	6.3	1.44	none		
7	5.5	0.50	0.02		
8	6.0	0.36	tr.		
9	7.1	0.31	none		
10	5.4	2.20	none		
11	4.1	5.70	tr.		
12	10.0	0.68	none		
13	4.4	2.12	none		
14	5.2	3.66	none		
15	8.7	2.37	tr.		
16	2.7	0.37	none		
A	6.5	1.80		0.56	0.09
B	3.5	0.28		1.51	0.03
C	9.0	3.63		0.76	0.16

Samples 1 to 16 from a private report by C. F. Tolman and Z. K. Melcon
Samples A–C by U.S. Geological Survey

GEOLOGIC MAP AND SECTIONS
FRIDAY MINE
NEAR JULIAN
SAN DIEGO COUNTY, CALIFORNIA
GEOLOGY BY S.C. CREASEY & R.M. HUTCHINSON
JUNE 1944



SECTION A—A'



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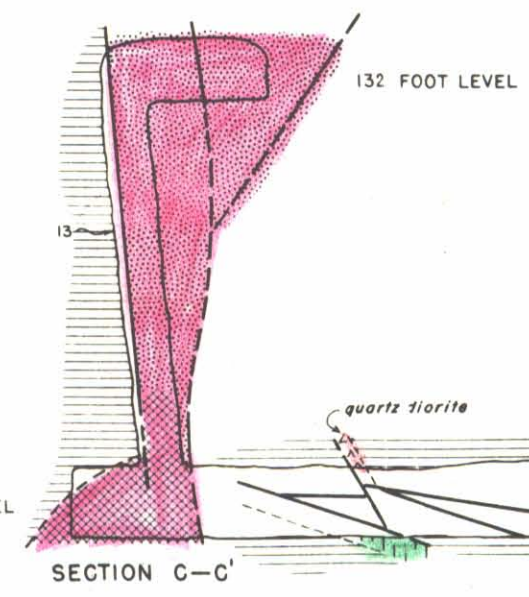


SECTION C—C'

EXPLANATION

- Cuyamaca gabbro
- Julian schist
- Sulphide mineralization
- Gossan from oxidation of sulphides
- Contact
- Fault or fracture

FRIDAY MINE

SAN DIEGO CO., CALIF.

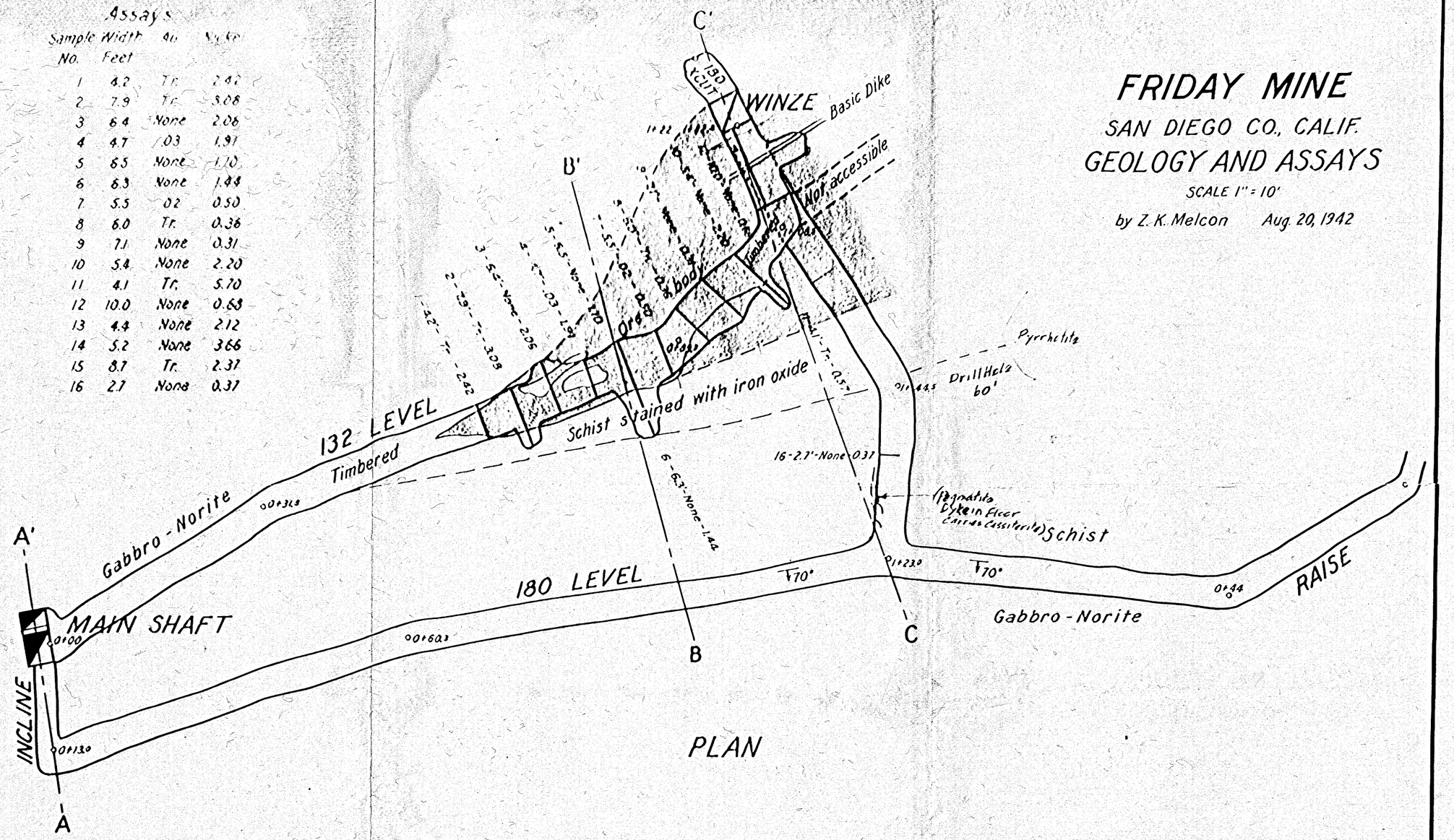
GEOLOGY AND ASSAYS

SCALE 1" = 10'

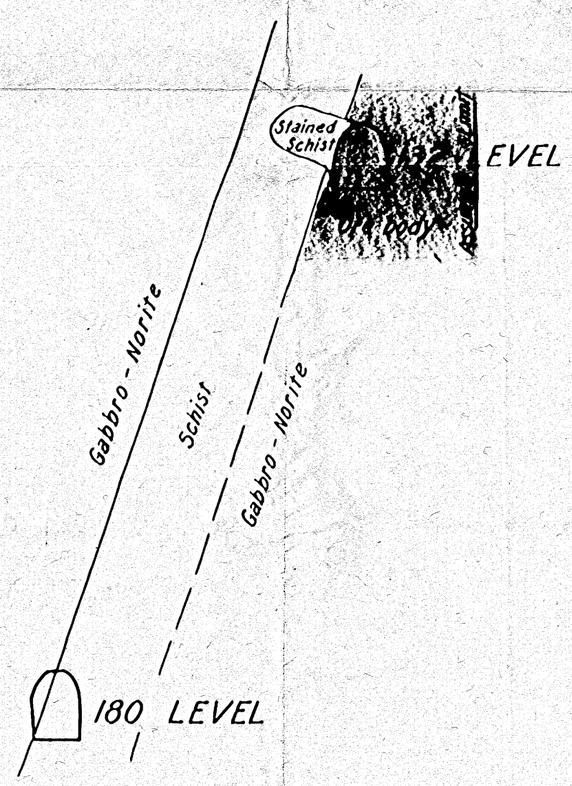
by Z. K. Melcon Aug. 20, 1942

Assays

Sample No.	Width Feet	Au	Value
1	4.2	Tr.	2.42
2	7.9	Tr.	3.08
3	6.4	None	2.06
4	4.7	.03	1.91
5	6.5	None	1.70
6	6.3	None	1.44
7	5.5	.02	0.50
8	6.0	Tr.	0.38
9	7.1	None	0.31
10	5.4	None	2.20
11	4.1	Tr.	5.70
12	10.0	None	0.68
13	4.4	None	2.12
14	5.2	None	3.66
15	8.7	Tr.	2.37
16	2.7	None	0.37



Section A-A'



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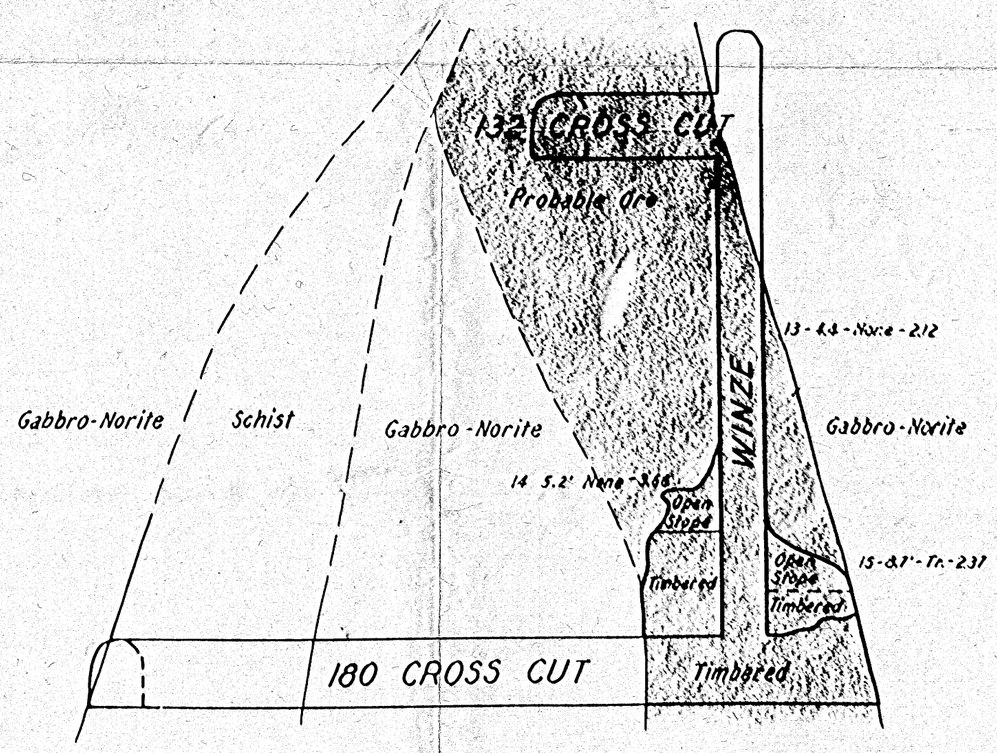
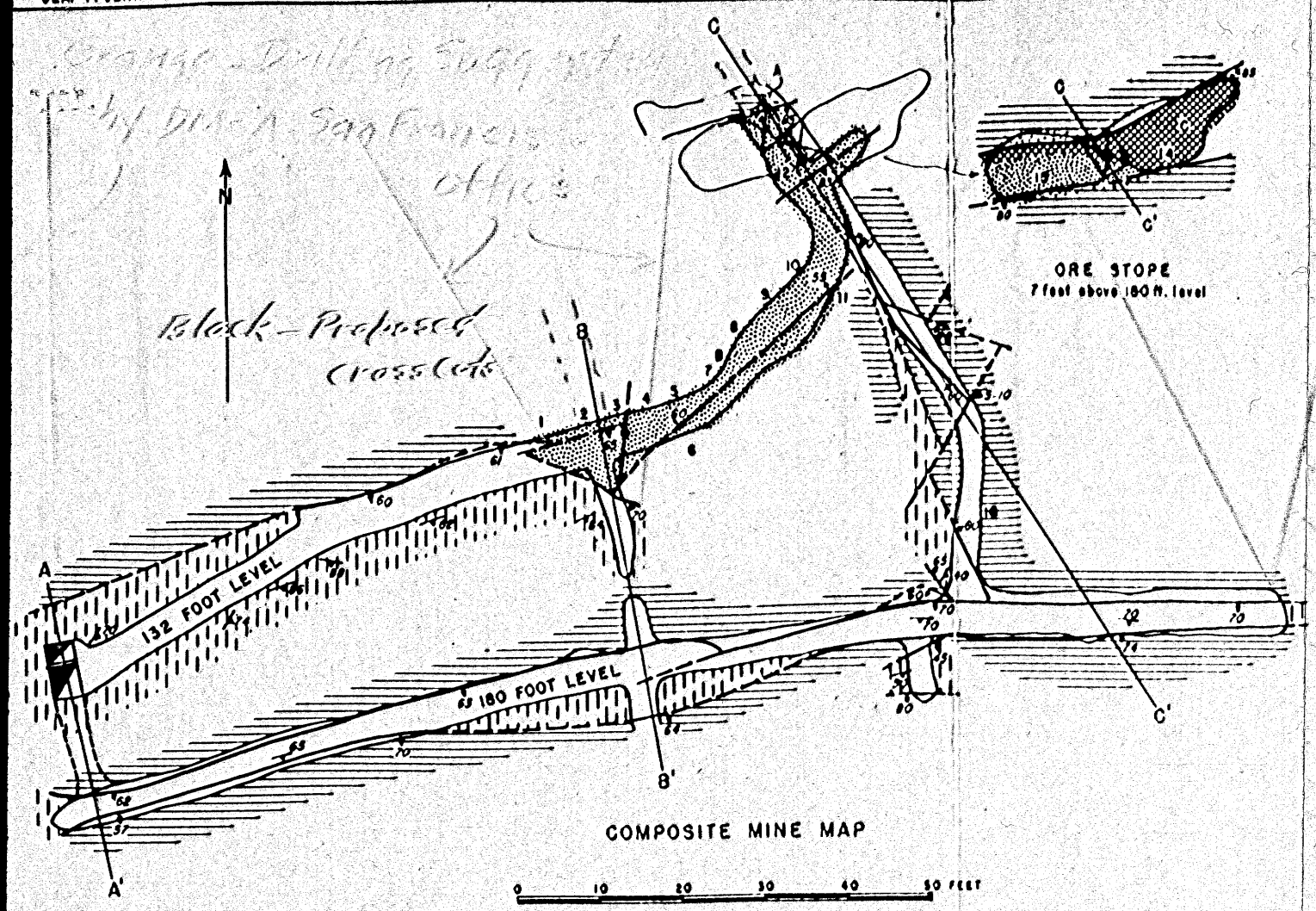


Section C-C'

MAP No. 2



COMPOSITE MINE MAP

SAMPLE ASSAY DATA

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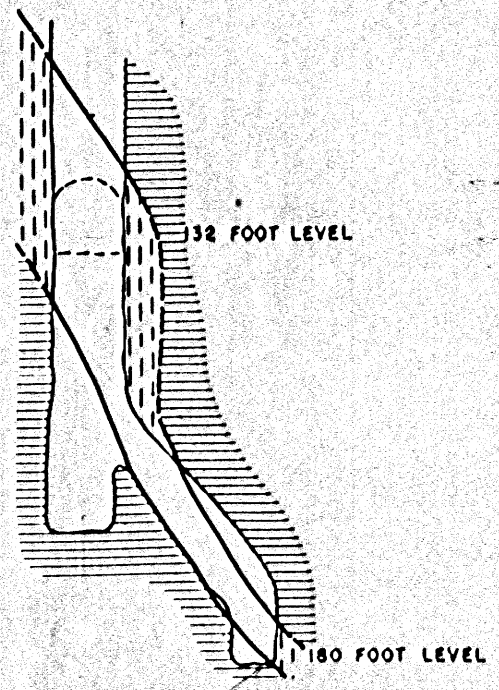
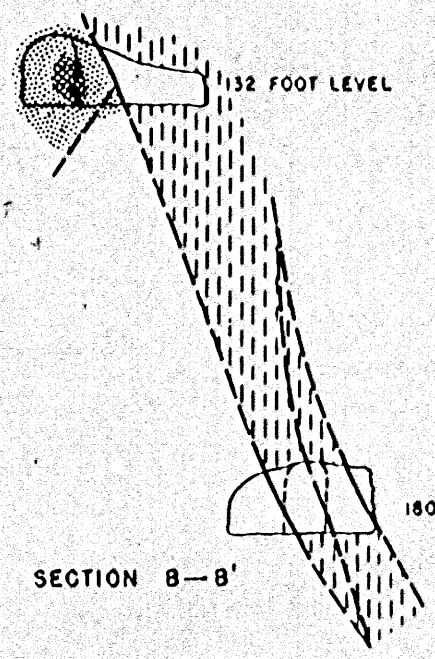
3	6.4	2.06	none		
4	4.7	1.91	0.03		
5	6.5	1.10	none		
6	6.3	1.44	none		
7	5.5	0.50	0.02		
8	6.0	0.36	tr.		
9	7.1	0.31	none		
10	5.4	2.20	none		
11	4.1	5.70	tr.		
12	10.0	0.68	none		
13	4.4	2.12	none		
14	5.2	3.66	none		
15	8.7	2.37	tr.		
16	2.7	0.37	none		
A	6.5	1.80		0.36	0.09
B	3.5	0.28		1.51	0.03
C	9.0	3.63		0.16	0.18

Samples 1 to 16 from a private report by C. F. Tolman and Z. K. Walcon
Samples A-C by U.S. Geological Survey

GEOLOGIC MAP AND SECTIONS
FRIDAY MINE
NEAR JULIAN
SAN DIEGO COUNTY, CALIFORNIA
GEOLOGY BY S.C. CREASEY & R.M. HUTCHINSON
JUNE 1944



SECTION A—A'



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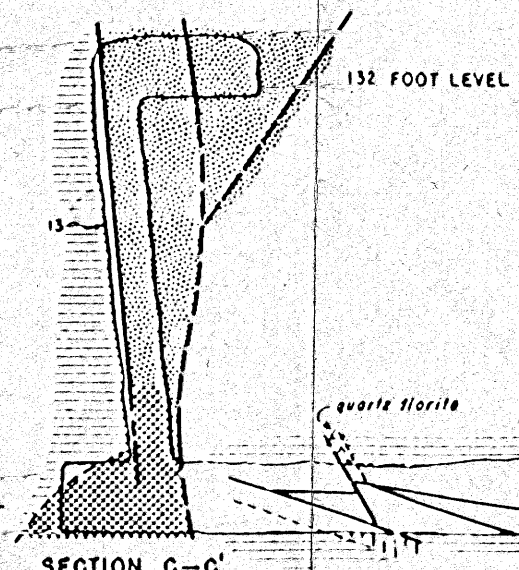

SECTION C—C'

EXPLANATION

- Cuyamaca gabbro
- Julian schist
- Sulphide mineralization
- Gossan from oxidation of sulphides
- Contact
- Fault or fracture

MAP No. 1