



CONTACT INFORMATION

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

The following file is part of the

Arizona Department of Mines and Mineral Resources Mining Collection

ACCESS STATEMENT

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

CONSTRAINTS STATEMENT

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

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

QUALITY STATEMENT

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

UNITED VERDE MINE

SELENIUM STUDY

Southwest Experiment Station
P. O. Box 4097
Tucson 5, Arizona

May 31, 1955

Through: J. H. East, Jr.
J. B. Clemmer

Mr. Clarence A. Fredell
Acting Director, Materials Div.
Emergency Procurement Service
General Services Administration
Washington 25, D. C.

Refer to: EDE

My dear Mr. Fredell:

In answer to your letter of May 19, regarding our report on the United Verde selenium samples, we sent copies of the analyses to Dr. Louis E. Reber and also to Mr. Charles R. Kuzell of Phelps Dodge Corporation on March 9, 1955. We also sent Dr. Reber and Mr. Kuzell copies of Mr. J. B. Clemmer's spectrographic analysis of nine samples of core which were selected at random from the samples. Copies of these analyses were sent by Mr. Clemmer to Messrs. Hedges and Sargent in the Bureau's Washington office, so you probably received a copy.

As already mentioned, we sent a copy of all analyses to Dr. Reber and also to Mr. Kuzell. However, we are enclosing an extra copy of the report for your use should you desire to send the analyses and descriptions to Dr. Reber, as mentioned in your letter.

Sincerely yours,

Cc - J. H. East, Jr.
J. B. Clemmer
421-1527
DF

Walter R. Storms
Superintendent
Southwest Experiment
Station

WRS/wrs

421/1527

GENERAL SERVICES ADMINISTRATION



Emergency Procurement Service
Washington 25, D. C.

May 19, 1955

In reply refer to: EDE

AIR MAIL

Mr. Walter R. Storms
Supervising Mining Engineer
U. S. Bureau of Mines
Tucson, Arizona

Re: United Verde Samples

Dear Mr. Storms:

Your very interesting report including the description and the analyses of the core samples that you got from Dr. Reber has been received.

Will you please tell us whether you have sent a copy of the analyses and descriptions to Dr. Reber, and if not could you let us have an extra copy.

Your assistance will be appreciated.

Sincerely yours,

Clarence A. Fredell
Acting Director
Materials Division

U. S. Bureau of Mines
Southwest Experiment Station
MAY 27 1955
Tucson, Arizona

Copy sent to;
East
Clearance 5-31-55

421 - United Verde
Selenium

GENERAL SERVICES ADMINISTRATION



Stearns

Emergency Procurement Service
Washington 25, D. C.

April 8, 1955

wrc

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

Dear Mr. East:

This is to acknowledge and thank you for a copy of the letter report prepared by Mr. Walter R. Stearns regarding the sampling of certain diamond drill cores at the United Verde Mine, Jerome, Arizona, for selenium content.

Sincerely yours,

Clarence A. Fredell
Chairman
Operating Committee

U. S. BUREAU OF MINES
APR 15 1955
TUCSON, ARIZONA



OFFICE OF
REGIONAL DIRECTOR

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

REGION III

224 NEW CUSTOMHOUSE
DENVER 2, COLORADO

April 5, 1955

Mr. Clarence A. Fredell
Chairman, Operating Committee
Emergency Procurement Service
General Services Administration
Washington 25, D. C.

REFER: EDE

Dear Mr. Fredell:

Reference is made to your letter dated January 26, regarding the sampling of certain diamond drill cores at the United Verde Mine, Jerome, Arizona, and securing information regarding the selenium content.

Attached are the original and one copy of a letter report prepared by Walter R. Storms regarding the sampling.

We will be glad to furnish you with any additional information you desire.

Very truly yours,

Original signed by
J. H. EAST, Jr.

J. H. East, Jr.
Regional Director

Enclosures

Copy to: J. H. Hedges (w/copy of report)
C. W. Merrill " " "
W. R. Storms
J. B. Clemmer
W. H. King

JHEast:ftm

U. S. BUREAU OF MINES

APR 6 1955
TUCSON, ARIZONA

421- United Verde
1527 Selenium

WRS

March 31, 1955

Dr. Louis E. Reber, Jr.
Phelps Dodge Corp.
Douglas, Ariz.

Dear Louis:

Enclosed you will find the five United Verde level maps which you loaned me sometime ago. Thanks very much for the use of these maps. Our draftsman traced them but we only showed the diamond drill holes which were sampled for selenium, omitting all other drill holes.

Our report on the selenium samples from the United Verde finally was mailed to our Denver office yesterday. I included all of the sample data that you gave me while I was in Jerome, so General Services Administration should get a pretty good picture.

With best regards, I am

Sincerely yours,

Walter R. Storms
Superintendent
Southwest Experiment Station

CC J. B. Clemmer
W. H. King
421/1527
DF

WRStorms:frj

March 21, 1955

Dr. Louis E. Reber, Jr.
Phelps Dodge Corp.
Douglas, Ariz.

Dear Louis:

Thanks for the United Verde maps which I received
yesterday. I will return them to you as soon as we have traced
them.

With best regares, I am

Sincerely yours,

Walter R. Storms
Superintendent
Southwest Experiment Station

CC J. B. Clemmer
W. H. King
421/1527
DF

WRStorms:frj

March 28, 1955

Memorandum

To : J. Bruce Clemmer, Chief, Division of Mineral
Technology, Region III

From : Superintendent, Southwest Experiment Station, Region III

Subject : Selenium samples, United Verde Branch, Phelps Dodge
Corp., Jerome, Ariz.

Thanks very much for the spectrographic analysis of the nine United Verde diamond drill core samples, which we received this morning. I will send a copy to Mr. Kuzell and one to Dr. Reber.

My final report on this project should be submitted this week. I wrote to Reber on March 9 and asked for his maps, but did not receive them until March 21, then only received one print of each level which was sampled. Our draftsman is tracing these prints and should be finished today or tomorrow.

I will send the report to Regional Director East, with a copy to you as you suggest in your memorandum of March 25.

Walter R. Storms

Walter R. Storms

CC J. H. East, Jr.
W. H. King
421/1527
DF

WRStorms:frj

March 28, 1955

Dr. Louis E. Reber, Jr.
Phelps Dodge Corp.
Douglas, Ariz.

Dear Louis:

Enclosed is a copy of the Chemical Laboratory Report from our Intermountain Experiment Station at Salt Lake City, which gives the results of spectrographic analysis of nine samples selected at random from the United Verde diamond drill core samples. I promised, in my letter to you of March 9, to send you these analyses as soon as they had been received.

Complete spectrographic analyses were made on these nine samples, but only the elements present were listed on the chemical report. Mercury was not found in any of the samples. Some samples showed a trace of indium, and all gave a trace of gallium.

Our draftsman has almost completed the job of tracing your United Verde level maps. When he finishes, I will return the maps to you.

With best regards, I am

Sincerely yours,

Walter R. Storms

Walter R. Storms
Superintendent
Southwest Experiment Station

CC Mr. C. R. Kuzell
Vice-President
Phelps Dodge Corp.
Douglas, Ariz.

CC J. H. East, Jr.
J. B. Clemmer
W. H. King

421/1527
DF



421 / 1527

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
1600 EAST FIRST SOUTH STREET
SALT LAKE CITY 1, UTAH

March 25, 1955

Memorandum

To: W. R. Storms, Tucson, Arizona

From: J. Bruce Clemmer, Salt Lake City, Utah

Subject: Selenium samples from United Verde Branch of Phelps Dodge Corp., Jerome, Ariz.

Herewith are three copies of our Chemical Laboratory Report showing the results of spectrographic analysis of nine samples selected from the 113 diamond drill core samples from the United Verde deposit.

As you have been handling the correspondence with Dr. Reber, I would suggest that you send him a copy of our analyses and also a copy to Mr. Kuzell.

Copies of the spectrographic reports are being sent to Messrs. Hedges and Sargent of our Washington office. They may wish to pass the information on to Mr. Fredell.

Although complete spectrographic analyses were made on the nine samples, only those elements present were listed on the report. As would be expected, copper, zinc, silver, lead, and iron were present. Mercury was not detected in any of the samples. Of the rarer elements, a trace of gallium was noted in all samples whereas three samples showed traces of indium. Nothing particularly significant is shown in the analysis of the higher selenium samples from Hole No. 11-U-1.

These results will add to information you already have regarding samples from this deposit and can be included in your report. Your report should be sent to Mr. East with a copy to this office.


Bruce Clemmer

Copy to: J. H. East, Jr. (w/o report)
J. H. Hedges (w/c report)
J. D. Sargent "

U. S. BUREAU OF MINES

MAR 23 1955
TUCSON, ARIZONA



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

1600 EAST FIRST SOUTH STREET
SALT LAKE CITY 1, UTAH

March 25, 1955

Memorandum

To: W. R. Storms, Tucson, Arizona

From: J. Bruce Clemmer, Salt Lake City, Utah

Subject: Selenium samples from United Verde Branch of Phelps Dodge Corp., Jerome, Ariz.

Herewith are three copies of our Chemical Laboratory Report showing the results of spectrographic analysis of nine samples selected from the 113 diamond drill core samples from the United Verde deposit.

As you have been handling the correspondence with Dr. Reber, I would suggest that you send him a copy of our analyses and also a copy to Mr. Kuzell.

Copies of the spectrographic reports are being sent to Messrs. Hedges and Sargent of our Washington office. They may wish to pass the information on to Mr. Fredell.

Although complete spectrographic analyses were made on the nine samples, only those elements present were listed on the report. As would be expected, copper, zinc, silver, lead, and iron were present. Mercury was not detected in any of the samples. Of the rarer elements, a trace of gallium was noted in all samples whereas three samples showed traces of indium. Nothing particularly significant is shown in the analysis of the higher selenium samples from Hole No. 11-U-1.

These results will add to information you already have regarding samples from this deposit and can be included in your report. Your report should be sent to Mr. East with a copy to this office.

J. Bruce Clemmer

Copy to: J. H. East, Jr. (w/o report)
J. H. Hedges (w/c report)
J. D. Sargent "

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
Salt Lake City, Utah

March 15, 1955

Results of Spectrographic Analysis, Diamond Drill Core Samples, United Verde Mine, Phelps Dodge Corp., Jerome, Ariz.

Description	Sample No.	Se ^{1/} /K		Cu	Ag	Mg	Ca	Zn	Al	Ga	In	Ti	Si	Sn	Pb	As	Mn	Fe	Co	Ni
United Verde 1200-Level plus 20 ft., Hole 16-K-7-0' to 20'	13201	.040	-	+	+	+	+	+	+	tr	-	+	+	-	-	-	+	+	tr	-
United Verde 3000-Level Hole 11-U-1-375' to 395'	13223	.042	-	+	+	+	+	+	+	tr	tr	+	+	tr	+	-	+	+	tr	-
United Verde 3000-Level Hole 11-U-1-395' to 416'	13224	.060	-	+	+	+	+	+	+	tr	tr	+	+	tr	+	-	+	+	tr	tr
United Verde 3000-Level Hole 11-U-1-475' to 490'	13225	.132	-	+	+	+	+	+	+	tr	-	+	+	tr	+	tr	+	+	-	-
United Verde 4500-Level Hole 7-U-4-76' to 106'	13242	.073	+	+	+	+	+	+	+	tr	tr	+	+	+	+	tr	+	+	tr	-
United Verde 3000-Level Haynes Hole UVX-17-72' to 92'	13262	.057	+	+	+	+	+	+	+	tr	-	+	+	tr	+	-	+	+	-	-
Equator Copper Chief Hole 9-22' to 40'	14508	.038	-	+	+	+	tr	+	+	tr	-	tr	+	tr	+	tr	+	+	-	-
United Verde 700-Level Hole 15-L-1 115' to 135'	14522	.038	-	+	+	+	+	+	+	tr	-	tr	+	tr	+	-	+	+	tr	-
United Verde 1200-Level Hole 16-N-2 0' to 20'	14546	.055	-	+	+	+	+	+	+	tr	-	+	+	-	+	-	+	+	-	-

1/ Chemical analysis previously reported

Remarks: + = present
- = absent
tr = trace

PHELPS DODGE CORPORATION

OFFICE OF GENERAL MANAGER

DOUGLAS, ARIZONA

March 19, 1955

WRS

Mr. W. R. Storms
U. S. Bureau of Mines
P. O. Box 4097
University Station
Tucson, Arizona

U. S. BUREAU OF MINES

MAR 21 1955
TUCSON, ARIZONA

Dear Rex:

When your letter asking about the U. V. maps reached me at Jerome I expected to be in Douglas within two or three days and, hence, did not take time to try to consult Mr. Kuzell by phone as I should have done. Then, with unexpected delays all along the line, including a couple of extra days on the road due to car trouble, it was a week before I got here.

Mr. Kuzell has approved letting you borrow the five maps showing the location of the samples, if you still want them. Since you are out of town and not accessible by phone, it seems best to send them along so that you will have them Monday, if still needed.

I believe that the selenium assay results will prove to be of some interest, but have not yet had a chance to check them carefully.

Very sincerely,

Louis

Louis E. Reber, Jr.

LER:S

Enc. 5

P.S. Thanks for the memo on clay separation. Will have some further questions in that connection later. L. E. R. Jr.

OVER

Re Selenium:—

Presume you will not show the reserve items if you have the maps copied. However, it might be worth while to consider having a few of them assayed — that is, those which are from close to and similar in character to those which gave the best results of those already run, as a further check on the distribution of values. (As for example 3000 level, 11-U-490 to 506 feet).

L. E. R. Jr.

XXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXX

March 16, 1955

Dr. Louis E. Reber, Jr.
Copper Queen Hotel
Bisbee, Arizona

Dear Louis:

As requested in your letter of March 7, regarding the separation of sand and clay, I am enclosing a short memorandum report by our Mr. Carl Rampacek, Supervising Metallurgist, which I hope will answer your question.

I hope you received the selenium analyses which I sent to you at Douglas.

With best regards, I am

Sincerely yours,

Cc - JBClemmer
Carl Rampacek
421/1527
DF

Walter R. Storms
Superintendent, South-
west Experiment Station

WRStorms/WRS

March 16, 1955

Memorandum

To: W.R. Storms
From: Carl Rampacek
Subject: Separation of clay from sand.

This has reference to your inquiry regarding method of separating clay from sand.

In commercial operations clay is separated from the undesirable sand and gangue by screening and sedimentation methods. Generally, the crude material is blunged vigorously with water to disintegrate and slake down the clay into slime thereby freeing it from the sand particles. The pulp is then screened at about 100 mesh to reject the coarser sand. The thin, screen undersize is treated with 2 to 4 pounds per ton of caustic soda and about 1 pound of dispersant such as sodium silicate or sodium hexameta phosphate (commercial calgon) in order to disperse the pulp. This slurry is then run into a number of concrete settling troughs in series. These troughs are usually about 7 feet wide by 30 feet long by 4-1/2 feet deep. Periodically the settled sands are pumped from the tanks and discarded while the tank overflow is pumped to large thickener tanks where the clay is flocculated by addition of alum to recover the clay.

From the brief description above it is evident that the sand-clay separation is a size elutriation operation since the clays usually slake down into particles of 2 to 5 microns or less in size whereas the bulk of the sand particles will be coarser than 5 microns.

In the laboratory we can separate sand and slime fractions of ore pulps by a sedimentation procedure that is similar to the commercial operation. The ore pulps containing about 500 grams of solids first are blunged vigorously to make certain that the slimes are thoroughly broken down after which the pulp is wet screened at about 100 or 200 mesh to reject the bulk of the sand. The screen undersize is then permitted to stand in a pan for a sufficient length of time to settle and thicken the solids and then the clear water is decanted off. It may take 15 minutes or several hours to accomplish this thickening step depending upon the type of pulp that is treated. After thickening, the solids are washed into a 3-liter beaker and the equivalent of several pounds per ton of caustic soda and one pound of calgon are added to the beaker in order to disperse the

solids; if calgon is not available several pounds of sodium silicate will usually give the dispersion. As a general rule the quantities of reagents given above will be sufficient to disperse the pulps but in the event lime has been added to the pulps at one time or another, considerably more of the reagents will be required. This is particularly true of copper flotation pulps where dehydrated lime has been used to adjust the pH.

When the dispersing agents have been added to the beaker, the pulp is diluted with soft or distilled water until the pulp column is 6.5 inches. This slurry is then stirred thoroughly with a glass rod after which it is permitted to stand for about 5 minutes to determine if it is dispersed. If dispersion has been obtained a distinct line between sand and slime will form at the bottom of the beaker and the pulp near the top of the beaker will be murky from the profusion of suspended solids. On the other hand, if the pulp has not been dispersed it will begin to settle with the liquor at the top of the beaker becoming clear while no definite sand line will form at the bottom of the beaker. In this event more dispersing reagents must be added and the procedure repeated until the proper pulp conditions are attained.

When dispersion has been obtained the pulp is again stirred thoroughly and permitted to settle for a predetermined length of time depending upon the size separation desired. The times required to settle 1, 2, 3, 4, 5, 10 and 20 micron particles of 2.3 specific gravity, which is about average for the clays, are given below.

<u>Size of separation, microns</u>	<u>Settling time</u>
1	51 hours
2	12.5 hours
3	5 hours 40 minutes
4	3 hours 11 minutes
5	2 hours 2 minutes
10	30.5 minutes
20	7.5 minutes

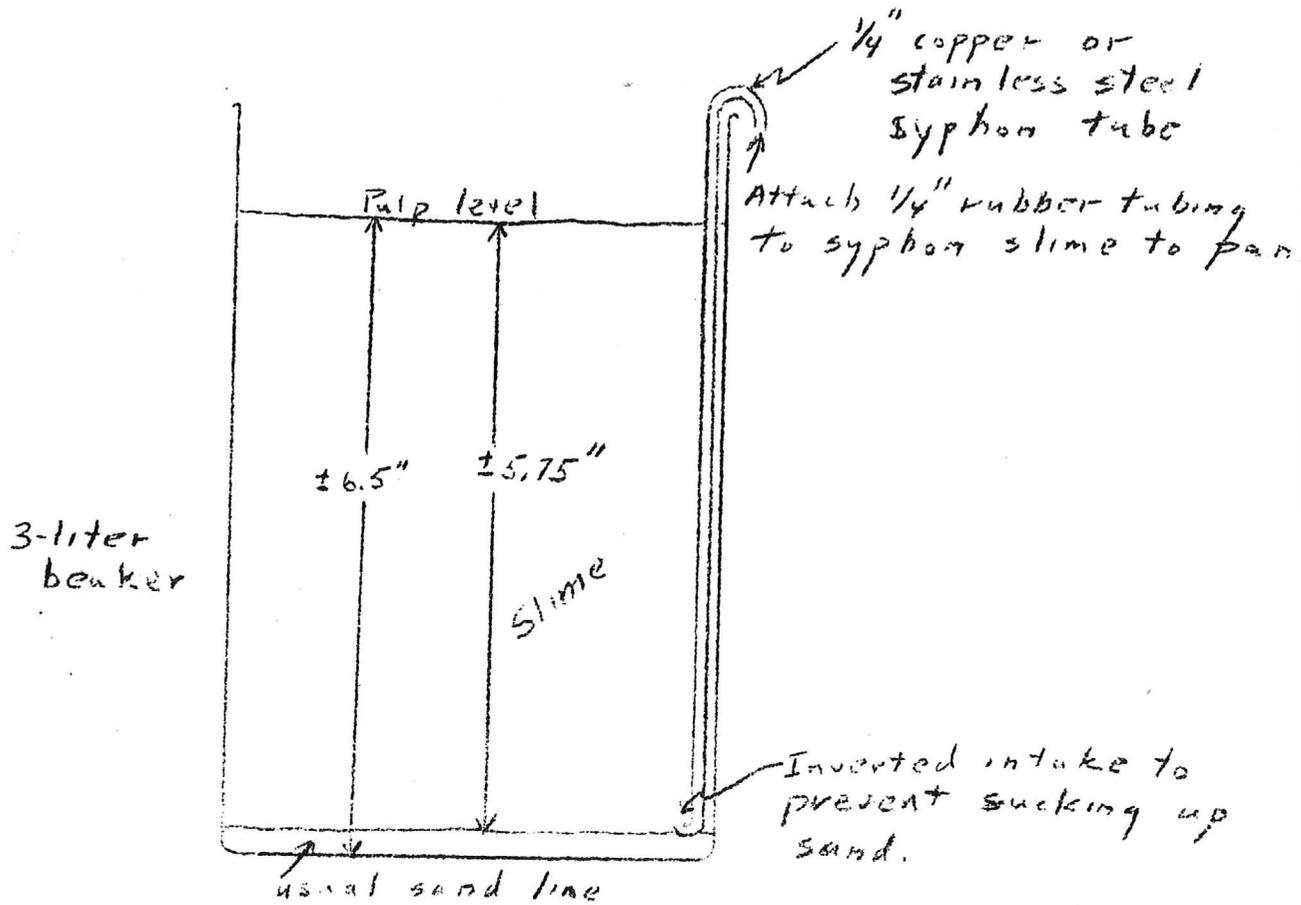
After settling for the required length of time the suspended slimes are syphoned from the beaker by means of an inverted syphon and then flocculated by addition of alum. Repeating this operation at least twice for each particle size separation usually recovers substantially all of the material finer than that size. Thus, if several different fractions are desired such as a 5 and 10 micron split, the pulp should be settled for 2 hours and 2 minutes followed by syphoning-off the slime. Fresh water and more reagent should then be added to the beaker to bring the level up to the 6.5-inch mark and after stirring it should again be settled for 2 hours and

2 minutes and then syphoned off. The sand can then be repulped with more water and reagent and settled for 30.5 minutes before syphoning to recover material coarser than 5 microns and finer than 10 microns.

A sketch of the beaker and syphon arrangement used in our test work are given on the attached sheet.

Carl Raszpcek

cc: WRStorns ✓



Siphon arrangement for desliming ores

March 9, 1955

Memorandum

To : J. Bruce Clemmer, Chief of the Division of
Mineral Technology, Region III

From : Superintendent, Southwest Exp. Station, Region III

Subject : Selenium samples from the United Verde Branch
of Phelps Dodge Corp.

Thanks very much for the selenium analyses which were received this morning. I have forwarded a copy to Mr. Kuzell and one to Dr. Reber. As you will note from my attached letter to Reber, I will try to obtain copies of their level maps, then will send you a more detailed report on these samples.

Walter R. Storms

Walter R. Storms

CC J. H. East, Jr.
W. H. King
421
DF

WRStorms:frj

March 9, 1955

Dr. Louis E. Reber, Jr.
Phelps Dodge Corp.
Douglas, Ariz.

Dear Louis:

Your letter of March 7 and the selenium assays from Salt Lake City both arrived this morning. I am enclosing a copy of the assays and also am sending a copy to Charlie Kuzell. As you will note, most of the selenium assays aren't very interesting although some selenium does show up in the 3,000 level 11-U-1 Hole. Also no particular correlation seems to exist between the selenium and copper contents.

Mr. J. Bruce Clemmer, Chief of our Division of Mineral Technology, and also Superintendent of our Intermountain Experiment Station in Salt Lake City, who sent me the assays for transmittal to Mr. Kuzell and you, says in his memorandum to me that they will make spectrographic analyses of the three 11-U-1 hole samples and on several others selected at random to try to determine the selenium mineral. I will forward these spectrographic analyses to Mr. Kuzell and you as soon as I receive them,

Mr. Clemmer has asked for a more detailed report from me about these samples, so as you suggest, I will send him a more detailed description of the samples from the data that you supplied me. If possible, Mr. Clemmer also would like to have level maps to show the hole locations. I believe you had 100-scale level maps showing these holes. If it were possible to borrow them, I could have our draftsman here make tracings of these maps, then return the originals to you. Mr. Clemmer wants this information so he can make a more detailed report to General Services Administration in Washington, D. C. From the low grade of the selenium samples, it might be that such a report would complete the investigation as far as the Government is concerned.

With best regards, I am

Sincerely yours,

Walter R. Storms, Superintendent
Southwest Exp. Station, Region III

CC Mr. Charles R. Kuzell
Vice-President
Phelps Dodge Corp.
Douglas, Ariz.

East, King,
Clemmer, 421 ✓ DF

P.S. I will write you later regarding your request for information about the possibility of separating sand and clay.

W.R.S.

PHELPS DODGE CORPORATION

UNITED VERDE BRANCH, MINES DIVISION

JEROME, ARIZONA

March 7, 1955

WRS

Mr. W. R. Storms,
Southwest Experiment Station,
U. S. Bureau of Mines,
Tucson, Arizona.

Dear Rex:

The brief general explanation which I sent you was primarily for the purpose of showing just how the descriptions and the original core assays, which are really part of the descriptions, fit into the picture.

We are reconciled to the necessity of going into the matter further should the selenium assays show any hint of anything which might be of present economic interest, but we deem that an extremely remote possibility. On the other hand, it is believed very probable that the assays will show enough selenium content and enough range in selenium content to permit them to throw some very interesting light on the occurrence, distribution and favored associations of the selenium in the United Verde deposit. Such data hinges entirely on the classification of the samples on the basis of the descriptions and we have assumed that Mr. Gumbel and associates or perhaps some Bureau of Mines selenium expert would expect to have any such data as can be gleaned from the assay results and would deem it of real value, even if the results are entirely negative so far as present economic possibilities are concerned. For this reason I believe that both the descriptions and the explanatory page should accompany the assay results through the hands of all interested parties. It is believed that this should make the picture reasonably self-explanatory and thus minimize the chances for any call for further explanation. Only a very unexpected degree of interest in the general (non-economic) results or some hint of commercial possibilities should need to bring the maps into the picture.

I am sorry if this proves to be a little late, but I have been in touch with Mr. Kuzell by phone and presume that he would have told me if the selenium assays had arrived.

Although there does not seem to be any very plausible alternative to having the "reserve" samples shipped back to Jerome, I believe that

U. S. BUREAU OF MINES

MAR 9 1955
TUCSON, ARIZONA

Mr. W. R. Storms,
March 7, 1955,
Page No. 2.

it would be preferable for you to keep them for the time being, if they are not too much in the way.

Very sincerely,

Louis

Louis E. Reber, Jr.

P. S. I would appreciate it very much if you or your metallurgist could give me some information about the possibility of separating sand and clay, perhaps very roughly, but on a moderately large scale; that is, to take soil or alluvium or any sort of clayey sand or silt and get a product at least relatively high in Al_2O_3 . My next address will be care of Phelps Dodge, Douglas or Copper Queen Hotel, Bisbee. *Either will serve.*

L.E.R. Jr.

LER, Jr./lmw



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
1600 EAST FIRST SOUTH STREET
SALT LAKE CITY 1, UTAH

March 7, 1955

U. S. BUREAU OF MINES
MAR 9 1955
TUCSON, ARIZONA

Memorandum

To: W. R. Storms, Tucson, Arizona

From: J. Bruce Glemmer, Salt Lake City, Utah

Subject: Selenium samples from United Verde Branch of Phelps Dodge Corp., Jerome, Ariz.

Herewith are three copies of our Chemical Laboratory Report showing the selenium and copper assays on the 113 diamond drill core samples from the United Verde deposit.

As you have been handling the correspondence with Dr. Reber, I would suggest that you send him a copy of our analyses and a copy also to Mr. Kuzell, who has been very helpful in the past in sending us samples from their other properties.

Copies of the assay reports and of Dr. Reber's statement regarding the position of the Phelps Dodge Corporation in relation to these selenium samples are being sent to Messrs. Hedges and Sargent of our Washington office. They may wish to discuss the assays with Mr. Fredell so that he will be informed that the work is in progress.

You will note that the selenium content of the samples ranges from less than 0.002 to 0.132 percent Se, with an arithmetical average of 0.018 percent Se. No particular correlation appears to exist between the copper and selenium contents of these various samples. Assays for other constituents and a careful microscopic examination would be required to determine the selenium mineralization. The high selenium content of the samples from Hole No. 11-U-1, ranging from 0.042 to 0.132 percent Se are of particular interest. We will make spectrographic analyses on these three samples and on several others selected at random from the group. These may give us some clue as to the selenium mineralization. We will send you copies of our

spectrographic analyses to forward to Dr. Reber and Mr. Kuzell. They should be of interest to Phelps Dodge if they do not have such information available on the United Verde deposit. Charlie Kuzell always asks for a spectrographic analysis when submitting samples from their properties.

You mention in your memorandum of February 28, that you have a more complete description of the samples. As this work was done at the request of Messrs. Fredell, Hedges, and Thayer of the operating committee, you should prepare a brief report with such information as you have available on the location of the drill holes, together with such other data as you have available on the samples. If you can obtain level maps from Dr. Reber, it would be interesting to spot the drill holes to see if the better grade selenium samples are from the same general area. Some of the drill holes cut very good grade copper ore, but they are meaningless without a location map. If you can obtain level maps from Dr. Reber, it would add materially to your report.


J. Bruce Clemmer

Copy to: J. H. Hedges (w/c of assay report)
J. H. East, Jr. (w/o assay report)
J. D. Sargent (w/c of assay report)
W. H. King (w/o assay report)



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
1600 EAST FIRST SOUTH STREET
SALT LAKE CITY 1, UTAH

March 7, 1955

Memorandum

To: W. R. Storms, Tucson, Arizona

From: J. Bruce Clemmer, Salt Lake City, Utah

**Subject: Selenium samples from United Verde Branch of
Phelps Dodge Corp., Jerome, Ariz.**

Herewith are three copies of our Chemical Laboratory Report showing the selenium and copper assays on the 113 diamond drill core samples from the United Verde deposit.

As you have been handling the correspondence with Dr. Reber, I would suggest that you send him a copy of our analyses and a copy also to Mr. Kuzell, who has been very helpful in the past in sending us samples from their other properties.

Copies of the assay reports and of Dr. Reber's statement regarding the position of the Phelps Dodge Corporation in relation to these selenium samples are being sent to Messrs. Hedges and Sargent of our Washington office. They may wish to discuss the assays with Mr. Fredell so that he will be informed that the work is in progress.

You will note that the selenium content of the samples ranges from less than 0.002 to 0.132 percent Se, with an arithmetical average of 0.018 percent Se. No particular correlation appears to exist between the copper and selenium contents of these various samples. Assays for other constituents and a careful microscopic examination would be required to determine the selenium mineralization. The high selenium content of the samples from Hole No. 11-U-1, ranging from 0.042 to 0.132 percent Se are of particular interest. We will make spectrographic analyses on these three samples and on several others selected at random from the group. These may give us some clue as to the selenium mineralization. We will send you copies of our

spectrographic analyses to forward to Dr. Reber and Mr. Kuzell. They should be of interest to Phelps Dodge if they do not have such information available on the United Verde deposit. Charlie Kuzell always asks for a spectrographic analysis when submitting samples from their properties.

You mention in your memorandum of February 28, that you have a more complete description of the samples. As this work was done at the request of Messrs. Fredell, Hedges, and Thayer of the operating committee, you should prepare a brief report with such information as you have available on the location of the drill holes, together with such other data as you have available on the samples. If you can obtain level maps from Dr. Reber, it would be interesting to spot the drill holes to see if the better grade selenium samples are from the same general area. Some of the drill holes cut very good grade copper ore, but they are meaningless without a location map. If you can obtain level maps from Dr. Reber, it would add materially to your report.

J. Bruce Clemmer

Copy to: J. H. Hedges (w/c of assay report)
J. H. East, Jr. (w/o assay report)
J. D. Sargent (w/c of assay report)
W. H. King (w/o assay report)

6-308
(March 1941)

UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF MINES
Salt Lake City, Utah

No. 1

Report to Mr. Walter R. Storms

Chemical Laboratory Report

Date received February 23, 1955

Sample 1418

Date reported March 3, 1955

Serial No.	DESCRIPTION	IR No.	%	Se	Cu								
	Diamond Drill Core Samples United Verde Mine Phelps Dodge Corp. Jerome, Arizona												
	United Verde 1200-Level plus 20 ft.												
41916	Hole No. 16-K-7 - 0' to 20'	13201		0.040	1.35				0.80 lb.	@ \$6	=	\$4.80	
41917	" " 20' " 28'	202		0.038	1.00				0.76 lb.	@ \$6	=	4.56	
41918	" " 28' " 33.5'	203		0.027	0.15				0.54		=	3.24	
	United Verde 3000-Level												
41919	Hole No. 6-T-1 - 0' to 30'	13204		0.008	1.40								
41920	" " 30' " 60'	205		0.003	0.35								
41921	" 7-U-1 - 0' to 35'	206		0.034	1.20				0.65 lb.	=	\$4.08		
41922	" " 35' " 75'	207		0.031	2.95				0.62	=	3.72		
41923	" " 75' " 115'	208		0.003	0.05								
41924	" 7-U-4 0' " 19'	209		0.074	10.8				1.48 lb.	=	\$8.88		
41925	" " 19' " 23.5'	13210		0.012	3.15								
41926	" 8-V-2 30' " 50'	211		<0.002	0.20								
41927	" 9-V-11 0' " 15'	212		0.027	13.5								

Signed Heber E. Peterson

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
Salt Lake City, Utah

No. 2

Report to Mr. Walter R. Storms

Chemical Laboratory Report

Date received February 23, 1955

Sample 1418

Date reported March 3, 1955

Serial No.	DESCRIPTION	XXX No.	%	Se	Cu								
	Diamond Drill Hole Samples United Verde 3000-Level												
41928	Hole No. 9-V-11 - 16' to 48'	13213		0.011	0.75								
41929	" " 48' " 68'	214		0.036	13.9								
41930	" " 68' " 89'	215		0.018	3.40								
41931	" " 89' " 113'	216		0.033	12.1								
41932	" 10-W-4 58' " 78'	217		0.008	1.35								
41933	" " 101' " 120'	218		0.011	2.00								
41934	" " 129' " 144'	219		0.019	2.50								
41935	" 10-X-2 104.5- 135'	13220		0.025	0.80								
41936	" " 175' " 186'	221		0.014	0.25								
41937	" " 186' " 210'	222		0.002	0.10								
41938	" 11-U-1 375' " 395'	223		0.042	6.4								
41939	" " 395' " 416'	224		0.060	4.10								
41940	" " 475' " 490'	225		0.132	0.75								
41941	" 11-W-1 0' " 20'	226		0.027	2.20								
41942	" " 20' " 47'	227		0.017	5.35								

Signed Heber E. Peterson

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
Salt Lake City, Utah

No. 3

Report to Mr. Walter R. Storms

Chemical Laboratory Report

Date received February 23, 1955

Sample 1418

Date reported March 3, 1955

Serial No.	DESCRIPTION	Tag No.	%	Fe	Cu								
Diamond Drill Hole Samples													
United Verde 3000-Level													
41943	Hole No. 11-W-1 - 47' to 70'	13228		0.012	2.55								
41944	" " 70' " 96.5'	229		0.008	3.05								
41945	" 12-W-4 92.5'-108'	13230		0.033	1.05								
41946	" " 108' - 110.5'	231		0.025	0.30								
41947	" " 200' " 220'	232		<0.002	0.10								
41948	" " 220' " 235'	233		0.006	0.20								
41949	" 13-W-4 165' " 180'	234		0.014	0.15								
41950	" " 180' " 195'	235		0.039	0.10								
41951	" 16-U-3 0' " 25'	236		<0.002	0.10								
41952	" " 25' " 53'	237		0.015	4.75								
41953	" 5-Q-1 0' " 23'	238		0.008	2.00								
41954	" " 23' " 50'	239		<0.002	0.10								
41955	" " 85' " 114'	13240		0.038	4.75								
United Verde 4500-Level													
41956	Hole No. 6-S-3 140' to 175'	13241		0.011	5.00								

Signed Heber E. Peterson

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
Salt Lake City, Utah

No. 4Report to Mr. Walter R. Storms

Chemical Laboratory Report

Date received February 23, 1955Sample 1418Date reported March 3, 1955

Serial No.	DESCRIPTION	Int. No.	%	Se	Cu								
	Diamond Drill Hole Samples United Verde 4500-Level												
41957	Hole No. 7-U-4 - 76' to 106'	13242		0.073	1.85								
41958	" 9-2E-1 69' " 89'	243		0.010	4.7								
41959	" " 116' " 129'	244		0.015	1.35								
41960	" " 131' " 140'	245		0.006	0.50								
41961	" " 144' " 159'	246		0.009	3.8								
41962	" 9-2E-3 90' " 110'	247		0.003	1.35								
41963	" " 110' " 134'	248		0.021	0.75								
41964	" " 134' " 156'	249		0.002	0.20								
41965	" " 156' " 167'	13250		0.025	3.90								
41966	" 9-2E-4 74' " 107'	251		0.014	8.55								
41967	" " 111' " 131'	252		0.003	0.30								
41968	" 9-2E-1 0' " 18'	253		0.014	1.85								
41969	" " 18' " 31'	254		0.012	4.00								
41970	" 9-2E-3 0' " 49'	255		0.012	1.20								
41971	" " 49' " 71'	256		0.029	1.50								

Signed Heber E. Peterson

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
Salt Lake City, Utah

No. 5

Report to Mr. Walter R. Storms

Chemical Laboratory Report

Date received February 23, 1955

Sample 1418

Date reported March 3, 1955

Serial No.	DESCRIPTION	Lot No.	%	Se	Cu								
	Diamond Drill Hole Samples United Verde 4500-Level												
41972	Hole No. 9-20-3 - 71' to 93'	13257		0.009	4.50								
	United Verde 3000-Level Haynes												
41973	Hole No. UVX-4 - 180' to 198'	13258		0.013	0.30								
41974	" " 198' " 202'	259		0.009	0.35								
41975	" UVX-6 105' " 140'	13260		0.002	0.06								
41976	" UVX-7 230' " 245'	261		0.009	0.20								
41977	" UVX-17 72' " 92'	262		0.057	0.35								
41978	" " 92' " 122'	263		0.046	0.10								
41979	" 97-2-2 430' " 434'	264		0.009	0.40								
41980	" " 434' " 436'	265		0.002	0.10								
41981	" 97-2-3 457' " 459'	266		0.031	5.05								
41982	" " 459' " 480'	267		0.003	1.10								
41983	" " 480' " 500'	268		0.002	0.25								
41984	" " 500' " 510'	269		<0.002	0.07								

Signed Heber E. Peterson

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
Salt Lake City, Utah

No. 6Report to Mr. Walter R. Storms

Chemical Laboratory Report

Date received February 23, 1955Sample 1418Date reported March 3, 1955

Serial No.	DESCRIPTION	XX No.	%	Se	Cu								
	Equator-Copper Chief Diamond Drill Hole Samples												
41985	Hole No. 9 - 0' to 22'	14507		0.008	1.70								
41986	" " 22' " 40'	508		0.038	2.25								
41987	" 10 23' " 47'	509		<0.002	0.80								
41988	" 11 0' " 25'	14510		0.008	0.75								
41989	" " 29' " 47'	511		0.007	0.40								
41990	" 17 0' " 18'	512		<0.002	0.47								
41991	" 18 0' " 17'	513		<0.002	0.18								
41992	" " 17' " 41'	514		<0.002	0.81								
41993	" 23 54' " 68'	515		0.007	3.34								
	United Verde 700-Level Diamond Drill Hole Samples												
41994	Hole No. 14-K-4 - 0' to 20'	14516		<0.002	0.31								
41995	" " 20' " 40'	517		0.013	1.89								
41996	" " 40' " 65'	518		0.020	5.53								
41997	" 15-L-1 55' " 74'	519		0.036	0.24								
41998	" " 74' " 95'	14520		0.031	0.21								

Signed Heber E. Peterson

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
Salt Lake City, Utah

No. 7

Report to Mr. Walter R. Storms

Chemical Laboratory Report

Date received February 23, 1955

Sample 1418

Date reported March 3, 1955

Serial No.	DESCRIPTION	Box No.	%	Se	Cu								
	United Verde 700-Level Diamond Drill Hole Samples												
41999	Hole No. 15-L-1 - 95' to 115'	14521		0.013	1.23								
42000	" " 115' " 135'	522		0.038	0.50								
42001	" 15-L-7 0' " 20'	523		0.007	0.10								
42002	" " 20' " 40'	524		0.013	0.60								
42003	" " 40' " 70'	525		0.013	0.15								
42004	" " 75' " 100'	526		0.032	0.34								
42005	" 17-M-2 & 3 10' " 35'	527		0.008	3.56								
42006	" 18-J-2 0' " 26'	528		0.022	10.8								
42007	" " 41' " 60'	529		0.013	3.55								
42008	" " 60' " 77'	14530		0.006	0.58								
42009	" " 85' " 105'	531		0.002	0.65								
42010	" 18-J-4 0' " 25'	532		0.007	1.89								
42011	" " 36' " 62'	533		0.021	12.0								
	United Verde 1200-Level Diamond Drill Hole Samples												
42012	Hole No. 10-N-3 - 0' to 25'	14534		0.016	0.99								

Signed Heber E. Peterson

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
Salt Lake City, Utah

No. 8Report to Mr. Walter R. Storms

Chemical Laboratory Report

Date received February 23, 1955Sample 1418Date reported March 3, 1955

Serial No.	DESCRIPTION	Zn No.	%	Se	Cu								
	United Verde 1200-Level Diamond Drill Hole Samples												
42013	Hole No. 10-N-3 - 25' to 50'	14535		0.015	0.76								
42014	" 10-N-4 0' " 25'	536		0.020	0.95								
42015	" " 25' " 50'	537		0.018	0.57								
42016	" 10-P-2 0' " 15'	538		0.006	0.12								
42017	" " 15' " 25'	539		0.007	0.20								
42018	" " 25' " 45'	14540		0.013	0.35								
42019	" " 45' " 75'	541		0.008	0.19								
42020	" 14-0-1 50' " 65'	542		0.002	0.07								
42021	" " 65' " 81'	543		0.007	0.10								
42022	" 16-L-2 20' " 40'	544		0.006	0.08								
42023	" " 40' " 60'	545		0.007	0.07								
42024	" 16-N-2 0' " 20'	546		0.055	0.30								
42025	" 16-0-2 0' " 29.5'	547		0.007	0.65								
42026	" " 29.5' - 47'	548		0.029	1.55								
42027	" " 200' - 215'	549		<0.002	0.06								
42028	" " 215' - 225'	14550		0.003	0.05								

Signed Heber E. Peterson

February 28, 1955

Memorandum

To : J. Bruce Clemmer, Chief, Division of Mineral Technology
From : Superintendent, Southwest Exp. Station, Region III
Subject : Selenium samples from United Verde Branch of Phelps Dodge Corp., Jerome, Ariz.

Today I received a letter from Dr. Louis E. Reber, Jr., geologist for the Phelps Dodge Corp. and the man who gave me the selenium samples which I sent to you sometime ago. Dr. Reber says that his company would like to have the selenium assays for these samples just as soon as you have had them run. I assumed that you would send that company a copy of the assays and so told Dr. Reber in a telephone conversation with him about a week ago when he phoned me.

Enclosed is a copy of a statement by Dr. Reber which explains the company's position in relation to these selenium samples. Dr. Reber thought that a copy of this statement should be sent to you in case you reported the sample results directly to Mr. Gumbel of G.S.A.

I have here a more complete description of the samples so if they look promising at all, I will send you a more complete report on them. If the assay results seem to indicate that the selenium content of the ore is not worth bothering about, then I see no reason for submitting a more complete report. As you may know, I worked for the United Verde Copper Co. for nearly 12 years (1923-1935), much of the time as a mining geologist, so am fairly familiar with the sample areas should you desire additional information. If the samples seem promising, I believe we can obtain level maps from Dr. Reber which will show the exact locations of the diamond drill holes.

Walter R. Storms

CC J. H. East, Jr.
W. H. King
421
DF

WRStorms:frj

DIAMOND DRILL CORE SPECIMENS FOR SELENIUM TEST
OF UNITED VERDE ORE DEPOSIT

present condition of the United Verde mine, the negligible amount of selenium and the relatively small amount of "near ore" material remaining in the deposit, as well as the general evidence which offers little hope for more than a very low selenium content in such a deposit, are believed to make even the most obvious possibilities very remote, so far as the finding any significant amount of material with selenium values which might be of present economic interest are concerned. For this reason and because even the very low grade pyrite might come into the picture in the distant future, the test material has been chosen to throw as much light as possible on the tenor, distribution and most favored associations of selenium throughout the United Verde deposit, rather than to investigate only the most obvious possibilities such as hinge on association with at least "near ore" values in other constituents.

The test sample material has been chosen to represent all of the most distinct types of mineralized ground in the United Verde ore deposit, a wide range of minor variants, including most of the range in mineral content, as well as the more or less complete range in copper, zinc, lead, (mercury), gold and silver content.

Samples from the United Verde 700 and 1200 foot levels pertain specifically to the upper part of the main ore zone and those from the main 3000 foot level work give a fair cross section of the deeper part. Samples are included from the Equator sulphide body, the Haynes sulphide body and from the United Verde 4000 level primarily to make the type coverage as complete as possible.

The descriptive lists and the tabulated assay data from the original core samples serve to classify the samples as to general type and significant constituents and furnish a worth-while basis for comparison with the selenium determinations; even though the selenium in the relatively small specimen samples cannot be expected to give more than a rough measure of the selenium content of the original core samples. Determination of copper as well as selenium in the specimen samples will throw more light on the exact quantitative relation between copper and selenium, which may be of special interest.

It is believed that the assay results should prove adequately conclusive# in regard to immediate possibilities (even the most far fetched), come as near to telling the complete story of selenium occurrence throughout the United Verde deposit as possible with the number of assays involved, throw some worth while light on the future possibilities of the deposit, and may comprise a worth while addition to the general knowledge of selenium occurrence in sulphide deposits.

Respectfully submitted,

Louis E. Reber, Jr.

Louis E. Reber, Jr.

#That is, conclusively negative or tentatively favorable.

February 28, 1955

Dr. Louis E. Reber, Jr.
Phelps Dodge Corp.
Jerome, Arizona

Dear Louis:

Thanks very much for your letter of February 25 with copies of your statement relating to the selenium samples. As I told you over the phone when you called about a week ago, I sent the samples to our Intermountain Experiment Station at Salt Lake City for assay of any selenium content. I have written to Mr. J. Bruce Clemmer, Chief of our Division of Mineral Technology and Superintendent of the Salt Lake Station and asked him to send a copy of the assays to your company (probably to Mr. Charles R. Kuzell, vice-President of the company at Douglas) as soon as the samples have been analyzed. I also sent a copy of your statement to Mr. Clemmer.

I will hold your original assay data and descriptive details of the samples here until I have seen the assays. If they seem promising, then I will send Mr. Clemmer a more detailed report, and possibly copies of your maps if you think necessary.

I am holding the "reserve" samples here so you may get them at any time, or I can ship them to you if you so desire.

With best regards, I am

Sincerely yours,

Walter R. Storms
Superintendent
Southwest Experiment Station

CC J. B. Clemmer
W. H. King
~~421~~
DF

WRStorms:frj

PHELPS DODGE CORPORATION

UNITED VERDE BRANCH, MINES DIVISION

JEROME, ARIZONA

February 25, 1955

WRS

Mr. W. R. Storms,
U. S. Bureau of Mines,
U. of A., Tucson, Arizona.

Dear Rex:

Although I had failed to mention to Mr. Kuzell that you had promised to send us copies of the selenium assay returns if they were reported to you, in his latest note to me he expresses the hope that I arrange with you that we may have the results very promptly.

Mr. Kuzell did suggest that the final arrangements for the conference and turning over the samples be made with me, but this was not done. Since, I have not entered into the picture officially at all, it might be deemed a bit out of line for me to write Salt Lake or Denver about the samples, as you suggested. Since Mr. Kuzell has expressed interest in the matter I would feel very grateful to you if you could fix it so that we receive the returns as soon as available, whether or not the Salt Lake Office reports directly to you.

I presume that you are waiting for at least some word about the completion of the assaying before attempting to pass on the list with the descriptive details and original core assays - and the "necessary minimum of general explanation" which I talked you into taking care of, but which I should have supplied you with in writing at the beginning. Enclosed herewith is a copy of such explanation which meets with Mr. Kuzell's approval, and which with the other aforementioned data should permit Messers Gumbel, et al to interpret the new assays for themselves and perhaps eliminate the need for our version, unless something very unexpected should materialize.

I hope that this reaches you in time to save you some trouble, and that you will forgive me for imposing on you unduly.

I am still finding other things to keep me busy here but should be on my way south very soon now, I hope!

With best wishes to yourself and Melva, I am

Very sincerely,

Louis
Louis E. Reber, Jr.

U. S. BUREAU OF MINES
FEB 28 1955
TUCSON, ARIZONA

LER, Jr/lmw
Enclosure

PHELPS DODGE CORPORATION

UNITED VERDE BRANCH, MINES DIVISION

JEROME, ARIZONA

February 14, 1955

U. S. BUREAU OF MINES
FEB 16 1955
TUCSON, ARIZONA

Mr. Rex Storms,
U. S. Bureau of Mines,
U. of A., Tucson, Arizona.

Dear Rex:

It makes me feel very ignorant not to know or remember just what is the official designation or title of the head of the Tucson office of the Bureau! However, this communication is more or less personal and very definitely not official.

I hope very much that you made it back to Tucson without getting too overtired or ending up with a real relapse. I am sure that Mr. Kuzell would not have been so insistent on haste had he realized how you were feeling and as it turned out a few days more delay would not have made a great deal of difference. I still have quite a few tag ends to attend to here at Jerome and the urgent call to meet Mr. Notman in Douglas has been eliminated by his willingness to stop by and see me here.

I am sorry that we did not have time for more of a visit as well as a more thorough discussion of the problem of procedure in connection with the selenium samples. I feel that I may have taken undue advantage of your co-operative attitude in passing the buck to you in regard to passing on the minimum of necessary explanation, and keeping it down to a minimum in line with Mr. Kuzell's fear that too much explanation would only lead to further complications.

Judging by the earlier correspondence it would appear that we are committed to making all the additional diamond drill core specimen and assay pulp material which we have, available for further tests, should the preliminary test results suggest any excuse for same. It also seems to me that inadequate explanation of the "preliminary" test material is much more likely to lead to a request for a comprehensive interpretation and appraisal of the results by us, or a call for a lot more explanatory detail, than if a fairly complete story were submitted with the samples.

It was my understanding that you would endeavor to pass on a necessary minimum of explanation together with the descriptive lists and assay data accompanying the samples. I should be glad to know just what you have done in that connection.

I believe that you also agreed to have the lists copied to cover only the 113 specified test samples and hold all the reserve material at Tucson, for the time being; and to send the 113 test samples on to the U. S. Bureau of Mines laboratory at Salt Lake City to be run for selenium and for copper.

Mr. Rex Storms
February 14, 1955
Page No. 2

Although there has been some reference to a statement that the Bureau might want to do some exploratory drilling in the United Verde, I presume that the Bureau is only acting at the request of the General Services Administration so that your report will go to Mr. Gumbel, at least eventually. It might be helpful in connection with possible further correspondence on our part to know the probable course of the data you submit.

I hope that this finds you in much better health and that Melva is well. With best regards to you both, I am,

Very sincerely yours,

Louis
Louis E. Reber, Jr.

LER, Jr/lmw

February 14, 1955

Memorandum

To : J. Bruce Clemmer, Chief, Division of Mineral Technology
and Superintendent, Intermountain Experiment Station.

From : Superintendent, Southwest Experiment Station

Subject : Diamond Drill Core Samples from United Verde Mine of
Phelps Dodge Corp., Jerome, Ariz.

At the request of the Regional Director, I am sending you by Arizona Express, Inc. one box of 113 diamond drill core samples which I obtained from Dr. Louis E. Reber, Jr. at Jerome. Dr. Reber is geologist for Phelps Dodge Corp. and recently spent several months at the company's United Verde Branch in Jerome, collecting data and samples of core holes at the request of Mr. Gumbel of the General Services Administration. As you may know, GSA is interested in new sources of selenium and asked Phelps Dodge Corp. if diamond drill cores from the massive sulfide mass at the old United Verde mine could be assayed for selenium.

At the request of Regional Director East, I visited Jerome on February 9, thoroughly discussed the problem with Dr. Reber, looked over his maps, then picked up the core samples which he gave me. However, these samples were given to the Bureau of Mines with the understanding that copper as well as selenium would be run on each sample as there may be a relationship between those two metals.

The United Verde Branch skeletonizes core from all diamond drill holes after the core has been "read" and sampled for copper or zinc. To skeletonize the core, a small specimen (usually 1 to 2 inches long) is taken from each 5-foot section of core, or from each change of formation. Therefore, when GSA wanted samples of core assayed for selenium, all Dr. Reber could do was have each one of these small specimens sawed in half with a diamond saw. One half was kept by the company as its permanent record and the second half was made up into drill hole samples.

CC J. B. Clemmer
J. H. East, Jr.
W. H. King
421
DF

WRStorms:frj

Each large sample envelope contains a number of smaller envelopes, each with a piece of core. All these pieces should be combined to form one sample.

Attached is a list of the samples; also enclosed are a copy of Form T-Met. 6 and Government Bill of Lading No. I-125482.

Walter R. Storms

DIAMOND DRILL CORE SAMPLES
 UNITED VERDE BRANCH
 PHELPS DODGE CORP.
 JEROME, ARIZONA

Equator-Copper Chief Diamond Drill Hole Samples

Sample No	Hole No.	Sample Data		
		From	To	Length (ft.)
14507	9	0	22	22
14508	9	22	40	18
14509	10	23	47	24
14510	11	0	25	25
14511	11	29	47	18
14512	17	0	18	18
14513	18	0	17	17
14514	18	17	41	24
14515	23	54	68	14

United Verde 700-Level Diamond Drill Hole Samples

14516	14-K-4	0	20	20
14517	14-K-4	20	40	20
14518	14-K-4	40	65	25
14519	15-L-1	55	74	19
14520	15-L-1	74	95	21
14521	15-L-1	95	115	20
14522	15-L-1	115	135	20
14523	15-L-7	0	20	20
14524	15-L-7	20	40	20
14525	15-L-7	40	70	30
14526	15-L-7	75	100	25

<u>Sample No.</u>	<u>Hole No.</u>	<u>Sample Data</u>		
		<u>From</u>	<u>To</u>	<u>Length (ft.)</u>
14527	17-M-2 & 3	10	35	25
14528	18-J-2	0	26	26
14529	18-J-2	41	60	19
14530	18-J-2	60	77	17
14531	18-J-2	85	105	20
14532	18-J-4	0	25	25
14533	18-J-4	36	62	32

United Verde 1200-Level Diamond Drill Hole Samples

14534	10-N-3	0	25	25
14535	10-N-3	25	50	25
14536	10-N-4	0	25	25
14537	10-N-4	25	50	25
14538	10-P-2	0	15	15
14539	10-P-2	15	25	10
14540	10-P-2	25	45	20
14541	10-P-2	45	75	30
14542	14-O-1	50	65	15
14543	14-O-1	65	81	16
14544	16-L-2	20	40	20
14545	16-L-2	40	60	20
14546	16-N-2	0	20	20
14547	16-O-2	0	29.5	29.5
14548	16-O-2	29.5	47	17.5
14549	16-O-2	200.	215	15
14550	16-O-2	215	225	10

<u>Sample No.</u>	<u>Hole No.</u>	<u>Sample Data</u>		
		<u>From</u>	<u>To</u>	<u>Length (ft.)</u>

United Verde 1200-Level plus 20 ft.

13201	16-K-7	0	20	20
13202	16-K-7	20	28	8
13203	16-K-7	28	33.5	5.5

United Verde 3000-Level Diamond Drill Hole Samples

13204	6-T-1	0	30	30
13205	6-T-1	30	60	30
13206	7-U-1	0	35	35
13207	7-U-1	35	75	40
13208	7-U-1	75	115	40
13209	7-U-4	0	19	19
13210	7-U-4	19	23.5	4.5
13211	8-V-2	30	50	20
13212	9-V-11	0	15	15
13213	9-V-11	16	48	32
13214	9-V-11	48	68	20
13215	9-V-11	68	89	21
13216	9-V-11	89	113	24
13217	10-W-4	58	78	20
13218	10-W-4	101	120	19
13219	10-W-4	129	144	15
13220	10-X-2	104.5	135	30.5
13221	10-X-2	175	186	11
13222	10-X-2	186	210	24

<u>Sample No.</u>	<u>Hole No.</u>	<u>Sample Data</u>		<u>Length (ft.)</u>
		<u>From</u>	<u>To</u>	
13223	11-U-1	375	395	20
13224	11-U-1	395	416	21
13225	11-U-1	475	490	15
13226	11-W-1	0	20	20
13227	11-W-1	20	47	27
13228	11-W-1	47	70	23
13229	11-W-1	70	96.5	26.5
13230	12-W-4	92.5	108	15.5
13231	12-W-4	108	110.5	2.5
13232	12-W-4	200	220	20
13233	12-W-4	220	235	15
13234	13-W-4	165	180	15
13235	13-W-4	180	195	15
13236	16-U-3	0	25	25
13237	16-U-3	25	53	28
13238	5-Q-1	0	23	23
13239	5-Q-1	23	50	27
13240	5-Q-1	85	114	29

United Verde 4500-Level Diamond Drill Hole Samples

13241	6-S-3	140	175	35
13242	7-U-4	76	106	30
13243	9-2E-1	69	89	20
13244	9-2E-1	116	129	13
13245	9-2E-1	131	140	9
13246	9-2E-1	144	159	15

<u>Sample No.</u>	<u>Hole No.</u>	<u>Sample Data</u>		<u>Length (ft.)</u>
		<u>From</u>	<u>To</u>	
13247	9-2E-3	90	110	20
13248	9-2E-3	110	134	24
13249	9-2E-3	134	156	22
13250	9-2E-3	156	167	11
13251	9-2E-4	74	107	33
13252	9-2E-4	111	131	20
13253	9-2G-1	0	18	18
13254	9-2G-1	18	31	13
13255	9-2G-3	0	49	49
13256	9-2G-3	49	71	22
13257	9-2G-3	71	93	22

United Verde 3000-Level Haynes Diamond Drill Hole Samples

13258	UVX-4	180	198	18
13259	UVX-4	198	202	4
13260	UVX-6	105	140	35
13261	UVX-7	230	245	15
13262	UVX-17	72	92	20
13263	UVX-17	92	122	30
13264	97-Z-2	430	434	4
13265	97-Z-2	434	436	2
13266	97-Z-3	457	459	2
13267	97-Z-3	459	480	21
13268	97-Z-3	480	500	20
13269	97-Z-3	500	510	10

T-Met.6

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
METALLURGICAL DIVISION, REGION IV
PROCESS DEVELOPMENT AND RESEARCH BRANCH

SAMPLE REPORT

Date February 11, 1935

To: J. Bruce Cleaver From: Walter R. Storms
Intermountain Exp. Station Southwest Exp. Station
Salt Lake City, Utah Tucson, Ariz.

Name and location of property or project:

United Verde Branch, Phelps Dodge Corp., Jerome, Arizona

Number of samples in shipment: 113 in 1 bags. Total Weight _____
~~boxes~~

Shipped: _____; GBL No. 1-123482 Carrier Arizona Express

Nature of Ore and general comments:

Sections of diamond drill core, mostly massive sulfide.

Identification of samples with tests or analyses desired:

Sample Nos. 14507 to 14550, inclusive

Sample Nos. 13201 to 13269, inclusive.

Please assay each sample for selenium and copper

This is a General Services Administration project.

CC J. B. Cleaver (Orig. & 1)

J. H. East, Jr.

W. H. King

421

BF

WRStorms:frj

February 10, 1955

Memorandum

Air Mail

To : J. H. East, Jr., Regional Director, Region III
From : Superintendent, Southwest Exp. Station, Region III
Subject : Potential sources of selenium.

As requested in your recent memoranda and your telephone call of February 7, I visited the United Verde Branch of Phelps Dodge Corp. in Jerome yesterday and picked up the diamond drill core samples. These samples were given to me with the understanding that they would be analyzed by a competent assayer and that they would be assayed for copper as well as selenium.

I assured Dr. L. E. Reber, Jr., geologist for Phelps Dodge who turned the samples over to me, that our chemists in Salt Lake City had been making a large number of selenium analyses and that they were capable of doing a good job. I also assured him that I could see no reason why copper assays also could not be run on all samples.

As I believe my trip and subsequent work to get the samples numbered and ready for shipment to Salt Lake City are to be charged to General Services Administration, can you give me a work order number for this work?

Walter R. Storms

Walter R. Storms

CC J. B. Clemenner
W. H. King
T. A. Christensen
~~421~~
DF

WRStorms:frj



OFFICE OF
REGIONAL DIRECTOR

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

REGION III

224 NEW CUSTOMHOUSE
DENVER 2, COLORADO

February 7, 1955

Memorandum

To: W. R. Storms, Superintendent, Southwest Experiment
Station

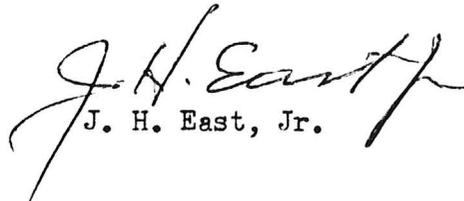
From: J. H. East, Jr., Regional Director, Region III

Subject: Potential sources of selenium

Reference is made to your memorandum dated February 3 concerning the potential sources of selenium, particularly in regard to the drill cores at United Verde mine. This memorandum will confirm our telephone conversation of today replying to your teletype.

The diamond drill cores are to be shipped to J. Bruce Clemmer with a covering letter giving him as complete information as you can obtain regarding the cores.

We are currently working on a selenium project on cores from Lysite, Wyoming, and I can assure you that our analysts are fully competent to make accurate determinations. Please advise Dr. Reber of this. I can well understand his reluctance to turn cores over for assay if the analyst is inexperienced.


J. H. East, Jr.

cc: J. Bruce Clemmer
W. H. King

U. S. BUREAU OF MINES
FEB 8 1955
TUCSON, ARIZONA

February 7, 1955 at 1.40 p.m. frj

Telephone call from Denver, Colorado, J. H. East, Jr., to Walter R. Storms, Tucson, Ariz.

East: We just received your teletype about these selenium ore samples. They are to be shipped to Salt Lake City. We have reliable people doing work for GSA and they have run 100,000 a year. Don't be afraid they are not reliable and that they will not be held confidential.

Storms: He said they had spent so much money on them they didn't want to turn them over to us unless they were sure someone reliable —

East: We are better equipped than anybody else.

Storms: Going to see Reber Wednesday morning.

East: Have had a bunch of properties in Wyoming of extremely low grade and have done a lot of work on them so that we are not just turning them over to somebody who has not done it before. We have done hundreds of them.

Storms: There is something else Tosca wanted to know what Stewart's travel authority to Venezuela and allotment

East: I will buzz Christensen, How are you feeling?

Storms: Not so good, but think I can make it up there.

East: Travel order R, Roman C, 86 - Charge to 122 work Order 55-40. We hope to come down there early in March and spend some time down there.

Storms: Fine.

GSA
PBS TELETYPE
TUCSON, ARIZ.

1955 FEB 7 PM 1 22

U. S. BUREAU OF MINES
FEB 7 1955
TUCSON, ARIZONA

OO
DN TS 7 I-BOM

TUCSON ARIZ 2-7-55 118P

J H EAST JR

BOM DN

RE PHELPS DODGE UNITED VERDE DIAMOND DRILL CORE, C. R. KUZELL,
VICE PRESIDENT, PHELPS DODGE CORPORATION, PHONED ME AND SAID CORE WOULD
BE TURNED OVER TO BUREAU ONLY IF RELIABLE ASSAYER IS TO ANALYZE CORE
SAMPLES. DOES CLEMMER HAVE RELIABLE ASSAYER IN SALT LAKE CITY FOR
SELENIUM ANALYSIS OR SHOULD SAMPLES BE SENT TO CUSTOMS ASSAYER? I WILL
SEE DR. REBER IN JEROME WEDNESDAY MORNING TO OBTAIN SAMPLE DATA AND OTH-
ER INFORMATION BUT SHOULD BE ABLE TO GIVE HIM INFORMATION ABOUT WHERE
SAMPLES WILL BE ASSAYED BEFORE HE WILL TURN SAMPLES OVER TO ME.

WALTER R STORMS

BEA 122P

STANDARD FORM NO. 14
APPROVED BY THE PRESIDENT
MARCH 10, 1926

TELEGRAM

OFFICIAL BUSINESS—GOVERNMENT RATES

FROM Walter R. Storms
BUREAU of Mines
CHG. APPROPRIATION GSA teletype
Tucson, Arizona, Feb. 7, 1955

U. S. GOVERNMENT PRINTING OFFICE 10-1723

Phoned 1.15 p.m. frj

Mr. J. H. East, Jr.
U. S. Bureau of Mines
224 New Customhouse
Denver, Colorado

Re Phelps Dodge United Verde diamond drill core, C. R. Kuzell, Vice President, Phelps Dodge Corp., phoned me and said core would be turned over to Bureau only if reliable assayer is to analyze core samples. Does Clemmer have reliable assayer in Salt Lake City for selenium analysis or should samples be sent to custom assayer? I will see Dr. Reber in Jerome Wednesday morning to obtain sample data and other information but should be able to give him information about where samples will be assayed before he will turn samples over to me.

Walter R. Storms

CC Confirmation
J. B. Clemmer
W. H. King
File _____
DF

WRStorms:frj

Feb. 4, 1953

Memo for files.

Phoned Jerome and talked to Louis E. Reber about picking up the United Verde drill & core. Will visit Jerome Wednesday morning, February 9 and talk to Reber. His phone in Clarkdale 5521 although he is at the United Verde office in Jerome.

WRS

February 3, 1955

Memorandum

To : J. H. East, Jr., Regional Director, Region III
From : Superintendent, Southwest Experiment Station,
Region III
Subject : Potential sources of selenium

In answer to your memorandum of February 1, regarding the diamond drill cores from the old United Verde mine, I will get in touch with Louis Reber and arrange to obtain the core samples. I have been laid up somewhat with the flu, but will try to obtain the samples and necessary data from Reber myself as soon as possible as I am familiar with the United Verde mine.

I assume that the core samples are to be assayed here.

Walter R. Storms

CC J. B. Clemmer
W. H. King
File _____
DF

WRStorms:frj

February 3, 1955

Mr. Charles R. Kuzell
Vice-President
Phelps Dodge Corp.
Douglas, Ariz.

Dear Charlie:

Our Regional Director has written me that the Emergency Procurement Service of General Services Administration in Washington, D. C. has asked him to have a Bureau of Mines engineer contact Dr. L. E. Reber and pick up some diamond drill core samples which Louis will have. Evidently the samples are from the United Verde mine in Jerome and are supposed to contain selenium.

Can you tell me where I can get in touch with Louis? The last time I talked to him he spoke something about retiring and moving to the coast.

With best regards, I am

Sincerely yours,

Walter R. Storms
Superintendent
Southwest Experiment Station

CC J. H. East, Jr.
J. B. Clemmer
W. H. King
File _____
DF

WRStorms:frj

Kuzell phoned at ± 9:45 a.m., Feb. 4.
Reber is in Jerome at phone 5521.
Company won't release core until
satisfied that reliable assayer will analyze.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

REGION ~~IX~~ III

224 NEW CUSTOMHOUSE
DENVER 2, COLORADO

February 1, 1955

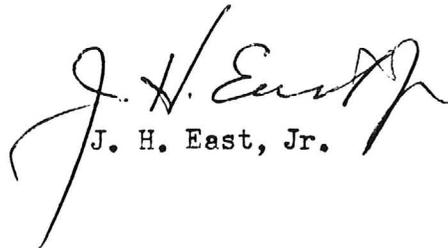
Memorandum

To: W. R. Storms, Superintendent, Southwest Experiment Station
From: Regional Director, Region III
Subject: Potential sources of selenium

We are attaching a photostat copy of a letter from Clarence A. Fredell relative to some diamond drill cores at Jerome which are to be assayed for selenium.

Please arrange to have someone pick up the cores from Dr. L. E. Reber, Jr., and secure the requisite information regarding the location of the holes and any pertinent information.

It might be a good chance for you to revisit your childhood home!


J. H. East, Jr.

Attachment

cc: J. Bruce Clemmer
W. H. King

U. S. BUREAU OF MINES

FEB 3 1955
TUCSON, ARIZONA



OFFICE OF
REGIONAL DIRECTOR

REGIONAL SERVICES ADMINISTRATION

Emergency Procurement Service
Washington 25, D. C.

January 26, 1955

In Reply Refer To: EOE

REGIONAL DIRECTOR'S
OFFICE
REGION III

JAN 31 1955

BUREAU OF MINES
DENVER, COLORADO

Mr. John H. East, Jr.
Regional Director, Region III
Bureau of Mines
224 New Custom House
Denver 2, Colorado

Dear Mr. East:

The Expansion Branch is interested in developing new sources of selenium. It has been brought to their attention that the Pyrite deposits at the United Verde Mine in Jerome, Arizona are a large potential source.

In correspondence with the Phelps Dodge Corporation they have agreed to have their geologist, Dr. L. E. Reber, Jr., select representative drill hole cores for sampling and analysis.

They now advise us that Dr. Reber has selected the cores that they are available for sampling and analysis.

It is requested that the bureau arrange a mutually satisfactory time with Dr. Reber and send an engineer to Jerome for the purpose of obtaining data on the location of the drill holes, sample the drill cores, and arrange for assaying such samples for selenium content.

Your prompt attention to this request will be greatly appreciated.

Very truly yours,

Clarence A. Fredell

Clarence A. Fredell
Chairman, Operating Committee

A. H. Hedger
Member, Bureau of Mines

Thayer

Survey



OFFICE OF
REGIONAL DIRECTOR

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

REGION III

224 NEW CUSTOMHOUSE
DENVER 2, COLORADO

February 1, 1955

Mr. Clarence A. Fredell
Chairman, Operating Committee
Emergency Procurement Service
General Services Administration
Washington 25, D. C.

Reference : EEE

Dear Mr. Fredell:

This will acknowledge receipt of your letter dated January 26 relative to the sampling and analysis of certain drill hole cores at the United Verde Mine, Jerome, Arizona.

We will be glad to arrange for a Bureau of Mines' engineer to meet with Dr. Reber to secure the cores and necessary data. We will also arrange for the analyses. This will be given high priority.

Very truly yours,

Original signed by
J. H. EAST, Jr.

J. H. East, Jr.
Regional Director, Region III

cc: J.H. Hedges
T.P. Theyer
W.R. Storms
J. Bruce Clemmer
W.H. King

Memorandum

March 29, 1955

To : J. H. East, Jr., Regional Director, Region III
From : Superintendent, Southwest Exp. Station, Region III
Subject : Selenium Samples from the United Verde Branch,
Phelps Dodge Corp., Jerome, Ariz.

Enclosed are original and four copies of a report on the selenium samples which I obtained from Dr. Louis E. Reber, Jr. of the Phelps Dodge Corp. in Jerome in February.

As you requested in your memorandum of February 1, I visited the United Verde mine on February 9 and picked up 113 diamond drill core samples from Dr. Reber. These samples then were shipped to the Intermountain Experiment Station at Salt Lake City for analysis. On March 9, I received the selenium and copper assays on these 113 samples from Mr. Clemmer who requested that I prepare a brief report, showing location of the drill holes, etc. Mr. Clemmer also suggested that level maps showing the hole locations be obtained if possible from Dr. Reber. I then wrote to Reber and asked to borrow his maps, but did not receive them until March 21.

We have made tracings of these maps and prints are included in the report. However, it should be pointed out that only the diamond drill holes, which were sampled for selenium, are shown on these maps. All other drill holes were omitted when the maps were traced.

As you will note, selenium is scarce in the holes that were sampled. There seems to be a possibility that Phelps Dodge Corp. may mine the entire sulphide mass at the United Verde mine at some future time, as it perfected a method, or methods of extracting the iron, sulphur, copper, zinc, and other valuable elements some time ago. However, there doesn't seem much chance of mining the mass for selenium at the present time.

Walter R. Storms

Walter R. Storms

CC J. B. Clemmer

W. H. King

421/1527

DF

**UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES**

**SELENIUM SAMPLES FROM THE
UNITED VERDE BRANCH
PHELPS DODGE CORP.,
JEROME, ARIZ.**

By

**Walter R. Storms
Supervising Mining Engineer
Bureau of Mines**

March 1955

**SELENIUM SAMPLES FROM THE UNITED VERDE BRANCH,
PHELPS DODGE CORP., JEROME, ARIZ.**

By Walter R. Storms

CONTENTS

	<u>Page</u>
Summary and conclusions -----	1
Introduction -----	4
Acknowledgments -----	5
Location -----	6
History -----	6
Geology -----	7
Diamond drill hole samples -----	10

ILLUSTRATIONS

<u>Figure</u>		<u>To follow page</u>
1	Plan of 700-foot level -----	56
2	Plan of 1200-foot level -----	56
3	Plan of 3000-foot level -----	56
4	Plan of 4500-foot level -----	56
5	Plan of Haynes area on 3000-foot level-----	56

1/ Supervising Mining Engineer, Bureau of Mines, Tucson, Ariz.

March 7, 1996

Additional Notes

Illustration Figures 1 to 5 are located in Map Cabinet Number 0465,
Drawer Number 03, Envelope Number 04, Map Numbers 0017-002 to 0017-006.

SUMMARY AND CONCLUSIONS

Early in 1955, the Emergency Procurement Service of the General Services Administration asked the Bureau of Mines to pick up diamond drill core samples from the United Verde Branch, Phelps Dodge Corp., Jerome, Ariz. and to have these samples analyzed for their selenium content. The Expansion Branch of this agency was interested in developing new sources of selenium, and it had been brought to its attention that the large massive sulphide body at the United Verde mine might be a large potential source of this metal.

The United Verde mine is situated a short distance west of the city of Jerome in Yavapai County, Ariz. The ore deposit first was located in 1876 when it was worked primarily for gold in its upper, oxidized part. In 1889, the late Senator W. A. Clark purchased the property and produced many million pounds of copper under the firm name of the United Verde Copper Co. The property was bought in 1935 by Phelps Dodge Corp. This company operated it until 1953, when production became uneconomical, so the mine was closed and all valuable equipment removed.

The United Verde ore body "consists of a very irregular pipelike body of massive sulphide, quartz and mixed sulphide and rock, with a steep north-northwesterly plunge. Quartz predominates on the hanging wall or diorite side of the main sulphide mass, with the mixed material on the footwall or quartz-porphphyry side".^{2/} Below the 3000-foot

^{2/} Reber, Louis E., Jr., Jerome District, Some Arizona Ore Deposits. Ariz. Bur. of Mines Bull. 145, Oct. 1, 1938, pp. 43-44.

level the sulphide mass split into a number of downward-pointing fingers, these fingers gradually pinching out below the 4500-foot level. Copper ore occurred along the footwall or quartz-porphyry side of the deposit, as well as in the massive sulphide mass itself. Some zinc ore also was mined in later years.

The mine was developed by several vertical shafts, the main ones being Nos. 5 and 6, to the 3000-foot level. Later another shaft or winze was sunk from the 3000-foot level to below the 4500-foot level. In the upper part of the mine, levels were opened at 100-foot intervals down to the 1000-foot level. A 200-foot interval was left between the 1000- and the 1200-foot level, then levels below 1200 feet were spaced at 150-foot intervals. Stoping in the upper part of the mine mostly was by square-set methods although some horizontal cut-and-fill also was used. Later much of the ore above the 700-foot level was mined in an open pit. In the lower part of the mine, many mining methods were used, horizontal cut-and-fill, inclined cut-and-fill, shrinkage, square-set, top-slicing, and on some of the lower levels, stoping with long-hole radial drilling.

In 1953, the economical limit of mining was reached on the 4500-foot level, so the mine was closed and all valuable equipment removed. The pumps were pulled and the area below the 1000-foot, or Hopewell Tunnel level allowed to fill with water. As the area above the 1000-foot level drains to that level, where the water runs out the Hopewell Tunnel, it will remain dry even though the pumps have been pulled.

In selecting areas for the selenium test, diamond drill hole cores on the 700-, 1200-, 3000-, and 4500-foot levels of the United Verde mine, the 3000-foot level Haynes area of the United Verde, and the Equator-Copper Chief mine were used. Selected core samples from diamond drill holes on these levels were analysed for selenium and copper. Results of these analyses are given near the end of this report. However, the assays of the samples were relatively low, averaging only about 0.018 percent selenium (arithmetical average) for 113 samples. The highest assay was 0.132 percent selenium in Hole 11-U-1 on the 3000-foot level. Many were less than 0.002 percent.

On January 3, 1955, the price of selenium was \$6.00 per pound. With the low average content of selenium in the United Verde sulphide mass it can be seen that the selenium-bearing areas could not be mined for this metal alone. Selenium would have to be a by-product of some more plentiful metal. However, the copper ore in the mine has been largely extracted, as has some zinc ore.

In the late 1920's or early 1930's, the United Verde Copper Co. did much research work on the massive sulphide mass, endeavoring to recover iron, sulphur, copper, zinc, and all or most of the lesser metals from the sulphide body. It is understood that methods were perfected for recovering the numerous elements in that mass, but the method or methods were not economical. This research work

was under the direction of Messrs. Charles R. Kuzell and Oliver C. Ralston. At some future date Phelps Dodge Corp. may mine the entire sulphide mass in order to recover the iron, sulphur and other elements. Until that time comes it would seem that the selenium in the deposit is of no apparent interest for itself alone.

INTRODUCTION

On February 1, 1955, J. H. East, Jr., Regional Director of Region III, wrote to the writer and asked him to get in touch with Dr. Louis E. Reber, Jr. of Phelps Dodge Corp. and have someone pick up some diamond drill core samples from the United Verde Branch of that company. These samples were to be analyzed for selenium at the request of the Emergency Procurement Service of the General Service Administration in Washington, D. C., as the Expansion Branch of that agency was interested in developing new sources of selenium.

On February 4, 1955, the writer talked by telephone to Mr. Charles R. Kuzell, Vice-President of Phelps Dodge Corp. in Douglas, Ariz., and was told that Dr. Reber was in Jerome and that the selenium samples could be picked up there. However, Mr. Kuzell emphasized that the company did not care to turn over the samples until assured that an assayer, who was familiar with the analysis of selenium samples and who was competent to analyze the United Verde samples, was available to the Bureau of Mines. On February 4, the writer phoned Dr. Reber in Jerome and arranged to meet him there on February 9.

Upon contacting Regional Director, J. H. East, Jr., the writer was assured that the staff of the Intermountain Experiment Station at Salt Lake City was perfectly competent to analyze the samples for selenium as it had been making several hundred such analyses for the General Services Administration.

On February 9, 1955, the writer met Dr. Reber at the United Verde office in Jerome, Ariz., discussed the selection of the diamond drill core samples with him, and after assuring him that the Bureau of Mines had assayers who were capable of analyzing the samples for selenium, secured 113 samples from him. As there might have been a possible relationship between the selenium and copper content of the ore, Dr. Reber asked that copper analysis also be made of each sample.

The 113 samples were brought back to the Southwest Experiment Station in Tucson, each given a Bureau of Mines sample number, then the lot was shipped to the Intermountain Experiment Station in Salt Lake City on February 14. Results of the analyses were received in Tucson on March 9.

ACKNOWLEDGMENTS

Acknowledgments are made to Dr. Louis E. Reber, Jr., who spent several months at the closed mine of the United Verde Branch, collecting information on the diamond drill holes and cutting the core samples in half, and to Mr. Charles R. Kusell, Vice-President in charge of Western Operations for Phelps Dodge

Corp. Acknowledgment also is made to Mr. J. Bruce Cleumer, Chief of the Division of Mineral Technology of Region III and Superintendent of the Intermountain Experiment Station at Salt Lake City, and to Mr. Heber E. Peterson of the Bureau of Mines, who analyzed the samples.

LOCATION

The mine, offices and surface plant of the United Verde Branch of Phelps Dodge Corp. are situated a short distance west of the city of Jerome, Yavapai County, Ariz., in secs. 15 and 22, T. 16 N., R. 2 E. at an altitude of about 5,300 feet. Jerome is on the northeast slope of the Black Hills, facing the Verde Valley to the north. It is about 31 miles by U. S. Alternate Highway 89 northeast of Prescott and some 9 miles by the same road west of Cottonwood. Cottonwood and Clarkdale are situated near the Verde River while Jerome is some 2,000 feet higher on the northeast slope of the mountains.

Jerome formerly could be reached by railroad from Clarkdale, but this line now is being removed.

HISTORY

The original claims of the United Verde mine were located in 1876 by M. A. Ruffner. In 1882 the claims were purchased by the United Verde Copper Co. In 1888, Senator W. A. Clark of Montana became interested in the property. He purchased it in 1899. The mine finally was purchased by the present owner, Phelps Dodge Corp., in 1935.

The economical limits of mining were reached at the 4500-foot level and the mine was shut down in 1953. At the present time, lessees are producing some copper ore from the old open pit.

The pumps were pulled when the mine was closed and the area below the 1000-foot haulage level (Hopewell Tunnel) is being allowed to fill with water. All levels above this Hopewell Tunnel drain into it, so are dry, but the levels below this haulage tunnel eventually will be flooded.

GEOLOGY

^{3/} Dr. Louis E. Reber, Jr. describes the United Verde ore deposit as follows:

"The United Verde ore zone, as developed in the United Verde mine, consists of a very irregular pipelike body of massive sulphide, quartz, and mixed sulphide and rock, with a steep north-northwesterly plunge. Quartz predominates on the hanging wall or diorite side of the main sulphide mass, with the mixed material on the footwall or quartz-perphyry side. In plan the mineralized zone ranges from more than 500,000 square feet or about 12 acres to less than 300,000 square feet, with an average near 400,000 square feet. The massive sulphide itself has an average cross section of approximately 250,000 square feet.

^{3/} Previously mentioned in footnote 2.

"The downward trend of the ore zone is determined by a steeply dipping, very irregularly interfingering intrusive contact between rhyolitic quartz porphyry to the south and a series of banded tuffs and sedimentary material (bedded sediments) to the north. It is located where the average strike of the contact changes from northerly to northeasterly. The more regularly curving contact of the diorite mass, which approximately parallels the rhyolitic porphyry-bedded sediment contact, forms a clean-cut limit to the northerly or hanging-wall side of the ore zone. On the footwall or quartz-porphyry side the boundary is very irregular and interfingering, largely controlled by the schistosity of the porphyry, the average trend of which is about N. 10 degrees W. with steep easterly to vertical dips.

"In the upper part of the mine an embayment in the diorite and a band of relatively strong schistosity in the quartz porphyry combined to give the ore zone a roughly lenticular cross section, with the longer axis corresponding to the trend of the schistosity.

"In the lower levels the more open curve of the diorite, the less intense but more uniform schistosity of the quartz porphyry, the tendency of the schistosity to approach parallelism to the contact, and, no doubt, less irregularity in the original porphyry contact, were jointly responsible for the crescent-shaped outline of the ore zone with the elongation more or less paralleling the diorite and much less interfingering with the porphyry.

"Although other sulphides are present, the copper content of the ore as a rule depends on the abundance of chalcopyrite. Pyrite, generally with appreciable sphalerite, constitutes the sulphide gangue. Black chlorite rock, with some quartz porphyry and quartz, is the predominant rock gangue. About one seventh of the volume of the mineralized zone is commercial copper ore, and a somewhat smaller amount is possible low-grade zinc ore.

"As may be inferred from the preceding description of the structural features that control the form of the ore zone, the mineralization is very clearly of the replacement type. Characteristic structures and textures of the replaced rock are commonly preserved by the massive sulphide, and residual shreds of rock or unreplaced quartz phenocrysts are present in many places. Some evidence bearing on the former distribution of rock types in the ore zone aids the unraveling of the complicated history of the mineralization, which in turn serves to explain the occurrence and distribution of the commercial ore."

Since the above was written, the mine has been deepened to the 4500-foot level. Below the 3000-foot level the sulphide mass began to break up into downward-plunging fingers. Below the 4500-foot level these small masses did not contain enough copper to be commercial.

DIAMOND DRILL HOLE SAMPLES

After the General Services Administration had written to officials of Phelps Dodge Corp., regarding the possibility of finding a considerable amount of selenium within the massive sulphide mass at the United Verde mine, Dr. Louis E. Reber, Jr., geologist for that company, was sent to Jerome and spent several months there, checking over old diamond drill holes for sampling. Diamond drill holes were selected on the 700, 1200, 3000, and 4500-foot levels of the United Verde Mine, the Haynes area of the 3000-foot level, and the company-owned Equator-Copper Chief mine.

The entire core from diamond drill holes at the United Verde mine never was saved. After the core from a new diamond drill hole had been scanned or "read" by one of the mine geologists, areas were selected for sampling and carefully marked off. The core then was "skeletonized"; that is, a small piece, 1 to 2 inches in length, was removed every 5 feet where the material was uniform, or wherever the formation changed. These specimens then were stored in a special core rack and kept for a permanent record of the hole. The areas to be sampled were sacked and sent to the assay office, while the remainder of the core was dumped out.

Therefore, after Dr. Reber had selected holes for sampling, all he had to sample was a small 1 or 2 inch specimen of core that had been taken every 5 feet or whenever the formation changed. In

order to preserve part of these core specimens for the permanent record, Dr. Reber had each small specimen cut in half longitudinally with a diamond saw. One half then was replaced in the permanent core file and the other half was used for a sample. One hundred thirteen such samples were made up from 45 holes on the several mine levels mentioned above.

In order to explain the reasons for sampling the holes on the various levels as he did, Dr. Reber submitted the following:

"Diamond Drill Core Specimens for Selenium Test
of United Verde Ore Deposit"

"The present condition of the United Verde Mine, the negligible amount of ore and the relatively small amount of "near ore" material remaining in the deposits as well as the general evidence which offers little hope for more than a very low selenium content in such a deposit, are believed to make even the most obvious possibilities very remote, so far as the finding any significant amount of material with selenium values which might be of present economic interest are concerned. For this reason and because even the very low grade pyrite might come into the picture in the distant future, the test material has been chosen to throw as much light as possible on the tenor, distribution and most favored associations of selenium throughout the United Verde deposit, rather than to investigate only the most obvious possibilities such as hinge on association with at least "near ore" values in other constituents.

"The test sample material has been chosen to represent all of the most distinct types of mineralized ground in the United Verde ore deposit, a wide range of minor variants, including most of the range in mineral content, as well as the more or less complete range in copper, zinc, lead, (mercury), gold and silver content.

"Samples from the United Verde 700 and 1200 foot levels pertain specifically to the upper part of the main ore zone and those from the main 3000-foot level work give a fair cross section of the deeper part. Samples are included from the Equator sulphide body, the Haynes sulphide body and from the United Verde 4500 level primarily to make the type coverage as complete as possible.

"The descriptive lists and the tabulated assay data from the original core samples serve to classify the samples as to general type and significant constituents and furnish a worthwhile basis for comparison with the selenium determinations; even though the selenium in the relatively small specimen samples cannot be expected to give more than a rough measure of the selenium content of the original core samples. Determination of copper as well as selenium in the specimen samples will throw more light on the exact quantitative relation between copper and selenium, which may be of special interest.

"It is believed that the assay results should prove adequately conclusive (that is, conclusively negative or tentatively favorable) in regard to immediate possibilities (even the most far fetched), come as near to telling the complete story of selenium occurrence throughout the United Verde deposit as possible with the number of assays involved, throw some worth while light on the future possibilities of the deposit, and may comprise a worth while addition to the general knowledge of selenium occurrence in sulphide deposits."

The assay data as furnished by Dr. Reber, and the information about the samples, with analyses and descriptive material, are as follows:

EQUATOR - COPPER CHIEF MINE DIAMOND DRILL HOLE SAMPLES

Sample No.	Hole	Sample		Length, Ft.	Analysis		Description
		From	To		Selenium	Copper	
14507	9(-13°)	0	22	22	0.008	1.70	Massive sulphide - high zinc, medium low copper. Some covellite enrichment.
14508	9	22	40	18	0.038	2.25	Massive sulphide - high zinc, medium low copper. Some covellite enrichment.
14509	10(-34°)	23	47	24	<0.002	0.80	Massive sulphide - high zinc, low copper, maximum mercury.
14510	11(-13°)	0	25	25	0.008	0.75	Massive sulphide - medium zinc, medium low copper, minimum mercury. Some covellite enrichment.
14511	11	29	47	18	0.007	0.40	Massive sulphide - medium zinc, medium low copper, minimum mercury. Some covellite enrichment.
14512	17(30°)	0	18	18	<0.002	0.47	Massive sulphide - maximum lead, medium zinc, medium low copper
14513	18(13°)	0	17	17	<0.002	0.18	Massive sulphide - above average lead, medium low zinc, low copper.
14514	18	17	41	24	<0.002	0.81	Massive sulphide - maximum lead, high zinc, medium low copper
14515	23(-25°)	54	68	14	0.007	3.34	Massive sulphide - high zinc, medium copper, maximum mercury.

ASSAY DATA RELATIVE TO SELENIUM SAMPLES
EQUATOR-COPPER CHIEF

Equator No. 9 D. D. Hole. Southwesterly through Equator-Copper Chief sulphide body. Drilled at minus 13° from the 5th floor above the main Iron King tunnel level. Collar about 5597 ft. elevation. Nine specimens between 0 and 40 feet. Massive sulphide, somewhat leached and/or enriched. Traces of covellite.

ASSAYS 0 to 40 FT.

<u>Feet</u>	<u>Cu</u>	<u>Zn</u>	<u>Au</u>	<u>Ag</u>	<u>Specimens at - feet</u>
0 - 5	0.55	3.8	0.09	3.70	3
5 -10	1.88	20.9	0.06	3.66	7
10 -16	0.55	11.6	0.04	1.41	13
16 -22	1.85	22.8	0.05	2.08	18
22 -25	3.61	15.1	0.045	2.70	23
25 -32	4.39	21.4	0.095	2.36	26 & 30
32 -37	1.25	9.1	0.05	2.19	31
37 -40	0.65	5.3	0.065	2.32	40

Equator No. 10 D.D. Hole. Southwesterly through Equator-Copper Chief sulphide body. Minus 34° down hole from the 5th floor above the main Iron King tunnel level. Collar about 5596 ft. elevation. Five specimens between 23 and 47 feet. Massive sulphide, with relatively high zinc, low copper and maximum mercury.

ASSAYS 23 to 47 Ft.

<u>Feet</u>	<u>Cu</u>	<u>Zn</u>	<u>Au</u>	<u>Ag</u>	<u>As</u>	<u>Sb</u>	<u>Hg</u>	<u>Specimens at - feet</u>
23-25	0.42	22.2	0.02	2.44		0		23
25-30	0.56	18.7	0.03	1.98				27
30-35	0.56	14.1	0.06	2.16			0.06	32
35-40	0.65	15.8	0.12	2.50				37
40-47	1.12	9.7	0.10	2.68			0.05	42
Composite								
23-47	(0.66)	(16.1)	(0.07)	(2.35)	0.68	0.07	0.03	

Equator No. 11 D.D. Hole. Drilled about S.15° W. at minus 13°. Collar about 5597 ft. elevation. Seven specimens between 0 and 47 feet. Seven specimens between 0 and 47 feet. Massive Sulphide somewhat leached and or enriched. Some traces of covellite.

ASSAYS 0 to 47 FT.

Feet	Cu	Zn	Au	Ag	As	Sb	Pb	Hg	Specimens at - feet
0-7	0.49	3.2	0.06	2.42					7
7-10	1.23	4.0	0.06	1.04					10
10-15	1.47	5.9	0.04	1.07					20
15-20	1.46	9.7	0.04	1.81					—
20-25	1.20	6.6	0.05	1.77					—
Dike									
29-38	1.28	7.6	0.05	1.46					32
38-41	0.65	1.2	0.05	1.57					39
41-47	0.67	2.1	0.08	2.12					42 & 47
Composites									
0-25	(1.17)	(5.9)	(0.05)	(1.62)	0.01	0.22	0.63	0.00	
29-47	(0.86)	(3.6)	(0.06)	(1.72)	0.15	0.16	0.38	0.03	

Equator No. 17 D.D.Hole. Drilled S. 7½° W., at about 30° up from the Iron King tunnel, through the Equator-Copper Chief sulphide body. Collar at about 5576 feet elevation. Four core specimens between 0 and 18 feet. Massive sulphide with maximum lead, medium zinc and medium lowcopper.

ASSAYS 0 to 18 FT.

Feet	Cu	Zn	Au	Ag	As	Sb	Pb	Hg	Specimens at - feet
0-5	0.79	7.8	0.05	2.20					1
5-11	0.31	7.7	0.05	1.71					8
11-18	0.74	10.9	0.06	1.88					14 & 17
Composite									
0-18	(0.61)	(8.8)	(0.05)	(1.93)	0.03	0.21	1.18	0.04	

Equator No. 18 D.D. Hole. South-southwesterly through the Equator-Copper Chief sulphide body at about 14° up from the Iron King tunnel level. Collar at about 5575 feet elevation. Ten core specimens between 0 and 41 feet. Massive sulphide with specially "high" lead and varying Zn and copper.

ASSAYS 0 TO 41 FT.

<u>Feet</u>	<u>Cu</u>	<u>Zn</u>	<u>Au</u>	<u>Ag</u>	<u>As</u>	<u>Sb</u>	<u>Pb</u>	<u>Hg</u>	<u>Specimens at - feet</u>
0-6	0.20	2.5	0.03	1.97					0 & 5
6-11	0.14	2.4	0.04	1.86					10½
11-17	0.18	5.4	0.04	1.98					16
17-23	0.91	14.7	0.04	1.80					19 & 20
23-26	0.98	15.3	0.05	1.80					26
26-31	0.55	7.1	0.05	1.75					29
31-36	0.83	13.9	0.06	1.50					35
36-41	0.85	13.3	0.06	1.52					40
Composites									
0-17	(0.17)	(3.4)	(0.04)	(1.94)	0.17	Tr	0.88	0.02	
17-41	(0.82)	(12.9)	(0.05)	(1.67)	0.32	Tr	0.87	0.05	

Equator No. 23 D.D. Hole. Southwesterly through the Equator-Copper Chief sulphide body at about 25° down from the fifth floor above the Iron King tunnel level. Collar at about 5597 feet elevation. Four core specimens between 54 and 68 feet. Massive sulphide with relatively high zinc, medium copper and maximum mercury.

ASSAYS 54 to 68 FT.

<u>Feet</u>	<u>Cu</u>	<u>Zn</u>	<u>Au</u>	<u>Ag</u>	<u>As</u>	<u>Sb</u>	<u>Pb</u>	<u>Hg</u>	<u>Specimens at - feet</u>
54-59	0.74	24.2	0.05	1.69					55
59-64	1.04	13.7	0.07	2.03					60
64-68	3.16	13.1	0.26	3.74					65 & 67
Composites									
50-64	(0.96)	(19.3)	(0.05)	(1.82)	0.29	0.19	0.51	0.07	
64-72½	(2.80)	(8.0)	(0.17)	(3.85)	0.41	0.12	0.41	0.07	

UNITED VERDE MINE - 700-LEVEL DIAMOND DRILL HOLE SAMPLES

Sample No.	Hole	Sample			Analyses		Description
		From - To	Length, Ft.	Selenium	Copper		
14516	14-K-4	0 - 20	20	<0.002	0.31	Massive sulphide - high zinc, low copper (less than 0.5%) and much better than average silver and gold.	
14517	14-K-4	20 - 40	20	0.013	1.89	Massive sulphide - high zinc, medium low copper and better than average silver and gold.	
14518	14-K-4	40 - 65	25	0.020	5.53	Massive sulphide - medium low zinc, high copper and exceptional silver and gold.	
14519	15-L-1	55 - 74	19	0.036	0.24	Massive sulphide - medium zinc (?), medium copper.	
14520	15-L-1	74 - 95	21	0.031	0.21	Massive sulphide - medium zinc (?), medium low copper.	
14521	15-L-1	95 - 115	20	0.013	1.23	Massive sulphide - medium zinc (?), medium low copper.	
14522	15-L-1	115 - 135	20	0.038	0.50	Massive sulphide - medium zinc (?), medium low copper.	
14523	15-L-7 (25° up)	0 - 20	20	0.007	0.10	Massive sulphide - low zinc (?), very low copper, fine texture	
14524	15-L-7	20 - 40	20	0.013	0.60	Massive sulphide - low zinc (?), medium low copper, more granular texture.	
14525	15-L-7	40 - 70	30	0.013	0.15	Massive sulphide - low zinc (?), low copper, somewhat granular texture	
14526	15-L-7	75 - 100	25	0.032	0.34	Massive and siliceous sulphide - copper ore and fringe, medium low zinc.	

UNITED VERDE MINE - 700 LEVEL DIAMOND DRILL HOLE SAMPLES

Sample No.	Hole	Sample		Length, Ft.	Analyses		Description
		From	To		Selenium	Copper	
14527	17-M-2 (3½°)	10-	35	25	0.008	3.56	Quartz, siliceous sulphide and schist ore.
	17-M-3 (-2°)	10	- 35	25			Like above. Holes 1 to 3 feet apart so only 1 sample.
14528	18-J-2 (-25°)	0	- 26	26	0.022	10.8	Mineralized black schist and porphyry ore
14529	18-J-2	41	- 60	19	0.013	3.55	Black schist with spotty chalcopyrite.
14530	18-J-2	60	- 77	17	0.006	0.58	Lean Black schist.
14531	18-J-2	85	- 105	20	< 0.002	0.65	Slightly mineralized quartz porphyry.
14532	18-J-4 (-60°)	0	- 25	25	0.007	1.89	Black Schist ore.
14533	18-J-4	35	- 62	32	0.021	12.0	Black Schist. Very good copper, and better than average silver.

ASSAY DATA RELATIVE TO SELENIUM SAMPLES UNITED VERDE 700 FOOT LEVEL

14 - K - 4 (20° down hole)

<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Oz. Au</u>	<u>Oz. Ag</u>	<u>Specimens at - feet</u>
0-5	0.3	17.5	0.08	4.30	0
5-10	0.2	19.4	0.07	1.40	5
10-15	0.3	22.9	0.06	2.90	10
15-20	0.3	20.8	0.06	2.20	15
20-25	0.4	16.9	0.06	2.90	20
25-30	0.3	20.1	0.04	1.90	25
30-35	3.0	11.8	0.04	2.00	30
35-40	3.7	7.5	0.04	3.00	35 & 40
40-45	5.6	5.5	0.04	3.60	45
45-50	6.2	3.4	0.04	4.40	50
50-55	4.4	3.4	0.08	6.20	55
55-60	5.1	3.6	0.06	8.00	60
60-65	5.6	3.8	0.04	3.70	65
65-68	3.0	4.8	0.03	1.40	
End					

15-L-7

	<u>Cu</u>	<u>Zn</u>	<u>Au</u>	<u>Ag</u>	<u>SiO₂</u>	<u>Fe</u>	<u>Al₂O₃</u>	<u>S</u>	<u>MgO</u>
80 to 95 ft.	4.09	3/8	0.04	3.20	35.6	24.0	1.5	25.4	3.68

15-L-1			15-L-1 Continued		
<u>Feet</u>	<u>% Cu</u>	<u>Specimens at - feet</u>	<u>Feet</u>	<u>% Cu</u>	<u>Specimens at - feet</u>
0-5	0.40		74-80	0.70	75
5-10	0.40		80-85	0.40	80
10-15	0.35	13	85-90	0.70	85
15-20	0.35	17	90-95	0.45	90, 95
20-25	0.40	23	95-100	0.65	99
25-30	0.50	26, 30	100-105	0.70	100
30-35	0.90		105-110	0.65	105
35-40	0.86	35	110-115	0.65	110
40-45	0.45	40	115-120	1.10	115, 117
45-50	0.35	45	120-125	0.85	120
50-55	0.50	50	125-130	1.15	125
55-58	1.00	55	130-135	1.80	130
58-63	2.30	60	135-143	2.65	
63-68	1.65	64, 65			
68-72	1.00	70			
72-74	3.10	—			

All but first 15 feet once figured in "6½% zinc ore area". Composite for full 143 feet gave Cu 0.9, Zn 5.3, Au 0.005, Ag 0.92, SiO₂ 5.0 and Fe 38.8%.

17-M-2 (3½° up)

<u>Feet</u>	<u>% Cu</u>	<u>Specimens at - feet</u>
0-5	0.80	
5-10	1.65	
10-15	0.40	10, 15
15-20	1.00	19
20-25	4.25	23
25-30	11.35	27
30-35	5.85	35
35-40	2.50	

17-M-3 (2° down)

<u>Feet</u>	<u>% Cu</u>	<u>Specimens at - feet</u>
0-5	1.35	
5-10	1.35	
10-15	1.00	14
15-20	1.20	18
20-25	3.05	22
25-30	16.05	30
30-35	2.10	
35-40	1.30	

Two holes close together

18 - J - 2 (25° down)

<u>Feet</u>	<u>% Cu</u>	<u>Oz. Au</u>	<u>Oz. Ag</u>	<u>Specimens at - feet</u>
0-6	2.9	Tr	0.60	5
6-10	0.8	Tr	0.20	6
10-13	10.2	0.01	0.90	10, 13
13-18	12.3	0.01	1.30	15
18-23	14.9	0.005	2.10	20
23-26	2.4	Tr	0.90	<u>26</u>
26-30	2.3	Tr	0.20	
30-32	1.2	0.72	0.30	
32-41	—	Dike		
41-47	0.9	Tr	Tr	<u>45</u>
47-49	10.1	Tr	0.80	48
49-55	0.3	Tr	0.10	50
55-60	0.3	Tr	0.20	<u>55</u>
60-65	1.2	Tr	0.40	60
65-69	0.2	Tr	0.10	65
69-72	1.2	0.01	0.60	70
72-77	0.3	0.01	0.30	<u>75</u>
77-82	0.0	Tr	0.40	
82-85	1.6	0.01	1.20	
85-95	0.2	0.015	0.30	<u>85, 90</u>
95-100	0.4	0.01	0.40	95, 100
100-105	2.3	0.01	0.90	<u>105</u>
105-110	0.0	0.005	0.30	
110-117	0.0	0.005	0.30	
End				

18 - J - 4 (60° down)

<u>Feet</u>	<u>% Cu</u>	<u>Oz. Au</u>	<u>Oz. Ag</u>	<u>Specimens at - feet</u>
0-5	0.6	Tr	0.20	5
5-11	4.2	Tr	0.70	10
11-16	— Dike	—	—	—
16-21	6.6	Tr	1.10	15,19
21-25	4.7	Tr	0.70	<u>21,25</u>
25-30	— Dike	—	—	—
30-35	6.9	0.01	1.30	30
35-40	12.3	0.005	1.60	35
40-45	13.9	0.005	2.30	40
45-50	9.2	0.005	1.20	
50-55	6.8	0.01	0.90	50
55-62	10.1	0.01	1.90	<u>60</u>
62-72	— Dike	—	—	—
72-73	1.6	0.01	1.20	
73-74	— Dike	—	—	
74-77	1.0	0.005	0.40	
End				

UNITED VERDE MINE - 1200 LEVEL DIAMOND DRILL HOLE SAMPLES

Sample No.	Hole No.	Sample		Analysis		Description
		From - To	Length, Ft.	Selenium	Copper	
14534	10-N-3	0 - 25	25	0.016	0.99	Massive sulphide - medium low copper, no zinc.
14535	10-N-3	25 - 50	25	0.015	0.76	Massive sulphide - medium low copper, no zinc.
14536	10-N-4	0 - 25	25	0.020	0.95	Massive sulphide - medium low copper, low zinc.
14537	10-N-4	25 - 50	25	0.018	0.57	Massive and siliceous sulphide - medium low copper, low zinc.
14538	10-F-2	0 - 15	15	0.006	0.12	Massive sulphide, trace of black schist - trace copper, high zinc.
14539	10-P-2	15 - 25	10	0.007	0.20	Massive sulphide, trace of black schist - low copper, high zinc.
14540	10-P-2	25 - 45	20	0.013	0.35	Massive sulphide, trace of black schist - trace of copper, high zinc.
14541	10-P-2	45 - 75	30	0.008	0.19	Massive sulphide, trace of black schist - low copper, high zinc.
14542	14-O-1	50 - 65	15	0.002	0.07	Massive sulphide - trace of copper, medium zinc, exceptional lead.
14543	14-O-1	65 - 81	16	0.007	0.10	Massive sulphide - trace of copper, medium zinc, very exceptional lead.
14544	16-L-2	20 - 40	20	0.006	0.08	Massive sulphide - medium low copper, low zinc.
14545	16-L-2	40 - 60	20	0.007	0.07	Massive sulphide - medium low copper, low zinc.

UNITED VERDE MINE - 1200 LEVEL DIAMOND DRILL HOLE SAMPLES

Sample No.	Hole No.	Sample		Analysis		Description
		From - To	Length, Ft.	Selenium	Copper	
14546	16-N-2	0 - 20	20	0.055	0.30	Predominant pyrite in black schist gangue - low copper, low zinc, pseudo breccia.
14547	16-0-2	0 - 29.5	29.5	0.007	0.65	Black to grey schist with very fine pyrite - medium low copper, low zinc.
14548	16-0-2	29.5 - 47	17.5	0.029	1.55	Heavy pyrite in black schist gangue, a little "Quartz-Carbonate" - medium low copper, medium zinc.
14549	16-0-2	200 - 215	15	< 0.002	0.06	Massive sulphide with residual black schist and trace of "Quartz-Carbonate" - low copper, medium low zinc and some lead.
14550	16-0-2	215 - 225	10	0.003	0.05	Massive sulphide with residual black schist and trace of "Quartz-Carbonate" - low copper, medium zinc and exceptional lead.

UNITED VERDE MINE - 1200 LEVEL 20th FLOOR, DIAMOND DRILL HOLE SAMPLES

Sample No.	Hole No.	Sample		Analysis		Description
		From - To	Length, Ft.	Selenium	Copper	
13201	16-K-7	0 - 20	20	0.040	1.35	Massive sulphide, Quartz-Carbonate and residual black schist-medium low copper, low zinc.
13202	16-K-7	20 - 28	8	0.038	1.80	Black schist and massive sulphide - medium low copper, very low zinc.
13203	16-K-7	28 - 33.5	5.5	0.027	0.15	Black schist with heavy pyrite - medium.

ASSAY DATA RELATIVE TO SELENIUM SAMPLES UNITED VERDE 1200 FOOT LEVEL

1200 LEVEL

10 - N - 3

0 to 75 feet

<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Specimens at - feet</u>
0-5	1.2	Nil	1
5-10	1.4	Nil	5
10-15	1.0	Nil	10
15-20	1.1	Nil	15
20-25	1.2	Nil	<u>20</u>
25-30	1.0	Nil	25
30-35	0.9	Nil	30
35-40	0.8	Nil	35
40-45	0.8	Nil	40
45-50	0.7	Nil	<u>50</u>
50-55	0.7	Nil	55
55-60	0.5	Tr	60
60-65	0.6	Tr	65
65-70	0.7	Nil	70
70-75	0.5	0.3	<u>75</u>

10 - N - 4

0 to 45 feet

<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Specimens at - feet</u>
0-5	1.0	Tr	5
5-10	1.0	0.5	5
10-15	0.7	Tr	10
15-20	0.7	1.4	15
20-25	0.8	0.9	<u>20</u>
25-30	0.9	0.5	25
30-35	0.9	0.3	30
35-40	0.5	1.2	35
40-45	0.8	2.4	40
45-50	0.4	1.0	<u>45</u>

1200 LEVEL

10 - P - 2
5 to 140 feet

<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Specimens at - feet</u>
0- 2	Dike	---	
2- 5	Tr	10.6	5
5-10	Tr	5.8	10
10-15	Tr	8.0	<u>15</u>
15-20	0.5	10.4	20
20-25	0.4	12.3	<u>25</u>
25-30	Tr	12.6	30
30-35	Tr	9.6	35
35-40	Tr	9.2	40
40-45	Tr	7.8	<u>42</u>
45-50	0.8	9.9	45
50-55	0.6	10.0	50
55-60	Tr	5.3	55
60-65	Tr	8.7	60
65-70	0.4	8.3	65

10 - P 2 continued

<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Specimens at - feet</u>
70- 75	Tr	7.9	<u>70</u>
75- 80	Tr	8.8	<u>75</u>
80- 85	0.5	10.9	80
85- 90	Tr	0.5	85
90- 95	0.6	8.7	90
95-100	Tr	6.3	<u>95</u>
100-105	0.6	7.4	100
105-110	0.9	8.3	105 & 108
110-115	0.5	7.7	110
115-120	0.3	5.9	<u>115</u>
120-125	0.6	7.0	120
125-130	Tr	9.4	125
130-135	0.5	9.1	130
135-140	0.5	5.8	135 & 140

1200 Level

14 - 0 - 1

<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>% Pb</u>	<u>Specimens at - feet</u>
40-45	Tr	6.2	Nil	
45-50	Tr	4.7	0.3	
50-55	Tr	3.2	1.0	<u>50, 55</u>
55-56	Dike			
56-60 MS	Tr	5.7	0.5	60
60-65	Tr	3.4	1.0	
65-70	Tr	4.6	1.3	<u>65, 70</u>
70-75	Tr	6.7	3.7	75
75-81	Tr	5.9	1.4	<u>80</u>
End				

16- L - 2

<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Specimens at - feet</u>
15-20	0.7	Nil	—
20-25	0.5	Nil	25
25-30	1.7	1.5	30
30-35	1.1	1.0	35
35-40	1.3	0.9	<u>40</u>
40-45	1.0	2.3	45
45-50	1.0	2.0	50
50-55	0.8	2.8	55
55-60	1.2	Tr	<u>58, 59</u>
60-65	0.5	1.4	

16 - N - 2

<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Specimens at - feet</u>
0 - 5	0.5	Nil	5
5-10	0.3	0.2	10
10-15	0.7	2.5	15
15-20	Tr	4.8	<u>18</u>
	Dike		
23 $\frac{1}{2}$ -28	Tr	0.6	

1200 LEVEL

16-0-2

<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>% Pb</u>	<u>Specimens at - feet</u>
0 - 5	0.4	Nil		5
5 -10	0.4	Nil		10
10 -15	0.5	Nil		15
15 -20	0.5	Nil		20
20 -23 $\frac{1}{2}$	0.5	Tr		
23 $\frac{1}{2}$ -26 $\frac{1}{2}$	4.1	6.6		24
26 $\frac{1}{2}$ -29 $\frac{1}{2}$	1.8	2.2		<u>28</u>
29 $\frac{1}{2}$ -35	2.4	4.5		30
35 -40	1.7	4.7		35
40 -42 $\frac{1}{2}$	1.3	17.9		
42 $\frac{1}{2}$ -46	1.0	4.4		43
46 -47	1.2	6.2		<u>46$\frac{1}{2}$</u>
47 -48	0.8	2.3		
48 -57	0.5	Nil		
57 -60	0.5	7.8		
180-190	Tr	Porphyry		
190-197	Tr	Porphyry		
197-200	0.4	1.6	Nil	
200-205	Tr	3.1	0.5	<u>201</u>
205-210	0.4	4.7	Nil	205
210-215	0.2	4.1	0.5	<u>210</u>
215-220	0.2	5.7	0.8	215
220-225	0.2	5.7	0.9	<u>220-225</u>
225-230	Tr	2.3	Nil	
230-232	Tr	1.7	Nil	

End

1200 PLUS 20 (Twentieth Floor)

16 - K - 7 0 to 33 Feet (Dike at 35)

<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Specimens at - feet</u>
0 - 5	0.5	Nil	0
5 -10	0.5	0.7	5
10 -15	0.4	0.9	10
15 -20	1.1	1.3	<u>15</u>
20 -21 $\frac{1}{2}$	1.4	0.2	20, 21
21 $\frac{1}{2}$ -28	1.9	Nil	<u>22, 25</u>
28 -33 $\frac{1}{2}$	1.7		<u>28, 29, 30, 33</u>
33 $\frac{1}{2}$ -34 $\frac{1}{2}$	Dike		

UNITED VERDE MINE - 3000 LEVEL DIAMOND DRILL HOLE SAMPLES

Sample No.	Hole No.	Sample		Analysis		Description
		From - To	Length, Ft.	Selenium	Copper	
13204	6-T-1	0 - 30	30	0.008	1.40	Massive sulphide - generally fine grained. Copper ore with medium high zinc.
13205	6-T-1	30 - 60	30	0.063	0.35	Massive sulphide - sphalerite veinlets in fine grained pyrite. Low copper with medium high zinc
13206	7-U-1	0 - 35	35	0.034	1.20	Massive sulphide - fine to medium grained. Spotty high copper or zinc values
13207	7-U-1	35 - 75	40	0.031	2.95	Massive sulphide - fine to medium grained. Copper ore and low grade with medium high zinc
13208	7-U-1	75 - 115	40	0.003	0.05	Massive sulphide - fine to medium grained. Low copper and high zinc.
13209	7-U-4	0 - 19	19	0.074	10.8	Massive sulphide - with traces of black schist. High copper and low zinc.
13210	7-U-4	19 - 23.5	4.5	0.012	3.15	Siliceous sulphide and quartz-low values.
13211	8-V-2	30 - 50	20	< 0.002	0.20	Siliceous massive sulphide - uneven streaky texture. Trace of copper and zinc. Trace of specularite.
13212	9-V-11	0 - 15	15	0.027	13.5	Black schist - with abundant chalcopyrite. High-grade copper ore.

UNITED VERDE MINE - 3000 LEVEL DIAMOND DRILL HOLE SAMPLES

Sample No.	Hole No.	Sample		Analyses		Description
		From - To	Length, Ft.	Selenium	Copper	
13213	9-V-11	16-48	32	0.011	0.75	Black schist - with considerable pyrite and some chalcopyrite, with quartz - carbonate locally. About 2% copper.
13214	9-V-11	48-68	20	0.036	13.9	Black schist - about like 0 to 15 feet. High-grade copper.
13215	9-V-11	68-89	21	0.018	3.40	Black schist, about like preceding. High-grade copper.
13216	9-V-11	89-113	24	0.033	12.1	Black schist, with considerable quartz-carbonate and some pyrite - less than 1% copper ("Quartz-carbonate" is finely intergrown quartz and dolomite and/or calcite).
13217	10-W-4	58-78	20	0.008	1.35	Quartz porphyry (?), hard gray siliceous with some pyrite and spotty chalcopyrite and quartz-carbonate.
13218	10-W-4	101-120	19	0.011	2.00	Black schist, with very fine thready chalcopyrite and fine pyrite, and considerable quartz-carbonate-marginal ore.
13219	10-W-4	129-144	15	0.019	2.50	Black schist - similar to preceding but with faint trace of residual quartz porphyry.

UNITED VERDE MINE - 3000 LEVEL DIAMOND DRILL HOLE SAMPLES

Sample No.	Hole No.	Sample		Analysis		Description
		From - To	Length, Ft.	Selenium	Copper	
13220	10-X-2	104.5-135	30.5	0.025	0.80	Massive sulphide, with some quartz - medium copper (2%), very low zinc.
13221	10-X-2	175 -196	11	0.014	0.25	Siliceous sulphide, medium grained pyrite with finely intergrown quartz. Low copper and medium high zinc (7%).
13222	10-X-2	186 -210	24	0.002	0.10	Siliceous sulphide, with streaky quartz and pyrite. Trace of copper and medium zinc (6%).
13223	11-U-1	375 -395	20	0.042	6.4	Black schist, with quartz-carbonate, pyrite and chalcopryrite, 4% copper ore.
13224	11-U-1	395 -416	21	0.060	4.10	Black schist and massive sulphide-abundant fine-grained pyrite. 5% copper ore with 0.5% zinc.
13225	11-U-1	475- 490	15	0.132	0.75	Massive sulphide, medium fine-grained pyrite with traces of quartz- low copper and medium zinc.
13226	11-W-1	0. - 20	20	0.027	2.20	Black schist with sparse, fine-grained pyrite and chalcopryrite - medium copper (2.5%).
13227	11-W-1	20 - 47	27	0.017	5.35	Black schist, similar to preceding plus scattering, patchy quartz-carbonate and more very fine chalcopryrite - high copper (5.5%).

UNITED VERDE MINE - 3000 LEVEL DIAMOND DRILL HOLE SAMPLES

Sample No.	Hole No.	Sample		Analysis		Description
		From - To	Length, Ft.	Selenium	Copper	
13228	11-W-1	47 - 70	23	0.012	2.55	Black schist with quartz-carbonate veinlets and spotty chalcopyrite - medium low copper (1.6%)
13229	11-W-1	70 - 96.5	26.5	0.008	3.05	Black schist with some quartz-carbonate, very spotty chalcopyrite and fine-grained pyrite - low to high copper.
13230	12-W-4	92.5-108	15.5	0.033	1.05	Massive sulphide, generally clean fine-grained pyrite with some faint hairline streaks which may be dark sphalerite - 1.5% copper and 5% zinc.
13231	12-W-4	108 - 110.5	2.5	0.025	0.30	Siliceous massive sulphide, medium fine pyrite with finely intergrown quartz-0.76% copper and 2% zinc.
13232	12-W-4	200 - 220	20	<0.002	0.10	Siliceous massive sulphide, medium pyrite with quartz more uneven - 0.1% copper and 5% zinc.
13233	12-W-4	220 - 235	15	0.006	0.20	Siliceous massive sulphide, similar to last, but 0.2% copper and 9% zinc.
13234	13-W-4	165 - 180	15	0.014	0.15	Massive sulphide, generally fine-grained pyrite with some faint hairline streaks which may be dark sphalerite - very low copper with 4% to 5% zinc.

UNITED VERDE MINE - 3000 LEVEL DIAMOND DRILL HOLE SAMPLES

Sample No.	Hole No.	Sample		Analysis		Description
		From - To	Length, Ft.	Selenium	Copper	
13235	13-W-4	180 - 195	15	0.039	0.10	Massive sulphide like preceding.
13236	16-U-3	0 - 25	25	< 0.002	0.10	Black schist with some quartz-carbonate and relatively little sulphide - nearly 0.5% copper?
13237	16-U-3	25 - 53	28	0.015	4.75	Black schist, very clean schist with local bunches of pure (?) chalcopyrite - 0 to 10% copper.
13238	5-Q-1	0 - 23	23	0.008	2.00	Quartz porphyry - copper ore (about 5%)
13239	5-Q-1	23 - 50	27	< 0.002	0.10	Quartz porphyry and black schist - very low grade (0.2%) with sparse pyrite.
13240	5-Q-1	85 - 114	29	0.038	4.75	Massive sulphide, relatively clean and fine grained - copper ore (about 5%).

ASSAY DATA RELATIVE TO SELENIUM SAMPLES . UNITED VERDE 3000 FOOT LEVEL

3000 LEVEL

6 - T - 1 Massive Sulphide

0 to 65 feet

<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Specimens at - feet</u>
0 - 4	Dike		
4 -10	3.1	5.9	5
10 -15	3.9	8.0	
15 -20	4.1	7.0	20
20 -25	2.5	5.5	
25 -30	1.6	8.9	<u>30</u>
30 -35	Tr	7.9	
35 -40	Tr	5.6	32
40 -45	1.7	6.6	40
45 -50	0.5	7.2	50
50 -55	Tr	10.4	54
55 -60	1.7	8.1	<u>60</u>
60 -65	1.3	7.6	

55

3700 LEVEL. Massive Sulphide

0 to 117 feet

<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Specimens at - feet</u>	<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Specimens at - feet</u>
0 - 5	11.5	0.0	1	60-65	5.4	5.4	65
5 -10	6.6	4.3	5	65-70	2.9	7.1	
10 -15	1.1	15.3	10	70-75	Tr	5.6	<u>75</u>
15 -20	0.8	4.6	15	75-80	Tr	5.2	
20 -25	0.8	0.8	20	80-85	Tr	5.0	85
25 -30	0.5	0.9	30	85-89	0.4	2.6	89
30 -35	3.6	4.8	<u>35</u>	91 $\frac{1}{2}$ -95	0.5	10.4	95
35 -40	1.2	3.1	40	95-100	Tr	7.0	100
40 -45	0.8	1.4	45	100-105	0.6	10.1	105
45 -50	1.5	5.0		105-110	0.7	7.4	110
50 -55	3.9	3.7	55	110-115	Tr	9.4	<u>115</u>
55 -60	3.5	3.5	59	115-117	Tr	7.1	

3000 LEVEL

7 - U - 4 Massive Sulphide
0 to 68 feet

<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Oz. Au</u>	<u>Oz. Ag</u>	<u>Specimens at - feet</u>
0 - 5	11.70	0.8	0.06	3.50	1
5 - 10	9.14	0.5	0.05	1.90	10
10 - 13	9.28	0.5	0.03	0.80	
13 - 17	7.78	0.6	0.07	0.75	15
17 - 18	5.15	0.5	0.02	1.20	18
18 - 18	6.64	1.1	0.05	0.70	1
19 - 23 $\frac{1}{2}$	0.61	1.2	0.01	0.20	<u>20, 23</u>
23 $\frac{1}{2}$ - 27	6.77	1.4	0.02	3.60	
27 - 30	2.24	0.9	0.02	1.70	
30 - 35	22.31	3.7	0.02	1.00	
35 - 40	4.59	3.8	Tr	0.70	<u>40</u>
40 - 45	1.69	4.0	0.01	0.30	45
45 - 50	3.33	3.5	0.02	0.90	<u>50</u>
50 - 55	0.63	6.2	0.02	1.10	55
55 - 60	0.29	4.1	0.02	Tr	60
60 - 65	0.23	12.5	0.01	0.30	65
65 - 68	0.29	8.2	0.01	Tr	<u>68</u>

End

3000 LEVEL

8 - V - 2 Siliceous Massive Sulphide

<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Specimens at - feet</u>
30 - 35	Tr	Tr	30
35 - 40	Tr	0.0	35
40 - 45	Tr	Tr	40
45 - 50	Tr	Tr	<u>45, 50</u>

3000 LEVEL

9 - V - 11 10th Floor Black Schist 0 to 113 feet				
Feet	% Cu	Oz. Au	Oz. Ag	Specimens at - feet
0-5	11.0	0.01	1.80	0, 5
5-10	17.3	0.01	1.20	10
10-15	5.8	0.01	3.00	<u>15</u>
15-16	Dike			
16-21	2.5	0.005	0.50	20
21-26	2.0	0.005	0.20	25
26-31	2.1	Tr	0.25	30
31-36	3.2	0.01	0.50	35
36-43	0.8	Tr	0.05	
43-48	1.4	Tr	0.10	<u>45</u>
48-53	9.0	Tr	0.95	50
53-58	5.6	Tr	Tr	55
58-63	5.1	0.005	0.15	60
63-68	17.9	0.01	1.05	<u>65</u>
68-73	10.1	0.01	0.80	70
73-78	7.7	0.005	0.95	75
78-83	10.4	0.005	0.80	80
83-89	8.0	0.005	0.60	<u>85</u>
89-94	0.8	Tr	Tr	90
94-99	1.6	Tr ³⁰	0.30	95
99-104	0.8	Tr	Tr	100
104-109	1.2	Tr	0.20	105
109-113	0.6	Tr	0.25	<u>110, 113</u>

3000 LEVEL

10 - W - 4 Porphyry and Schist 55 to 78 feet and 101 to 148 feet				
Feet	% Cu	Oz. Au	Oz. Ag	Specimens at - feet
55-58	Dike			
58-61	1.38	Tr	0.20	<u>59</u>
61-65	0.93	Tr	0.10	62
65-67	0.45	Tr	0.10	65
67-70	6.95	0.01	Tr	69
70-75	1.00	Tr	0.25	72
75-78	0.19	Nil	Tr	<u>76</u>
101-105	0.43	Tr	0.35	<u>105</u>
105-110	0.68	Tr	0.15	110
110-115	1.21	0.01	0.50	115
115-120	2.23	0.01	0.60	<u>120</u>
120-125	4.28	0.02	1.20	
125-129	0.92	0.03	1.50	
129-132	1.60	Tr	0.30	<u>130</u>
132-133 ¹ / ₂	Dike			
133 ¹ / ₂ -137	1.67	0.01	1.85	135
137-140	3.80	0.02	2.85	140
140-144	3.85	0.02	3.40	<u>144</u>
144-148	0.10	Tr	0.30	

3000 LEVEL

10 - X - 2 Siliceous Sulphide (etc.)
78½ to 104½ feet and 170 to 210 feet

Feet	% Cu	% Zn	Specimens at - feet	Feet	% Cu	% Zn	Specimens at - feet
78½-104½	Dike			170-175	Tr	0.7	
104½-110	1.4	Tr	110	175-180	Tr	5.9	176
110-115½	1.8	Nil	115	180-182½	0.9	6.4	180
115½-120	6.5	Nil	119	182½-183	Dike		
120-125	Tr	Nil	122	183-186	0.9	8.5	186
125-130	1.2	0.6	125,130	186-190	Dike		
130-135	1.2	0.2	135	190-195	Tr	5.8	190
135-138½	2.7	0.4		195-200	Tr	8.4	195
				200-205	Tr	5.0	200
				205-210	Tr	6.2	210

COMPOSITE

175-210	<u>Cu</u> 0.44	<u>Zn</u> 6.4	<u>Pb</u> Nil	<u>Au</u> 0.01	<u>Ag</u> 1.09	<u>Fe</u> 31.0	<u>S</u> 33.0	<u>SiO₂</u> 24.6	<u>Al₂O₃</u> 1.2	<u>MgO</u> 1.1	<u>CaO</u> 0.4
---------	-------------------	------------------	------------------	-------------------	-------------------	-------------------	------------------	--------------------------------	---	-------------------	-------------------

3000 LEVEL

12 - U - 1 Black Schist
370 to 418 feet and 465 to 506 feet

Feet	% Cu	% Zn	Specimens at - feet	Feet	% Cu	% Zn	Specimens at - feet
370-375	0.8			465-473	0.7		
375-377½	1.4		375	473-480	0.7	6.2	475
377½-380	5.4		380	480-485	Tr	3.6	480
380-385	2.7			485-490	Tr	4.8	485
385-390	6.6		390	490-495	0.3	7.0	490
390-395	5.7		395	495-500	0.8	5.0	495
395-400	4.9		400	500-506	0.9	3.5	500
400-405	8.0	0.9	405				
405-408	4.9	0.8	408				
408-410	5.4	0.4	410				
410-416	4.0	0.5	415				
416-418	Tr	2.5					

3000 LEVEL

11 - U - 1 Black Schist
370 to 418 feet and 465 to 506 feet.
COMPOSITES

	<u>Cu</u>	<u>Zn</u>	<u>Pb</u>	<u>Au</u>	<u>Ag</u>	<u>Fe</u>	<u>S</u>	<u>SiO₂</u>	<u>Al₂O₃</u>	<u>MgO</u>	<u>CaO</u>
377 $\frac{1}{2}$ -416	5.27	0.3	Nil	0.01	0.49	25.3	26.0	7.2	6.7	2.4	5.1
473 -500	0.64	5.3	Nil	0.01	0.49	36.00	41.2	2.6	1.4	3.7	3.6

11 - W - 1
0 to 133 feet

<u>Feet</u>	<u>% Cu</u>	<u>Oz. Au</u>	<u>Oz. Ag</u>	<u>Specimens at - feet</u>	<u>Feet</u>	<u>% Cu</u>	<u>Oz. Au</u>	<u>Oz. Ag</u>	<u>Specimens at - feet</u>
0-2	3.87	0.01	2.10	1	68-70	3.22	0.005	0.80	70
2-6	2.59	0.005	1.30	5	70-74	2.22	0.005	1.00	
6-10	0.74	Tr	0.30	10	74-79	7.42	0.005	1.00	75
10-15	2.96	Tr	0.95	15	79-84	1.69	0.005	0.50	80
15-20	1.42	Tr	0.10	20	84-88	0.74	0.005	0.80	85
20-25	8.44	Tr	0.60	25	88-91	1.02	0.005	0.50	90
25-30	4.88	Tr	0.50	30	91-95	0.81	0.005	0.70	95
30-34	10.65	0.005	1.35		95-96 $\frac{1}{2}$	6.56	0.005	0.40	
34-38	1.10	Tr	0.10	35	96 $\frac{1}{2}$ -100	0.66	Tr	0.20	100
38-42	3.27	Tr	Tr	40	100-105	1.18	Nil	Tr	105
42-47	5.67	Tr	0.30	45	105-110	0.96	Tr	0.35	110
47-50	1.28	Tr	0.40	50	110-115	2.50	0.005	0.70	115
50-53	4.68	Tr	0.35		115-120	9.86	0.005	0.90	120
53-56	2.40	Nil	Tr	55	120-125	2.61	0.005	0.75	125
56-59	0.23	Nil	Tr		125-128	1.05	Tr	0.50	
59-63	0.15	Nil	0.05	60	128-133	0.71	Tr	0.50	
63-68	0.90	Nil	Tr	65					

3000 LEVEL

12 -W- 4 Siliceous Massive Sulphide (etc.)
62 to 116 feet and 195 to 256 feet

<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Oz. Au</u>	<u>Oz. Ag</u>	<u>Specimens at - feet</u>
62 - 92 $\frac{1}{2}$	Dike				
92 $\frac{1}{2}$ - 95	1.00	4.6	0.03	2.20	<u>95</u>
95 - 100	1.30	4.3	0.03	2.60	100
100 - 105	1.34	5.2	0.02	6.70	105
105 - 108	2.07	5.8	0.02	11.20	
108 - 110 $\frac{1}{2}$	0.76	2.0	0.01	1.40	<u>110</u>
110 $\frac{1}{2}$ - 116	Dike				
195 - 200	0.07	4.0	0.03		
200 - 205	0.07	3.0	0.03		<u>205</u>
205 - 210	0.07	4.2	0.03		210
210 - 215	0.12	6.9	0.02		215
215 - 220	0.14	5.1	0.02		<u>220</u>
220 - 225	0.17	8.2	0.02		<u>225</u>
225 - 230	0.27	12.0	0.01		230
230 - 235	0.14	7.4	0.02		<u>235</u>
235 - 240	0.23	5.2	0.02		240
240 - 245	0.18	6.4	0.02		245
245 - 251	0.31	5.7	0.02		<u>250</u>
251 - 256	0.60	3.5	0.02		

3000 LEVEL

13 - W - 4		Massive Sulphide		
155 to 200 feet				
<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Oz. Au</u>	<u>Oz. Ag</u>
155-160	0.15	2.4	0.01	0.50
160-165	0.19	2.0	0.005	0.40
165-170	0.21	4.3	0.005	0.40
170-175	0.13	5.7	0.02	0.60
175-180	0.11	5.1	0.02	0.60
180-185	0.03	4.4	0.02	0.50
185-190	0.08	6.1	0.01	1.20
190-195	0.05	3.2	0.01	0.30
195-200	0.05	3.8	0.01	0.30

16 - U - 3		Black Schist		
0 to 53 feet				
<u>Feet</u>	<u>% Cu</u>	<u>Oz. Au</u>	<u>Oz. Ag</u>	<u>Specimens at - feet</u>
0-5	Tr	Tr	0.10	0
5-10	0.1	Tr	Tr	5, 8
10-15	0.1	Tr	0.10	10, 13
15-18	2.5	Tr	Tr	15
18-21	0.6	0.01	0.10	20
21-24	0.1	Tr	Tr	
24-25	1.2	Tr	0.30	25
25-28	0.1	0.01	0.90	
28-31	9.8	0.04	0.20	30
31-34	8.7	0.02	0.50	
34-38	0.4	Tr	0.30	35
38-41	4.7	0.02	0.70	40
41-42	Dike			
42-46	2.8	0.02	0.60	45
46-50	2.6	0.02	0.70	50
50-53	4.2	0.02	1.60	53
End				

3000 LEVEL

**5 - Q - 1 Porphyry, Schist and Sulphide
0 to 50 feet and 85 to 121 feet**

<u>Feet</u>	<u>% Cu</u>	<u>Specimens at - feet</u>
0- 5	6.2	0, 3
5- 10	5.0	10
10- 15	3.3	
15- 19	2.7	15
19 - 23	7.2	20
23- 30	0.2	25
30- 39	0.4	35, 40
39- 45	0.3	43
45- 50	0.1	46, 50
85- 90	4.2	<u>90</u>
90- 95	5.1	
95- 96	Dike	100
96-103	5.7	
103-107	Dike	
107-114	3.2	<u>110, 114</u>
114-121	0.1	

UNITED VERDE MINE - 4500 LEVEL DIAMOND DRILL HOLE SAMPLES

Sample No.	Hole No.	Sample		Analysis		DESCRIPTION
		From - To	Length, Ft.	Selenium	Copper	
13241	6-S-3	140 - 175	35	0.011	5.00	Quartz porphyry, hard grey rock with patchy flecks or local blobs of chalcopyrite - 1.5% copper.
13242	7-U-4	76 - 106	30	0.073	1.85	Massive sulphide, fine pyrite and ZnS with some residual schist and some quartz locally - 1.5% copper and spotty zinc
13243	9-2E-1	69 - 89	20	0.010	4.7	Quartz with fine pyrite locally and patchy flecks of chalcopyrite - 4% (?) copper, low zinc.
13244	9-2E-1	116 - 129	13	0.015	1.35	Massive sulphide and schist, patch, fine grained streaky sulphide - medium copper and high zinc.
13245	9-2E-1	131-140	9	0.006	0.50	Massive sulphide and black schist with streaky fine grained sulphide and local quartz-carbonate-medium copper and high zinc
13246	9-2E-1	144 - 159	15	0.009	3.8	Massive sulphide, fine streaky sulphide with traces of residual rock - 3% (?) copper and medium low zinc
13247	9-2E-3	90 - 110	20	0.003	1.35	Massive sulphide with very fine ZnS and pyrite and flecks of chalcopyrite locally - medium copper (2%) and very high zinc (15.5%)
13248	9-2E-3	110 - 134	24	0.021	0.75	Massive sulphide similar to last - 1.5% ? copper and 11.5%? zinc.

UNITED VERDE MINE - 4500 LEVEL DIAMOND DRILL HOLE SAMPLES

Sample No.	Hole No.	Sample		Analysis		Description
		From - To	Length, Ft.	Selenium	Copper	
13249	9-2E-3	134 - 156	22	0.002	0.20	Black schist, relatively clean chlorite with a little fine pyrite locally and traces of chalcopyrite - 1% ? copper
13250	9-2E-3	156 - 167	11	0.025	3.90	Massive sulphide, fine pyrite and ZnS with some residual chlorite - local flecks of chalcopyrite. Medium copper and medium zinc.
13251	9-2H-4	74 - 107	33	0.014	8.55	Siliceous sulphide, streaky sulphide and quartz - high copper and zinc.
13252	9-2E-4	111 - 131	20	0.003	0.30	Massive sulphide, very fine pyrite etc. - low copper and high zinc.
13253	9-2B-1	0 - 18	18	0.014	1.85	Massive sulphide, fine pyrite and ZnS with local flecks of chalcopyrite and blebs of quartz-carbonate - 3% copper and low zinc.
13254	9-2B-1	18 - 31	13	0.012	4.00	Massive sulphide and quartz - Fine pyrite and ZnS with local flecks of chalcopyrite. High copper and medium low zinc (4%)
13255	9-2B-3	0 - 49	49	0.012	1.20	Black schist with sparse pyrite and chalcopyrite locally - 1% ? copper
13256	9-2B-3	49 - 71	22	0.029	1.50	Massive sulphide with some black schist and at start - 1% ? copper and high zinc (11.5% ?)
13257	9-2B-3	71 - 93	22	0.009	4.50	Quartz and massive sulphide with fine pyrite and ZnS and flecks of chalcopyrite - medium copper (2% ?) with high zinc (11% ?)

ASSAY DATA RELATIVE TO SELENIUM SAMPLES UNITED VERDE 4500 FOOT LEVEL

4500 LEVEL

6 - S - 3 Quartz Porphyry

140 to 175 feet

<u>Feet</u>	<u>% Cu</u>	<u>Oz. Au</u>	<u>Oz. Ag</u>
131-140	Tr		
140-150	0.5		
150-160	0.4		
160-165	1.2	0.002	0.15
165-170	2.9	0.005	0.30
170-175	2.6	0.002	0.30
175-185	0.5	Tr	0.05
185-200	0.1		

Specimens
at - feet

144
150, 155
160
167
170, 175

7 - U - 4
74 to 106 feet

<u>Feet</u>	<u>% Cu</u>
61- 67	Tr
67- 74	1.1
74- 79	5.3
79- 85	1.7
85- 88	0.1
88- 95	1.4
95-101	1.4
101-106	0.4
106-121	Tr

Massive Sulphide, etc.

<u>% Zn</u>	<u>Oz. Au</u>	<u>Oz. Ag</u>
-	Tr	
-	0.01	1.90
1.3	0.025	2.25
6.0	0.03	0.50
-	0.01	0.55
1.9	0.045	4.30
2.8	0.10	4.45
-	0.06	1.90
-	Tr	Tr

Specimens
at - feet

74
80
85
90
100
101, 105

Composites

160-185	1.4	0.002	0.15
---------	-----	-------	------

Composites

74-85 and				
88-101	2.3	3.0	0.05	2.96

4500 LEVEL

9 - 26 - 1
69- to 159 feet

Massive Sulphide, Quartz and Schist

<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Oz. Au</u>	<u>Oz. Ag</u>	<u>Specimens at - feet</u>
69- 74	6.2	1.6	0.08	3.80	70, 73
74- 79	3.7	0.6	0.205	4.45	77
79- 84	3.6	6.4	0.055	1.80	80
84- 89	1.3	0.3	0.125	0.90	85
89-111	-	-	-	-	
111-116	0.2	-	0.005	0.10	
116-120	1.7	5.1	0.195	6.15	119, 120
120-125	1.9	14.1	0.11	1.95	123
125-129	2.4	13.1	0.14	4.00	125, 129
129-131	-	-	-	-	
131-135	0.6	16.3	0.09	1.35	131, 133, 134
135-140	1.5	1.9	0.005	1.00	136, 139
140-144	-	-	-	-	
144-149	1.2	8.6	0.005	0.45	145
149-154	3.4	1.9	0.01	0.55	150
154-159	5.1	0.3	0.005	0.70	155, 157
Composites					
69-89	3.7	2.2	0.115	2.80	
116-159	2.2	7.4	0.08	1.70	

4500 LEVEL

9 - 2E - 4 Siliceous sulphide, etc.
74 to 131 feet

<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Oz. Au</u>	<u>Oz. Ag</u>	<u>Specimens at - feet</u>
68 - 74	0.5	-	0.02	0.80	-
74 - 78	2.6	14.3	0.23	3.80	75
78 - 82	3.9	17.6	0.14	1.70	78
82 - 87	8.1	8.1	0.05	4.30	82
87 - 92	8.5	9.1	0.18	3.95	90
92 - 97	6.1	8.3	0.31	5.50	95
97 - 102	4.5	15.0	0.16	5.95	100
102 - 107	4.7	12.7	0.11	7.10	105
107-111	3.1	14.7	0.05	3.70	
111- 116	0.5	21.4	0.13	1.15	113
116 - 121	0.2	17.4	0.11	1.10	119
121 - 126	0.2	14.1	0.06	0.85	126
126 - 131	0.3	9.6	0.03	1.45	131
131 - 139½	0.1	-	Tr	0.05	
Composites					
74 - 121	3.6	13.4	0.125	3.40	

4500 LEVEL

9 - 2E - 3 Massive Sulphide and Black Schist

62 to 167 feet

<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Oz. Au</u>	<u>Oz. Ag</u>	<u>Specimens at - feet</u>
62- 66	5.3	5.1	0.05	4.45	62, 63
66- 70	3.0	13.1	0.08	2.00	67
70 -75	2.1	13.6	0.13	1.60	70
75- 80	3.7	16.3	0.11	6.55	75
80- 85	4.1	9.1	0.07	3.75	80
85- 90	3.6	11.5	0.08	2.45	85, 90
90- 95	1.4	13.7	0.10	1.80	95
95-100	1.3	19.8	0.14	2.25	100
100-105	2.2	14.1	0.22	4.70	105
105-110	3.1	15.3	0.10	2.25	110
115-120	2.1	18.7	0.05	3.40	120
120-125	2.3	10.6	0.09	2.15	125
125-130	2.2	9.0	0.06	1.95	130
130-134	0.8	2.3	0.01	1.25	134
134-140	0.9	-	-	-	135
140-145	1.3	-	-	-	140, 145
145-150	1.4	-	-	-	150
150-156	1.8	-	-	-	153
156-161	2.4	6.3	0.02	1.30	156, 159
161-167	0.9	4.9	0.02	0.95	163, 166

Composites

62- 95	3.4	12.5	0.9	3.05
95-134	1.9	13.6	0.10	2.80
156-167	1.5	5.5	0.02	1.05

110-115 0.3 16.6 0.09 4.30 115

4500 LEVEL

9 - 23 - 1 Massive Sulphide, (etc.)

Feet	% Cu	% Zn	Oz. Au	Oz. Ag	Specimens at - foot
0- 3	4.9	-	TR	0.80	1
3- 8	3.3	1.9	TR	0.50	5
8- 12	1.5	1.2	TR	1.00	10
12- 18	3.1	6.2	0.03	1.65	15
18- 24	5.9	2.5	0.03	4.70	20
24- 29	5.4	8.7	0.04	1.65	25
29- 31	3.8	1.2	0.03	2.10	30, 30½
31- 41	0.2	-	TR	TR	
End					
Composites					
0- 3, 31-41	1.3	-	TR	0.18	
3-31	4.0	4.0	0.02	2.04	

4500 LEVEL

9 - 23 - 3 Black Schist, Massive Sulphide, etc.
0 to 89 feet.

<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Oz. Au</u>	<u>Oz. Ag</u>	<u>Specimens at - feet</u>
0-4	1.3	-	Tr	0.25	2
4-10	1.5	-	Tr	0.35	6
10-15	0.8	-	Tr	0.35	12
15-20	1.8	-	Tr	0.90	20
20-25	1.8	-	0.005	3.85	
25-30	2.9	-	Tr	1.20	26
30-37	2.2	-	Tr	0.45	33
37-42	Dike	-	-	-	-
42-49	1.1	-	Tr	0.40	44
49-53	0.8	10.0	0.005	0.95	50
53-57	1.5	19.3	0.01	1.70	55
57-62	1.2	15.6	0.01	3.40	60
62-67	0.6	33.1	0.04	4.00	65
67-71	1.2	10.0	0.07	7.95	70
71-76	1.0	7.5	0.04	5.7	73,75
76-78½	1.9	15.1	0.17	3.25	
78½-80	Dike	-	-	-	-
80-84	2.5	20.6	0.15	5.15	-
84-88	3.8	10.0	0.09	5.90	85
88-93	2.8	-	0.11	1.30	89
End					
Composites					
0-49	1.7	-	Tr	1.08	
49-93	1.7	12.1	0.06	3.93	

UNITED VERDE MINE - 3000 LEVEL HAYNES AREA DIAMOND DRILL HOLE SAMPLES

Sample No.	Hole No.	Sample		Analysis		Description
		From - To	Length, Ft.	Selenium	Copper	
13258	UVX-4 (45°)	180 - 198	18	0.013	0.30	Massive sulphide - fairly clean fine to medium grained pyrite (and pyrrhotite?)
13259	UVX-4	198-202	4	0.009	0.35	Dark magnetite rock, very fine grained with irregular massive pyrite
13260	UVX-6 (46°)	105-140	35	0.002	0.06	Massive sulphide with varying silica and very fine grained magnetite locally - generally fine pyrite with trace of zinc and copper
13261	UVX-7 (60°)	230-245	15	0.009	0.20	Massive sulphide about like preceding with some very fine magnetite locally.
13262	UVX-17 (60°)	72-92	20	0.057	0.35	Massive sulphide, medium grained pyrite - medium low copper (0.7%?), veinlet of zinc (5%)
13263	UVX-17	92-122	30	0.046	0.10	Massive sulphide, slightly siliceous, and dark fine-grained rock - slight trace of copper and some zinc (3%?)
13264	97-Z-2	430-434	4	0.009	0.40	Dark chloritic gangue, very fine grained, streaked with pyrrhotite, and tiny gash veinlets of chalcopyrite - low copper (0.3%)

UNITED VERDE MINE - 3000 LEVEL HAYNES AREA DIAMOND DRILL HOLE SAMPLES

Sample No.	Hole No.	Sample		Analysis		Description
		From - To	Length, Ft.	Selenium	Copper	
13265	97-Z-2	434 - 436	2	0.002	0.10	Massive sulphide with fine streaky banding of medium coarse pyrite and very fine grained pyrrhotite
13266	97-Z-3	457 - 459	2	0.031	5.05	Dark chloritic and magnetitic fine-grained gangue with irregular chalcopyrite, pyrite, and fine pyrrhotite - 2.3% ? Copper
13267	97-Z-3	459 - 480	21	0.003	1.10	Massive sulphide with scattering large pyrites in fine pyrrhotite - pyrite matrix - medium copper (1.1%?)
13268	97-Z-3	480 - 500	20	0.002	0.25	Massive sulphide like preceding, but less copper (0.3%?)
13269	97-Z-3	500 - 510	10	< 0.002	0.07	Massive sulphide, pyrite and pyrrhotite with streaky dark chloritic material - very low copper (0.1%?).

ASSAY DATA RELATIVE TO SELENIUM SAMPLES UNITED VERDE 3000 LEVEL HAYNES AREA

Haynes Area

U. V. X. No. 4 Hole (45° up)
180 to 202 feet Massive Sulphide

<u>Feet</u>	<u>% Cu</u>	<u>Specimens at - feet</u>
180-185	0.62	182, 183
185-190	0.36	
190-193	Nil	192
193-196	Nil	
196-198	Tr	<u>197</u>
198-200	Nil	
200-202	Nil	<u>201, 202</u>

Haynes Area

U. V. X. No. 6 Hole (46° up)
105 to 164 feet Massive Sulphide

No assay data available. Specimens at 105, 120, 130, 135,/143, 145, 150 and 164 feet.

Haynes Area
U.V.X. No. 7 Hole (60° up)
185 to 245 feet Massive Sulphide

Feet	% Cu	Oz. Au	Oz. Ag	Specimens at - feet
185-196	0.40	0.02	0.80	184, 188, 190, 192, 194, 195
196-201	0.21	0.03	0.80	197, 198, <u>199</u> , /200
201-206	0.30	0.06	1.00	201, 202, 203, 205
206-211	0.40	0.04	0.50	207, 209
211-218	0.64	Nil	Nil	213, <u>214</u> , / 216, 218
218-229	0.06	0.02	0.35	219, 221, 223, 225, 226, 227, 228
229-236	0.16	-	-	<u>229</u> , / 231, 233, 235
236-240	0.06	Nil	Nil	237, 239, 240
240-245	-	-	-	241, 242, 244, <u>245</u>

Haynes area
U.V.X. No. 17 Hole (60° down)
72 to 122 feet Massive Sulphide, etc.

Feet	% Cu	% Zn	Oz. Au	Oz. Ag	Specimens at - feet
72- 77	.36	2.5	Nil	0.30	73
77- 82	Nil	5.2	0.01	0.19	82
82- 87	1.73	6.4	0.01	0.55	
87- 92	0.85	6.0	0.02	0.78	<u>91</u>
92- 97	Nil	5.3	0.04	1.20	
97-102	Nil	2.6	0.04	1.36	100
102-107	Nil	1.1	0.09	1.55	
107-112	Nil	5.7	0.01	0.29	112
112-119	Nil	2.6	0.01	0.29	
119-122	0.14	-	0.02	0.30	<u>120, 122</u>

Haynes Area
97 - Z - 2 (78° down) AX Core
430 to 436 feet Chloritic Gangue, etc.

Feet	% Cu	% Zn	% Fe	% S	Oz. Au	Oz. Ag	Specimens at - feet
428-430	0.05	0.2	13.2	0.4	Tr	Tr	
430-436	0.29	11.2	37.3	12.1	0.005	Tr	430, 430 $\frac{1}{2}$, 431, 433, <u>434</u> ,
436- 441	0.05	Tr	10.5	0.25	Tr	TR	/435, 435 $\frac{1}{2}$

Haynes Area

97 - 2 - 3 (75° down) AX Core

457 to 523 feet

Massive Sulphide, etc.

<u>Feet</u>	<u>% Cu</u>	<u>% Zn</u>	<u>% Fe</u>	<u>% S</u>	<u>Oz. Au</u>	<u>Oz. Ag</u>	<u>% SiO₂</u>	<u>% Al₂O₃</u>	<u>% CaO</u>	<u>% MgO</u>	<u>Specimens at - feet</u>
453-457	1.37	0.2	20.7	1.7	0.23	1.00	35.6	15.9	7.8	3.48	457
457-459	2.34	2.2	39.4	14.4	0.08	1.00	18.4	6.1	3.2	2.46	458, <u>459</u>
459-463	0.60	5.3	44.9	37.2	0.05	0.35	4.0	2.5	0.9	1.52	460
463-467	1.59	3.5	49.7	38.2	0.02	0.50	1.8	1.1	0.4	0.94	465
467-470	1.60	1.7	52.3	39.8	0.025	0.70	2.0	1.3	0.7	0.72	470
470-475	1.37	4.0	49.1	37.7	0.02	0.60	3.4	1.0	0.9	0.80	475
475-480	0.41	1.7	48.2	26.4	0.075	0.35	7.7	1.9	1.0	1.38	<u>480</u>
480-485	0.25	4.0	47.5	38.4	0.11	0.65	4.2	2.4	0.7	0.87	<u>485</u>
485-490	0.22	3.0	46.9	36.2	0.06	0.05	5.4	3.9	0.5	0.87	490
490-495	0.33	7.9	39.7	34.7	0.075	0.35	9.1	3.9	0.8	0.58	495
495-500	0.30	5.0	44.0	37.2	0.45	0.15	6.1	1.6	1.0	1.38	<u>500</u>
500-506	0.08	6.6	41.9	37.3	0.02	0.20	9.3	1.4	0.8	0.72	<u>505</u>
506-510	0.14	4.1	39.7	40.7	0.01	0.05	7.7	3.5	0.6	0.87	506, <u>508</u>
510-515	0.22	3.9	38.4	46.0	0.01	Tr	7.7	0.9	1.7	0.65	510
515-520	0.85	10.8	28.2	33.3	0.025	0.70	23.0	0.9	0.5	0.58	515
520-523	0.66	7.3	34.6	33.0	0.09	0.80	14.5	4.4	0.5	0.72	520, <u>523</u>

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
Salt Lake City, Utah

March 15, 1955

Results of Spectrographic Analysis, Diamond Drill Core Samples, United Verde Mine, Phelps Dodge Corp., Jerome, Ariz.

Description	Sample No.	<u>1/</u>		<u>Cu</u>	<u>Ag</u>	<u>Mg</u>	<u>Ca</u>	<u>Zn</u>	<u>Al</u>	<u>Ga</u>	<u>In</u>	<u>Ti</u>	<u>Si</u>	<u>Sn</u>	<u>Pb</u>	<u>As</u>	<u>Mn</u>	<u>Fe</u>	<u>Co</u>	<u>Ni</u>
		<u>Se</u>	<u>K</u>																	
United Verde 1200-Level plus 20 ft., Hole 16-K-7-0' to 20'	13201	.040	-	*	*	*	*	*	*	tr	-	*	*	-	-	-	*	*	tr	-
United Verde 3000-Level Hole 11-U-1375' to 395'	13223	.042	-	*	*	*	*	*	*	tr	tr	*	*	tr	*	-	*	*	tr	-
United Verde 3000-Level Hole 11-U-1-395' to 416'	13224	.060	-	*	*	*	*	*	*	tr	tr	*	*	tr	*	-	*	*	tr	tr
United Verde 3000-Level Hole 11-U-1475' to 490'	13225	.132	-	*	*	*	*	*	*	tr	-	*	*	tr	*	tr	*	*	-	-
United Verde 4500-Level Hole 7-U-4-76' to 106'	13242	.073	*	*	*	*	*	*	*	tr	tr	*	*	*	*	tr	*	*	tr	-
United Verde 3000-Level Haynes Hole UVX 17-72' to 92'	13262	.057	*	*	*	*	*	*	*	tr	-	*	*	tr	*	-	*	*	-	-
Equator Copper Chief Hole 9-22' to 40'	14508	.038	-	*	*	*	tr	*	*	tr	-	tr	*	Tr	*	tr	*	*	-	-
United Verde 700-level Hole 15-L-1 115' to 135'	14522	.038	-	*	*	*	*	*	*	tr	-	tr	*	Tr	*	-	*	*	tr	-
United Verde 1200-Level Hole 16-N-2 0' to 20'	14546	.055	-	*	*	*	*	*	*	tr	-	*	*	-	*	-	*	*	-	-

1/ Chemical analysis previously reported

Remarks: * = Present
 - = absent
 tr = trace

RESERVE ITEMS MARKED R

SELENIUM TEST MATERIAL - CORE SPECIMEN SAMPLES

EQUATOR-COPPER CHIEF MINE DIAMOND DRILL HOLES

Sample No.

Sample No.	Hole Number	Sample Feet From to	Length	Number of Specimens	Type of Material
14507V	Equator 13° No. 9 (-13°)	0-22	22	4	Massive Sulphide - high zinc, medium low copper. Some covellite enrichment.
14508		22-40	18	5	" " - high zinc, medium low copper. Some covellite enrichment.
14509V	No. 10 (-39°)	23-47	24	5	" " - high zinc, low copper, maximum mercury.
14510V	No. 11 (-13°)	0-25	25	3	" " - medium zinc, medium low copper, minimum mercury. Some covellite enrichment.
14511		29-47	18	4	" " - medium zinc, medium low copper, minimum mercury. Some covellite enrichment.
cut	✓ No. 12 (-37°) R	11-25	14	3	" " - high zinc, medium low copper, very low mercury.
		R 25-38	13	4	" " - high zinc, medium low copper, very low mercury.
14512V	No. 17 (+30°)	0-18	18	4	" " - maximum lead, medium zinc, medium low copper.
14513V	No. 18 (+13°)	0-17	17	4	" " - above average lead, medium low zinc, low copper.
14514		17-41	24	6	" " - maximum lead, high zinc, medium low copper.
14515V	No. 23 (-25°)	54-68	14	4	" " - high zinc, medium copper, maximum mercury.

TOTAL 46 CORE BITS FOR 11 SAMPLES FROM 7 DRILL HOLES IN THE EQUATOR MASSIVE SULPHIDE BODY.

FOR TEST 39 CORE BITS FOR 9 SAMPLES FROM 6 DRILL HOLES IN THE EQUATOR MASSIVE SULPHIDE BODY.

EXTRA OR RESERVE ITEMS MARKED R

SELENIUM TEST MATERIAL - CORE SPECIMEN SAMPLES

EQUATOR-COPPER CHIEF MINE DIAMOND DRILL HOLES

Sample
No.

Sample No.	Hole Number	Sample Feet		Number of Specimens	Type of Material	
		From to	Length			
	Equator					
14507	No. 9 (-13°)	0-22	22	4	Massive Sulphide	- high zinc, medium low copper. Some covellite enrichment.
14508		22-40	18	5	" "	- high zinc, medium low copper. Some covellite enrichment.
14509	No. 10 (-34°)	23-47	24	5	" "	- high zinc, low copper, maximum mercury.
14510	No. 11 (-13°)	0-25	25	3	" "	- medium zinc, medium low copper, minimum mercury. Some covellite enrichment.
14511		29-47	18	4	" "	- medium zinc, medium low copper, minimum mercury. Some covellite enrichment.
	No. 12 (-37°) R	11-25	14	3	" "	- high zinc, medium low copper, very low mercury.
		R	25-38	13	4	" "
14512	No. 17 (+30°)	0-18	18	4	" "	- maximum lead, medium zinc, medium low copper.
14513	No. 18 (+13°)	0-17	17	4	" "	- above average lead, medium low zinc, low copper.
14514		17-41	24	6	" "	- maximum lead, high zinc, medium low copper.
14515	No. 23 (-25°)	54-68	14	4	" "	- high zinc, medium copper, maximum mercury.

TOTAL 46 CORE BITS FOR 11 SAMPLES FROM 7 DRILL HOLES IN THE EQUATOR MASSIVE SULPHIDE BODY.

FOR TEST 39 CORE BITS FOR 9 SAMPLES FROM 6 DRILL HOLES IN THE EQUATOR MASSIVE SULPHIDE BODY.

EXTRA OR RESERVE ITEMS MARKED R

SELENIUM TEST MATERIAL - CORE SPECIMEN SAMPLES
UNITED VERDE MINE - 700 LEVEL - DIAMOND DRILL HOLES

Hole Number	Sample From	Feet to Length	Number of Specimens	Type of Material
Out 14-K-1	R	0-25	5	Massive Sulphide - high zinc, generally low copper, much better than average silver (and gold).
	R	25-50	5	Massive Sulphide - medium zinc, "high" (over 3%) copper and exceptional silver (and gold).
	R	50-61	3	Massive Sulphide - similar to preceding but lower copper and silver.
14516	14-K-4	0-20	4	Massive Sulphide - high zinc, low copper (less than 1/2%) and much better than average silver and gold.
14517		20-40	5	Massive Sulphide - high zinc, medium low copper and better than average silver and gold.
14518		40-65	5	Massive Sulphide - medium low zinc, high copper and exceptional silver and gold.
Out 15-L-1	R	10-30	5	Massive Sulphide - medium zinc (?), low copper.
	R	30-55	4	Massive Sulphide - medium zinc (?), medium low copper.
14519		55-74	5	Massive Sulphide - medium zinc (?), medium copper.
14520		74-95	5	Massive Sulphide - medium zinc (?), medium low copper.
14521		95-115	4	Massive Sulphide - medium zinc (?), medium low copper.
14522		115-135	5	Massive Sulphide - medium zinc (?), medium low copper.
Out 15-L-6 (25° up)	R	0-25	5	Massive Sulphide - low zinc (?) and very low copper. Fine texture.
	R	25-50	5	Massive Sulphide - low zinc (?) and low copper. More granular texture.
	R	65-100	5	Siliceous Sulphide - copper ore and fringe. Low zinc - small sample.
	R	100-130	8	Siliceous Sulphide and Quartz - low zinc (?) and low copper.

Hole Number	Sample From	Feet to Length	Number of Specimens	Type of Material	
14523	15-L-7 (25° up)	0-20	20	4	Massive Sulphide - low zinc (?), very low copper, fine texture.
14524	20-40	20	20	4	Massive Sulphide - low zinc (?), medium low copper, more granular texture.
14525	40-70	30	30	4	Massive Sulphide - low zinc (?), low copper, somewhat granular texture.
14526	75-100	25	25	4	Massive and Siliceous Sulphide - copper ore and fringe, medium low zinc
14527	17-M-2 (31° up)	10-35	25	6	Quartz, siliceous sulphide and schist ore.
	17-M-3 (-2°)	10-35	25	4	Like #2. Holes one to the other apart, one sample.
	18-I-1	R 0-25	25	7	Mineralized black schist. (No assays.)
		R 30-55	25	6	Mineralized black schist. (No assays.)
	18-I-5 (-35°)	R 0-20	20	4	Mineralized black schist. (Low copper.)
		R 29-47	18	4	Mineralized black schist. (Copper ore.)
14528	18-J-2 (-25°)	0-26	26	7	Mineralized black schist and porphyry ore.
14529	41-60	19	19	4	Black schist with spotty chalcopyrite.
14530	60-77	17	17	4	Lean black schist.
14531	85-105	20	20	5	Slightly mineralized quartz porphyry.
14532	18-J-4 (-60°)	0-25	25	6	Black schist ore.
14533	36-62	32	32	5	Black schist. Very good copper, and better than average silver.

out

TOTAL
FOR TEST

ONE HUNDRED FIFTY-SIX CORE BITS FOR 31 SAMPLES FROM ELEVEN 700 LEVEL DRILL HOLES.
NINETY CORE BITS FOR (18) SAMPLES FROM SEVEN 700 LEVEL DRILL HOLES

EXTRA OR RESERVE ITEMS MARKED R

SELENIUM TEST MATERIAL - CORE SPECIMEN SAMPLES
 UNITED VERDE MINE - 700 LEVEL - DIAMOND DRILL HOLES

Hole Number	Sample Feet From to	Length	Number of Specimens	Type of Material
✓ Y4-K-1	R✓ 0-25	25	5	Massive Sulphide - high zinc, generally low copper, much better than average silver (and gold). Massive Sulphide - medium zinc, "high" (over 3%) copper and exceptional silver (and gold). Massive Sulphide - similar to preceeding, but lower copper and silver.
	R✓ 25-50	25	5	
	R✓ 50-61	11	3	
✓ 14-K-4	✓ 0-20	20	4	Massive Sulphide - high zinc, low copper (less than 1/2%) and much better than average silver and gold. Massive Sulphide - high zinc, medium low copper and better than average silver and gold. Massive Sulphide - medium low zinc, high copper and exceptional silver and gold.
	✓ 20-40-	20	5	
	✓ 40-65	25	5	
✓ 15-L-1	R✓ 10-30	20	5	Massive Sulphide - medium zinc (?), low copper. Massive Sulphide - medium zinc (?), medium low copper. Massive Sulphide - medium zinc (?), medium copper. Massive Sulphide - medium zinc (?). medium low copper. Massive Sulphide --medium zinc (?); medium low copper. Massive Sulphide - medium zinc (?), medium low copper.
	R✓ 30-55	25	4	
	✓ 55-74	19	5	
	✓ 74-95	21	5	
	✓ 95-115	20	4	
	✓ 115-135	20	5	
✓ 15-L-6 (25° up)	R✓ 0-25	25	5	Massive Sulphide - low zinc (?) and very low copper. Fine texture. Massive Sulphide - low zinc (?) and low copper. More granular texture. Siliceous Sulphide - copper ore and fringe. Low zinc - small sample. Siliceous Sulphide and Quartz - low zinc (?) and low copper.
	R✓ 25-50	25	5	
	R✓ 65-100	35	5	
	R✓ 100-130	30	8	

Hole Number	Sample Feet From to	Length	Number of Specimens	Type of Material
✓ 15-L-7 (25° up)	✓ 0-20	20	4	Massive Sulphide - low zinc (?), very low copper, fine texture.
	✓ 25-40	20	4	Massive Sulphide - low zinc (?), medium low copper, more granular texture.
	✓ 40-70	30	4	Massive Sulphide - low zinc (?), low copper, somewhat granular texture.
	✓ 75-100	25	4	Massive and Siliceous Sulphide - copper ore and fringe, medium low zinc.
✓ 17-M-2 (3½° up)	10-35	25	6	Quartz, siliceous sulphide and schist ore.
✓ 17-M-3 (-2°)	10-35	25	4	Like #2. Holes one to three feet apart, one sample.
✓ 18-I-1	R 0-25	25	7	Mineralized black schist. (No assays.)
	B 30-55	25	6	Mineralized black schist. (No assays.)
✓ 18-I-5 (-35°)	R 0-20	20	4	Mineralized black schist. (Low copper.)
	R 29-47	18	4	Mineralized black schist. (Copper ore.)
✓ 18-J-2 (-25°)	✓ 0-26	26	7	Mineralized black schist and porphyry ore.
	✓ 41-60	19	4	Black schist with spotty chalcopyrite.
	✓ 60-77	17	4	Lean black schist.
	✓ 85-105	20	5	Slightly mineralized quartz porphyry.
18-J-4 (-60°)	✓ 0-25	25	6	Black schist ore.
	✓ 38-62	32	5	Black schist. Very good copper, and better than average silver.

TOTAL

ONE HUNDRED FIFTY-SIX CORE BITS FOR 31 SAMPLES FROM ELEVEN 700 LEVEL DRILL HOLES.

FOR TEST

NINETY CORE BITS FOR 18 SAMPLES FROM SEVEN 700 LEVEL DRILL HOLES

SELENIUM TEST MATERIAL - CORE SPECIMEN SAMPLES
 UNITED VEIN NINE - 1200 LEVEL - DIAMOND DRILL HOLES

Hole Number	Sample Feet From to	Length	Number of Specimens	Type of Material
1453410 - N - 3	0-25	25	5	Massive Sulphide - medium low copper, nil zinc.
14535	25-50	25	5	Massive Sulphide - medium low copper, nil zinc.
cut	R 50-75	25	5	Massive Sulphide - medium low copper, trace zinc.
1453610 - N - 4	0-25	25	4	M. Sulphide - medium low copper, low zinc.
14537	25-50	25	5	Massive and Siliceous Sulphide - medium low copper, low zinc.
1453810 - P - 2	0-15	15	3	Massive Sulphide, trace Black Schist - trace copper, high zinc.
14539	15-25	10	2	Massive Sulphide, trace Black Schist - low copper, high zinc.
14540	25-45	20	4	Massive Sulphide, trace Black Schist - trace copper, high zinc.
14541	45-75	30	6	Massive Sulphide, trace Black Schist - low copper, high zinc.
	R 75-100	25	5	Massive Sulphide, trace Black Schist - low copper, high zinc.
out	R 100-120	20	5	Massive Sulphide, trace Black Schist - medium low copper, medium zinc.
	R 120-140	20	5	Massive Sulphide, trace Black Schist - low copper, high zinc.
1454214 - O - 1	50-65	15	3	Massive Sulphide - trace copper, medium zinc, exceptional lead.
14543	65-81	16	4	Massive Sulphide - trace copper, medium zinc, very exceptional lead.

EXTRA OR RESERVE ITEMS MARKED R

SELENIUM TEST MATERIAL - CORE SPECIMEN SAMPLES
UNITED VERDE MINE - 1200 LEVEL - DIAMOND DRILL HOLES

Hole Number	Sample Feet From to	Length	Number of Specimens	Type of Material
10 - N - 3	0-25	25	5	Massive Sulphide - medium low copper, nil zinc.
	25-50	25.	5	Massive Sulphide - medium low copper, nil zinc.
	R 50-75	25	3	Massive Sulphide - medium low copper, trace zinc.
10 - N - 4	0-25	25	4	Massive Sulphide - medium low copper, low zinc.
	25-50	25	5	Massive and Siliceous Sulphide - medium low copper, low zinc.
10 - P - 2	0-15	15	3	Massive Sulphide, trace Black Schist - trace copper, high zinc.
	15-25	10	2	Massive Sulphide, trace Black Schist - low copper, high zinc.
	25-45	20	4	Massive Sulphide, trace Black Schist - trace copper, high zinc.
	45-75	30	6	Massive Sulphide, trace Black Schist - low copper, high zinc.
	R 75-100	25	5	Massive Sulphide, trace Black Schist - low copper, high zinc.
	R 100-120	20	5	Massive Sulphide, trace Black Schist - medium low copper, medium zinc.
	R 120-140	20	5	Massive Sulphide, trace Black Schist - low copper, high zinc.
14 - O - 1	50-65	15	3	Massive Sulphide - trace copper, medium zinc, exceptional lead.
	65-81	16	4	Massive Sulphide - trace copper, medium zinc, very exceptional lead.

Hole Number	Sample Feet From to	Length	Number of Specimens	Type of Material	
14544	16 - L - 2	20-40	20	4	Massive Sulphide - medium low copper, low zinc.
14545	_____	40-60	20	5	Massive Sulphide - medium low copper, low zinc.
14546	16 - N - 2	0-20	25	4	Predominant pyrite in Black Schist gangue - low copper, low zinc, Pseudo breccia!
14547	16 - O - 2	0-29½	29½	6	Black to Grey Schist with very fine pyrite - medium low copper, low zinc.
14548	_____	29½-47	17½	4	Heavy pyrite in Black Schist gangue; a little Quartz-Carbonate - medium low copper, medium zinc.
14549	_____	200-215	15	3	Massive Sulphide with residual Black Schist and trace Quartz-Carbonate - low copper, medium low zinc and some lead.
14550	_____	215-225	10	3	Massive Sulphide with residual Black Schist and trace Quartz-Carbonate - low copper, medium zinc and exceptional lead.
<u>1200 PLUS 20</u> (Twentieth Floor)					
13201	16 - K - 7	0-20	20	4	Massive Sulphide, Quartz-Carbonate and residual Black Schist - medium low copper, low zinc.
13202	_____	20-28	8	4	Black Schist and Massive Sulphide - medium low copper, very low zinc.
13203	_____	28-33½	5½	4	Black Schist with heavy pyrite - medium copper, very low zinc.
TOTAL ONE HUNDRED TWO CORE BITS FOR 24 SAMPLES FROM 8 1200 LEVEL DRILL HOLES					
FOR TEST EIGHTY-TWO CORE BITS FOR 20 SAMPLES FROM EIGHT 1200 LEVEL DRILL HOLES					

Hole Number	Sample Feet From to	Length	Number of Specimens	Type of Material
16 - L - 2	20-40	20	4	Massive Sulphide - medium low copper, low zinc.
	40-60	20	5	Massive Sulphide - medium low copper, low zinc.
16 - N - 2	0-20	25	4	Predominant pyrite in black Schist gangue - low copper, low zinc. Pseudo breccia!
16 - O - 2	0-29 $\frac{1}{2}$	29 $\frac{1}{2}$	6	Black to Grey schist with very fine pyrite - medium low copper, low zinc.
	29 $\frac{1}{2}$ -47	17 $\frac{1}{2}$	4	Heavy pyrite to Black Schist gangue, a little "Quartz-Carbonate - medium low copper, medium zinc.
	200-215	15	3	Massive Sulphide with residual Black Schist and trace Quartz-Carbonate - low copper, medium low zinc and some lead.
	215-225	10	3	Massive Sulphide with residual Black Schist and trace Quartz-Carbonate - low copper, medium zinc and exceptional lead.
<u>1200 PLUS 20</u>	(Twentieth Floor)			
16 - K - 7	0-20	20	4	Massive Sulphide, Quartz-Carbonate and residual Black Schist - medium low copper, low zinc.
	20-28	8	4	Black Schist and Massive Sulphide - medium low copper, very low zinc.
	28-33 $\frac{1}{2}$	5 $\frac{1}{2}$	4	Black Schist with heavy pyrite - medium copper, very low zinc.

TOTAL ONE HUNDRED TWO CORE BITS FOR 24 SAMPLES FROM 8 1200 LEVEL DRILL HOLES
 FOR TEST EIGHTY-TWO CORE BITS FOR 20 SAMPLES FROM EIGHT 1200 LEVEL DRILL HOLES

SELENIUM TEST MATERIAL - CORE SPECIMEN SAMPLES
 UNITED VALE MINE - 3000 LEVEL - DIAMOND DRILL HOLES

Core Number	Depth Interval	Depth (Feet)	Number of Specimens	Type of Material
13100 - T - 1	0-30	30	3	Massive Sulphide - Generally fine grained. Copper ore with medium high zinc.
13205	30-60	30	5	Massive Sulphide - Sphalerite veinlets in fine grained pyrite. Low copper with medium high zinc.
7 - T - 1 R	0-20	20	5	Massive Sulphide - Generally fine grained. Low copper and medium zinc.
Out	R 20-42	22	5	Massive Sulphide - Generally fine grained. Rare veinlets. Medium low copper and medium zinc.
7 - T - 2 R	0-15	15	3	Massive Sulphide - Generally fine grained. Medium low copper and medium zinc.
Out	R 15-33	18	4	Massive Sulphide - Generally fine grained. Medium low copper and medium zinc.
13203	0-35	35	7	Massive Sulphide - Fine to medium grained. Spotty high copper or zinc values.
13207	35-75	40	6	Massive Sulphide - Fine to medium grained. Copper ore and low grade with medium high zinc.
13208	75-115	40	7	Massive Sulphide - Fine to medium grained. Low copper and high zinc.
13209 - U - 4	0-19	19	4	Massive Sulphide - With traces Black Schist. High copper and low zinc.
13210	19-20 1/2	4 1/2	2	Siliceous Sulphide and Quartz - Low Values.
Out	R 35-50	15	3	Massive Sulphide - Generally fine grained. Copper ore with medium low zinc.
Out	R 50-68	18	4	Massive Sulphide - Generally fine grained. Copper ore with medium to high zinc.

SELENIUM TEST MATERIAL - CORE SPECIMEN SAMPLES
 UNITED VERDE MINE - 3000 LEVEL - DIAMOND DRILL HOLES

Hole Number	Sample From	Feet to	Length	Number of Specimens	Type of Material
6 - T - 1	0-30	30	3	Massive Sulphide - Generally fine grained. Copper ore with medium high zinc.	
	30-60	30	5	Massive Sulphide - Sphalerite veinlets in fine grained pyrite. Low copper with medium high zinc.	
7 - T - 1	R 0-20	20	5	Massive Sulphide - Generally fine grained. Low copper and medium zinc.	
	R 20-42	22	5	Massive Sulphide - Generally fine grained. Rare veinlets. Medium low copper and medium zinc.	
7 - T - 2	R 0-15	15	3	Massive Sulphide - Generally fine grained. Medium low copper and medium zinc.	
	R 15-33	18	4	Massive Sulphide - Generally fine grained. Medium low copper and medium zinc.	
7 - U - 1	0-35	35	7	Massive Sulphide - Fine to medium grained. Spotty high copper or zinc values.	
	35-75	40	6	Massive Sulphide - Fine to medium grained. Copper ore and low grade with medium high zinc.	
	75-115	40	7	Massive Sulphide - Fine to medium grained. Low copper and high zinc.	
7 - U - 4	0-19	19	4	Massive Sulphide - With traces Black Schist. High copper and low zinc.	
	19-23½	4½	2	Siliceous Sulphide and Quartz - Low Values.	
	R 35-50	15	3	Massive Sulphide - Generally fine grained. Copper ore with medium low zinc.	
	R 50-68	18	4	Massive Sulphide - Generally fine grained. Low copper with medium to high zinc.	

Hole Number	Sample feet from to	Length	Number of Specimens	Type of Material
8 - V - 2	30-50	20	5	Siliceous massive sulphide - irregular streaky texture. Trace copper and zinc. Trace arsenic.
9 - V - 11 (73 feet up)	0-15	15	4	Black schist - With abundant chalcopyrite. "High grade" copper ore.
	16-48	32	5	Black schist - With considerable pyrite and some chalcopyrite, with quartz carbonate locally. About 2% copper.
	48-68	20	4	Black schist - About like 0 to 15 feet. "High grade" copper.
	68-89	21	4	Black schist - About like preceding. "High grade" copper.
	89-113	24	6	Black schist - With considerable quartz-carbonate and some pyrite. Less than 1% copper. ("Quartz-carbonate" is finely intergrown quartz and dolomite and or calcite.)
10 - # - 4	58-78	20	6	Quartz Porphyry (?) Hard grey siliceous with some pyrite and spotty chalcopyrite and quartz-carbonate.
	101-120	19	4	Black schist - With very fine thready chalcopyrite and fine pyrite and considerable quartz-carbonate. Marginal ore.
	129-144	15	4	Black schist - Similar to preceding but with faint trace residual quartz porphyry.
10 - X - 2	104 $\frac{1}{2}$ -135	30 $\frac{1}{2}$	7	Massive sulphide - With some quartz. Medium copper (2%), very low zinc.
	175-186	11	3	Siliceous sulphide - Medium grained pyrite with finely intergrown quartz. Low copper and medium high zinc (7%).
	186-210	24	4	Siliceous sulphide - With streaky quartz and pyrite. Trace copper and medium zinc (6%).

Hole Number	Sample Feet		Number of Specimens	Type of Material
	From to	Length		
3211 8 - V - 2	30-50	20	5	Siliceous Massive Sulphide - Uneven streaky texture. Trace copper and zinc. Trace specularite.
3212 9 - V - 11 (73 feet up)	0-15	15	4	Black Schist - With abundant chalcopyrite. "High grade" copper ore.
13213	15-48	32	5	Black Schist - With considerable pyrite and some chalcopyrite, with quartz carbonate locally. About 2% copper.
13214	48-68	20	4	Black Schist - About like 0 to 15 feet. "High grade" copper.
13215	68-89	21	4	Black Schist - About like preceding. "High grade" copper.
13216	89-113	24	6	Black Schist - With considerable quartz-carbonate and some pyrite. Less than 1% copper. ("Quartz-carbonate" is finely intergrown quartz and dolomite and or calcite.)
3217 10 - W - 4	58-78	20	6	Quartz Porphyry (?) Hard grey siliceous with some pyrite and spotty chalcopyrite and quartz-carbonite.
13218	101-120	19	4	Black Schist - With very fine thready chalcopyrite and fine pyrite and considerable quartz-carbonate. Marginal ore.
13219	129-144	15	4	Black Schist - Similar to preceding but with faint trace residual quartz porphyry.
3220 10 - X - 2	104 $\frac{1}{2}$ -135	30 $\frac{1}{2}$	7	Massive Sulphide - With some quartz. Medium copper (2%), very low zinc.
13221	175-186	11	3	Siliceous Sulphide - Medium grained pyrite with finely intergrown quartz. Low copper and medium high zinc (7%).
13222	186-210	24	4	Siliceous Sulphide - With streaky quartz and pyrite. Trace copper and zinc (6%).

Hole Number	Sample Feet From to	Length	Number of Specimens	Type of Material
11 - W - 1	375-395	20	4	Black Schist - With quartz-carbonate, pyrite and chalcopyrite, 4% copper ore.
	395-416	21	5	Black Schist and massive sulphide. Abundant fine grained pyrite. 3% copper ore with 1/2% zinc.
	475-490	15	3	Massive Sulphide - Medium fine grained pyrite with traces of quartz. Low copper and medium zinc.
	R 490-506	16	3	Massive Sulphide - Like preceding.
11 - W - 1	0-20	20	5	Black Schist - Similar to preceding plus fine grained pyrite and chalcopyrite. Medium copper (2 1/2%).
	20-47	27	5	Black Schist - Similar to preceding plus scattering patchy quartz-carbonate and more very fine chalcopyrite. High copper (5 1/2%).
	47-70	23	5	Black Schist - With quartz-carbonate veinlets and spotty chalcopyrite. Medium low copper (1.5%).
	70-96 1/2	26 1/2	5	Black Schist - With some quartz-carbonate, spotty chalcopyrite and fine grained pyrite. Low to high copper.
	R 96 1/2-125	28 1/2	6	Black Schist - With some quartz-carbonate, and spotty chalcopyrite. Low to high copper.
12 - W - 3 R	0-25	25	6	Black Schist - With some quartz-carbonate and relatively little visible sulphide. Copper ?
	25-55	30	6	Black Schist - With considerable fine pyrite. 1 1/2% copper ?
	R 55-85	30	7	Black Schist - With some quartz-carbonate and considerable fine pyrite. 1 1/2% copper ?
	R 85-103	18	6	Black Schist - Like preceding but more chalcopyrite. 3% copper ?

U. V. MINE - 3000 LEVEL - D. D. HOLE SAMPLES - PAGE

Hole Number	Sample Feet From to	Length	Number of Specimens	Type of Material
13223 11 - U - 1	375-395	20	4	Black Schist - With quartz-carbonate, pyrite and chalcopyrite, 4% copper ore.
13224	395-416	21	5	Black Schist and Massive Sulphide. Abundant fine grained pyrite. 5% copper ore with 1/2% Zinc.
13225	475-490	15	3	Massive Sulphide - Like fine grained pyrite with traces of quartz. Low copper and medium zinc.
Out R	490-506	16	3	Massive Sulphide - Like preceding.
13226 11 - W - 1	0-20	20	5	Black Schist - With sparse, fine grained pyrite and chalcopyrite. Medium copper (2 1/2%).
13227	20-47	27	5	Black Schist - Similar to preceding plus scattering patchy quartz-carbonate and more very fine chalcopyrite. High copper (5 1/2%).
13228	47-70	23	5	Black Schist - With quartz-carbonate veinlets and spotty chalcopyrite. Medium low copper (1.8%).
13229	70-96 1/2	26 1/2	5	Black Schist - With some quartz-carbonate, very spotty chalcopyrite and fine grained pyrite. Low to high copper.
Out R	96 1/2-125	28 1/2	6	Black Schist - With some quartz-carbonate, and spotty chalcopyrite. Low to high copper.
12 - W - 3	0-25	25	6	Black Schist - With some quartz-carbonate and relatively little visible sulphide. 2% copper ?
R	25-55	30	6	Black Schist - With considerable fine pyrite. 1 1/2% copper ?
R	55-85	30	7	Black Schist - With some quartz-carbonate and considerable fine pyrite. 1 1/2% copper
R	85-103	18	6	Black Schist - Like preceding but more chalcopyrite. 3% copper ?

H. V. Mine - 3000 LEVEL - P. E. HOIL SAMPLES - PAC

Hole Number	Sample Feet From to	Length	Number of Specimens	Type of Material
12 - W - 4 13230	92 $\frac{1}{2}$ -108	15 $\frac{1}{2}$	3	Massive Sulphide - Generally clean fine grained pyrite with some faint hairline streaks which may be dark sphalerite. 1 $\frac{1}{2}$ % copper and 5% zinc.
13231	108-110 $\frac{1}{2}$	2 $\frac{1}{2}$	1	Siliceous Massive Sulphide - Medium fine pyrite with finely intergrown quartz. 0.76% copper and 2 $\frac{1}{2}$ % zinc!
13232	200-220	20	4	Siliceous Massive Sulphide - Medium pyrite with quartz more uneven. 0.1 copper and 5% zinc.
13233	220-235	15	3	Siliceous Massive Sulphide - Similar to last but 0.2% copper and 9% zinc.
Out R 13234	236-250	15	3	Siliceous Massive Sulphide - Medium fine and very fine pyrite with irregular quartz and later veinlet. 0.24% copper and 5.5% zinc.
13 - W - 4 13234	165-180	15	3	Massive Sulphide - Generally fine grained pyrite, with some faint hairline streaks which may be dark sphalerite. Very low copper with 4 to 5% zinc.
13235	180-195	15	3	Massive Sulphide - Like preceding.
16 - U - 3 13236	0-25	25	8	Black Schist - With some quartz-carbonate and relatively little sulphide. Nearly 1/2% copper?
13237	25-53	28	6	Black Schist - Very clean schist with local bunches pure (?) chalcopyrite. 0 to 10% copper!
13238	0-23	23	5	Quartz Porphyry - Copper ore (about 5%).
13239	23-50	27	6	Quartz Porphyry and Black Schist - Very low grade (0.2%) with sparse pyrite.
13240	85-114	29	4	Massive Sulphide - Relatively clean, fine grained, copper ore (about 5%).

TOTAL TWO HUNDRED TWENTY NINE CORE BITS FOR 50 SAMPLES FROM 16 3000 LEVEL DRILL HOLES.

FOR TEST ONE HUNDRED SIXTY-EIGHT CORE BITS FOR 37 SAMPLES FROM THIRTEEN 3000 LEVEL DRILL HOLES

U. V. Mine - 3000 LEVEL - D. P. CORE SAMPLES - 2

Hole Number	Sample Feet From to	Length	Number of Specimens	Type of Material
12 - W - 4	92 $\frac{1}{2}$ -108	15 $\frac{1}{2}$	3	Massive Sulphide - Generally clean fine grained pyrite with some faint hairline streaks which may be dark sphalerite. 1 $\frac{1}{2}$ % copper and 5% zinc.
	108-110 $\frac{1}{2}$	2 $\frac{1}{2}$	1	Siliceous Massive Sulphide - Medium fine pyrite with finely intergrown quartz. 0.75% copper and 2% zinc.
	200-220	20	4	Siliceous Massive Sulphide - Medium pyrite with quartz more common. 0.1 copper and 5% zinc.
	220-225	15	3	Siliceous Massive Sulphide - Similar to last but 0.2% copper and 9% zinc.
R	233-250	15	3	Siliceous Massive Sulphide - Medium fine and very fine pyrite with irregular quartz and later veinlet. 0.24% copper and 5.5% zinc.
13 - W - 4	165-180	15	3	Massive Sulphide - Generally fine grained pyrite, with some faint hairline streaks which may be dark sphalerite. Very low copper with 4 to 5% zinc.
	180-195	15	3	Massive Sulphide - Heavy chalcopyrite.
16 - U - 3	0-25	25	8	Black Schist - With some quartz-carbonate and relatively little sulphide. Nearly 1/2% copper?
	25-53	28	6	Black Schist - Very clean schist with local bunches pure (?) chalcopyrite. 0 to 10% copper!
5 - Q - 1	0-23	23	5	Quartz Porphyry - Copper ore (about 5%).
	23-50	27	5	Quartz Porphyry and Black Schist - Very low grade (0.2%) with sparse pyrite.
	85-114	29	4	Massive Sulphide - Relatively clean, fine grained, copper ore (about 5%).

TOTAL 100 HUNDRED TWENTY NINE CORE BITS FOR 50 SAMPLES FROM 16 3000 LEVEL DRILL HOLES.

FOR TEST ONE HUNDRED SIXTY-EIGHT CORE BITS FOR 37 SAMPLES FROM THIRTEEN 3000 LEVEL DRILL HOLES

EXTRA RESERVE ITEMS MARKED R

SSENIUS TEST MATERIAL - CORE SPECIMEN SAMPLES
 UNITED VERDE MINE 3000 LEVEL, HAYNES AREA DIAMOND DRILL 1-1-48

Hole Number	Sample Foot From to	Length	Number of Specimens	Type of Material
U. V. X. No. 4 (45° up)	190-198	18	4	Massive Sulphide - Fairly clean fine to medium grained pyrite (and pyrrhotite)
	198-202	4	2	Dark Magnetite Rock - Very fine grained with irregular massive pyrite.
U. V. X. No. 6 (46° up)	105-140	35	4	Massive Sulphide - With varying silice and very fine grained magnetite locally. Generally fine pyrite with trace zinc and copper.
	R 140-164	24	4	Massive Sulphide - Fine grained pyrite with tongue of black schist. Trace zinc and copper.
U. V. X. No. 7 R (60° up)	165-200	15	9	Massive Sulphide - Generally fine grained pyrite with a spot of black chlorite and some silice locally. Very low copper and zinc (7)
	R 200-215	15	6	Massive Sulphide - About like preceding.
	R 215-230	15	10	Massive Sulphide - About like preceding.
	R 230-245	15	10	Massive Sulphide - About like preceding with some very fine magnetite locally.
U. V. X. No. 13 (43 1/2° down)	R 67-81	14	4	Siliceous Sulphide - No schist. Some zinc and copper. Some pyrrhotite.
	R 81-104	23	3	Quartz and Sulphide - No schist and zinc.
U. V. X. No. 14 (41° down)	78-82	4	3	Massive Sulphide - About like preceding. Some zinc and copper. Some pyrrhotite.
	82-88	6	1	Massive Sulphide - About like preceding. Some zinc and copper. Some pyrrhotite.

Hole Number	Sample Feet From to	Length	Number of Specimens	Type of Material
<u>AX CORE</u>				
97 - Z - 2 (-78°)	430-434	4	5	Dark Chloritic Gangue - Very fine grained. Streaked with pyrrhotite, and tiny gash veinlets of chalcopyrite. low copper (0.3%?).
	434-436	2	2	Massive Sulphide - With fine streaky banding of medium coarse pyrite and very fine grained pyrrhotite.
<u>EX CORE</u>				
97 - Z - 3 (-75°)	457-459	2	3	Dark Chloritic and Magnetitic fine grained gangue with irregular chalcopyrite, pyrite, and fine pyrrhotite. 2.3%? copper.
	459-480	21	5	Massive Sulphide - With scattering large pyrites in fine pyrrhotite-pyrite matrix. Medium copper (1.1%).
	480-500	20	1	Massive Sulphide - Like preceding but less copper (0.3%?).
	500-501	10	3	Massive Sulphide - Pyrite and pyrrhotite with coarse dark chloritic material. Very low copper (0.1%).
	510-523	13	4	Massive Sulphide - Similar to preceding. Variable texture. (1/2% copper?).

TOTAL NINETY ONE CORE BITS FOR 19 SAMPLES FROM SEVEN 3000 LEVEL HAYNES AREA DRILL HOLES

FOR TEST FORTY-NINE CORE BITS FOR 18 SAMPLES FROM SIX 3000 LEVEL HAYNES AREA DRILL HOLES

Hole Number	Sample Fast From to	Length	Number of Specimens	Type of Material
AX CORE				
97 - Z - 2 (-78°) 13264	430-434	4	5	Dark Chloritic Congue - Very fine grained. Streaked with pyrrhotite, and tiny black veinlets of chalcopyrite. Low copper (0.3%?).
13265	434-435	2	2	Massive Sulphide - With fine streaky banding of medium coarse pyrite and very fine grained pyrrhotite.
13266 AX CORE				
97 - Z - 3 (-75°)	457-459	2	3	Dark Chloritic and Magnetitic fine grained congue with irregular chalcopyrite, pyrite, and fine pyrrhotite. 2.3% ? copper.
13267	459-480	21	5	Massive Sulphide - With scattering large pyrites in fine pyrrhotite-pyrite matrix, Medium copper (1.1%?).
13268	480-500	20	4	Massive Sulphide - Like preceding but less copper (0.3%?).
13269	500-510	10	3	Massive Sulphide - Pyrite and pyrrhotite with streaky dark chloritic material. Very low copper (0.1%?).
out	R 510-523	13	4	Massive Sulphide - Similar to preceding. Variable texture. (1/2% copper ?).

TOTAL NINETY ONE CORE BITS FOR 19 SAMPLES FROM SEVEN 3000 LEVEL HAYNES AREA DRILL HOLES

FOR TEST FORTY-NINE CORE BITS FOR 12 SAMPLES FROM SIX 3000 LEVEL HAYNES AREA DRILL HOLES

U.V. MINE 4500 LEVEL D.D. HOLE SAMPLES

Hole Number	Sample Feet From to	Length	Number of Specimens	Type of Material
9 - 2G - 5 13255	0-49	49	7	Black Schist - With sparse pyrite and chalcopyrite locally. 1% ?? copper.
13256	49-71	22	5	Massive Sulphide - With some black schist at start. 1% ? copper and high zinc (11 1/2%).
13257	71-93	22	4	Quartz and Massive Sulphide - With fine pyrite and ZnS and flecks of chalcopyrite. Medium copper (2%) and high zinc (11%).
9 - 2H - 3 R Out R	77 1/2 - 105	27 1/2	5	Quartz-Carbonate and Black Schist - With some blobs and streaks of pyrite. 1/2 ? copper.
	105-123	18	4	Massive Sulphide - With some streaky schist and quartz. Medium copper and spotty zinc.

TOTAL ONE HUNDRED FORTY THREE CORE BITS FOR 29 SAMPLES FROM TEN 4500 LEVEL DRILL HOLES
 FOR TEST EIGHTY SIX CORE BITS FOR 17 SAMPLES FROM SEVEN 4500 LEVEL DRILL HOLES

U.V. MINE 4500 LEVEL D.D. HOLE SAMPLES

Hole Number	Sample Feet From to	Length	Number of Specimens	Type of Material
9 - 2G - 3	0-49	49	7	Black Schist - With sparse pyrite and chalcopyrite locally. 1% ?? copper.
	49-71	22	5	Massive Sulphide - With some black schist at start. 1% ? copper and high zinc (11 1/2%).
	71-93	22	4	Quartz and Massive Sulphide - With fine pyrite and ZnS and flecks of chalcopyrite. Medium copper (2%?) and high zinc (11 1/2%).
9 - 2H - 3 R	77 1/2-105	27 1/2	5	Quartz-Carbonate and Black Schist - With some blobs and streaks of pyrite. 2% ? copper.
	105-123	13	4	Massive Sulphide - With some streaky schist and quartz. Medium copper and spotty zinc.

TOTAL ONE HUNDRED FORTY THREE CORE BITS FOR 25 SAMPLES FROM TEN 4500 LEVEL DRILL HOLES

FOR TEST SIXTY SIX CORE BITS FOR 17 SAMPLES FROM SEVEN 4500 LEVEL DRILL HOLES

U.V. MINE 4500 LEVEL D.D. HOLE SAMPLES

Hole Number	Sample Feet From to Length	Number of Specimens	Type of Material
9 - 2E - 3	R 62-70 8	3	Rock Gangue - With fine pyrite and ZnS and flecks of chalcopyrite. High copper and zinc.
<i>out</i>	R 70-90 20	5	Massive Sulphide - Similar to last but only traces chloritic gangue. Medium high copper and high zinc.
13247	90-110 20	4	Massive Sulphide - With very fine ZnS and pyrite and flecks of chalcopyrite locally. Medium copper (2%) and very high zinc (15%).
13248	110-134 24	5	Massive Sulphide - Similar to last. 1% ? copper and 11% ? zinc.
13249	134-156 22	5	Black Schist - Relatively clean chlorite with a little fine pyrite locally and traces of chalcopyrite. 1% ? copper.
13250	156-167 11	4	Massive Sulphide - Fine pyrite and ZnS with some residual chlorite. Local flecks of chalcopyrite. Medium copper and medium zinc.
13251	9 - 2E - 4 74-107 33	7	Siliceous Sulphide - Streaky sulphide and quartz. High copper and zinc.
13252	111-131 20	4	Massive Sulphide - Very fine pyrite (etc?). Low copper and high ! zinc.
13253	9 - 2E - 1 0-18 18	4	Massive Sulphide - Fine pyrite and ZnS with local flecks of chalcopyrite and blebs of quartz-carbonate. 3% ? copper and low zinc.
13254	18-31 13	4	Massive Sulphide and Quartz - Fine pyrite and ZnS with local flecks of chalcopyrite. High copper and medium low zinc (4%).
9 - 2C - 2	R 0-26 26	8	Massive Sulphide - With some black schist at start. Generally fine grained with local flecks of chalcopyrite. Medium copper and spotty zinc.
<i>out</i>	R 26-45 19	4	Massive Sulphide - Fine pyrite and ZnS with local flecks of chalcopyrite. Medium copper (2%) and high zinc (11%).

U.V. MINE 4500 LEVEL D.D. HOLE SAMPLES

Hole Number	Sample From	Feet to Length	Number of Specimens	Type of Material
9 - 2E - 3	R 62-70	8	3	Rock Gangue - With fine pyrite and ZnS and flecks of chalcopyrite. High copper and zinc.
	R 70-90	20	5	Massive Sulphide - Similar to last but only traces chloritic gangue. Medium high copper and high zinc.
	90-110	20	4	Massive Sulphide - With very fine ZnS and pyrite and flecks of chalcopyrite locally. Medium copper (2%) and very high zinc (15%).
	110-134	24	5	Massive Sulphide - Similar to last. 1% ? copper and 11% ? zinc.
	134-156	22	5	Black Schist - Relatively clean chlorite with a little fine pyrite locally and traces of chalcopyrite. 1% ? copper.
	156-167	11	4	Massive Sulphide - Fine pyrite and ZnS with some residual chlorite. Local flecks of chalcopyrite. Medium copper and medium zinc.
9 - 2E - 4	74-107	33	7	Siliceous Sulphide - Streaky sulphide and quartz. High copper and zinc.
	111-131	20	4	Massive Sulphide - Very fine pyrite (etc?). Low copper and high ! zinc.
9 - 2E - 1	0-18	18	4	Massive Sulphide - Fine pyrite and ZnS with local flecks of chalcopyrite and blebs of quartz-carbonate. 3% ? copper and low zinc.
	18-31	13	4	Massive Sulphide and Quartz - Fine pyrite and ZnS with local flecks of chalcopyrite. High copper and medium low zinc (4%).
9 - 2E - 2	R 0-26	26	6	Massive Sulphide - With some black schist at start. Generally fine grained with local flecks of chalcopyrite. Medium copper and spotty zinc.
	R 26-45	19	4	Massive Sulphide - Fine pyrite and ZnS with local flecks of chalcopyrite. Medium copper (2%) and high zinc (11%).

EXTRA OR RESERVE ITEMS MARKED R

SOIL SAMPLE TEST MATERIAL - CORE SPECIMEN SERIES
 UNITED VERDE MINE - 4500 LEVEL - DIAMOND HILL BRIDGE

Core Number	From to	Sample Feet Length	Number of Specimens	Type of Material
13241	140-170	75	7	quartz schist - Hard grey rock with patchy flecks or local blots of chalcopyrite. 1% copper?
13242	66-106	15	7	Massive sulphide - fine pyrite and ZnS with some residual schist and some quartz locally. 1 1/2% copper? and 30% zinc.
9-2E-1	69-89	20	5	Quartz - With fine pyrite locally and patchy flecks of chalcopyrite. 4%? copper, low zinc.
116-120	116-120	18	5	Massive sulphide - fine pyrite and ZnS with some residual schist and some quartz locally. 1% copper?
131-140	131-140	9	5	Massive sulphide - fine pyrite and ZnS with some residual schist and some quartz locally. 1% copper?
141-150	141-150	10	4	Massive sulphide - fine pyrite and ZnS with some residual schist and some quartz locally. 1% copper?
12-13	12-13	17	3	Massive sulphide, some residual schist and some quartz locally. 1% copper?
86-90	86-90	5	2	Massive sulphide - fine pyrite and ZnS with some residual schist and some quartz locally. 1% copper?
106-130	106-130	16	2	Massive sulphide - fine pyrite and ZnS with some residual schist and some quartz locally. 1% copper?
130-138	130-138	8	1	Black Schist - Strucky schist, quartz-carbonate and fine sulphide. 1% copper.
138-145	138-145	14	1	Massive sulphide - fine pyrite and ZnS with some residual schist and some quartz locally. 1% copper?
153-159	153-159	14	1	Massive sulphide - fine pyrite and ZnS with some residual schist and some quartz locally. 1% copper?
159-171	159-171	12	5	Massive sulphide - fine pyrite and ZnS with some residual schist and some quartz locally. 1% copper?

Out

EXTRA OR RESERVE ITEMS MARKED R

SELENIUM TEST MATERIAL - CORE SPECIMEN SAMPLES
 UNITED VERDE MINE - 4500 LEVEL - DIAMOND DRILL HOLES

Hole Number	Sample Feet From to	Length	Number of Specimens	Type of Material
6 - S - 3	140-175	35	7	Quartz Porphyry - Hard gray rock with patchy flecks or local blobs of chalcop- pyrite. 1 1/2% copper?
7 - D - 4	76-106	32	7	Massive Sulphide - Fine pyrite and ZnS with some residual schist and some quartz locally. 1 1/2% copper? and spotty zinc.
9 - 2E - 1	69-89	20	5	Quartz - With fine pyrite locally and patchy flecks of chalcopyrite. 4%? copper, low zinc.
	116-130	15	5	Massive Sulphide and Schist - Patchy, fine grained streaky sulphide. Medium copper and high zinc.
	151-140	8	5	Massive Sulphide and Black Schist - With streaky fine grained sulphide and local quartz-carbonate. Medium copper and high zinc.
	144-139	15	4	Massive Sulphide - Fine streaky sulphide with traces residual rock. 3 1/2% copper, and medium low zinc.
9 - 1E -	53-55	12	7	Massive Sulphide, rock and quartz - Patchy fine grained sulphide with medium copper and high zinc.
	65-70	5	5	Massive Sulphide - Fine pyrite and ZnS with flecks of chalcopyrite. Medium copper (20%), and high zinc (50%).
	77-110	33	8	Massive Sulphide - Generally fine streaky sulphide with patchy flecks of chalcop- pyrite. High copper and zinc.
	R 104-100	4	5	Black Schist - Black schist, quartz-carbonate and fine sulphide. 30% copper.
	R 100-140 R 100-100	40	7	Massive Sulphide - Fine and medium grained sulphide with some quartz and some vein- let chalcopyrite and local quartz-carbonate. High copper and zinc.
R 136-171	18	5	Massive Sulphide - Fine grained sulphide with some residual chalcopyrite. 3 1/2% copper and high zinc.	

Omit
 ASSAY DATA RELATIVE TO PROPOSED SELENIUM SAMPLES
EQUATOR-COPPER CHIEF

Equator No. 9 D. D. Hole. Southwesterly through Equator-Copper Chief sulphide body. Drilled at minus 13° from the 5th floor above the main Iron King tunnel level. Collar about 5597 ft. elevation. Nine specimens between 0 and 40 feet. Massive sulphide, somewhat leached and/or enriched. Traces of covellite.

ASSAYS 0 to 40 FT.

<u>Feet</u>	<u>Cu</u>	<u>Zn</u>	<u>Au</u>	<u>Ag</u>	<u>Specimens at - feet</u>
0-5	0.55	3.8	0.09	3.70	3
5-10	1.88	20.9	0.06	3.66	7
10-16	0.55	11.6	0.04	1.41	13
16-22	1.85	22.8	0.05	2.08	18
22-25	3.61	15.1	0.045	2.70	23
25-32	4.39	21.4	0.095	2.36	26 & 30
32-37	1.25	9.1	0.05	2.19	31
37-40	0.65	5.3	0.065	2.32	40

Omit (Suggest two selenium samples, four core bits 3 to 18 inclusive, and five 23 to 40 inclusive.)

Equator No. 10 D. D. Hole. Southwesterly through Equator-Copper Chief sulphide body. Minus 34° down hole from the 5th floor above the main Iron King tunnel level. Collar about 5596 ft. elevation. Five specimens between 23 and 47 feet. Massive sulphide, with relatively high zinc, low copper and maximum mercury.

ASSAYS 23 to 47 FT.

<u>Feet</u>	<u>Cu</u>	<u>Zn</u>	<u>Au</u>	<u>Ag</u>	<u>As</u>	<u>Sb</u>	<u>Hg</u>	<u>Specimens at - feet</u>
23-25	0.42	22.2	0.02	2.44				23
25-30	0.56	18.7	0.03	1.98				27
30-35	0.56	14.1	0.06	2.16			0.06	32
35-40	0.65	15.8	0.12	2.50				37
40-47	1.12	9.7	0.10	2.68			0.05	42
Composite								
23-47	(0.66)	(16.1)	(0.07)	(2.35)	0.68	0.07	0.03	

Omit (One selenium sample, five core bits 23 to 42 inclusive.)

Equator No. 11 D. D. Hole. Drilled about S.15° W. at minus 13°. Collar about 5597 ft. elevation. Seven specimens between 0 and 47 feet. Massive Sulphide somewhat leached and or enriched. Some traces of covellite.

ASSAYS 0 to 47 FT.

Feet	Cu	Zn	Au	Ag	As	Sb	Pb	Hg	Specimens at - feet
0-7	0.49	3.2	0.06	2.42					7
17-10	1.23	4.0	0.06	1.04					10
10-15	1.47	5.9	0.04	1.07					
15-20	1.46	9.7	0.04	1.81					20
20-25	1.20	6.6	0.05	1.77					—
Dike									
29-38	1.28	7.6	0.05	1.46					32
38-41	0.65	1.2	0.05	1.57					39
41-47	0.67	2.1	0.08	2.12					42 & 47
Composites									
0-25	(1.17)	(5.9)	(0.05)	(1.62)	0.01	0.22	0.63	0.00	
29-47	(0.86)	(3.5)	(0.06)	(1.72)	0.15	0.16	0.38	0.03	

Omit

Two (?) selenium samples, three core bits 7, 10 and 20, and four 32 to 47 inclusive

Equator No. 12 D. D. Hole. Drilled about S 33° West through Equator-Copper Chief sulphide body. Minus 37° down hole. Collar at about 5597 ft. elevation. Seven specimens between 11 and 38 feet. Massive Sulphide with relatively high zinc, medium low copper and very low mercury.

ASSAYS 11 to 38 FT.

Feet	Cu	Zn	Au	Ag	As	Sb	Hg	Specimens at - feet
11-15	1.28	18.2	0.08	2.26				14
15-21	0.79	14.8	0.07	2.57			0.02	19
21-25	0.58	5.1	0.05	2.17				21
25-30	1.04	13.4	0.13	1.96			0.05	25
30-34	0.96	11.5	0.10	2.14				30
34-38	1.19	13.8	0.07	1.57			0.07	34 & 36
Composite								
11-38	(0.97)	(12.8)	(0.08)	(2.11)	0.68	0.07	0.03	

Omit

2 Inches at 35 feet - - - - - 0.22

Two samples for selenium, three core bits 14, 19 and 21, and four 25 to 36 inclusive.

Equator No. 17 D. D. Hole. Drilled S. $7\frac{1}{2}^{\circ}$ W., at about 30° up from the Iron King tunnel, through the Equator-Copper Chief sulphide body. Collar at about 5576 feet elevation. Four core specimens between 0 and 18 feet. Massive sulphide with maximum lead, medium zinc and medium low copper.

ASSAYS 0 to 18 FT.									Specimens
Feet	Cu	Zn	Au	Ag	As	Sb	Pb	Hg	at - feet
0-5	0.79	7.8	0.05	2.20					1
5-11	0.31	7.7	0.05	1.71					8
11-18	0.74	10.9	0.06	1.88					14 & 17
Composites									
0-18	(0.61)	(8.8)	(0.05)	(1.93)	0.03	0.21	1.18	0.04	

omit One selenium sample, four core bits one to 17 inclusive

Equator No. 13 D. D. Hole. South-southwesterly through the Equator-Copper Chief sulphide body at about 14° up from the Iron King tunnel level. Collar at about 5575 feet elevation. Ten core specimens between 0 and 41 feet. Massive sulphide with specially "high" lead and varying Zn and copper.

ASSAYS 0 to 41 FT.									Specimens
Feet	Cu	Zn	Au	Ag	As	Sb	Pb	Hg	at - feet
0-6	0.20	2.5	0.03	1.97					0 & 5
6-11	0.14	2.4	0.04	1.86					10 $\frac{1}{2}$
11-17	0.18	5.4	0.04	1.98					16
17-23	0.91	14.7	0.04	1.80					19 & 20
23-26	0.98	15.3	0.05	1.80					26
26-31	0.55	7.1	0.05	1.75					29
31-36	0.83	13.9	0.06	1.50					35
36-41	0.85	13.3	0.06	1.52					40
Composites									
0-17	(0.17)	(3.4)	(0.04)	(1.94)	0.17	Tr	0.88	0.02	
17-41	(0.82)	(12.9)	(0.05)	(1.67)	0.32	Tr	1.87	0.05	

omit Two samples for selenium, four bits 0 to 16 inclusive, and 6 bits 19 to 40 inclusive.

Equator No. 23 D. D. Hole. Southwesterly through the Equator-Copper Chief sulphide body at about 25° down from the fifth floor above the Iron King tunnel level. Collar at about 5597 feet elevation. Four core specimens between 54 and 68 feet. Massive sulphide with relatively high zinc, medium copper and maximum mercury.

ASSAYS 54 to 68 FT.									Specimens
Feet	Cu	Zn	Au	Ag	As	Sb	Pb	Hg	at - feet
54-59	0.74	24.2	0.05	1.69					55
59-64	1.04	13.7	0.07	2.03					60
64-68	3.16	13.1	0.26	3.74					65 & 67
Composites									
50-64	(0.96)	(19.3)	(0.05)	(1.82)	0.29	0.19	0.51	0.07	
64-72 $\frac{1}{2}$	(2.80)	(8.0)	(0.17)	(3.85)	0.41	0.12	0.41	0.07	

omit One selenium sample, four core bits 55 to 67 inclusive.

Omit

ASSAY DATA RELATIVE TO PROPOSED SELENIUM SAMPLES
UNITED VERDE 700 FOOT LEVEL

700 LEVEL

14 - K - 1 (Hole No. 1 in 14 - K Block)

Feet	%Cu	%Zn	Oz. Au	Oz. Ag	Specimens at - feet
0-5	1.6	11.4	0.01	1.90	0
5-10	0.3	16.2	0.02	1.60	5
10-15	0.4	8.7	0.02	1.80	10
15-20	0.4	15.7	0.02	1.95	15
20-25	0.4	15.6	0.03	1.30	20
25-30	2.3	7.5	0.04	3.2	25
30-35	5.9	5.3	0.05	6.10	30
35-40	2.7	5.2	0.07	5.40	35
40-45	4.7	4.4	0.04	5.50	40
45-50	5.5	5.1	0.04	3.50	45
50-55	1.3	4.1	0.04	2.50	50
55-61	0.9	8.1	0.03	2.4	55 & 61
End					

Omit

Thirteen specimen bits. Three selenium samples:
0 to 25 feet 5 core bits; 25 to 50 feet 5 core bits, and 50 to 61 feet
three core bits.

700 LEVEL

14 - K - 4 (20° down hole)

Feet	%Cu	%Zn	Oz. Au	Oz. Ag	Specimens at - feet
0-5	0.3	17.5	0.08	4.30	0
5-10	0.2	19.4	0.07	1.40	5
10-15	0.3	22.9	0.06	2.90	10
15-20	0.3	20.8	0.06	2.20	15
20-25	0.4	16.9	0.06	2.90	20
25-30	0.3	20.1	0.04	1.90	25
30-35	3.0	11.8	0.04	2.00	30
35-40	3.7	7.5	0.04	3.00	35 & 40
40-45	5.6	5.5	0.04	3.60	45
45-50	6.2	3.4	0.04	4.40	50
50-55	4.4	3.4	0.08	6.20	55
55-60	5.1	3.6	0.06	8.00	60
60-65	5.6	3.8	0.04	3.70	65
65-68	3.0	4.8	0.03	1.40	
End					

Omit

Fourteen specimen bits. Three selenium samples:
0 to 20 feet 4 core bits; 20 to 40 feet 5 core bits, and 40 to 65 feet 5 core bits.

700 LEVEL

15-L-6 (25°up)

Feet	%Cu	Specimens at - feet
0-5	0.2	3
5-10	Tr	7
10-15	Tr	10
15-20	0.4	16
20-25	Tr	22
25-30	Tr	25
30-35	0.4	30, 34
35-40	0.9	37
40-45	0.9	
45-50	0.4	46
50-55	0.7	
55-60	0.4	
60-65	Tr	
65-70	0.5	65
70-75	1.0	75
75-80	3.0	
8-85	3.2	80
85-90	3.4	
90-95	1.4	90
95-100	0.4	96
100-105	0.2	100
105-110	0.4	108
110-113	0.2	112
113-118	0.5	
116-120	Tr	117, 118, 119
120-125	Tr	125
125-130	Tr	129
End		

Twenty three specimen bits.
 Four Selenium samples: 0 to 25 feet
 5 core bits, 25 to 50 feet 5 core bits,
 65 to 100 feet 5 core bits and 100 to
 130 feet 8 core bits.

700 LEVEL

15-L-7 (25°up)

Feet	%Cu	Specimens at - feet
0-5	Tr	1
5-10	Tr	
10-15	Tr	10
15-20	Tr	17, 20
20-25	Tr	22
25-30	0.2	26
30-35	1.8	30
35-40	1.8	36
40-45	1.4	43
45-50	0.4	
50-55	0.8	51
55-60	Tr	59
60-65	Tr	
65-70	Tr	66
70-75	0.5	
75-80	1.2	75
80-85	2.8	
85-90	4.2	85
90-95	4.9	91
95-100	1.1	99
100-105	1.0	
105-110	1.0	
110-115	0.7	
115-120	0.2	
120-124	0.4	
124-130	Tr	
130-135	Tr	
135-139	Tr	

Sixteen specimen bits. Four
 Selenium samples: 0 to 20 feet 4 core
 bits, 20 to 40 feet 4 core bits, 40
 to 70 feet 4 core bits and 70 to 100
 feet 4 core bits.

COMPOSITES:

omit

	Cu	Zn	Au	Ag	SiO2	Fe	Al2O3	S	MgO
15-L-6 75 to 90 ft.	3.30	0.4	0.04	5.76	2.3	25.2	0.7	29.0	3.68
15-L-7 80-to 95 ft.	4.09	3.6	0.04	3.20	35.6	24.0	1.5	25.4	3.68

700 LEVEL

15-L-1

Feet	%Cu	Specimens at - feet
0-5	0.40	
5-10	0.40	
10-15	0.33	13
15-20	0.35	17
20-25	0.40	23
25-30	0.50	26, 30
30-35	0.90	
35-40	0.86	35
40-45	0.45	40
45-50	0.35	45
50-55	0.50	50
55-58	1.00	55
58-63	2.30	60
63-68	1.65	64, 65
68-72	1.00	70
72-74	3.10	

15-I-1 Continued

Feet	%Cu	Specimens at - feet
74-80	0.70	75
80-85	0.40	80
85-90	0.70	85
90-95	0.45	90, 95
95-100	0.65	99
100-105	0.70	100
105-110	0.65	105
110-115	0.65	110
115-120	1.10	115, 117
120-125	0.85	120
125-130	1.15	125
130-135	1.80	130
135-143	2.65	

End

Twenty eight specimen bits for six selenium samples. Ten to 20 feet 5 core bits, 30 to 55 feet 4 core bits, 55 to 74 feet 5 core bits, 74 to 95 feet 5 core bits, 95 to 115 feet 4 core bits, and 115 to 135 feet 5 core bits.

All but first 15 feet once figured in "6 1/2 zinc ore area" Composite for full 143 feet gave Cu 0.9, Zn 5.3, Au 0.005, Ag 0.92, SiO2 5.0 and Fe 38.8%.

700 LEVEL

17-M-2 (3¹⁰up)

Feet	%Cu	Specimens at - feet
0-5	0.90	
5-10	1.65	
10-15	0.40	10, 15
15-20	1.00	19
20-25	4.25	23
25-30	11.35	27
30-35	5.85	35
35-40	2.50	

M-M-3 (2⁰down)

Feet	%Cu	Specimens at - feet
0-5	1.35	
5-10	1.35	
10-15	1.00	14
15-20	1.20	18
20-25	3.03	22
25-30	16.05	30
30-35	2.10	
35-40	1.30	

Two holes close together. Ten specimen bits, 10 to 35 feet one Selenium sample.

700 LEVEL - 18-I-1 No assays available.

700 LEVEL

18 - I - 5 (35° down)

Feet	%Cu	Specimens at - feet
0-5	0.7	0
5-10	0.3	5
10-15	0.4	10
15-20	0.2	<u>15</u>
20-25	3.4	
25-29	0.8	

Omit

18 - I - 5 Continued

Feet	%Cu	Specimens at - feet
29-32	3.4	30
32-35	10.1	
35-40	8.0	35
40-44	5.1	44
44-47	3.6	<u>45</u>
47-50	0.3	

Eight specimen bits. Two Selenium samples: 0 to 20 feet 4 core bits and 29 to 47 feet 4 core bits.

700 LEVEL

18 - J - 2 (25° down)

Feet	%Cu	Oz. Au	Oz. Ag	Specimens at - feet
0-5	2.9	Tr	0.60	5
5-10	0.8	Tr	0.20	6
10-13	10.2	0.01	0.90	10, 13
13-18	12.3	0.01	1.30	15
18-23	14.9	0.005	2.10	20
23-26	2.4	Tr	0.90	<u>26</u>
26-30	2.3	Tr	0.20	
30-32	1.2	Tr	0.30	
32-41	--	Dike		
41-47	0.9	Tr	Tr	<u>45</u>
47-49	10.1	Tr	0.80	48
49-55	0.3	Tr	0.10	50
55-60	0.3	Tr	0.20	<u>55</u>
60-65	1.2	Tr	0.40	<u>60</u>
65-69	0.2	Tr	0.10	65
69-72	1.2	0.01	0.60	70
72-77	0.3	0.01	0.30	<u>75</u>
77-82	0.0	Tr	0.40	
82-85	1.6	0.01	1.20	
85-95	0.2	0.015	0.30	<u>85, 90</u>
95-100	0.4	0.01	0.40	95, 100
100-105	2.3	0.01	0.90	<u>105</u>
105-110	0.0	0.005	0.30	
110-117	0.0	0.005	0.30	
End				

Twenty specimen bits. Four Selenium samples: 0 to 26 feet 7 core bits, 41 to 60 feet 4 core bits, 60 to 77 feet four core bits and 85 to 105 feet 5 core bits.

Omit

700 LEVEL

18 - J - 4 (60° down)

<u>Feet</u>	<u>%Cu</u>	<u>Oz. Au</u>	<u>Oz. Ag</u>	<u>Specimens at - feet</u>
0-5	0.6	Tr	0.20	5
5-11	4.8	Tr	0.70	10
11-16	-- Dike	--	--	--
16-21	6.6	Tr	1.10	15, 19
21-25	4.7	Tr	0.70	<u>21, 25</u>
25-30	-- Dike	--	--	--
30-35	6.9	0.01	1.30	<u>30</u>
35-40	12.3	0.005	1.60	35
40-45	13.9	0.005	2.30	40
45-50	9.2	0.005	1.20	
50-55	6.8	0.01	0.90	50
55-62	10.1	0.01	1.90	<u>60</u>
62-72	-- Dike	--	--	
72-73	1.6	0.01	1.20	
73-74	-- Dike	--	--	
74-77	1.0	0.005	0.40	
End				

dwit Eleven core bits. Two Selenium samples: 0 to 25 feet 6 core bits and 30 to 62 feet 5 core bits.

OMIT

ASSAY DATA RELATIVE TO PROCESSED SELENIUM SAMPLES
UNITED VERDE 1200 FOOT LEVEL

1200 LEVEL

10 - N - 3				10 - N - 4			
0 to 75 feet				0 to 45 feet			
Feet	%Cu	%Zn	Specimens at - feet	Feet	%Cu	%Zn	Specimens at - feet
0-5	1.2	N11	1	0-5	1.0	Tr	
5-10	1.4	N11	5	5-10	1.0	0.5	5
10-15	1.0	N11	10	10-15	0.7	Tr	10
15-20	1.1	N11	15	15-20	0.7	1.4	15
20-25	1.2	N11	20	20-25	0.8	0.9	20
25-30	1.0	N11	25	25-30	0.9	0.5	25
30-35	0.9	N11	30	30-35	0.9	0.3	30
35-40	0.8	N11	35	35-40	0.5	1.2	35
40-45	0.8	N11	40	40-45	0.8	2.4	40
45-50	0.7	N11	50	45-50	0.4	1.0	45
50-55	0.7	N11	55				
55-60	0.5	Tr	60				
60-65	0.6	Tr	65				
65-70	0.7	N11	70				
70-75	0.5	0.3	75				

OMIT (Fifteen specimen bits. Three Selenium samples: 0 to 25 feet 5 core bits, 25 to 50 feet 5 core bits and 50 to 75 feet 5 core bits.

OMIT (Nine specimen bits. Two Selenium Samples: 0 to 25 feet 4 core bits and 25 to 50 feet 5 core bits.

1200 LEVEL

10 - P - 2				10 - P 2 Continued			
5 to 140 feet				Specimens at - feet			
Feet	%Cu	%Zn	Specimens at - feet	Feet	%Cu	%Zn	Specimens at - feet
0-2	Dike	---		70-75	Tr	7.9	70
2-5	Tr	10.6	5	75-80	Tr	8.8	75
5-10	Tr	5.8	10	80-85	0.5	10.9	80
10-15	Tr	8.0	15	85-90	Tr	0.5	85
15-20	0.5	10.4	20	90-95	0.6	8.7	90
20-25	0.4	12.3	25	95-100	Tr	6.3	95
25-30	Tr	12.6	30	100-105	0.6	7.4	100
30-35	Tr	9.6	35	105-110	0.9	8.3	105 & 108
35-40	Tr	9.2	40	110-115	0.5	7.7	110
40-45	Tr	7.8	42	115-120	0.3	5.9	115
45-50	0.8	9.9	45	120-125	0.6	7.0	120
50-55	0.6	10.0	50	125-130	Tr	9.4	125
55-60	Tr	8.3	55	130-135	0.5	9.1	130
60-65	Tr	8.7	60	135-140	0.5	5.8	135 & 140
65-70	0.4	8.3	65				

OMIT (Thirty specimen bits. Seven Selenium samples: 0 to 15 feet 3 core bits, 15 to 25 feet 2 core bits, 25 to 45 feet 4 core bits, 45 to 75 feet 6 core bits, 75 to 100 feet 5 core bits, 100 to 120 feet 5 core bits, 120 to 140 feet 5 core bits.

1200 LEVEL

14 - 0 - 1

<u>Feet</u>	<u>%Cu</u>	<u>%Zn</u>	<u>%Pb</u>	<u>Specimens at - feet</u>
40-45	Tr	6.2	Nil	
45-50	Tr	4.7	0.3	
50-55	Tr	3.2	1.0	<u>50, 55</u>
55-56	Dike			
56-60 MS	Tr	5.7	0.5	<u>60</u>
60-65	Tr	3.4	1.0	
65-70	Tr	4.6	1.3	<u>65, 70</u>
70-75	Tr	6.7	3.7	<u>75</u>
75-81	Tr	5.9	1.4	<u>80</u>
End				

0 unit

Seven specimen bits. Two Selenium samples: 50 to 65 feet 3 core bits and 65 to 81 feet 4 core bits.

16 - L - 2

<u>Feet</u>	<u>%Cu</u>	<u>%Zn</u>	<u>Specimens at - feet</u>
15-20	0.7	Nil	
20-25	0.5	Nil	<u>25</u>
25-30	1.7	1.5	<u>30</u>
30-35	1.1	1.0	<u>35</u>
35-40	1.3	0.9	<u>40</u>
40-45	1.0	2.3	<u>45</u>
45-50	1.0	2.0	<u>50</u>
50-55	0.8	2.8	<u>55</u>
55-60	1.2	Tr	<u>58, 59</u>
60-65	0.5	1.4	

0 unit

Nine specimen bits. Two Selenium samples: 20 to 40 feet 4 core bits and 40 to 60 feet 5 core bits.

16 - N - 2

<u>Feet</u>	<u>%Cu</u>	<u>%Zn</u>	<u>Specimens at - feet</u>
0-5	0.5	Nil	<u>5</u>
5-10	0.3	0.2	<u>10</u>
10-15	0.7	2.5	<u>15</u>
15-20	Tr	4.8	<u>18</u>
	Dike		
23 1/2-28	Tr	0.6	

0 unit

Four specimen bits. One Selenium sample: 0 to 20 feet 4 core bits.

1200 LEVEL

15 - 0 - 2

Feet	%Cu	%Zn	%Pb	Specimens at - feet
0-5	0.4	N11		5
5-10	0.4	N11		10
10-15	0.5	N11		15
15-20	0.3	N11		20
20-23 $\frac{1}{2}$	0.5	Tr		
23 $\frac{1}{2}$ -29 $\frac{1}{2}$	4.1	1.6		24
26 $\frac{1}{2}$ -29 $\frac{1}{2}$	1.3	2.2		28
29 $\frac{1}{2}$ -35	2.4	4.5		30
35-40	1.7	4.7		35
40-42 $\frac{1}{2}$	1.3	17.9		
42 $\frac{1}{2}$ -46	1.0	4.4		43
46-47	1.2	6.2		46 $\frac{1}{2}$
47-48	0.8	2.3		
48-57	0.5	N11		
57-60	0.5	7.8		
190-190	Tr	Porphyry		
190-197	Tr	Porphyry		
197-200	0.4	1.6	N11	
200-205	Tr	3.1	0.5	201
205-210	0.4	1.7	N11	205
210-215	0.2	1.1	0.5	210
215-220	0.2	6.7	0.8	215
220-225	0.2	6.7	0.9	220, 225
225-230	Tr	2.3	N11	
230-232	Tr	1.7	N11	
End				

omit (Sixteen specimen bits. Four Selenium samples: 0 to 29 $\frac{1}{2}$ feet 6 core bits, 29 $\frac{1}{2}$ to 47 feet 4 core bits, 200 to 215 feet 3 core bits, and 215 to 225 feet 3 core bits.)

1200 PLUS 20 (Twentieth Floor)

15 - K - 7 0 to 33 Feet (Dike at 34)

Feet	%Cu	%Zn	Specimens at - feet
0-5	0.5	N11	0
5-10	0.3	0.7	5
10-15	0.4	0.9	10
15-20	1.1	1.3	15
20-21 $\frac{1}{2}$	1.4	0.2	20, 21
21 $\frac{1}{2}$ -28	1.9	N11	22, 25
28-33 $\frac{1}{2}$	1.7		28, 29, 30, 33
33 $\frac{1}{2}$ -34 $\frac{1}{2}$	Dike		

omit (Twelve specimen bits. Three Selenium samples: 0 to 20 feet 4 core bits, 20 to 28 feet 4 core bits, and 28 to 33 $\frac{1}{2}$ feet 4 core bits.)

4000 LEVEL

7 - U - 4 Continued

Thirteen specimen bits. Four
 35 feet 2 core bits, 35 to 50 feet

4000 Level

8 - V - 2 Siliceous Mn
 30 to 50 feet

Feet	Gr	Gr	Gr
30-35	Tr	Tr	Tr
35-40	Tr	0.0	Tr
40-45	Tr	Tr	Tr
45-50	Tr	Tr	Tr

Five specimen bits. One Sel

5000 LEVEL

9 - V - 11 Lath Flc
 0 to 113 feet

Feet	Gr	Gr	Gr
0-5	11.0	0.01	
5-10	17.5	0.01	
10-15	5.8	0.01	
15-16	Dike		
16-21	2.5	0.005	
21-25	0.0	0.005	
26-31	2.1	Tr	
31-36	3.2	0.01	
36-43	0.2	Tr	
43-48	1.4	Tr	
48-53	2.0	Tr	
53-58	5.6	Tr	
58-63	5.1	0.005	
63-68	10.9	0.01	
68-73	10.1	0.01	
73-78	7.7	0.005	
78-83	10.4	0.005	
83-88	2.0	0.01	
88-93	0.8	Tr	
93-98	1.0	Tr	
98-104	0.3	Tr	
104-109	1.2	Tr	
109-113	0.3	Tr	0.

Three specimen bits.
 1 to 48 feet 3 core bits, 4
 and 83 to 113 feet 2 core bits

ASSAY DATA RELATIVE TO PROPOSED SELENIUM SAMPLES -
UNITED VERDE 3000 FOOT LEVEL

3000 LEVEL

6 - T - 1		Massive Sulphide		Specimens at - feet
0 to 65 feet				
Feet	%Cu	%Zn		
0-4	Dike			
4-10	3.1	5.9		5
10-15	3.9	8.0		
15-20	4.1	7.0		20
20-25	2.5	5.5		
25-30	1.6	8.9		<u>30</u>
30-35	Tr	7.9		
35-40	Tr	5.6		37
40-45	1.7	5.6		40
45-50	0.5	7.2		50
50-55	Tr	10.4		54
55-60	1.7	8.1		<u>60</u>
60-65	1.3	7.8		

Eight specimen bits. Two Selenium samples: 0 to 30 feet 3 core bits and 30 to 50 feet 5 core bits.

3000 LEVEL

7 - T - 1		Massive Sulphide			Specimens at - feet
0 to 42 feet					
Feet	%Cu	%Zn	Oz Au	Oz Ag	
0-5	0.68	5.7	0.06	0.20	1
5-10	0.62	5.3	0.05	0.40	5
10-15	0.13	3.5	0.04	0.80	9
15-20	0.14	3.9	0.04	0.30	15
20-25	0.14	4.4	0.04	0.30	<u>20</u>
25-28	0.42	1.9	0.04	1.50	25
28-30	1.35	7.2	0.06	1.30	29
30-35	0.31	3.2	0.05	0.70	35
35-40	0.50	7.1	0.06	0.90	40
40-42	2.81	5.3	0.08	2.00	<u>41</u>
End					

Ten specimen bits. Two Selenium samples: 0 to 20 feet 5 core bits and 20 to 42 feet - 5 core bits

3000 LEVEL

7 - T - 2 Massive Sulphide

Feet	%Cu	%Zn	OzAu	OzAg	Specimens at - feet
0-5	0.39	3.1	Tr	Tr	0
5-10	0.59	6.5	0.04	0.50	5
10-15	0.94	4.0	0.02	0.30	10
15-20	1.02	7.8	0.04	0.90	15
20-25	0.43	5.3	0.04	0.45	20, 25
25-33	0.18	5.0	0.035	0.60	30

Omit

Seven specimen bits. Two Selenium samples: 0 to 15 feet 3 core bits and 15 to 33 feet 4 core bits.

3000 LEVEL

7 - U - 1 Massive Sulphide

Feet	%Cu	%Zn	Specimens at - feet	Feet	%Cu	%Zn	Specimens at - feet
0-5	12.5	0.0	1	60-65	5.4	5.4	65
5-10	6.8	4.3	5	65-70	2.9	7.1	
10-15	1.1	15.2	10	70-75	Tr	5.6	75
15-20	0.8	4.1	15	75-80	Tr	5.2	
20-25	0.8	0.8	20	80-85	Tr	5.0	85
25-30	0.5	0.0	30	85-89	0.4	2.6	89
30-35	0.6	4.3	35	91-95	0.5	10.4	95
35-40	1.2	3.1	40	95-100	Tr	7.0	100
40-45	0.8	1.4	45	100-105	0.6	10.1	105
45-50	1.5	3.0		105-110	0.7	7.4	110
50-55	3.3	2.7	55	110-115	Tr	9.4	115
55-60	3.5	3.0	59	115-117	Tr	7.1	

Omit

Twenty specimen bits. Three Selenium samples: 0 to 35 feet 7 core bits, 35 to 75 feet 6 core bits and 75 to 115 feet 7 core bits

3000 LEVEL

7 - U - 4 Massive Sulphide

Feet	%Cu	%Zn	OzAu	OzAg	Specimens at - feet
0-5	11.70		0.06	3.50	1
5-10	9.14		0.05	1.90	10
10-15	3.22	0.5	0.03	0.20	
15-17	7.70	0.8	0.07	0.75	15
17-18	3.15	0.5	0.02	1.20	18
18-19	6.64	1.1	0.05	0.70	
19-23	0.61	1.2	0.01	0.20	20, 23
23-27	6.77	1.4	0.02	3.60	
27-30	2.24	0.9	0.02	1.70	
30-35	2.31	3.7	0.02	1.00	
35-40	4.53	3.3	Tr	0.70	40
40-45	1.60	4.0	0.01	0.30	45
45-50	3.93	3.5	0.02	0.90	50
50-55	0.63	0.2	0.02	1.10	55
55-60	0.29	0.1	0.02	Tr	60
60-65	3.23	12.5	0.01	0.30	65
65-68	0.29		0.01	Tr	68

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
Salt Lake City, Utah

March 15, 1955

Results of Spectrographic Analysis, Diamond Drill Core Samples, United Verde Mine, Phelps Dodge Corp., Jerome, Idaho

Description	Sample No.	Se ^{1/} K		Cu	Ag	Mg	Ca	Zn	Al	Ga	In	Ti	Si	Sr	Pb	As	Mn	Fe	Co	Ni
United Verde 1200-Level plus 20 ft., Hole 16-K-7-0' to 20'	13201	.040	-	+	+	+	+	+	+	tr	-	+	+	-	-	-	+	+	tr	-
United Verde 3000-Level Hole 11-U-1-375' to 395'	13223	.042	-	+	+	+	+	+	+	tr	tr	+	+	tr	+	-	+	+	tr	-
United Verde 3000-Level Hole 11-U-1-395' to 416'	13224	.060	-	+	+	+	+	+	+	tr	tr	+	+	tr	+	-	+	+	tr	tr
United Verde 3000-Level Hole 11-U-1-475' to 490'	13225	.132	-	+	+	+	+	+	+	tr	-	+	+	tr	+	tr	+	+	-	-
United Verde 4500-Level Hole 7-U-4-76' to 106'	13242	.073	+	+	+	+	+	+	+	tr	tr	+	+	+	+	tr	+	+	tr	-
United Verde 3000-Level Haynes Hole DVA -17-72' to 92'	13262	.057	+	+	+	+	+	+	+	tr	-	+	+	tr	+	-	+	+	-	-
Equator Copper Chief Hole 9-22' to 40'	14508	.038	-	+	+	+	tr	+	+	tr	-	tr	+	tr	+	tr	+	+	-	-
United Verde 700-Level Hole 15-L-1 115' to 135'	14522	.038	-	+	+	+	+	+	+	tr	-	tr	+	tr	+	-	+	+	tr	-
United Verde 1200-Level Hole 16-N-2 0' to 20'	14546	.055	-	+	+	+	+	+	+	tr	-	+	+	-	+	-	+	+	-	-

^{1/} Chemical analysis previously reported

Remarks: + = present
- = absent
tr = trace

3000 LEVEL

10 - W - 4 Porphyry and Schist
55 to 78 feet and 101 to 148 feet

Feet	%Cu	OzAu	OzAg	Specimens at - feet
55-58	Dike			
58-61	1.38	Tr	0.20	59
61-63	0.93	Tr	0.10	62
63-67	0.45	Tr	0.10	65
67-70	6.93	0.01	Tr	69
70-73	1.00	Tr	0.25	72
75-78	0.19	Nil	Tr	75
101-105	0.43	Tr	0.35	105
105-110	0.68	Tr	0.15	110
110-115	1.21	0.01	0.50	115
115-120	2.23	0.01	0.60	120
120-125	4.28	0.02	1.20	
125-129	0.92	0.03	1.30	
129-132	1.60	Tr	0.30	130
132-133 $\frac{1}{2}$	Dike			
133 $\frac{1}{2}$ -137	1.67	0.01	1.85	135
137-140	3.80	0.02	2.85	140
140-144	3.85	0.02	3.40	144
144-148	0.10	Tr	0.30	

OMIT Fourteen specimen bits. Three Selenium samples: 58 to 73 feet 6 core bits, 101 to 120 feet 4 core bits, and 129 to 144 feet 4 core bits.

3000 LEVEL

10 - X - 2 Siliceous Sulphide (etc.)
78 $\frac{1}{2}$ to 104 $\frac{1}{2}$ feet and 170 to 210 feet

Feet	%Cu	%Zn	Specimens at - feet	Feet	%Cu	%Zn	Specimens at - feet
78 $\frac{1}{2}$ -104 $\frac{1}{2}$	Dike			170-175	Tr	0.7	
104 $\frac{1}{2}$ -110	1.4	Tr	110	175-180	Tr	3.9	176
110-115 $\frac{1}{2}$	1.8	Nil	113	180-182 $\frac{1}{2}$	0.9	6.4	180
115 $\frac{1}{2}$ -120	6.5	Nil	119	182 $\frac{1}{2}$ -183	Dike		
120-125	Tr	Nil	122	183-186	0.9	8.5	186
125-130	1.2	0.6	123, 120	186-190	Dike		
130-135	1.2	0.2	135	190-195	Tr	5.8	190
135-138 $\frac{1}{2}$	2.7	0.4		195-200	Tr	8.4	195
				200-205	Tr	5.0	200
				205-210	Tr	6.2	210

OMIT Fourteen specimen bits. Three Selenium samples: 104 $\frac{1}{2}$ to 135 feet 7 core bits, 175 to 186 feet 3 core bits, and 186 to 210 feet 4 core bits.

COMPOSITE

	Cu	Zn	Pb	Au	Se	Fe	S	SiO ₂	Al ₂ O ₃	MgO	CaO
175-210	0.44	6.4	Nil	0.01	1.09	31.0	33.0	24.6	1.3	1.1	0.4

3000 LEVEL

11 - U - 1 Black Schist
370 to 418 feet and 465 to 506 feet

Feet	Co	Zn	at - feet	Fe	Al	Si	Ca	Mg	Na	K	Other
370-375	0.8		375	475-478	0.7						
375-377 1/2	1.4		375	478-480	0.9						
377 1/2-380	5.4		375	480-482	0.7						
380-385	2.7		380	482-484	0.7						
385-390	6.6		380	484-486	0.8						
390-395	5.7		395	486-488	0.8						
395-400	4.9		395	488-490	0.9						
400-405	8.0	0.9	400								
405-408	4.9	0.8	400								
408-410	5.4	0.4	400								
410-416	5.0	0.5	410								
416-418	0	2.5	410								

D.W.I.X

Fifteen specimen bits. Four selected samples: 375 to 385 feet 4 bits, 415 feet 5 core bits, 475 to 485 feet 3 core bits, and 495 to 505 feet 3 core bits.

COMPOSITION

	Fe	Zn	Pb	As	Ag	Cu	Si	Al	Al2O3	Other
377 1/2-418	5.27	0.3	NIL	0.01	0.19	35.3	23.3	1.8	5.7	
475-500	0.64	0.3	NIL	0.01	0.42	73.0	11.7	1.4	2.4	

3000 LEVEL

11 - W - 1 Black Schist
0 to 133 feet

Feet	Co	GrAU	GrAg	Specimens at - feet
0-2	3.87	0.01	2.10	1
2-6	2.50	0.005	1.30	5
6-10	0.74	Tr	0.30	10
10-15	2.96	Tr	0.95	15
15-20	1.42	Tr	0.10	20
20-25	8.44	Tr	0.60	25
25-30	4.82	Tr	0.50	30
30-34	10.65	0.005	1.35	
34-38	1.10	Tr	0.10	35
38-42	3.27	Tr	Tr	40
42-47	5.67	Tr	0.30	45
47-50	1.38	Tr	0.50	50
50-53	4.68	Tr	0.35	
53-56	2.40	Nil	Tr	55
56-59	0.23	Nil	Tr	
59-63	0.15	Nil	0.05	60
63-68	0.90	Nil	Tr	65
68-70	3.22	0.005	0.80	70
70-74	1.22	0.005	1.00	
74-79	7.42	0.005	1.00	75
79-84	1.69	0.005	0.50	80
84-88	0.74	0.005	0.80	85
88-91	1.32	0.005	0.50	90
91-95	0.81	0.005	0.70	95
95-96½	6.56	0.005	0.40	
96½-100	0.66	Tr	0.20	100
100-105	1.18	Nil	Tr	105
105-110	0.96	Tr	0.32	110
110-115	2.50	0.005	0.70	115
115-120	9.86	0.005	0.90	120
120-125	2.41	0.005	0.55	125
125-128	1.05	Tr	0.50	
128-133	0.71	Tr	0.50	

Twenty-six specimen bits. Five Selenite samples. 0 to 20 feet 5 core bits, 20 to 47 feet 5 core bits, 47 to 70 feet 5 core bits, 70 to 96½ feet 3 core bits, and 96½ to 125 feet 6 core bits.

3000 LEVEL

12 - W - 3 Black Schist

0 to 103 feet

Feet	Cu	Specimens at - feet	Feet	Cu	Specimens at - feet
0-5	2.6	0, 5	55-60	0.4	55, 60
5-10	2.0	10	60-65	0.5	58
10-15	2.2	15	65-70	0.2	70
15-20	1.2	20	70-75	2.0	71
20-25	2.0	25	75-80	1.0	80
25-30	1.3	30	80-85	0.8	82
30-35	1.7	35	85-90	4.3	85
35-40	1.9	40	90-95	5.0	93
40-45	2.0	45	95-98	2.1	95, 98
45-50	0.4	50	98-103	0.3	100, 103
50-55	2.7	55	End		

OMIT

Twenty-five specimen bits. Four Selenium samples: 0 to 25 feet 2 core bits, 25 to 55 feet 6 core bits, 55 to 85 feet 7 core bits, and 85 to 103 feet 2 core bits.

COMPOSITES

	Cu	Zn	Pb	Au	Ag	Fe	S	SiO ₂	Al ₂ O ₃	MgO	TOT
0-5, 65-70,											
95-98	5.57	0.6	Nil	0.02	0.23	20.6	14.0	14.0	12.8	0.1	61.3

2000 LEVEL

12 - W - 4 Siliceous Massive Sulphide (etc.)

62 to 110 feet and 195 to 255 feet

Feet	Cu	Zn	OzAu	OzAg	Specimens at - feet
62-92 1/2	Dike				
92 1/2-95	1.00	4.6	0.03	2.20	95
95-100	1.30	4.3	0.03	2.50	100
100-105	1.34	5.2	0.02	3.70	105
105-108	2.07	5.8	0.02	11.20	
108-110 1/2	0.75	2.0	0.01	1.40	110
110 1/2-115	Dike				
195-200	0.07	4.0	0.03		
200-205	0.07	3.0	0.03		205
205-210	0.07	4.2	0.03		210
210-215	0.12	6.9	0.02		215
215-220	0.14	5.1	0.02		220
220-225	0.17	8.2	0.02		225
225-230	0.27	12.0	0.01		230
230-235	0.14	7.4	0.02		235
235-240	0.23	5.2	0.02		240
240-245	0.13	6.4	0.02		245
245-251	0.31	5.7	0.02		250
251-255	0.30	3.3	0.02		

Fourteen specimen bits. Five Selenium samples: 92 1/2 to 108 feet 6 core bits, 108 to 110 1/2 feet one core piece, 200 to 220 feet 4 core bits, 220 to 235 feet 3 core bits, and 235 to 250 feet 3 core bits.

3000 LEVEL

13 - W - 4		Massive Sulphide				Specimens
135 to 200 feet						at feet
Feet	Ag	Cu	OzAu	OzAg		
155-160	0.08	2.4	0.01	0.01		155
160-165	0.10	2.0	0.005	0.01		165
165-170	0.11	4.3	0.005	0.01		170
170-175	0.12	5.7	0.02	0.01		175
175-180	0.11	5.1	0.02	0.6		180
180-185	0.08	4.4	0.02	0.50		185
185-190	0.08	5.1	0.01	1.20		190
190-195	0.05	3.2	0.01	0.20		195
195-200	0.05	5.8	0.01	0.30		200

Omit

Six specimen bits. Two Selenium samples: 155 to 180 feet 3 core bits, and 185 to 195 feet 3 core bits.

3000 LEVEL

16 - U - 3		Black Schist			Specimens
0 to 53 feet					at feet
Feet	Ag	OzAu	OzAg		
0-5	Tr	Tr	0.10		0
5-10	0.1	Tr	Tr		5, 3
10-15	0.1	Tr	0.10		10, 3
15-21	2.5	Tr	Tr		15
19-21	0.6	0.01	0.10		20
21-24	0.1	Tr	Tr		
24-25	1.2	Tr	0.30		25
25-28	0.1	0.01	0.90		
28-31	9.8	0.04	0.20		30
31-34	8.7	0.02	0.50		
34-38	0.4	Tr	0.30		34
38-41	4.7	0.02	Tr		
41-42	Dike				
42-46	2.8	0.02	0.60		
46-50	2.6	0.02	0.70		50
50-53	4.2	0.02	1.60		53
End					

Omit

Fourteen specimen bits. Two Selenium samples: 0 to 25 feet 8 core bits, and 28 to 53 feet 6 core bits.

3000 LEVEL

5 - 0 - 1 Porphyry, Sulfide and Oxide
 0 to 50 feet and 85 to 121 feet

Feet	%Cu	
0-5	6.5	
5-10	5.0	
10-15	3.3	
15-19	2.7	
19-23	7.2	
23-30	0.2	
30-39	0.4	
39-45	0.3	
45-50	0.1	
85-90	4.2	
90-95	5.1	
95-96	Dike	
96-103	3.7	
103-107	Dike	
107-114	3.2	
114-121	0.1	

0.1%
 Fifteen specimen bits. Three bits from 0 to 50 feet, 10 to 15 feet, 19 to 23 feet, 30 to 39 feet, 39 to 45 feet, and 45 to 50 feet. Six core bits, and 35 to 114 feet core bits.

UNIT
ASSAY DATA RELATIVE TO PROPOSED SELENIUM
UNITED VERDE 4500 FOOT LEVEL

4500 LEVEL

6 - S - 3		Quartz Porphyry			Specimens at - feet
140 to 175 feet Feet	%Cu	OzAu	OzAg		
131-140	Tr				
140-150	0.5			144	
150-160	0.4			150, 155	
160-165	1.2	0.002	0.15	160	
165-170	2.9	0.005	0.30	167	
170-175	2.6	0.002	0.30	170, 175	
175-185	0.5	Tr	0.05		
185-200	0.1				

Composites

150-185 1.4 0.002 0.15

Seven specimen bits. One Selenium sample 140 to 175 feet 7 core bits.

4500 Level

7 - U - 4		Massive Sulfide, etc.			Specimens at - feet
74 to 106 feet Feet	%Cu	%Zn	OzAu	OzAg	
61-67	Tr	-	Tr	Tr	
67-74	1.1	-	0.01	1.0	
74-79	3.3	1.3	0.025	2.25	74
79-85	1.7	6.0	0.03	0.50	80
85-88	0.1	-	0.01	0.55	85
88-95	1.4	1.9	0.04	0.30	90
95-101	1.4	2.8	0.10	0.15	100
101-106	0.4	-	0.06	1.0	101, 105
106-121	Tr	-	Tr	Tr	

Composites

74-85 and
88-101 2.3 3.0 0.05 0.96

Seven specimen bits. One Selenium sample: 74 to 106 feet 7 core bits.

4500 LEVEL

9 - 2E - 1 Massive Sulphide					Specimens
69 to 159 feet					at - feet
Feet	%Cu	%Zn	OzAu	OzAg	
69-74	5.3	3.6	0.005	0.30	70
74-79	3.7	0.6	0.005	0.30	71
79-84	3.6	6.4	0.005	0.30	80
84-89	1.3	0.3	0.005	0.30	81
89-111	-	-	-	-	
111-116	0.2	-	0.005	0.30	
116-120	1.7	5.1	0.005	0.30	119, 120
120-125	1.9	14.1	0.005	0.95	123
125-129	2.4	13.1	0.005	4.00	125, 129
129-131	-	-	-	-	
131-135	0.6	14.3	0.009	1.35	131, 133, 134
135-140	1.5	1.9	0.005	1.00	136, 139
140-144	-	-	-	-	
144-149	1.2	2.6	0.005	0.30	145
149-154	3.4	1.9	0.01	0.55	150
154-159	5.3	0.3	0.005	0.70	155, 157
Composites					
69-89	3.7	2.2	0.015	2.80	
116-159	2.2	7.4	0.005	1.70	

19 Nineteen specimen pieces. Four Selenium samples: 69 to 89 feet 5 core bits, 116 to 129 feet 5 core bits, 131 to 140 feet 5 core bits, and 144 to 159 feet 4 core bits.

4500 LEVEL

9 - 2E - 4 Siliceous Sulphide, etc.					Specimens
74 to 131 feet					at - feet
Feet	%Cu	%Zn	OzAu	OzAg	
58-74	0.5	-	0.02	0.20	
74-78	2.6	14.3	0.23	3.20	75
78-82	3.9	17.6	0.14	1.70	78
82-87	8.1	8.1	0.05	4.30	82
87-92	2.5	9.1	0.03	3.93	90
92-97	6.1	8.3	0.51	5.50	95
97-102	4.3	15.0	0.16	3.95	100
102-107	4.7	12.7	0.11	7.10	105
107-111	3.1	14.5	0.07	3.70	
111-116	0.5	21.4	0.05	1.15	113
116-121	0.2	17.1	0.13	1.10	119
121-126	0.2	14.1	0.06	0.35	126
126-131	0.3	9.5	0.03	1.15	131
131-139	0.1	-	0.005	0.05	
Composites					
74-121	3.3	13.1	0.07	3.40	

11 Eleven specimen bits. Selenium samples, 74 to 97 feet 7 core bits, and 111 to 131 feet 4 core bits.

4500 LEVEL

9 - 2E - 3 Massive Sulphide and Black Schist

52 to 170 feet

Feet	%Cu	%Zn	OzAu	OzAg	Specimens
					- feet
52-57	Tr	-	0.105	0.75	54, 56, 57
57-61	1.5	12.6	0.13	1.20	59, 61
61-65	1.3	4.5	0.08	1.40	62, 63
65-70	2.1	11.5	0.075	7.15	65, 68, 70
106-112	4.8	9.6	0.08	1.95	107, 110
112-117	3.9	11.2	0.04	1.75	113, 116
117-122	5.3	4.2	0.07	3.45	119, 120, 121 ^{1/2}
122-130	0.3	-	0.02	0.35	
130-135	0.2	-	0.01	0.30	131, 135
135-138	1.5	-	0.01	0.35	137
138-145	2.2	7.2	0.125	2.10	140, 145
145-150	0.3	-	0.02	1.35	
150-153	0.8	-	0.01	1.00	
153-159	2.0	8.6	0.01	0.75	154, 155, 158
159-165	4.1	1.6	0.01	1.00	160, 163
165-171	3.5	5.8	0.005	1.15	165, 166, 170
Composites					
57-70	1.6	9.6	0.09	3.65	
106-122 and					
138-145	4.0	7.9	0.08	2.15	
153-171	3.4	5.3	0.015	0.80	

Thirty specimen pieces. Six Selection samples: 52 to 65 feet 7 core bits, 65 to 70 feet 3 core bits, 106 to 122 feet 7 core bits, 130 to 135 feet 3 core bits, 138 to 145 plus 153 to 159 feet 5 core bits, and 159 to 171 feet 3 core bits.

14500 115781

9 - 22 - 3 Massive Sulphide and Black Shale

62 to 167 feet

Feet	%Cu	%Zn	OzAu	OzAg	Specimens at - feet
62-63	5.3	5.1	0.03	4.45	62, 63
65-70	3.0	13.1	0.08	2.00	67
70-75	2.1	13.6	0.13	1.60	70
75-80	3.7	13.3	0.11	3.35	73
80-85	4.1	9.1	0.07	3.75	80
85-90	3.3	11.5	0.08	2.45	85, 90
90-95	1.4	13.7	0.10	1.60	95
95-100	1.3	19.8	0.14	2.25	100
100-105	2.2	14.1	0.22	4.70	105
105-110	3.1	13.3	0.10	2.75	110
110-115	0.3	16.6	0.09	4.30	115
115-120	3.1	13.7	0.05	3.40	120
120-125	2.3	10.6	0.09	2.10	125
125-130	2.2	9.0	0.06	1.90	130
130-134	0.8	2.3	0.01	1.25	134
134-140	0.9	-	-	-	139
140-145	1.3	-	-	-	140, 145
145-150	1.4	-	-	-	150
150-156	1.8	-	-	-	153
156-161	3.4	6.3	0.02	2.70	156, 159
161-167	0.9	4.9	0.02	0.80	163, 165
Composites					
62-95	3.4	12.5	0.09	3.05	
95-134	1.9	13.6	0.10	2.80	
134-167	1.3	3.5	0.02	1.05	

OMIX (Twenty six specimen bits. Six Selenium samples: 62 to 70 feet 3 core bits, 70 to 90 feet 5 core bits, 90 to 110 feet 4 core bits, 110 to 134 feet 5 core bits, 134 to 156 feet 5 core bits, and 156 to 167 feet 4 core bits.

4500 LEVEL

9 - 25 - 1 Massive Sulphide, (etc.)

Feet	%Cu	%Zn	OzAu	OzAg	Specimens at - feet
0-3	4.9	-	Tr	0.80	1
3-8	3.3	1.9	Tr	0.50	3
8-12	1.5	1.2	Tr	1.00	10
12-18	3.1	6.2	0.03	1.65	15
18-24	5.9	2.5	0.03	4.70	20
24-29	5.4	8.7	0.04	1.65	25
29-31	3.8	1.8	0.03	2.10	30, 30 $\frac{1}{2}$
31-41	0.2	-	Tr	Tr	
End					
Composites					
0-3, 31-41	1.3	-	Tr	0.18	
3-31	4.0	4.0	0.02	2.04	

0 unit

Eight specimen bits. Two Selenium samples: 0 to 12 feet 4 core bits, and 18 to 31 feet 4 core bits.

4500 LEVEL

9 - 26 - 2 Massive Sulphide, etc.

Feet	%Cu	%Zn	OzAu	OzAg	Specimens at - feet
0-4	1.8	-	Tr	0.65	1
4-6	3.7	-	0.005	0.95	3
6-11	1.4	1.2	0.01	0.95	10
11-16	1.7	1.2	0.005	0.70	13
16-21	2.5	10.0	0.05	1.80	20
21-26	2.3	10.0	0.05	1.80	25
26-31	0.8	11.9	0.06	1.25	30
31-36	1.1	6.2	0.13	1.45	35
36-40	0.7	1.2	0.07	0.60	40
40-45	0.3	1.2	0.10	0.55	44
45-50	0.1	-	Tr	0.05	
50-55	0.3	-	0.13	0.65	
End					
Composites					
1-6, 45-55	1.0	-	0.06	0.50	
6-45	1.4	5.3	0.06	1.11	

0 unit

Ten specimen bits. Two Selenium samples: 0 to 26 feet 6 core bits, and 26 to 45 feet 4 core bits.

4500 LEVEL

9 - 23 - 3

Black Schist, Massive Sulphide, etc.

0 to 89 feet

Specimens

Feet	%Cu	%Zn	OzAu	OzAg	at - feet
0-4	1.3	-	Tr	0.25	2
4-10	1.3	-	Tr	0.35	6
10-15	0.8	-	Tr	0.35	13
15-20	1.8	-	Tr	0.90	20
20-25	1.3	-	0.005	3.85	
25-30	0.9	-	Tr	1.20	28
30-37	0.2	-	Tr	0.45	33
37-42	Dike	-	-	-	-
42-49	1.1	-	Tr	0.40	44
49-53	0.2	10.0	0.005	0.95	50
53-57	1.5	19.3	0.01	1.70	55
57-62	1.2	15.6	-	3.10	60
62-67	0.6	3.1	0.00	4.20	65
67-71	1.2	10.0	0.00	2.50	70
71-76	1.0	7.5	0.04	2.20	75
76-80	1.0	12.1	0.17	2.20	
80-84	Dike	-	-	-	
84-88	3.5	20.6	0.15	5.10	
88-93	3.8	10.0	0.00	2.90	
93-98	2.8	-	0.11	1.50	
End					

Composites

0-49	1.7	-	Tr	1.10
49-93	1.7	12.1	0.00	2.10

Sixteen specimen bits. Three 5 core bits: 0 to 49 feet, 42 to 71 feet 5 core bits, and 13 to 37 feet 5 core bits.

4500 LEVEL

98-2H - 3 Black Schist, etc., etc.

77½ to 123 feet

Specimens
at - feet

Feet	Cu	Zn	Cz/Au	Cz/Ag	Specimens at - feet
76-77½	Dike	-	-	-	-
77½-85	0.5	-	0.002	0.05	85
85-90	0.1	-	Tr	0.10	89
90-95	0.4	-	0.007	0.20	91
95-100	2.0	-	0.1	0.90	95
100-105	0.3	-	0.1	1.10	100
105-110	0.9	6.4	0.003	Tr	105
110-115	1.7	21.5	0.185	2.15	110
115-116	Dike	-	-	-	-
116-119	Tr	0.4	Tr	0.20	117
119-123	2.1	5.4	0.058	3.20	122
123-132	Tr	-	0.0	5.25	-
Composites					
105-123	0.3	9.0	0.055	3.05	

C.M.T.

Nine specimen bits. Two Selenium samples: 77½ to 105 feet 5 core bits, and 105 to 123 feet 4 core bits.

108

ASSAY DATA RELATIVE TO THE MASSIVE SULPHIDE SAMPLES
 UNITED NUCLEAR CORP. AR.

Haynes Area

U. V. X. No. 4 Hole (45° up)
 180 to 202 feet Massive Sulphide

Feet	%Cu	Specimens at - feet
180-185	0.52	182, 183
185-190	0.38	
190-193	Nil	192
193-196	Nil	
196-198	Nil	197
198-200	Nil	
200-202	Nil	201, 202

Six specimen bits. Two Selenium samples: 180 to 198 feet 4 core bits,
 198 to 202 feet 2 core bits.

Haynes Area

U. V. X. No. 5 Hole (46° up)
 105 to 144 feet Massive Sulphide
 No assay data available. Specimens at 105, 120, 130, 135, 138, 141, 143 feet.

Eight specimen bits. Two Selenium samples: 105 to 140 feet 4 core bits,
 140 to 144 feet 4 core bits.

Haynes Area

U. V. X. No. 7 Hole (60° up)
 185 to 245 feet Massive Sulphide

Feet	%Cu	%Zn	%Ag	Specimens at - feet
185-196	0.40	0.02	0.30	184, 188, 190, 192, 194, 195
196-201	0.21	0.03	0.30	197, 198, 199, /200
201-206	0.30	0.06	1.00	201, 202, 203, 205
206-211	0.40	0.04	0.50	207, 209
211-213	0.64	Nil	Nil	213, 214, / 216, 218
213-229	0.06	0.02	0.55	219, 221, 223, 225, 226, 227, 228
229-238	0.10	-	-	229, / 231, 233, 235
238-240	0.06	Nil	Nil	237, 239, 240
240-245	-	-	-	241, 242, 244, 245

Thirty eight specimen bits. Four Selenium samples: 185 to 200 feet 9 core bits,
 200 to 215 feet 9 core bits, 215 to 230 feet 10 core bits and 230 to 245 feet 10
 core bits.

Haynes Area

U. V. X. No. 16 Hole (43¹⁰/₃° down)
 67 to 102 feet Massive Sulphide, etc., etc.
 No assay data available. Specimens at 70, 77, 79, 82,/87, and 96 feet.

Omit

Six specimen bits. Two Selenium samples 67 to 84 feet 4 core bits, and 84 to 102 feet 2 core bits.

Haynes Area

U. V. X. No. 17 Hole (50° down)
 72 to 122 feet Massive Sulphide, etc.

Feet	%Cu	%Zn	OzAu	OzAg	Specimens at - feet
72-77	.36	2.5	Nil	0.30	73
77-82	Nil	5.2	0.01	0.19	82
82-87	1.73	6.4	0.01	0.55	
87-92	0.85	5.0	0.02	0.78	<u>91</u>
92-97	Nil	5.3	0.04	1.20	
97-102	Nil	2.6	0.04	1.36	100
102-107	Nil	1.1	0.09	1.55	
107-112	Nil	5.7	0.01	0.29	112
112-119	Nil	2.6	0.01	0.29	
119-122	0.14	-	0.02	0.30	<u>120, 122</u>

Omit

Seven specimen bits. Two Selenium samples: 72 to 92 feet 3 core bits, and 92 to 122 feet 3 core bits.

Haynes Area

97 - 3 - 2 (78° down) AX Core
 430 to 436 feet Chloritic Gangue, etc.

Feet	%Cu	%Zn	%Fe	%S	OzAu	OzAg	Specimens at - feet
428-430	0.05	0.2	13.2	0.4	Tr	Tr	
430-436	0.29	11.2	37.3	12.1	0.005	Tr	430, 430 ¹ / ₂ , 431, 433, 434, /435, 435 ¹ / ₂
436-441	0.05	Tr	10.5	0.25	Tr	Tr	

Omit

Seven specimen bits. Two Selenium samples: 430 to 434 feet 5 core bits, and 434 to 436 feet 2 core bits.

Haynes Area

97 - Z 3 (75° down) AX Core
 457 to 523 feet Massive Sulphide, etc.

Feet	%Cu	%Zn	%Fe	%S	CzAu	Ag	%SiO ₂	%Al ₂ O ₃	%CaO	%MgO	Specimen # - feet
453-457	1.37	0.2	20.7	1.7	0.23	Tr	35.6	15.9	7.8	3.42	453
457-459	2.34	2.2	39.4	14.1	0.08	1.00	18.4	6.1	3.2	2.46	457, 459
459-463	0.60	5.3	44.9	37.1	0.05	0.35	4.0	2.5	0.9	1.52	460
463-467	1.59	5.5	49.7	38.2	0.02	0.50	1.8	1.1	0.4	0.94	465
467-470	1.60	1.7	52.3	39.1	0.025	0.70	2.0	1.3	0.7	0.72	470
470-475	1.37	4.0	49.1	37.7	0.02	0.60	3.4	1.0	0.9	0.60	475
475-480	0.41	1.7	48.2	26.4	0.075	Tr	7.7	1.9	1.0	1.38	480
480-485	0.25	4.0	47.5	38.4	0.11	0.65	4.2	2.4	0.7	0.67	485
485-490	0.22	3.0	46.9	36.2	0.06	0.05	5.4	3.9	0.5	0.87	490
490-495	0.33	7.9	39.7	34.7	0.075	0.55	0.1	3.9	0.8	0.52	495
495-500	0.30	5.0	44.0	37.2	0.45	0.15	5.1	1.6	1.0	1.38	500
500-506	0.08	6.6	41.9	47.3	0.02	0.20	9.3	1.4	0.8	0.72	500
506-510	0.14	4.1	39.7	40.7	0.01	0.05	7.7	3.5	0.6	0.67	506, 510
510-515	0.22	3.9	38.4	46.0	0.01	Tr	7.7	0.9	1.7	0.65	510
515-520	0.85	10.8	28.2	53.3	0.025	0.1	25.0	0.9	0.5	0.58	515
520-523	0.66	7.3	34.6	53.0	0.09	0.80	14.5	4.4	0.5	0.72	520, 523

Omit (Nineteen specimen bits. Five Selenium samples: 457 to 459 feet 3 core bits, 460 to 480 feet 5 core bits, 480 to 500 feet 4 core bits, and 500 to 510 feet 3 core bits, and 510 to 523 feet 4 core bits.)

UNITED VERDE COPPER COMPANY
reprinted from THE MINING
CONGRESS JOURNAL April 1930

G.W. Irvin

THE UNITED VERDE COPPER COMPANY



**A series of articles describing the organization,
operations, and activities of this company in the
Jerome District of Arizona.**

**Reprinted from
THE MINING CONGRESS JOURNAL
April, 1930**