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DUNDEE ARIZONA COPPER CO.

Two patented claims adjoining Jerome Verde and United Verde Extension ground. W. E. Defty, of Phoenix, Consulting Engineer. J. W. Hubbard, Superintendent. Alex. Mackay is said to be principal owner.

Visited underground workings September 20th, 1916 with Mr. Hubbard and the surface again on September 24th, with Mr. Defty. The shaft is 450 feet deep. Water, the flow of which is 60 gallons per hour, has lately caused the suspension of further sinking until a pump arrives. In the meantime a raise 35 feet high from the 65 foot level has been made into conglomerate, considerably stained with copper. Mr. Defty informed me that his assays of the conglomerate ran from 4 to 6% copper with a little gold. When enough development work has been done to enable the conglomerate to be sampled, Mr. Defty proposes to submit a sample to Mr. Colvocoresses.
I saw a thickness of 10 feet exposed in the raise. The conglomerate is made up largely of limestone fragments. Altho I saw in the district several bodies of conglomerate and cemented gravel, said to contain low gold values, I observed no other similar beg impregnated with copper. On the surface of the Dundee Arizona, the copper stained conglomerate can be traced for the greater part of the length of the two claims. A very heavy iron gossan shows lengthwise also, but is not in place apparently, altho a little higher up the hill the iron gossan disappears. At the entrance of the tunnel (which connects with the shaft 65 feet below the collar) is exposed, first, wash, then limestone lying very flat, then a fault, on the other side of which the limestone is standing vertically on end. In the shaft, the limestone is also on end. Only an inch or two of sandstone was found in the shaft in place of the usual bed several feet thick. In many respects the Dundee Arizona conditions appear to be unique. Its location would seem to be favorable for the finding of sulphide ore bodies in depth.

The quipment altho new and useful is rather light compared with neighboring plants, but I understand that a heavier compressor is on the way, besides a pump. The present hoist is a 25 HP

Fairbanks Morse gasoline machine, said to be good for 1000 feet.

A small compressor has been driven by a belt from the hoisting engine.

Sinking has been by jackhammers which have been satisfactory.

L. F. S. Holland

copied

Za

~~See also Drawer F~~

DISTRICT: Jerome

PROPERTY: Dundee Arizona

LOCATION: 1½ miles S. of Jerome on what is commonly known as the Hog Back

OWNERS: Dundee Arizona Copper Company - Mr. McKay of Scotland principal and Mr. Defty, Advertising Agent and Consulting Engineer

DATE VISITED: July 28, 1919

NOTES:

Geology

Two claims as per map

Series of highly sheared and reorganized Pre-Cambrian sediments and intrusives capped by limestone, above which lies a conglomerate, the cementing material of which is copper carbonate and copper silicate with iron oxide.

Occasional boulders of Glance in Conglomerate; also boulders of Cuprite as result of alterations of Glance. Below the Conglomerate the limestone where shabby or fractured is impregnated with carbonate or silicate of copper, but amount of this ore is very indefinite. Conglomerate ore is of most value and where boulders are small the percentage of ore is high, but the average ore is not over 40% of total conglomerate.

Development

Main shaft is 780' deep and located 300' away from line of U. V. Extension tunnel. SEE MAP

Tunnel on or below conglomerate bed 260' long with crosscuts and raises to the conglomerate ore, which follows roughly the eroded surface of the limestone.

Positive Ore

Block A

Developed by tunnel

$$\frac{260 \times 120 \times 6 \times 6}{180} = 6240 \text{ Tons}$$

Block B

Developed by Surface Cuts

$$\frac{250 \times 50 \times 6 \times 6}{180} = 6250 \text{ Tons}$$

Probable Ore

Block A

$$\frac{2 \times 310 \times 25 \times 6 \times 5}{180} = 3100 \text{ Tons}$$

Block B

$$\frac{120 \times 6 \times 25 \times 6}{180} = 600 \text{ Tons}$$

Possible Ore

$$\frac{285 \times 1000 \times 6 \times 6}{180}$$

Less 16,190 = 40,810 Tons

$57.000

Grade

Average shipped - 5.3 %, but estimated tonnage based on 3 and 4% ore, since former shipments were very

carefully sorted and estimated. Tonnage based on lower values.

Possible to obtain 5% ore but hardly a commercial proposition.

Costs:

Freight	$2.20
Haul	2.50
Mining	2.50 to 3.00

Conclusions

Ore should be mined and dropped down a double bottmm chute, first bottom a grizzlie. In this way sorting would be obviated but ore would be lower grade since present second class ore would be mixed with higher grade.

Fractured L.S. is not a likely producer.

Probability of extensions to above estimates not favorable. Carbonate ore is entirely result of replacement from surface waters and holds no promise as regards development of sulphide ores at depth.

A reasonable profit with copper above 20¢, provided mining cost is reduced over past performance.

W.V.DeC.

DUNDEE ARIZONA DUMPS

DISTRICT: Jerome, Arizona

LOCATION: " "

OWNERS: DUNDEE ARIZONA COPPER COMPANY

DATE VISITED: January 10, 1924 J. L. White.

NOTES:

On January 10th and 11th I visited the DUNDEE ARIZONA DEUMPS and measured the principal ore dump, which I find to contain 27,330 cubic feet, which represents at 18 cu. ft. per ton, 1,520 tons.

This dump I sampled by means of six parallel cuts across the top and several pits on the slopes. The average of these ten samples show 3.18 per cent Copper.

In addition to this larger ore dump there are several heaps of ore which might amount to 200 tons. Three samples from these dumps average 6.36 per cent Copper and probably represent the best ore that can be had by the closest sorting.

I do not believe that it would be possible to sort out over 15 per cent of waste from the larger dump and this would require screening and would be rather expensive.

Considerable money would have to be spent on a road or on bins and a surface tram to the Jerome-Clarkdale Highway. This would cost $2.00 per ton of ore, at least, and handling and sorting would cost $.75.

The possibility of a limestone ore being mined and shipped is remote as the only developed block of this ore is close to the shaft and the removal of much of this would endanger the shaft. There are other showings of ore wholly in limestone but it is doubtful if any considerable tonnage could be had. This ore is said to run 3.25 per cent Copper.

There is a large tonnage of ore in the mine, probably of the same grade and character as that in the main ore dump which I estimate can be mined and delivered at the portal of the tunnel for a cost of about $2.50 per ton.

In the ore dumps there is apparently an ore of about 50

per cent Insoluble and 6 per cent Lime and I would judge that the sorted ore might average about 40 per cent excess Insoluble or about the same as former shipments from the Dundee ground.

ESTIMATED COST:

Cost of ore	$ .63	
Preliminary Cost	2.30	
Sorting and Handling	.75	
Hauling	2.00	
Freight	1.00	
DELIVERED AT HUMBOLDT		$5.68
Smelting Charges		5.00 (?)
		$11.68

Unsorted Ore @ 63# Copper = Sorted Ore @ 74#

Copper Content	74#
Smelter Loss	4#
	70 # Recovered

70# @ x = $11.68
x = .16.7

Copper to be worth $ .16.7 in order to break even.

J. L. White
Jan 15, 1924.

JLW:D

THE DUNDEE-ARIZONA COPPER CO.

PHOENIX, ARIZONA

MINES AT JEROME, ARIZ.

OFFICES OF THE COMPANY
~~404 NATIONAL BANK OF ARIZONA BUILDING~~
206 Heard Building

January 17th 1924

Mr G. M. Colvocoresses
Southwest Metals Company
Humboldt, Arizona.

Dear Mr Colvocoresses;-

I have now prepared and am sending you under separate cover, complete assay map of the Carbonate Ore Tunnel Workings. This plan does not include the ore workings to the East of the main Tunnel. As you probably know the ore extends for some 600 or 700 feet East of the Tunnel mouth and has been partially developed by surface tunnels and drifts.

The Assay plan has been carefully prepared by me from the monthly Reports of Mr Defty, the Company's Engineer. These Reports describe in detail the work as it has from month to month progressed and give the ore showings and measurements, and the assays of the samples which he has taken. The assays were determined by Mr Thompson of the U. V. X. Mining Company and his reports are all on file in this office.

You will observe under "Notes & Explanations" that the number of samples taken is 206 and the average Copper

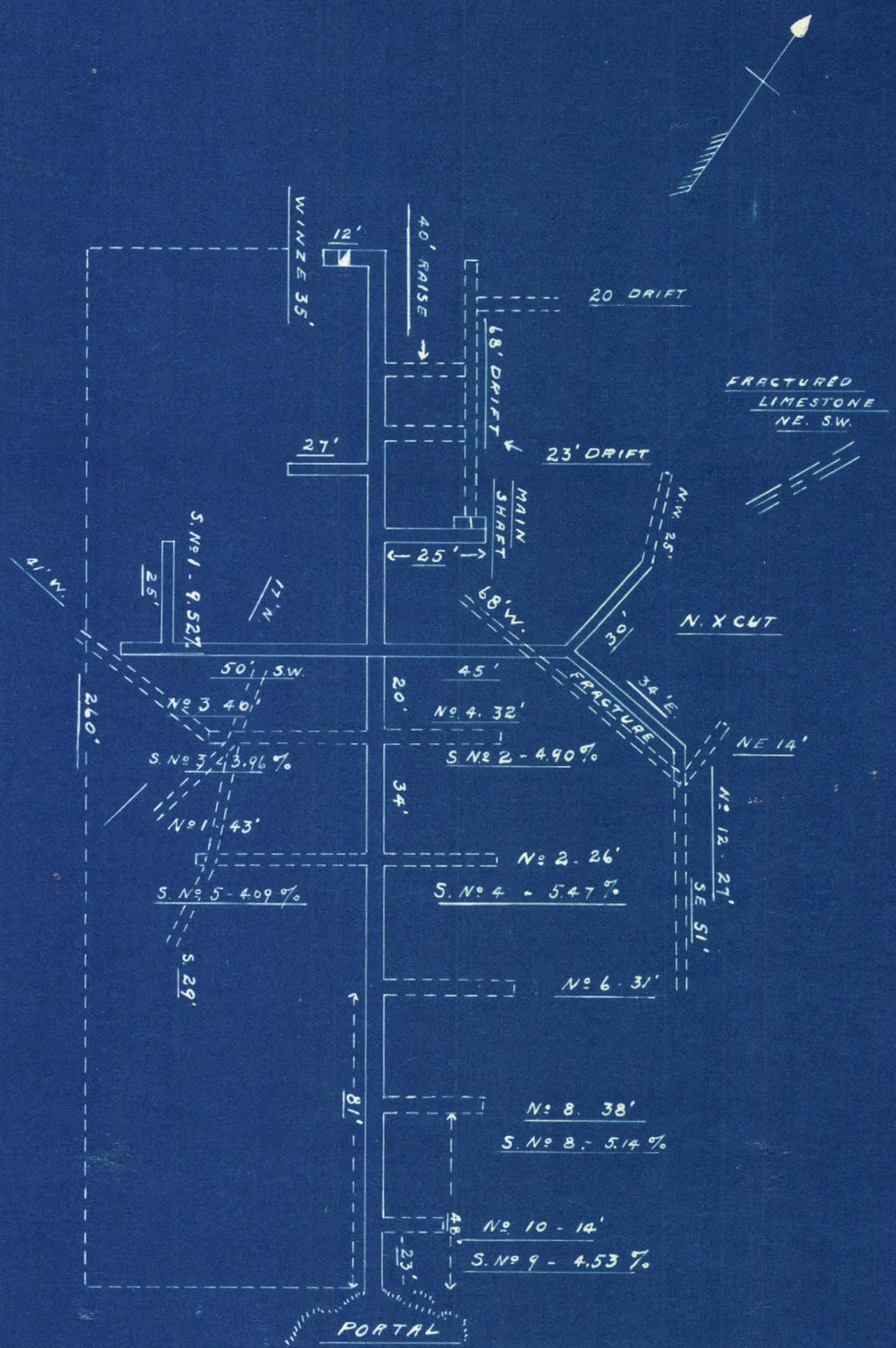
Contents of these samples is 4.19%.

If there is any further information you care to have, I shall be glad to hear from you.

Yours very truly

Secretary.

S/S



ORE

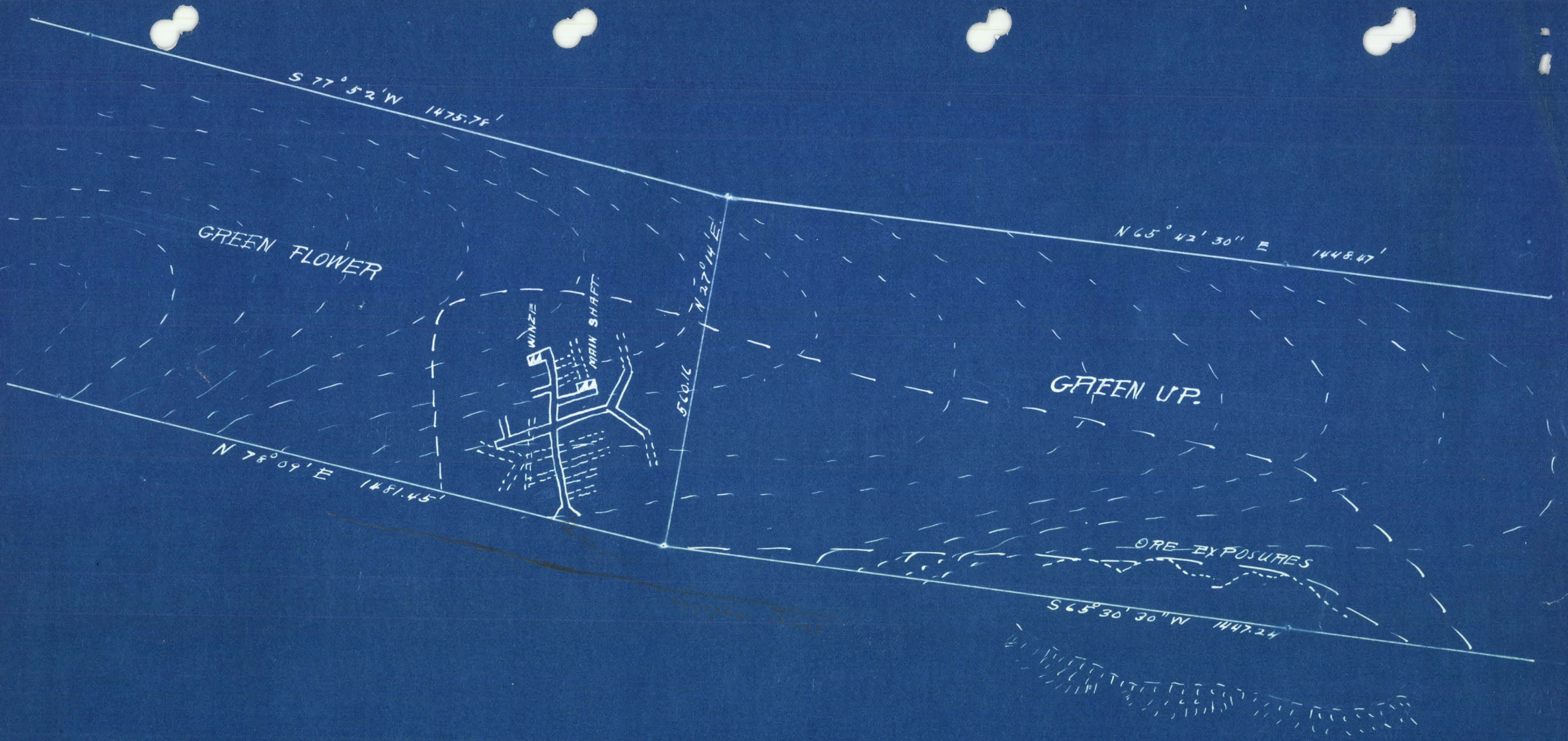
V RAISES 45°

DUNDEE — ARIZONA

PLAN

OF TUNNEL, DRIFTS & & RAISES

Scale 1" = 40'



PLAN

DUNDEE ARIZ COP CO.

Scale 200' = 1"

— — Cu Limit
Cu-Carbonate

═══ Tunnel Level

═ ═ ═ Raises + Sub Level.

July 29-1915.

CONSOLIDATED ARIZONA SMELTING CO.

Dundee Arizona. HUMBOLDT, ARIZONA DATE _____, 19____

ORE	DRY WT.	SILICA		ALUMINA		IRON		LIME		SULPHUR		COPPER		SILVER	GOLD
	POUNDS	%	POUNDS	%	POUNDS	%	POUNDS	%	POUNDS	%	POUNDS	%	POUNDS	OUNCES	OUNCES
Dundee Ore	2000	53.5	1070			4.0	80	6.3	126			5.67	113.40	0	0
Slag Produced	2518	42.5	1070			33.0	831	3.0	76			0.30	7.55		
Matte Produced	347					40.0	139					30.0	104.15		
Fe to buy							798								
CaO excess									50						

Mech loss = 1½% of 113.40 = 1.70 # Cu.
Slag loss = 7.55
Total loss = 9.25

Copper Recovered = 113.40 - 9.25 = 104.15 # Cu

SETTLEMENT

Payments 90% of Cu.			Values:
102 lbs. Cu @ (13 - 3½) = 9½¢ lb.	9	79	104.15 # Cu @ 13 ¢ 13 53
Roasting & Smelting	3	00	2.5 units CaO @ 12¢ 30
Overhead		50	Smelting toll flat 396
Crushing etc.		30	
Converting 104.15 # @ .8¢		83	
Frt. & Refining 104.15 # @ 1.7¢	1	77	
39.9 units Fe @ 4¢	1	60	Totals 17 79 17 79
Total	17	79	

6-18-18 1000 CRANE 26343

VOLATILIZATION TEST NO. 29

CALCINES FROM DUNDEE-ARIZONA LIMESTONE -35

This test was run to investigate the additional effect of renewing the Chloridizing reagent and rerunning the calcined ore. Calcines from tests 28-A and 28-B were combined and to this charge was added a little in excess of the theoretical amount of NaCl required to combine with the contained copper.

The assay of the Calcines was as follows:

#28-A	7.25 Gms	Cu% 2.37	Cl% 0.56
#28-B	7.75 "	" 4.19	0.45
Charge	15.00 gms,	3.31	0.50 / 1 Gm NaCl

Test	Wt Ore	Wt Salt	Time	Temp	Wt Calc	Assay Calcine Cu	Cl	Extraction Cu	Cl
29	15.0G	1.0	1.63	800	14.55	2.98	0.21	12.3%	95.5%

Discussion:-

The original charges from which the above calcines were obtained gave an average extraction of 67.5% for the Cu and 97.2% for the Cl of the added salt in the tests #28-A and 28-B. 3 Grams of salt were used at first. The only conclusion one can draw from the above experiment is that the Copper left in the calcined ore after the first volatilizing is subject to the action of the Cl of the salt. This would mean that if fresh salt could be added in the kiln at such point where the original chloridizing reagent has been used up it would make for increased extraction. This will probably be of great importance in the actual operation of the plant. It is possible that if some means of adding the salt can be invented that the original idea of intermixing salt and ore at the feed end of the Kiln will be modified by this method of adding a portion of the salt after the ore has travelled part way thru the kiln.

DUNDEE-ARIZONA CONGLOMERATE AND LIMESTONE ORES.

Test #3.

Head Sample (Conglomerate)

Cu	Insol	Fe	CaO	Al2O3

Charge:

Wt.Ore	Wt.Salt	Time	Temp C.	Wt.Tails	% Cu in Tails	Extraction
25 G	2.55G	80 M	850	21.20	1.29	71.0

Remarks*

This sample was ground to pass through 200 mesh. It will be noted that the extraction has fallen off rather than been improved by the finer grinding. The probable explanation for this is that the pryometer which is being used is different from that which was used for the other tests and that therefore there is a discrepancy in the temperatures of the runs. The temperature in this test is probably lower than that of the previous tests on this ore.

Test #4.

Head Sample (Limestone)

Cu	Insol	Fe	CaO	Al2O3
6.79	29.8	1.6	14.3	5.91

Charge:

Wt.Ore	Wt.Salt	Time	Temp C.	WtTails	% Cu in Tails	Extraction
25 G.	3.9 G.	90 M	850	16.58	4.55	55.2

Remarks:

This sample was also taken of ore that had been ground to pass 200 Mesh. The remarks that have been made about the previous sample will also hold good for this.

Test #5.

Head Sample (Conglomerate) See Test #3 for Assays

Test #6

Head Sample (Limestone) See Test #4 for Assays

Charge:

	Wt.Ore	Wt.Salt	Time	Temp C	Wt Tails	% Cu in Tails	Extraction
#5	25 G	3 g.	90 M	900-950	20.76	0.85	84.2
#6	25 G	4 G	75 M	950	16.33	2.95	71.5

DUNDEE-ARIZONA ORE (Contd)

It will be noticed in the previous tests on the Dundee-Arizona ore that there seems to have been some difficulty in obtaining a low tails especially in the Limestone Ore. It was thought that this might possibly be due to the insufficiency of salt in the charges. Experiments were carried out with this in view and the following results were obtained:

Tests No. 7,8,9,10,11 & 12.

These tests were all carried out on samples of the Limestone ore that had been groundto pass thru 200 mesh.

Test	Wt.Ore	Wt.Salt	Time	Temp C	Wt.Tails	%Cu in tails	Extraction
#7	25 G	4 G	40 M	1000	16.19	1.80	83.1
#8	25 G	7 G	56 M	1000	15.76	0.90	91.7
#9	25 G	10 G	66 M	1000	15.67	0.58	94.6
#10	25 G	10 G	75 M	980	15.42	0.78	93.2
#11	25 G	15 G	85 M	980	15.62	0.45	95.7
#12	25 G	20 G	85 M	980	15.17	0.23	98.0

Discussion:

In the above tests the endeavour was made to keep conditions the same thruout in order that true comparisons might be made. It will be noticed, however, that with the increasing amount of salt employed in the charge a longer time was required to complete the reaction in the furnace. It was thought best to allow the charge to remain in the furnace until the fumes had ceased to come off instead of withdrawing them all at the same times as in test #7. The conclusions therefore that may be drawn from the above tests are somewhat obscured by the fact that there are two variables. However, it will be seen that the increasing Salt charge together with the increasing time in the furnace make for increased extraction. As the reaction required more time for the increased amount of salt in the charge to become completely volatilized it would seem that the increased extraction might be attributed solely to the increased salt charge. That is that no matter how long the charge is allowed to remain in the furnace after the reaction has ceased (as shown by the cessation of the fumes) the extraction of copper would be the same. This of course is purely theoretical. Tests will be carried out later to see what relation there is between extraction and the length of time thecharge remains in the furnace after the fumes have ceased.

These tests would seem to bear out the theory that by the addition of salt and a proper control of the temperatures the copper content can be totally volatilized. This of course is purely theoretical, and it can be readily seen that the necessity of adding so great an excess of salt tothe charge in order to obtain a high extraction would be impractical. If however this theory is correct,

the addition of salt beyond the theoretically required amount may be made up to that point where it is commercially advisable to stop.

****

Another theory suggests itself from the results of the tests on the Dundee-Arizona Ores (especially the Limestone) that is that there is a selective action of the Chlorine during the roasting process and that the Chlorine will combine with the elements present with varying degrees of rapidity as the conditions of temperature, excess of Chlorine, etc. are changed. That the affinity of the Chlorine for certain elements is greater than for others. If such is the case it would have a bearing on the future treatment of the ore. It will be noted that in the tests on the limestone despite the varying amounts of the NaCl added to the charges the weight of the Calcines (or Tails) remains approximately the same. It shows a decrease with the increasing amounts of salt employed. In an attempt to ascertain what effect, if any, the Chlorine has on the other elements of the ore the following assays on the calcines were carried out.

Head Sample (Limestone Assays same as in Test #4.)

Calcines from Test		% Fe. in Calc.	Wt. Fe. in Cal.	Wt Fe Heads
	#3	4.7	1.00 G.	1.00 G
	4	2.2	0.36 G.	0.40 G
Iron	5	3.2	0.66 G	1.00 G
	6	2.2	0.36 G	0.40 G

Lime

Calcines from Test		% CaO in Calc.	Wt.CaO in Calc.	Wt CaO in Head
Test	#7	21.0	3.40 G	3.54 G
	8	21.4	3.36 G	"
	9	21.7	3.40	"

Insoluble

Calcines from Test	% Insol in Calc.	Gms Insoluble in Calcine	Insol in H	% Increase in Insol.
#7	54.0	8.75	7.45	17.5
8	53.1	8.36	"	12.2
9	52.1	8.16	"	9.8

Discussion:

The IRON and LIME content has not varied to any extent beyond a probable difference due to mechanical loss. The Insoluble content has increased presumably from the combining of the Sodium of the Salt with some of the elements in the original ore.

DUNDEE- ARIZONA ORE (Contd)

Al203 Calcines from	%Al203 in Calc.	Gms Al203 in Calc.	Al203 in Hds.	% Loss in Al203
Test #9	8.24	1.29	1.48	12.8

Here again the decrease in Al203 content is not sufficiently great to help support the theory proposed. More work will be done along this line of reasoning in an attempt to obtain more information as to the reactions which take place during the volatilization period.

Tests #13 &14

Going back over the tests it was decided to investigate the effect of the finer grinding in the percentage extraction obtained. Samples of Dundee-Arizona Limestone which had been ground to pass 35 Mesh were run under as nearly the same conditions as those in which the best extraction was obtained with ore thru 200. The following results were obtained:-

Head Sample (Same as in Test #4)

Test	Wt.Ore	Wt.Salt	Time	Temp C.	Wt.Tails	% Cu in Tails	Extraction
13	25 G	20 G	100 M	920	16.88	0.97	90.7
14	25 G	20 G	115 M	980	15.16	0.45	96.3

Discussion:

Test No. 13 was not completed as the furnace element gave out. Fumes were still coming off when the heat went off which would account for the extraction being lower than in test #14. It is also interesting to note that there is evidently considerable reaction takes place even towards the end of the fuming. Test #14 required more time than the corresponding test with ore thru 200 Mesh. This of course may have been due to some difference in temperature. We would conclude that it is possible, by the addition of a great excess of salt to make a high recovery even when the ore is not ground very fine.

Copied

DUNDEE ARIZONA COPPER CO.

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The equipment altho new and useful is rather light compared with neighboring plants, but I understand that a heavier compressor is on the way, besides a pump. The present hoist is a 25 HP Fairbanks Morse gasoline machine, said to be good for 1000 feet. A small compressor has been driven by a belt from the hoisting engine. Sinking has been by jackhammers which have been satisfactory.

Y. T. S. Holland

DUNDEE, ARIZONA file note:

June 25th, 1941

At Dundee Arizona the leaser is mining and shipping about 30 tons of ore per day averaging very consistently 3.7 and 3.8% copper.

C. A. S. Co.

COPY FOR

January
Tenth
1920

Mr. W. E. Defty
618 No. Third Ave.,
Phoenix, Arizona.

Chloridizing-volatilization tests
Dundee-Arizona Ore.

Dear Sir:-

I beg to hand you this brief report covering all essential points of the work done on Dundee-Arizona ore.

Two test runs were made on this ore in the experimental plant with kiln 24' long by about 24" diameter inside the lining, not including the short demonstration run the day you were here with Mr. MacKay and party, on which no records were kept. The first of these runs was of three hours and the second of ~~five~~ ten hours duration and the conditions and results thruout were so similar that they may be summarized together.

The ore was crushed and screened thru 14 mesh and mixed with 10% NaCl.

Rate of feeding	260 lb. per hour
Assay of Heads	4.76% Copper
Assay of calcines	1.39% copper
Assay of fume	26.00% copper.

In chloridizing volatilization treatment of Dundee-Arizona ore with 10% NaCl there is a shrinkage in weight of the calcines of 23% as compared with the heads. Thus, based on the weights and assays of the heads and calcines, the extraction of copper was 77.7%.

You will note that the extraction was not as good as in the laboratory muffle tests previously reported. For ore carrying 5% or more copper, the kiln is apparently too short to permit the charge sufficient time in the volatilization temperature.

As the writer informed you verbally, owing to delay incident to the business organization of the Western Metallurgical Co. the kiln testing work has

Dundee-Arizona Copper Co.

Carbonate Ore.

Results on
Volatilization Treatment

The Dundee-Arizona Copper Co.

Estimated Results of Treating Carbonate Ores by Installation Volatilization Process.

	Per Ton of Ore.	Per Ton of Fume	Per pound of copper
Receipts			
Production. Ore 4% Cu. Extraction 90% - Pounds.	72	720	1
Gross Value. Copper @ 24 cents less. 4 cents for refining, marketing & selling. 20 cents	$ 14.40	144.00	.2000
Costs.			
Mining.	$ 2.00	20.00	.0277
Cartage to Smelter of fume.	.30	3.00	.0042
Treatment	2.80	28.00	.0389
Royalty. 5%.	.72	7.20	.0100
Overhead & Depreciation	1.00	10.00	.0139
	$ 6.82	68.20	.0947
Net Profits.	$ 7.54	75.80	.1053

Estimated Saving if Dundee Company

subscribes for ₦10,000 Preferred Stock

Metallurgical Company.

Royalty.

50 Tons Production @ 5%
50 Do @ 3% plus 5 cents per ton of ore.

Production 72 pounds.

			Royalty
36 pounds @ 20 cents	₦7.20 @ 5%		36
36 do "	₦7.20 @ 3%	.216	
Plus 5 cents		.050	266
Royalty per Ton of Ore.			626
Do or 5% Basis per Statement of Costs			720
Estimated Saving per Ton of Ore			.094

Saving per annum.

35,000 Tons estimated Annual Production @ .094 per Ton. ₦3290.00

Total Saving.

100,000 Tons ore developed @ .094. ₦9400.00

Estimated Saving if Dundee Company subscribes

₦20,000 Preferred Stock Metallurgical Company.

Royalty.

100 Tons @ 3% plus 5 cents per ton of ore

Production

		Royalty
72 pounds @ 20 cents	₦14.40 @ 3%	432
Plus 5 cents.		050
Royalty per Ton of Ore.		482
Do or 5% Basis per Statement of Costs		720

THE DUNDEE-ARIZONA COPPER CO.

PHOENIX, ARIZONA

MINES AT JEROME, ARIZ.

OFFICES OF THE COMPANY
~~401 NATIONAL BANK OF ARIZONA BUILDING~~
206 Heard Building

November 28th 1923.

Mr G. M. Colvocoresses
Southwest Metals Company
Humboldt, Arizona.

Dear Mr Colvocoresses;-

Referring to our previous correspondence, I have now received some data from the Mine, so I am giving you the facts and figures herewith.

We have quite a substantial tonnage of the Carbonate ore on the dumps. We do not believe it would pay to endeavor to sort this ore. A safe figure to assume as the average of the dumps would be 3½% to 4% Cu. We figure the costs as follows-

Handling and loading	$ 0.50
Cartage to R. R.	I.00
Freight to Humboldt	I.00
Total	$ 2.50

Per ton

We find that several thousand dollars would have to be spent repairing and extending the road so as to permit of the handling of the ore. If we were able to establish a clear margin to ourselves even if this were quite small, we would be glad to go

into the matter with you.

Would you be interested in taking a lease on these dumps yourselves, if so we might discuss the matter from this point of view.

Thanking you for your attention,

We remain,

Yours very truly

Secretary

Shipments from Lincoln Arizona Copper Co. (Crude Ore)

	1917	1918	Total 1917-1918
Dry lbs	2,413,879 (1 car)	1,561,110	3,974,989
Gold ozs	—	—	—
Ag ozs	9.9	—	9.9
Cu lbs	128,857	84,792	213,649

Average Assay:

Au	.338 %	.432 %	.375 %

Ore Analysis:

Insol	59 %	52 %	
CaO	4 %	6 %	
Fe	2 %	2 %	

11/19.23
OJ

Pay Camp

December 27th, 1938

Phelps Dodge Corporation
United Verde Branch
Clarkdale, Arizona

Attention: Ore Purchasing Agent

Dentlemen:

Please give me your terms on purchasing copper ore delivered by trucks at your smelter at Clarkdale of approximately the following composition:

Copper 5%; Iron 4%; lime 6%; Silica 53%; practically no gold or silver.

This ore could be delivered if you desired in 30 ton loads by combining several truck loads.

Yours very truly,

GMC:MF

Clarkdale Smelter 1935

III. PAYMENTS, TREATMENT CHARGES, DEDUCTIONS

The SMELTER agrees to receive the ore subject to the above conditions and under the following schedule of payments, treatment charges, and deductions.

A. PAYMENTS

Gold: If the ore contains .05 ounces or more per ton, pay for full content at realized price less 8% to cover consideration of having returned 100% of the gold content, cost of transportation of bullion, insurance, selling, interest on advanced payment, and other charges. By realized price is understood the net weighted price per ounce gold received by the Phelps Dodge Corporation for the month next succeeding the month of delivery of SHIPPER'S ore.

Silver Deduct 10% of the content, provided the minimum deduction shall be .5 ounce per ton of ore and pay for the remainder at New York quotation. New York quotation is understood to be the average net refinery quotation for silver as reported by Handy and Harmon for the day following the date of sampling. In the event of a closed market following the date of sampling, the settlement quotation will be the first official Handy and Harmon silver quotation reported the day the market reopens.

In order to make available to the SHIPPER higher prices paid in silver dollars by the United States mint, under the Presidential proclamation of December 21, 1933, and the regulations of the Secretary of the Treasury and Director of the Mint subsequent thereto, a supplemental agreement may be made and attached to this contract.

Copper Payment will be made for the copper content of the ore at the New York quotation less 2-1/2 cents per pound. The New York quotation is understood to be the average net refinery quotation for copper published by the Engineering and Mining Journal's Metal and Mineral Markets for the week ending with Wednesday prior to date of sampling at SMELTER'S plant. The quantity of copper paid for will be the total content in the ore after deducting 10 pounds of copper per ton on shipments containing 5% copper or less. An additional deduction of .5 pound of copper per ton of ore will be made for each 1% of copper above 5%, fractions in proportion.

Lead: There will be no payment for lead content in the ore.

B. BASE & EXCESS TREATMENT CHARGES

The SMELTER will charge the SHIPPER $3.50 per dry ton of ore when the payment for gold, silver, and copper is $15.00 or less per dry ton. This base treatment charge will be increased by 10%, fractions in proportion, on payments of gold, silver and copper in excess of $15.00 per ton. The maximum treatment charge shall not exceed $6.00 per dry ton.

Zinc: A charge will be made for all zinc contained in the ore in excess of 2%, at the rate of 15 cents per unit, fractions in proportion.

Arsenic, Antimony & **Bismuth:** A charge will be made for the presence of arsenic, antimony and bismuth in the ore in excess of a combined amount of 1.5%, at a rate of $1.00 per unit.

Charge for Sampling: There will be no charge for sampling carload shipments of 30 tons dry weight or more. If a shipment contains under 30 tons dry weight per lot of ore, a sampling charge of 50 cents per ton will be made for the shortage under 30 tons. If a one car shipment contains more than one lot of ore, an additional sampling charge of $7.50 will be made for each additional lot above one contained in the one car shipment.

C. DEDUCTIONS

Deduction for Copper Shortage:

Copper short of 10 pounds per ton ore shall be charged at quotation price, less 2-1/2¢ per pound copper.

Moisture: All moisture as determined by the SMELTER on the SMELTER'S sample will be deducted from the wet weight of the ore and the minimum deduction for moisture will be 1%.

Other deductions will be made as outlined in sub-section "B" above.

IV SAMPLING

The SHIPPER may, if he wishes, be present in person or thru his representative during the operations of sampling the ore by the SMELTER. The finished sample will be divided into four portions; the first portion will be retained by the SMELTER FOR assaying by its assay office. The second portion will be delivered to the SHIPPER or his representative. The third and fourth portions will be sealed and held by the SMELTER as umpire sample and reference sample respectively.

V ASSAYING

The determination of the metal contents of the ore shall be made by either of the following methods at the option of the SHIPPER, and SHIPPER shall designate hereinafter in this agreement which of the following methods (A) or (B) he elects:

(A) - According to method "A" the SMELTER and the SHIPPER shall assay or cause to be assayed by a reputable and qualified assayer, its portion of the sample obtained as described under Article IV. The SHIPPER may then by himself or by his representative present his certificate of assay to the Chief Clerk of the smelter or the Chief Clerk's representative, who

NOTE RE DUNDEE ARIZONA

12/10/38

Robert Lansing, referred to me by Louis Chalmers, phoned to say that his father and a number of his friends in New York held a lot of stock in this company and that he had been commissioned to find out something about it while travelling in the West.

Told him that I had a very complete file on the mine of which would furnish him a copy for the sum of $100.00.

Lansing said that he would first visit the property to get personal information regarding its location etc., and on returning to Phoenix might call on me and get copy of my data, etc., Rather doubt if he will go to any expense in this connection.

G.M.C.

DUNDEE ARIZONA

DISTRICT: Jerome

LOCATION: 1¼ miles S. of Jerome on what is commonly known as the Hog Back.

OWNERS: Dundee Arizona Copper Company - Mr. McKay of Scotland principal and Mr. Defty, Advertising Agent and Consulting Engineer

DATE VISITED: July 28, 1919.

NOTES:

Geology

Two claims as per map.

Series of highly sheared and reorganized Pre-Cambrian sediments and intrusives capped by limestone, above which lies a conglomerate, the cementing material of which is copper carbonate and copper silicate with iron oxide.

Occasional boulders of Glance in Conglomerate; also boulders of Cuprite as result of alterations of Glance. Below the Conglomerate the limestone where shabby or fractured is impregnated with carbonate or silicate of copper, but amount of this ore is very indefinite. Conglomerate ore is of most value and where boulders are small the precentage of ore is high, but the average ore is not over 40% of total conglomerate.

Development

Main shaft is 780' deep and located 300' away from line of U. V. Extension tunnel. SEE MAP

Tunnel on or below conglomerate bed 260' long with cross-cuts and raises to the conglomerate ore, which follows roughly the eroded surface of the limestone.

Positive Ore

Block A

Developed by tunnel

$$\frac{260 \times 120 \times 6 \times 6}{180} = 6240 \text{ Tons}$$

Block B

Developed by Surface Cuts

$$\frac{250 \times 50 \times 6 \times 6}{180} = 6250 \text{ Tons}$$

Probable Ore

Block A

$$\frac{2 \times 310 \times 25 \times 6 \times 5}{180} = 3100 \text{ Tons}$$

Block B

$$\frac{120 \times 6 \times 25 \times 6}{180} = 600 \text{ Tons}$$

Possible Ore

$$\frac{285 \times 1000 \times 6 \times 6}{180} = 40{,}810 \text{ Tons}$$

Less 16,190

47,000

Grade

Average shipped - 5.3%, but estimated tonnage based on 3 and 4% ore, since former shipments were very carefully sorted and estimated. Tonnage based on lower values.

Possible to obtain 5% ore but hardly a commercial proposition.

Costs:

Freight	$2.20
Haul	2.50
Mining	2.50 to 3.00

Conclusions

Ore should be mined and dropped down a double bottom chute, first bottom a grizzlie. In this way sorting would be obviated but ore would be lower grade since present second class ore would be mixed with higher grade.

Fractured L.S. is not a likely producer.

Probability of extensions to above estimates not favorable. Carbonate ore is entirely result of replacement from surface waters and holds no promise as regards development of sulphide ores at depth.

A reasonable profit with copper above 20¢, provided mining cost is reduced over past performance.

W. V. DeCamp

7/19

CONSOLIDATED ARIZONA SMELTING COMPANY
HUMBOLDT, ARIZONA

OTTO F. JANSSEN
AUDITOR

Notes on Volatilization of Dundee-Arizona Ore

At the time of the original muffle work there were apparently two classes of ore, Conglomerate and Limestone.

	Insol	Fe	CaO
Conglomerate	55%	4%	7%
Limestone	30	1.6	14.3

Muffle Tests – Indicate a fusion at 850 Degs Cent.
Extractions from 66% to 84% and with the addition of Sulphur the extraction was raised to 90%
One muffle test with an excess of Salt and long time of contact showed an extraction of 98%

Kiln Tests – There was apparently some difficulty in getting good furnace conditions owing to the fact that the ore seemed to fuse rather readily at about 850 Degs and that as indicated in previous muffle tests it requires a somewhat higher temperature than this to get the best results.
Extractions indicated up to 90% though the actual recovery of the fume was never greater than 63%.
Fume assays 21.25% Cu and 18.4% Insol with chlorine content at 24%.

The general impression from reading over the reports is that the Dundee-Arizona ore is not the best adapted to the process of volatilization. Provided one is able to make a complete recovery of the fume it would not seem advisable to estimate more than a probable recovery of 85% by this process.

1

July 1919

DUNDEE-ARIZONA

Test #7. Head Sample same as in Test #1.

Wt.Ore grams	Wt.Salt grams	Wt.S. grams	Time	Temp.C	Wt.Tails grams	Cu In tails V	Extraction %
25	3	0.65	45min	850	20.65	0.80	85.31

****

Test #8. Head Sample same as in Test #2.

Wt.Ore grams	Wt.Salt grams	Wt.S. grams	Time	Temp.C	Wt.Tails grams	Cu in tails	Extraction %
25	4	0.75	45"	850	17.225	0.80	91.88

****

Test #9. Head Sample same as in Test #1.

Wt.Ore grams	Wt.Salt grams	Wt.S. grams	Time	Temp.C.	Wt. Tails grams	Cu in tails	Extraction %
25	3	-----	45"	850	19.985	0.76	86.49

****

Test #10. Head Sample same as in Test #2.

Wt.Ore grams	Wt.Salt grams	Wt.S. grams	Time	Temp.C	Wt.Tails grams	Cu in tails	Extraction %
25	4	-----	45"	850	15.530	1.51	86.18

****

Vol. I-a

July 1919

Tests 1-10 feed thru 30 mesh

DUNDEE - ARIZONA

VOLATILIZATION TESTS

Test #1 Head Sample (Conglomerate)

Cu	Insol	Fe	CaO	Al2O3
4.50%	55.0%	4.0%	7.1%	11.5%

Wt.Ore	Wt.Salt	Time	Temp.C	Wt. Tails	Extraction
50.0	5.0	1 hr.	800-850	41.9	65.3%

Note This charge fused slightly at 850.C

****

Test #2. Head Sample (limestone)

Cu	Insol	Fe	CaO	Al2O3
6.79%	29.8%	1.6%	14.3%	5.91%

Wt.Ore	Wt.Salt	Time	Temp.C	Wt. Tails	Extraction
50.0	7.0	1 hr.	800-850	32.8	66.8%

Note This charge fused readily at 850 C.

****

Test #3. Head Sample (Conglomerate)

Cu	Insol.	Fe	CaO	Al2O3
4.50%	55.0%	4.0%	7.1%	11.5%

Wt.Ore grams	Wt.Salt Grams	Time	Temp.C	Wt.Tails grams	Cu.in tails	Extraction
25	3	1 hr.	840	19.905	0.86%	84.8

Note: This charge was run with a thinner bed than Charge #1. No fumes were visible after thirty minutes.

****

Test #4. Head Sample (Limestone)

Cu.	Insol.	Fe.	CaO	Al2O3
6.79%	29.8%	1.6%	14.3%	5.91%

Wt.Ore grams	Wt.Salt grams	Time	Temp.C	Wt.Tails grams	Cu.in tails	Extraction
25	4	1 hr.	840	1563	1.76%	84.0

Note; This charge was run with a thin bed. No fumes visible after 35 min.

DUNDEE - ARIZONA

VOLATILIZATION TESTS

Test #5. Head Sample: same as in Test #3.

Wt. Ore grams	Wt. Salt grams	Wt. S. grams	Time	Temp. C	Wt. Tails	Cu. in tails	Extraction %
25	3	1	1 hr.	840.	20.495	0.88%	84.0

Note: The sulfur added to this charge did not help the extraction.
No fumes visible after thirty minutes.

****

Test #6. Head Sample: same as in Test #4.

Wt. Ore grams	Wt. Salt grams	Wt. S. grams	Time	Temp. C	Wt. Tails	Cu. in tails	Extraction %
25	4	1	1 hr.	840	16.980	0.91%	90.84

Note: The sulfur added to this charge raised the extraction 6.84%
No fumes visible after thirty five minutes.

****

May 11th, 1920

Mr. Arthur G. Smith, Secretary,
Dundee-Arizona Copper Co.,
Nat'l. Bank of Ariz. Bldg.,
Phoenix, Arizona.

Dear Sir:-

VOLATILIZATION

Referring to recent tests on Dundee-Arizona ore, will not go into great detail as much of the record is purely experimental in character and complete metallurgical balance, analyses of re-agents etc. would hardly interest you. The last three tests have shown extraction based on the calculated assays of the products as follows: April 15th; 75.4 %; April 26th; 87.4 %, or considering the time when the salt feed was on at the fire end as well as at the feed end 90.1 %. In this run the heads assayed 4.28 % copper; the fume 21 % and the calcine 0.91 %. On April 29th with a run of 2-tons, - extraction 87.1 % but during the latter part of the run the extraction was considerably better than 90 %. In this run the calcines averaged 0.75 % copper and the fume 16.5 %.

All of the above represent runs in our kiln but as you know this kiln is not completely equipped as would be the case in a commercial plant and we have every reason to say that under commercial conditions a considerably better extraction would be effected and represented by the fume actually recovered. I feel justified in saying that

by this process, in a plant equipped to treat 100-tons per day, a recovery of 92 % or better could be made continuously and in the form of a fume, averaging in all probability better than 20 % copper. In fact, if we can clean the fume of the siliceous flue dust which handicaps our present operations, the fume would probably average better than 30 % copper.

As I have previously advised you, we used up the greater part of the carload of ore you sent us in adjusting our plant and we have found (as expected) that each ore requires certain special treatment. I am sure that it would be to your advantage as well as ours to have another carload of average ore run thru the experimental plant and on such a run complete metallurgical balance, etc. would be furnished.

I might mention that we have treated the fume obtained from the kiln with considerable success in a small blast furnace which we erected for this purpose. We could also treat it in a reverberatory furnace and we believe that we could treat it by leaching if this should prove more satisfactory from a commercial stand-point. At the present time we are carrying on experiments in leaching the fume but I believe that, generally speaking, it will pay to smelt this wherever a smelter is available and considering the high grade content of the fume the cost of smelting would be very slight ~~as compared~~ per pound of copper contained. =

Yours very truly,

m
5/10

President. =

November 22,1923.

Mr. Arthur P. Smith, Secretary,
Dundee-Arizona Copper Company,
206 Heard Building,
Phoenix, Arizona.

Dear Mr. Smith:-

I have yours of November 16th. I do not wish to reply definitely to your letter and to quote you terms for treatment of your carbonate ores until I know a little more concerning your plans and determine whether or not there is any real possibility of our doing business. You say that you must see some profit in making shipments before you would consider doing so and I am doubtful as to whether or not you could possibly ship profitably on the basis of the present market price for Copper, unless you could manage to considerably increase the grade of your ore over the average of previous shipments.

Looking over your shipments for 1917 and 1918 I find that the average was 5.375 Copper, no Gold and practically no Silver and that the ore contained about 57 per cent Insoluble, 5 per cent Lime and 5 per cent Iron. In other words, we should have to provide for fluxing some 47 units of excess Insoluble and as you know, this is a pretty expensive matter at our Smelter where we always have excess Insoluble in our normal charge.

I realize that if we are going to handle your ore at the present time we should have to make a very low smelting charge

which would be considerably below our regular terms and would net us a smaller profit than I consider ordinarily justifiable. I also realize that your Company would have to be satisfied with a pretty small margin of profit which might be smaller than you would consider justifiable.

As you know, the new freight rate from Clarkdale to Humboldt is $1.00 per ton on low grade ores but I do not know the cost of hauling your ore from the mine to Clarkdale and loading it on cars or the cost which you would figure for your mining.

We would be prepared to pay for 90 per cent of your Copper with a minimum deduction of 10 pounds per ton and a maximum deduction of 15 pounds per ton on the New York market price less 3 cents per pound (to cover cost of converting, freight and refining).

With this information before you I wish you would figure out what treatment charge your Company could afford to pay for smelting the ore and also approximately what tonnage you could be reasonably certain of shipping in case we could meet the figures of your estimate. I would be willing to make a flat treatment charge covering smelting and fluxing but I am not sure that I could make this charge low enough to be of interest to you and I don't want to start cutting rates unless I am certain that we could afford to cut low enough to actually obtain some business.

Our smelter is short of ore just at present and we are certainly anxious to secure an additional 50 tons a day and will do everything that we can to cooperate with you, provided it does not mean actual operating loss.

I hope to hear from you again in the near future.

copied

NAME DUNDEE ARIZONA DUMPS

DISTRICT Jerome, Arizona.

LOCATION " "

OWNERS DUNDEE ARIZONA COPPER COMPANY

DATE VISITED January 10-1924. J. L. WHITE.

NOTES

On January 10th and 11th I visited the DUNDEE ARIZONA DUMPS and measured the principal ore dump, which I find to contain 27,350 cubic feet, which represents at 18 cu.ft. per ton, 1,520 Tons.

This dump I sampled by means of six parallel cuts across the top and several pits on the slopes. The average of these ten samples show 3.18 per cent Copper

In addition to this larger ore dump there are several heaps of ore which might amount to 200 tons. Three samples from these dumps average 6.36 per cent Copper and probably represent the best ore that can be had by the closest sorting.

I do not believe that it would be possible to sort out over 15 per cent of waste from the larger dump and this would require screening and would be rather expensive.

Considerable money would have to be spent on a road or on bins and a surface tram to the Jerome-Clarkdale Highway. This would cost $2.00 per ton of ore, at least, and handling and sorting would cost $. 75.

The possibility of a limestone ore being mined and shipped is remote as the only developed block of this ore is close to the shaft and the removal of much of this would endanger the shaft. There are other showings of ore wholly in limestone but it is doubtful if any considerable tonnage could be had. This ore is said to run 3.25 per cent Copper.

There is a large tonnage of ore in the mine, probably of the same grade and character as that in the main ore dump which I estimate can be mined and delivered at the portal of the tunnel for a cost of about $2.50 per ton.

In the ore dumps there is apparently an ore of about 50 per cent Insoluble and 6 per cent Lime and I would judge that the sorted ore might average about 40 per cent excess Insoluble or about the same as former shipments from the Dundee ground.

ESTIMATED COST

Cost of Ore	$ .63	
Preliminary Cost	2.30	
Sorting and Handling	.75	
Hauling	2.00	
Freight	1.00	
DELIVERED AT HUMBOLDT		$5.68
Smelting Charges		5.00 (?)
		$11.68

Unsorted Ore @ 63# Copper = Sorted Ore @ 74#

Copper Content	74#
Smelter Loss	4#
	70# Recovered

70# @ x = $11.68
x = $ .16.7

Copper to be worth $ .16.7 in order to break even.

J L Wheeler
Jan 15 1924

JLW:D

Ore sorted to be as by. 75# Cu

Dy.	0.75
Lab	0.75
dirty	1.50
Haul.	0.75
Tax	3.75
Profit	3.25
	7.00

x ore found on @ 10¢ per Cu
a Pound = 12¢

Ref.

20 Humboldt no finder and

Dundee Arizona

April 30, 1925.

Colonel Robert M. Thompson,
1804 Seventeenth Street,
Washington, D.C.

Dear Colonel Thompson:

RE: DUNDEE ARIZONA.

Yesterday I made an examination of the Dundee Arizona property, both underground and on the surface. Without attempting to verify the estimate of the Management, namely 85,000 tons of better than 4% copper ore, I can state quite positively that they have blocked out undergrounda very substantial tonnage of ore which can be mined and sorted to ship at an average grade of 4% or better. They also have some material on their dumps which by careful sorting can be brought up to average better than 4% copper. Some of the ore contains a substantial percentage of lime and might be nearly self-fluxing, but the bulk of their production, as I told you, would be highly silicious and require fluxing with barren limestone.

Everything considered, I am of the opinion that the calculations which I made in New York, and of which I gave you a copy, will prove to be quite accurate, and that it will be advantageous to contract for the purchase and treatment of 3,000 tons per month of this Dundee Arizona ore provided we can secure same for $4.25 or less per ton, fob Clarkdale, and provided further that the Santa Fe keep their promise and establish a

rate of 50¢ per ton for low grade ore from Clarkdale to Humboldt. I believe there is a possibility of obtaining this ore for $4.00 per ton with copper at 14¢ and scaling the price up gradually as the price advances, since the owners seem to prefer to sell their ore on a sliding scale based on the market and the average grade rather than to consider any flat rate, and such an arrangement would work out somewhat better for us until copper advances to a price of 15¢ per pound or better.

It will cost about $10,000.00, as estimated, to provide a road and ore bins for storing the ore at the portal of the tunnel and a loading platform or ore bins at the railroad siding at Clarkdale, and within a few days I hope to work out with the owners a plan whereby we can advance this money on good security until it can be repaid out of the profit which we expect to pay them over and above their costs of operation. In making this arrangement I would prefer that repayment should be made at a definite fixed rate per ton, since I do not feel at all certain that they can actually mine and haul the ore for the figures which they have estimated, although they continue to be very positive that this can be done, and I think they will have a good chance of actually shipping better than 4% product at least for some time, since certain portions of their orebody are quite rich and will average up to 5% copper.

It would take two months to prepare the mine for steady shipments, and it is not at all certain that at the end

T.B. Form 102 5m-8-18

COPY

CONSOLIDATED ARIZONA SMELTING COMPANY

FROM HUMBOLDT OFFICE. SUBJECT: DATE:

TO NEW YORK OFFICE.

of that time they can ship as much as 100 tons per day, although they should be able to produce a very substantial tonnage and to work up to at least two thousand tons per month without much difficulty, and two thousand tons per month will be quite sufficient to answer our purposes at least for two or three months after we start operations.

I shall proceed, with your approval, to work out all details of this plan along lines which would be satisfactory to the Dundee people and ourselves, but not to make any definite arrangements or commitments until we have some encouragement regarding an improved price for copper, and when such encouragement is actually obtainable to make the agreement effective and binding with the expectation that ore shipments will begin about sixty days thereafter.

Trusting that the above will meet with your approval,

Yours very truly,

General Manager.

GMC-s

P. S. - In passing the Verde Central I noticed that they were stocking some ore on their dump, the capacity of which is very limited. Newspaper reports that they have now opened up on the 1400-foot level a width of 60 feet of ore averaging between 6% and 7% copper, and that they expect shortly to strike this same orebody on the 1200-foot level. Their development work has been slower than expected, but apparently is turning out very nicely, and I continue to believe that we shall be able to do business with them just as quickly as the market price advances to 14¢ or better per pound.

GMC

T.B. Form 102 5m-8-18

COPY

CONSOLIDATED ARIZONA SMELTING COMPANY

FROM HUMBOLDT OFFICE. SUBJECT: DATE:

TO NEW YORK OFFICE.

To file Note by G. H. C.

DUNDEE ARIZONA 6/12/37 Conclusions

Alongroad from Clarkdale to Jerome and shaft connected with Josephine Tunnel of the U.V.X., but this is now caved and the cost of reopening might be prohibitive. Tunnels and drifts may also be in poor condition.

About 50,000 tons of carbonate ore may be called positive and highly probable with average grade of 3.5% copper or slightly better. No gold or silver.

Net value of ore 60 x 11.5 equals $6.90 and costs mining (2.50), hauling to Clarkdale (50¢). smelting (3.00) and royalty (40¢) equals $6.30.

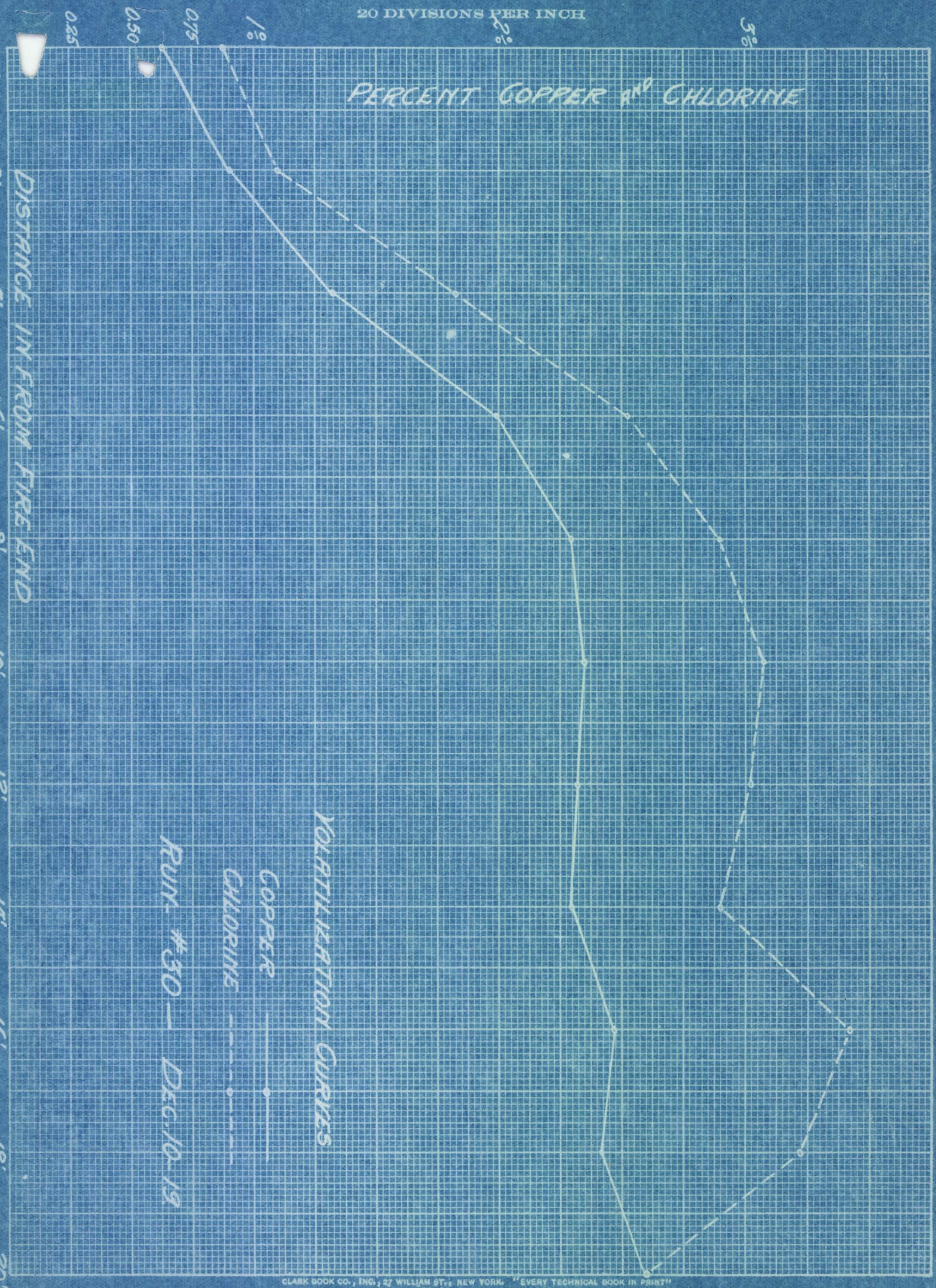
To sum up, the reopening of this mine wouldnot seem to be an attractive venture unless copper should go to 18¢ or better.

A small tonnage of higher grade ore might be produced but it is not likely that the profit would be sufficient to repay the first cost of cleaning out and providing the proper equipment.

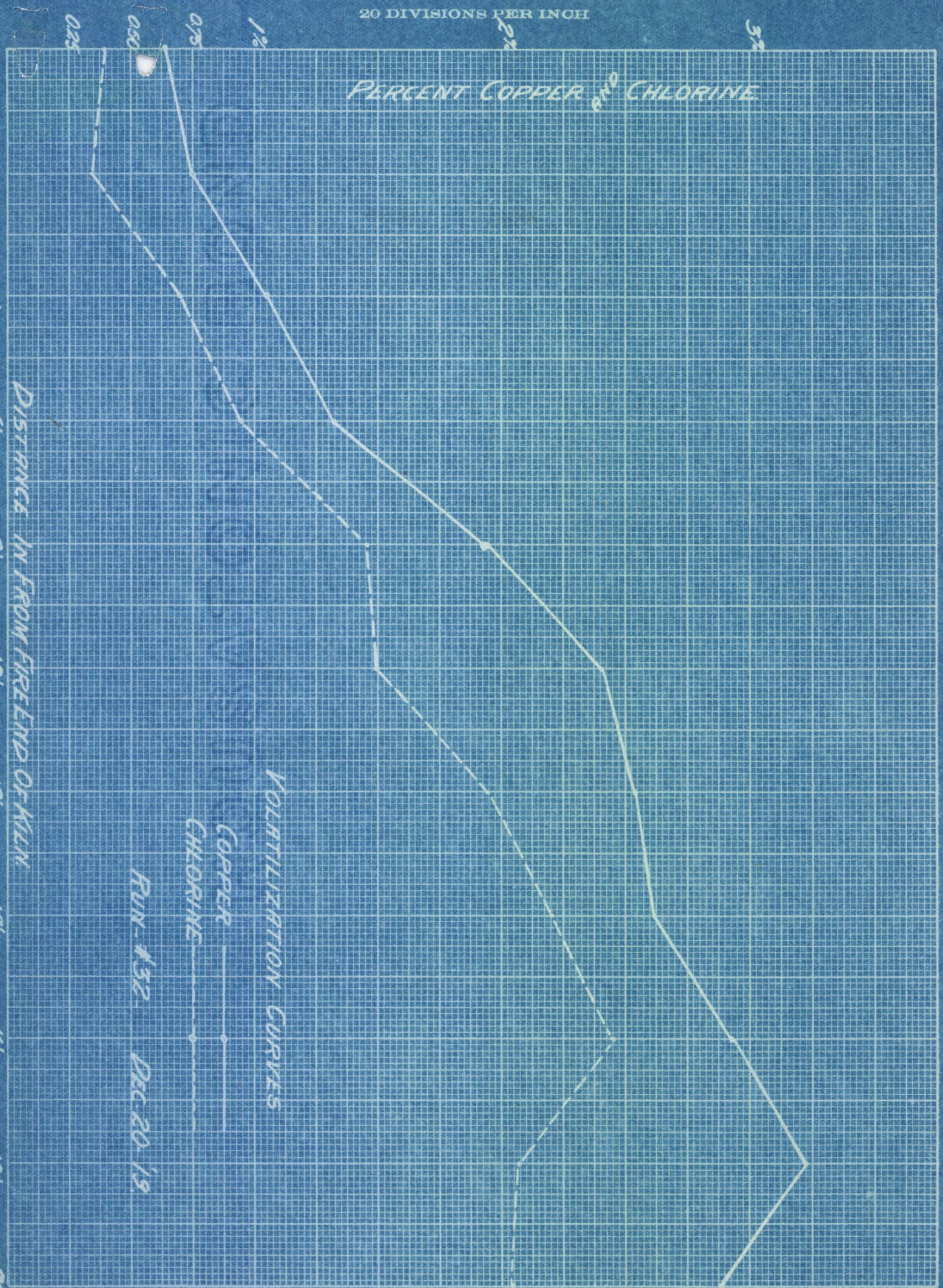
Tonnage is not sufficient to warrant a volatilization plant unless other similar ores were available.

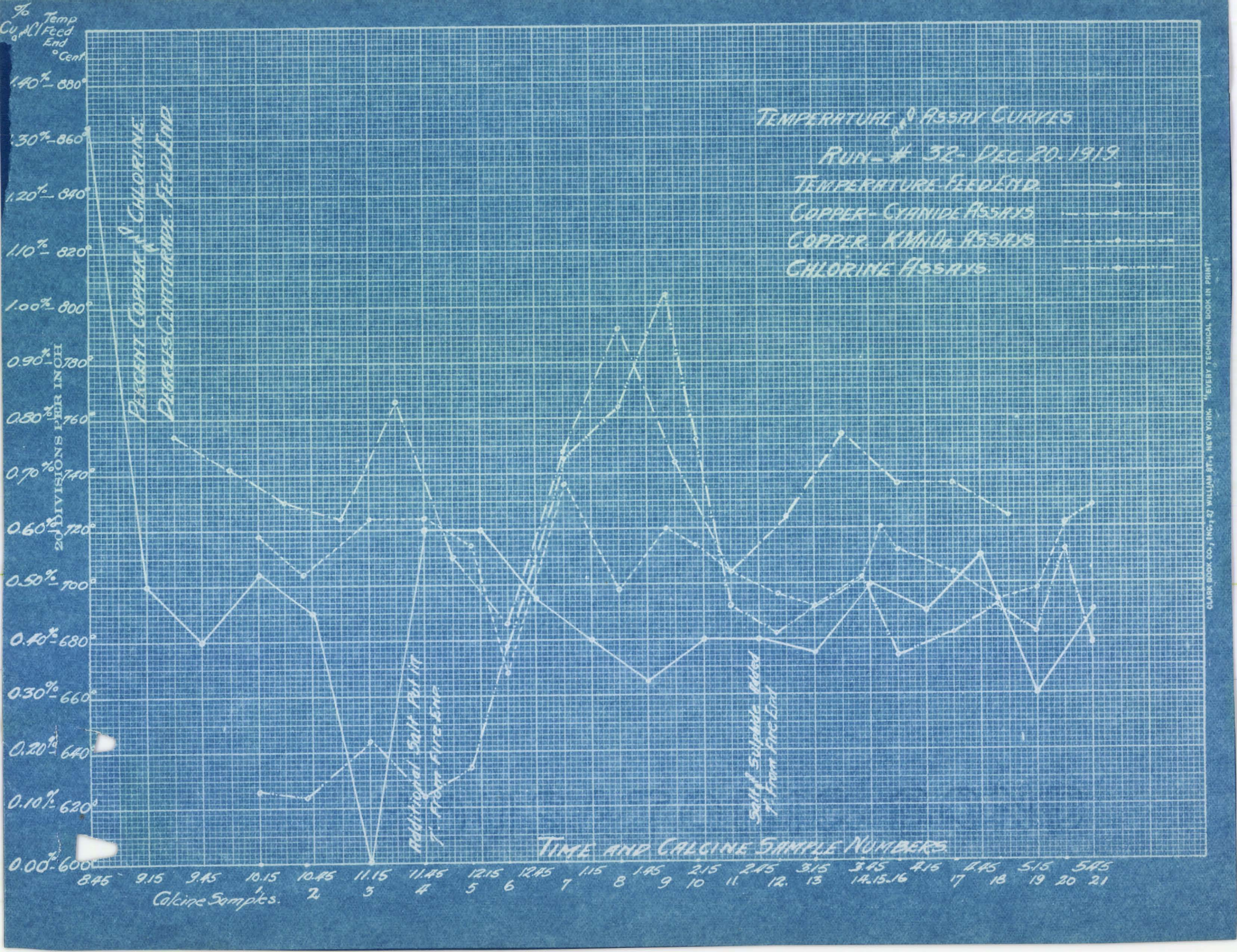
No interest at present and probably will eventually be picked up cheap by the P. D. Co.

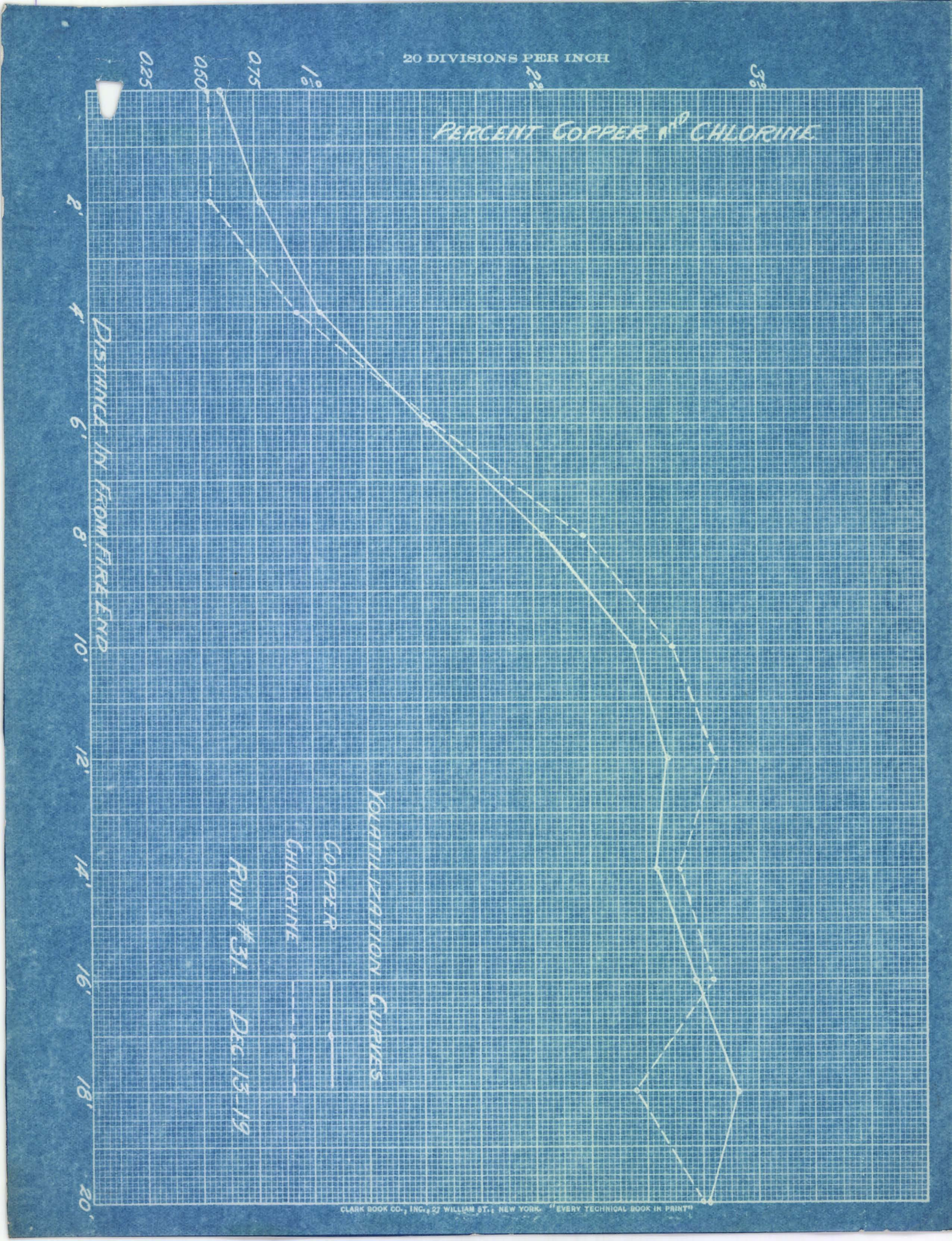
No further development since 1927 & only a very little ore extracted by lessees since that date.

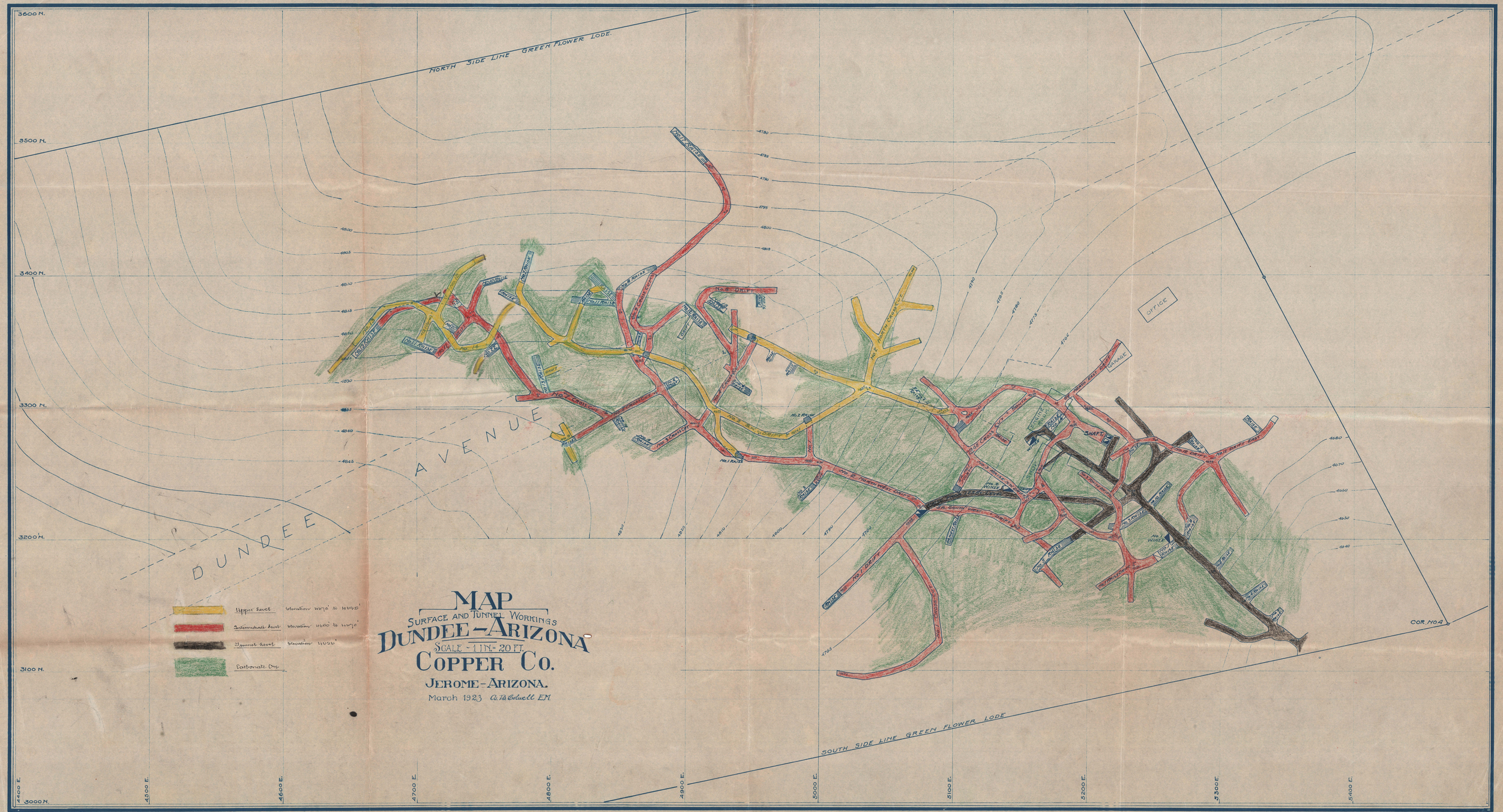


20 DIVISIONS PER INCH






20 DIVISIONS PER INCH
0.25
0.50
0.75
1.0
1.25
1.50
PERCENT COPPER AND CHLORINE
Distance in from Fire End
4'
6'
8'
10'
12'
14'
16'
18'
20'
Volatilization Curves
Copper
Chlorine
Run #31. Dec. 13-19
CLARK BOOK CO., INC., 27 WILLIAM ST., NEW YORK "EVERY TECHNICAL BOOK IN PRINT"



MAP

SURFACE AND TUNNEL WORKINGS

DUNDEE-ARIZONA COPPER CO.

SCALE - 1 IN. = 20 FT.

JEROME-ARIZONA.

March 1923 A. B. Colwell EM

MAP
SURFACE AND TUNNEL WORKINGS
DUNDEE – ARIZONA
SCALE - 1 IN. - 20 FT.
COPPER Co.
JEROME – ARIZONA.
March 1923 A. B. Coldwell E.M.

NORTH SIDE LINE GREEN FLOWER LODE.

SOUTH SIDE LINE GREEN FLOWER LODE

3600 N.
3500 N.
3400 N.
3300 N.
3200 N.
3100 N.
3000 N.
4400 E.
4500 E.
4600 E.
4700 E.
4800 E.
4900 E.
5000 E.
5100 E.
5200 E.
5300 E.
5400 E.

DUNDEE AVENUE

OFFICE

COR. NO 4

Portal Portland Tunnel

No 8 DRIFT

No 9 CROSS CUT

No 2 RAISE

No 2 NORTH CROSS CUT

No 1 RAISE

No 1 DRIFT

No 1 NORTH WEST DRIFT

No 1 CROSS CUT

No 2 DRIFT

No 3 RAISE

No 3 CROSS CUT

No 3 SOUTH DRIFT

No 4 RAISE

No 4 CROSS CUT

No 4 DRIFT

No 5 CROSS CUT SOUTH

No 5 RAISE

No 5 WINZE

No 5 DRIFT

No 6 RAISE

No 6 WINZE

No 6 DRIFT

No 7 RAISE

No 7 WINZE

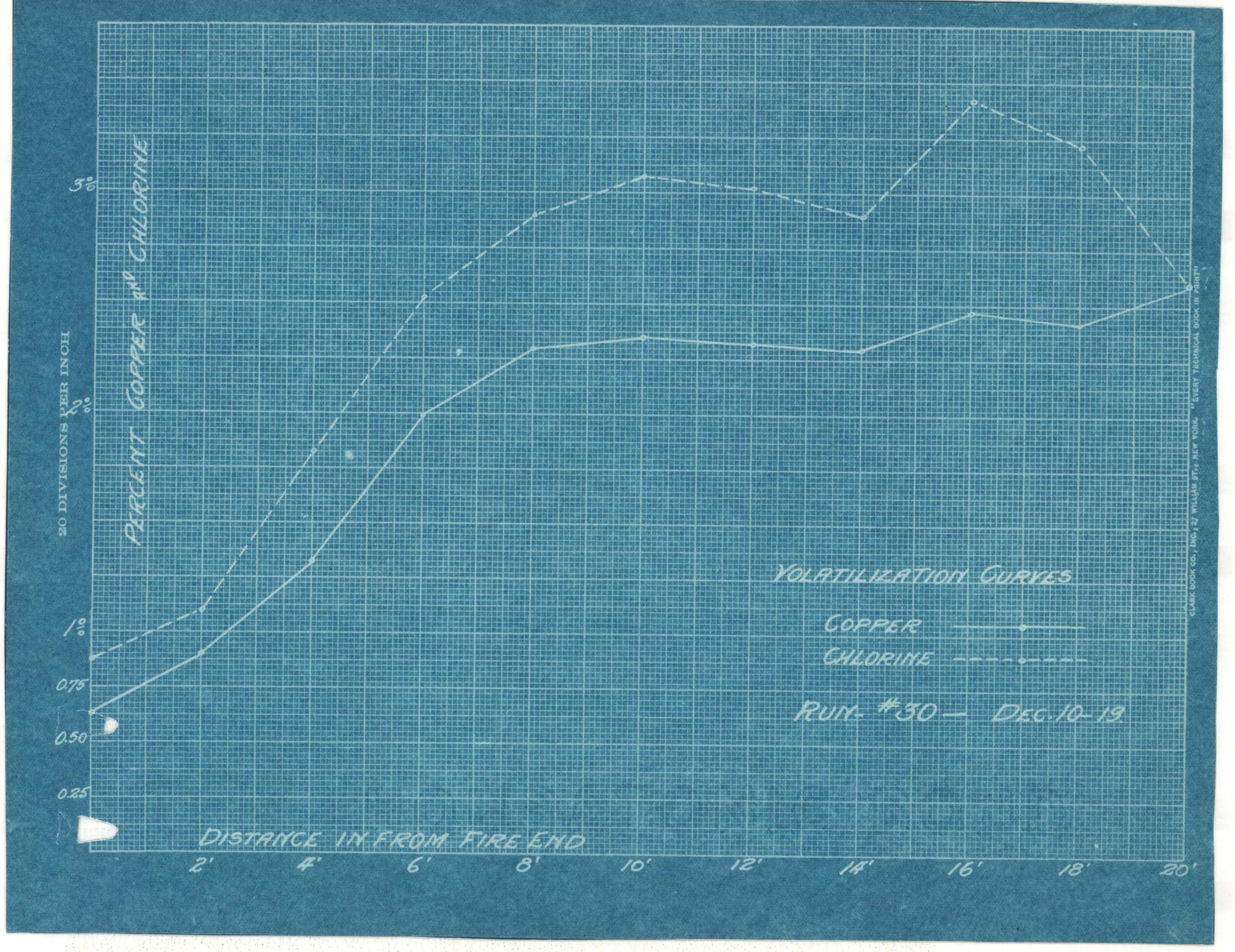
No 7 DRIFT

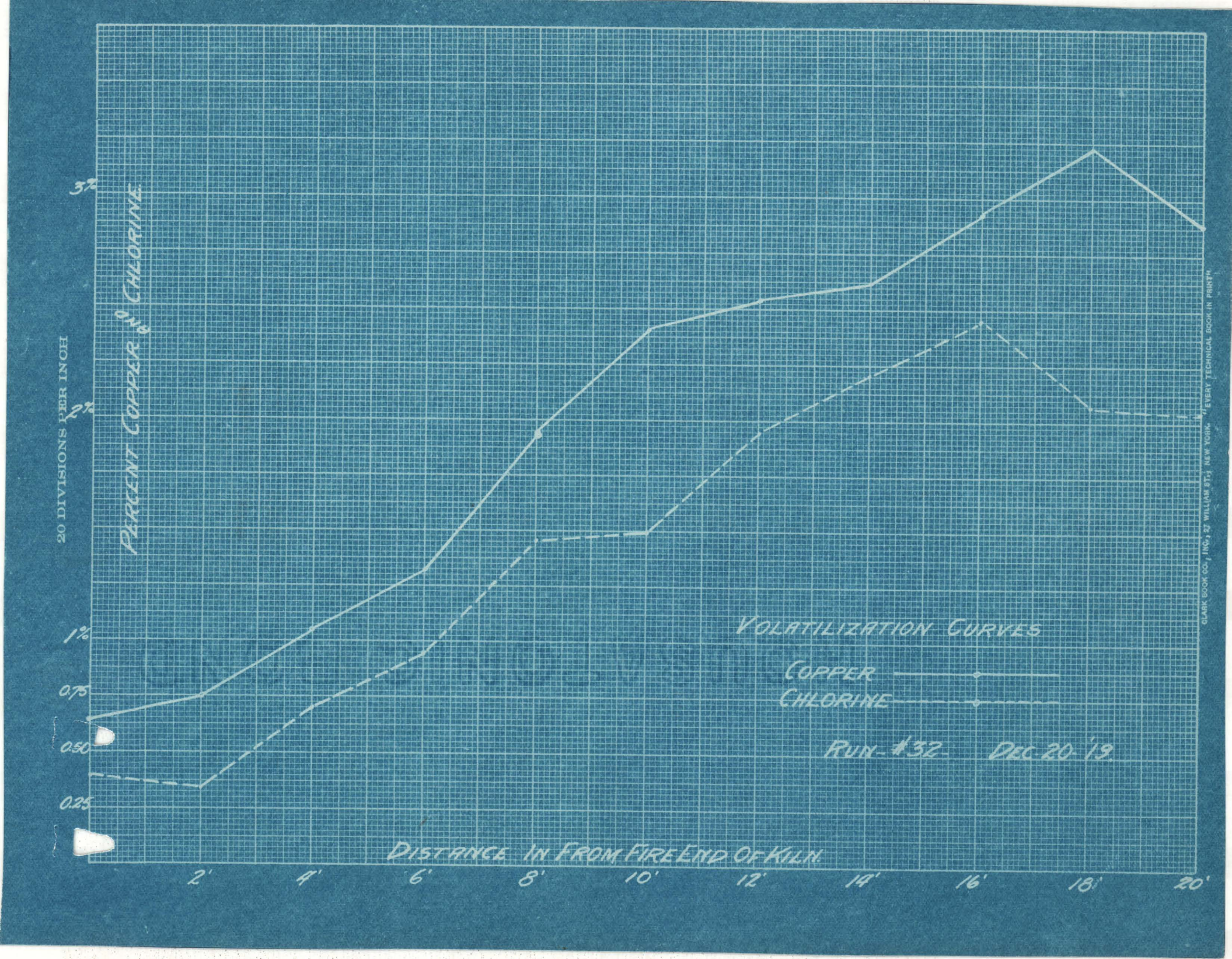
No 8 RAISE

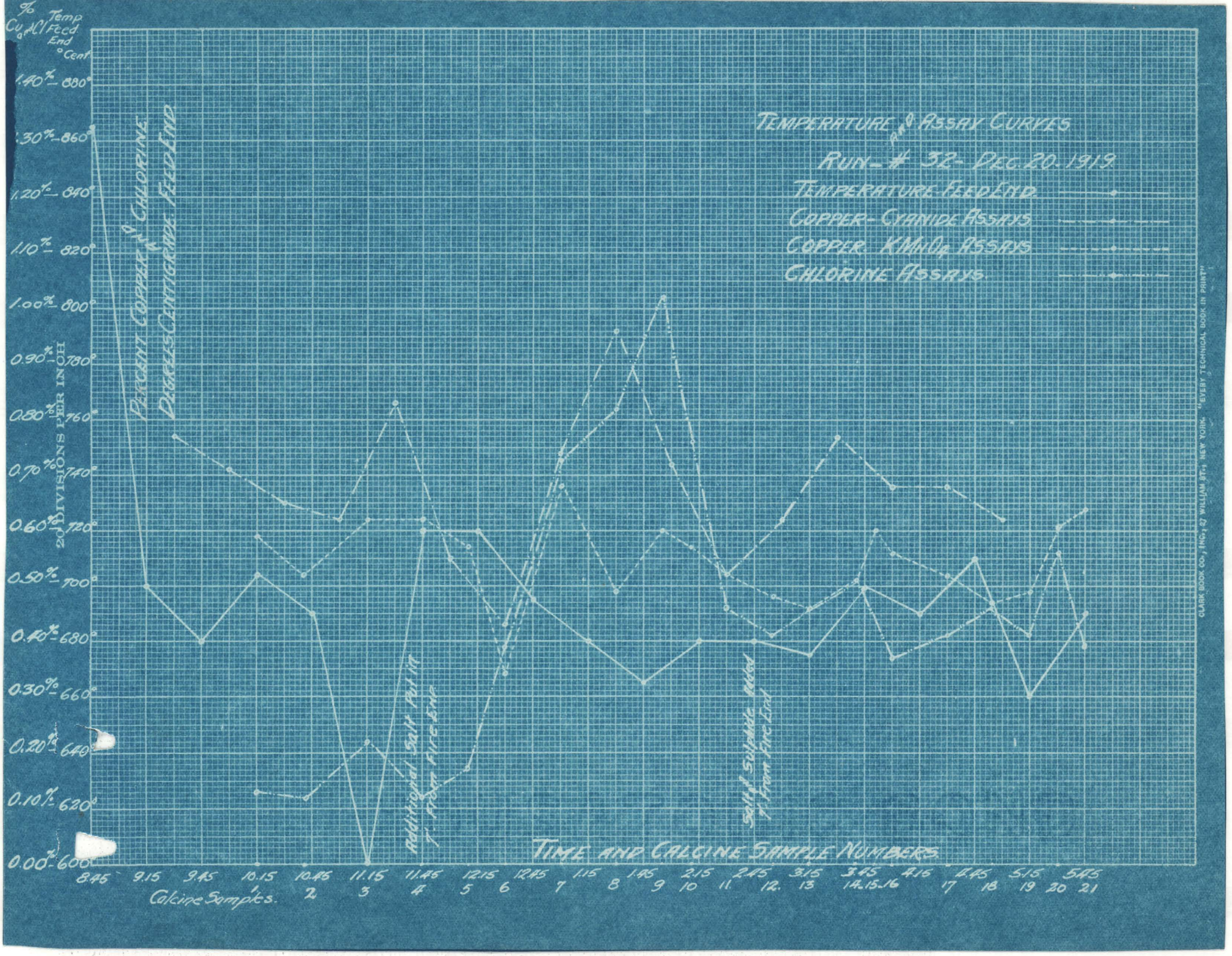
No 8 WINZE

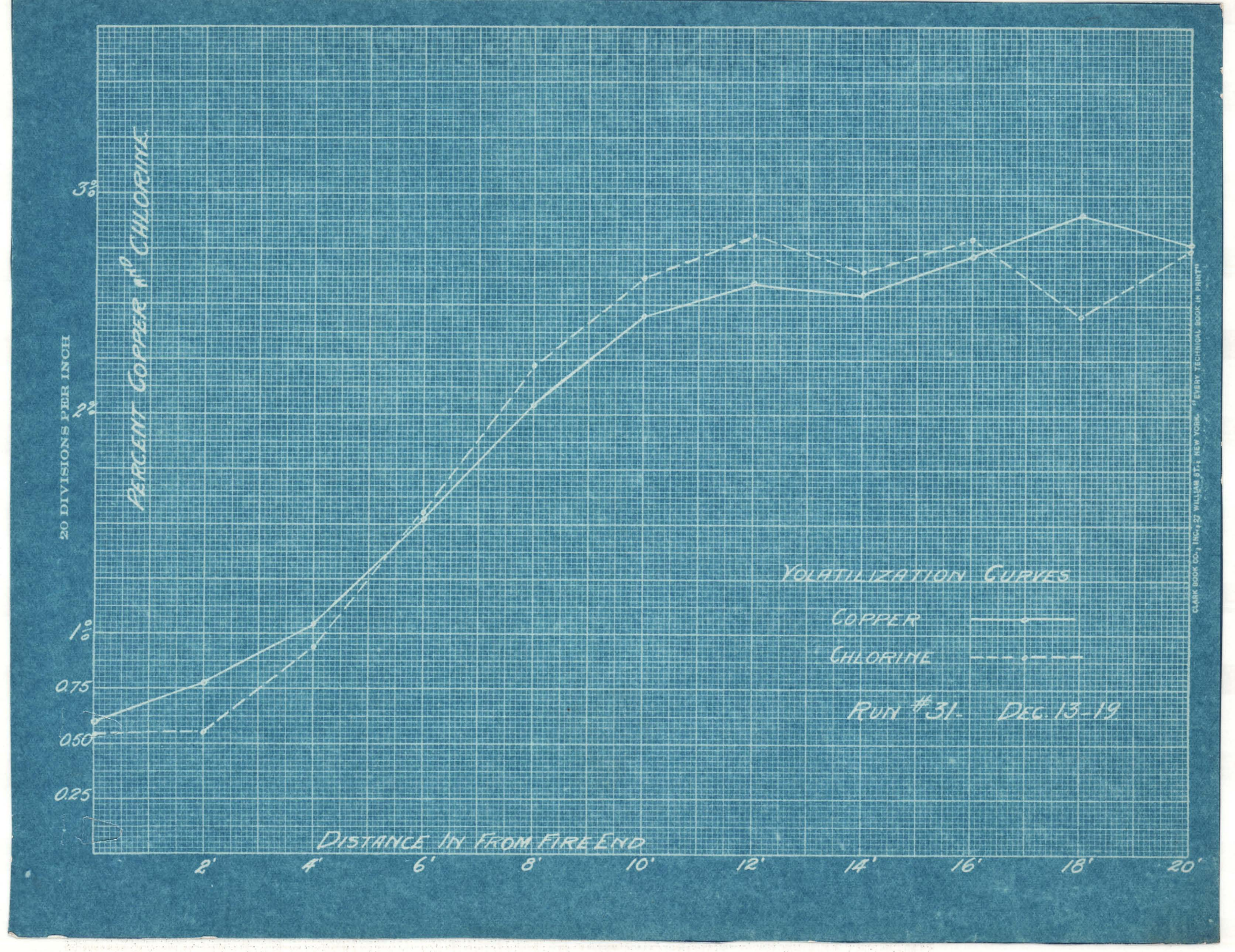
No 8 DRIFT

No


PERCENT COPPER IN CHLORINE
20 DIVISIONS PER INCH
3%
2%
1%
0.75
0.50
0.25
DISTANCE IN FROM FIRE END
2'
4'
6'
8'
10'
12'
14'
16'
18'
20'
VOLATILIZATION CURVES
COPPER
CHLORINE
RUN #30 — DEC. 10-19
CLARK BOOK CO., INC., 37 WILLIAM ST., NEW YORK "EVERY TECHNICAL BOOK IN PRINT"


20 DIVISIONS PER INCH
PERCENT COPPER and CHLORINE
3%
2%
1%
0.75
0.50
0.25
VOLATILIZATION CURVES
COPPER
CHLORINE
RUN #32 DEC 20-19
DISTANCE IN FROM FIRE END OF KILN
2'
4'
6'
8'
10'
12'
14'
16'
18'
20'
CLARK BOOK CO., INC., 57 WILLIAM ST., NEW YORK. "EVERY TECHNICAL BOOK IN PRINT"


% Cu as Cl
Temp. Feed End °Cent.
1.40% — 880°
1.30% — 860°
1.20% — 840°
1.10% — 820°
1.00% — 800°
0.90% — 780°
0.80% — 760°
0.70% — 740°
0.60% — 720°
0.50% — 700°
0.40% — 680°
0.30% — 660°
0.20% — 640°
0.10% — 620°
0.00% — 600°
20 DIVISIONS PER INCH
Percent Copper as Chlorine
Degrees Centigrade Feed End
Temperature & Assay Curves
Run — # 32 — Dec. 20. 1919.
Temperature Feed End
Copper — Cyanide Assays
Copper KMnO4 Assays
Chlorine Assays
Time and Calcine Sample Numbers
8.45 9.15 9.45 10.15 10.45 11.15 11.45 12.15 12.45 1.15 1.45 2.15 2.45 3.15 3.45 4.15 4.45 5.15 5.45
Calcine Samples. 1 2 3 4 5 6 7 8 9 10 11 12. 13 14. 15. 16 17 18 19 20 21
Salt Shipped Here
Salt Shipped Here
CLARK BOOK CO., INC., 27 WILLIAM ST., NEW YORK. "EVERY TECHNICAL BOOK IN PRINT"


Percent Copper & Chlorine
3%
2%
1%
0.75
0.50
0.25
20 Divisions per inch
Distance In From Fire End
2'
4'
6'
8'
10'
12'
14'
16'
18'
20'
Volatilization Curves
Copper
Chlorine
Run #31. Dec. 13-19
CLARK BOOK CO., INC., 52 WILLIAM ST., NEW YORK. "EVERY TECHNICAL BOOK IN PRINT"