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HUMPHREYS ENGINEERING

Spiral Test # 7972
June 2, 1961

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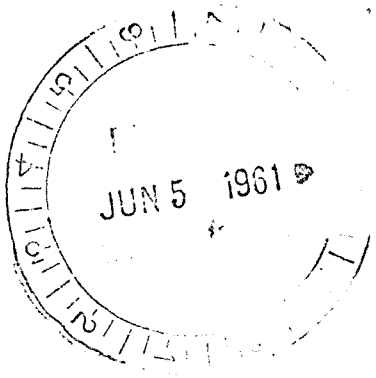
HUMPHREYS ENGINEERING COMPANY
910 AMERICAN NATIONAL BANK BUILDING
DENVER 2 COLORADO

CABLE ADDRESS:
"HUMPHREYS"

June 2, 1961

OUR REF. G-7972-HEC
YOUR REF. Lot 1508



Mr. W. H. Roxburgh
Canadian Javelin Ltd.,
680 - 5th Avenue
New York City, N. Y.

Dear Bill:

I enclose tables summarizing the results of spiral tests made on the sample of Javelin ore ground at Lakefield when we were there last January. Our tests consisted of a 2-stage spiral test made on a small sample without cleaner tailing recirculation; a 2-stage spiral-sizer test also made on a small sample without cleaner tailing recirculation, and, a 3-stage continuous test in which the bulk of the sample was treated and all middling products were recirculated.

In the 2-stage spiral test we recovered 78.5% of the iron in a concentrate assaying 63.95% Fe and .21% Mn. In the spiral-sizer test we recovered 79.5% of the iron in a concentrate assaying 62.87% Fe and .29% Mn. In the 3-stage spiral test we recovered 85.4% of the iron in a concentrate assaying 62.76% iron and .30% Mn.

We believe that the higher Fe recovery for the 3-stage test is in part due to the fact that middlings could be recirculated during the test run, and, in part due to the relatively low concentrate grade. This test is somewhat comparable to the tests made at Lakefield in which Fe recovery was approximately 80% in a concentrate assaying between 63-64% Fe - the better recovery for our test being largely attributable to use of three stages of concentration.

Use of the Humphreys counterflow sizer apparently offers no advantage in the treatment of this ore.

The fact that +65% Fe concentrates were difficult to obtain - both at Lakefield and in our Denver tests - is quite largely explained if you examine our Table 4, which gives screen and sink-float data on the head sample as received. These data indicate that over 50% of the iron in the ore reports as sink product which is lower in grade than 64% Fe, and nearly 40% lower in grade than 60% Fe. Failure to make a higher grade is largely a matter of incomplete liberation at the grind which was as shown by Table 5 - essentially 100% through 20 mesh (Tyler).

I am expecting to leave town next week but will arrange for Tom to forward tables giving complete test data including feed rates and water flow rates.

Best personal regards.

Very truly yours,

HUMPHREYS ENGINEERING COMPANY

Henry Knoblauch

Metallurgical Engineer

hs/g

encls - 5 tables
cc-Lab

Table No. 1

HUMPHREYS LABORATORY TEST

Date: 5/11/61 Lot No.: 1508 Test No.: H-J-K

Customer: Canadian Javelin Limited

Ore: Julian iron ore wet ground to -20 mesh in a Hardinge Cascade Mill at Lakefield, Ontario.

Object of Test: A pilot plant run made to determine probable iron recovery and concentrate grade for three stages of concentration.

SAMPLE NO.	PRODUCTS	WEIGHT DISTRIBUTION		Fe			Mn				
				Assay	Distribution		Assay	Distribution		Assay	Distribution
			%	%		%	%				
K-2	Re-cleaner spiral conct.		54.8	62.76		85.4	0.30				
H-4	Rougher spiral tail		45.2	13.02		14.6					
Calculated Head			100.0	40.28		100.0					
*H-1	Assay Head			41.51							
**A-1	Assay Head			41.25							

Remarks: *H-1 head was a sample taken off the feed belt at intervals during the test run.

**A-1 head was split out of the sample when received. During this test a rougher middling, and both cleaner and recleaner tailings were recirculated.

Rougher feed rate - new ore - 3330 #/Hr.
Cleaner " " - Ro.Conc.only - 2514 #/Hr.
Recleaner " " Cl. " " - 2256 #/Hr.

Test Engineer: H. Snedden
T. J. Ferree

Table No. 2

HUMPHREYS LABORATORY TEST

Date: 4/20/61 Lot No.: 1508 Test No.: D-F-G

Customer: Canadian Javelin Limited

Ore: Julian iron ore wet ground to -20 mesh in a Hardinge Cascade Mill at Lakefield, Ontario

Object of Test: To determine if the Humphreys counterflow sizer offers an advantage in concentration of this ore at this grind.

SAMPLE NO.	PRODUCTS	WEIGHT DISTRIBUTION		Fe			Composite			Mn		
			%	Assay	Distribution		Assay	Distribution		Assay	Distribution	
				%		%	Fe	Wgt	Fe	%		
F-2	Sizer U'flow		22.0	64.6		34.8	)			.29		
G-2	Cl.Sp.Conct.		29.6	61.6		44.7	)62.87	51.6	79.5			
G-4	" " Tail		13.1	25.55		8.2	25.55	13.1	8.2			
D-4.1	Ro.Sp. Sand Tail		24.7	9.85		6.0	)					
D-4.2	Ro.Sp. Slime Tail		10.6	24.15		6.3	)14.14	35.3	12.3			
Calculated Head			100.0	40.78		100.0	40.73	100.0	100.0			
A-1	Assay Head			41.25			41.25					

Remarks: Rougher feed rate (new ore) 3502 #/Hr.
Cleaner sizer-spiral feed rate 1537 #/Hr.

If G-4, the cleaner spiral tailing, could have been recirculated the overall spiral iron recovery would have been increased to about 85%.

Test Engineer: H. D. Snedden
T. J. Ferree

Table No. 3

HUMPHREYS LABORATORY TEST

Date: 4/18/61 Lot No.: 1508 Test No.: D-E

Customer: Canadian Javelin Limited

Ore: Julian iron ore wet ground to -20 mesh in a Hardinge Cascade mill at Lakefield, Ontario.

Object of Test: To permit estimation of iron recovery and concentration grade to be expected from two stages of spiral concentration.

SAMPLE NO.	PRODUCTS	WEIGHT DISTRIBUTION %	Fe Assay %	Fe Distribution %	Composites Assay Fe	Composites Distribution Wgt	Composites Distribution Fe	Mn Assay %	Mn Distribution
E-2	Cl.Sp.Cpnct.	48.9	63.95	78.5	63.95	48.9	78.5	.21	
E-4	Cl.Sp.Tail	15.8	22.70	9.0	22.70	15.8	9.0		
D-4.1	Ro.Sp. Sand Tail	24.7	9.85	6.1)					
D-4.2	Ro.Sp. Slime Tail	10.6	24.15	6.4)	14.14	35.3	12.5		
Calculated Head		100.0	39.85	100.0	39.85	100.0	100.0		
A-1	Assay Head		41.25		41.25				

Remarks: Rougher feed rate (new ore) 3307 #/Hr.
Cleaner " " 1849 #/Hr.

If E-4, the cleaner spiral tail, could have been recirculated the overall spiral iron recovery would have been increased to about 85%.

Test Engineer: H. Snedden
T. J. Ferree

Lab. Form 4—1M—3-54—R.F.F.Co.

Table No. 4

HUMPHREYS LABORATORY TEST

Date: 3/31/61 Lot No.: 1508 Test No.: B

Customer: Canadian Javelin Limited

Ore: Julian ore wet ground in a Hardinge Cascade Mill at Lakefield, Ontario

Object of Test: Heavy liquid separation with screen analysis on the sink to permit estimation of mineral liberation.

SAMPLE NO.	PRODUCTS	WEIGHT DISTRIBUTION %	Fe Assay %	Fe Distribution %				Composite Assay % Fe	Composite Distribution % Wgt	Composite Distribution % Fe
B-2.3	-14+20 sink	0.2	55.75	0.3	)					
4	-20+28 "	2.7	58.75	4.0	)					
5	-28+35 "	6.7	62.00	10.5	)					
6	-35+48 "	10.4	60.60	15.9	)					
7	-48+65 "	11.2	63.25	17.8	)					
8	-65+100 "	8.6	64.85	14.0	) Composite	sink		62.87	60.6	96.0
9	-100+150 "	6.9	65.45	11.4	)					
10	-100+200 "	5.2	66.15	8.7	)					
11	-200+325 "	4.8	65.30	7.9	)					
12	-325 "	3.9	56.45	5.5	)					
B-4	Float	39.4	3.98	4.0		Float		3.98	39.4	4.0
Calculated Head		100.0	39.67	100.0				39.67	100.0	100.0
A-1	Assay Head		41.25							

Remarks: The test indicates that enough iron mineral is still locked with gangue to prevent making a high grade concentrate except at a sacrifice in recovery.

Test Engineer: T. J. Ferree

Table No. 5

HUMPHREYS LABORATORY TEST

Date: 3/31/61 Lot No.: 1508 Test No.: A

Customer: Canadian Javelin Limited

Ore: Canadian Javelin's Julian ore received from Lakefield Research

Object of Test: Screen analysis of a split of the head sample, made by wet screening on 325 mesh followed by dry screening in Tyler Rotap.

SAMPLE NO.	PRODUCTS	WEIGHT DISTRIBUTION		Assay	Distribution		Assay	Distribution		Assay	Distribution	
			%									
A-1.1	+10 mesh		-									
A-1.2	-10+14		-									
A-1.3	-14+20		0.2									
A-1.4	-20+28		2.5									
A-1.5	-28+35		8.4									
A-1.6	-35+48		15.4									
A-1.7	-48+65		20.1									
A-1.8	-65+100		17.0									
A-1.9	-100+150		12.3									
A-1.10	-150+200		8.9									
A-1.11	-200+325		7.3									
A-1.12	-325 mesh		7.9									
	Head		100.0									

Remarks: None of these screen products were assayed for iron.

Test Engineer: T. J. Ferree

TABLE 7E SCREEN ANALYSES OF SWECO SCREEN UNDERSIZE - RUN NO. 6

Size, Tyler mesh	(A) Wt. gm.	(A) Wt.%	(B) Wt. gm.	(B) Wt. %
+ 20	1.0	0.4	1.1	0.4
35	27.7	10.7	28.1	10.6
48	36.1	14.0	36.9	13.9
65	47.1	18.2	48.9	18.4
100	46.7	18.1	48.3	18.2
200	47.4	18.4	49.1	18.5
325	22.8	8.8	23.4	8.8
- 325	27.3	11.4	28.4	11.2
Total	256.1	100.0	264.2	100.0
Original weight	258.2		265.6	

TABLE 8 SCREEN ANALYSES OF SWECO SCREEN OVERSIZE (Recycle)

Size, Inches or Mesh	Weight % Retained Runs 2, 3	Runs 4, 5
+ 1"	3.0	10.5
3/4"	23.5	28.2
1/2"	29.1	25.7
1/4"	21.6	18.7
6	7.8	6.9
10	4.6	3.3
20	3.8	2.6
- 20	6.6	4.1

TABLE 9 COMPARISON BETWEEN ACTUAL AND CALCULATED ROUGHER FEED

Product	Run No. 2			Run No. 3			Run No. 4			Run No. 5		
	Long tons per hr.	Wt. %	Assay % Fe	Long tons per hr.	Wt.%	Assay % Fe	Long tons per hr.	Wt.%	Assay % Fe	Long tons per hr.	Wt.%	As %
Screen U/S	2.54	84.95	39.64	2.70	82.32	39.10	2.68	81.46	39.28	2.71	84.69	3
Ro. middlings	0.17	5.68	23.37	0.25	7.62	25.82	0.26	7.90	35.37	0.17	5.31	3
Cl. tailings	0.28	9.37	24.18	0.33	10.06	25.99	0.35	10.64	30.16	0.32	10.00	2
Ro. feed (calc.)	2.99	100.00	37.27	3.28	100.00	36.77	3.29	100.00	38.00	3.20	100.00	3
Ro.feed(sampled)	3.33		36.00	3.56		37.32	3.54		38.00	3.36		4

TABLE 10 COMPARISON BETWEEN ACTUAL AND CALCULATED CLEANER FEED

Product	Run No.2			Run No. 3			Run No. 4			Run No. 5		
	Long tons per hr.	Wt.%	Assay % Fe	Long tons per hr.	Wt.%	Assay % Fe	Long tons per hr.	Wt.%	Assay % Fe	Long tons per hr.	Wt.%	As %
Ro.concentrate	2.65	97.07	56.10	1.47	92.45	57.55	1.59	95.78	58.19	1.56	95.12	57
Cl.middlings	0.08	2.93	50.82	0.12	7.55	45.28	0.07	4.22	61.35	0.08	4.88	61
Cl.feed(calc.)	2.73	100.00	55.95	1.59	100.00	56.62	1.66	100.00	58.32	1.64	100.00	58
Cl.feed(sampled)	1.62		59.10	1.61		55.90	1.80		58.45	1.37		58

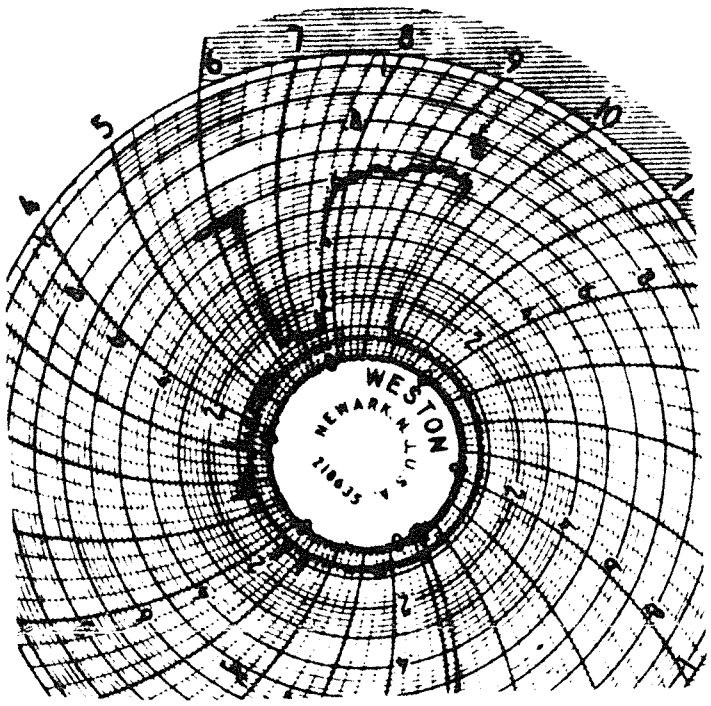
TABLE 11 SAMPLING DATA RUNS 2, 3, 4 AND 5

Sample	Barrel Data Diam. Ins.	Barrel Data Area sq.ins.	Tare wt.lbs	Depth Ins.	Pulp Sample Weight lbs.net	Pulp Sample Volume Cu.ins.	Volume Imp.Gals.	Solids Dry wt. lbs.	No.of samples	Secs. per sample	Total secs. filt.
Run No.2											
Head (Screen U/S)	*	*	24.5	*	154.0	2,610	9.44	79.0	5	10	5
Cleaner conc.			24.5		63.5	891	3.22	40.6	5	10	5
Rougher tailing			39.5		353.0	10,140	36.68	44.1	5	10	5
Rougher feed			22.5		178.5	4,010	14.50	41.4	2	10	2
Rougher middling			-		4.61	-	0.31	2.12	2	10	2
Rougher conc.			24.0		122.0	1,655	5.99	82.5	5	10	5
Cleaner feed			24.0		46.5	827	2.99	20.1	2	10	2
Cleaner middling			-		1.43	-	0.07	0.94	2	10	2
Cleaner tailing			25.5		153.0	4,330	15.65	8.75	5	10	5
Run No. 3											
Head (Screen U/S)	*	*	22.5	*	142.5	2,290	8.28	84.0	5	10	5
Cleaner conc.			26.5		87.5	1,210	4.37	55.8	6	10	6
Rougher tailing			43.0		464.0	12,130	43.88	52.0	6	10	6
Rougher feed			25.0		165.0	3,690	13.35	44.4	2	10	2
Rougher middling			-		6.15	-	0.40	3.05	2	10	2
Rougher concentrate			24.0		76.0	1,146	4.14	45.8	5	10	5
Cleaner feed			24.0		46.5	861	3.11	20.1	2	10	2
Cleaner middling			-		2.31	-	0.11	1.55	2	10	2
Cleaner tailing			25.0		213.0	5,730	20.72	12.45	6	10	6
Run No.4											
Head (Screen U/S)	18.0	254.	20.5	6.25	99.5	1,590	5.75	50.0	3	10	3
Cleaner conc.	18.0	254.	25.0	3.0	53.0	762	2.76	35.3	4	10	4
Rougher tailing	22.5	398.	43.0	21.5	327.5	8,560	30.96	37.5	4	10	4
Rougher feed	18.0	254.	24.5	15.75	177.5	4,000	14.47	44.0	2	10	2
Rougher middling	-	-	-	-	5.75	-	0.34	3.24	2	10	2
Rougher concentrate	18.0	254.	35.0	4.25	64.5	1,080	3.91	39.5	4	10	4
Cleaner feed	18.0	254.	23.0	7.0	78.0	1,780	6.44	22.4	2	10	2
Cleaner middling	-	-	-	-	1.24	-	0.05	0.93	2	10	2
Cleaner tailing	18.0	254.	22.0	18.0	171.0	4,570	16.53	8.62	4	10	4
Run No.5											
Head (Screen U/S)	18.0	254.	32.0	8.75	143.0	2,220	8.03	84.3	5	10	5
Cleaner conc.	18.0	254.	31.0	4.0	74.0	1,015	3.67	43.3	6	10	6
Rougher tailing	22.5	398.	40.0	30.75	473.0	12,240	44.27	54.0	6	10	6
Rougher feed	18.5	269.	23.0	15.25	175.0	4,100	14.83	41.8	2	10	2
Rougher middling	-	-	-	-	3.72	-	0.22	2.16	2	10	2
Rougher concentrate	18.5	269.	23.5	5.5	94.0	1,480	5.35	58.1	6	10	6
Cleaner feed	18.5	269.	23.0	3.35	43.5	901	3.26	17.0	2	10	2
Cleaner middling	-	-	-	-	1.63	-	0.08	1.02	2	10	2
Cleaner tailing	18.0	254.	22.0	21.25	205.0	5,400	19.53	9.98	5	10	5

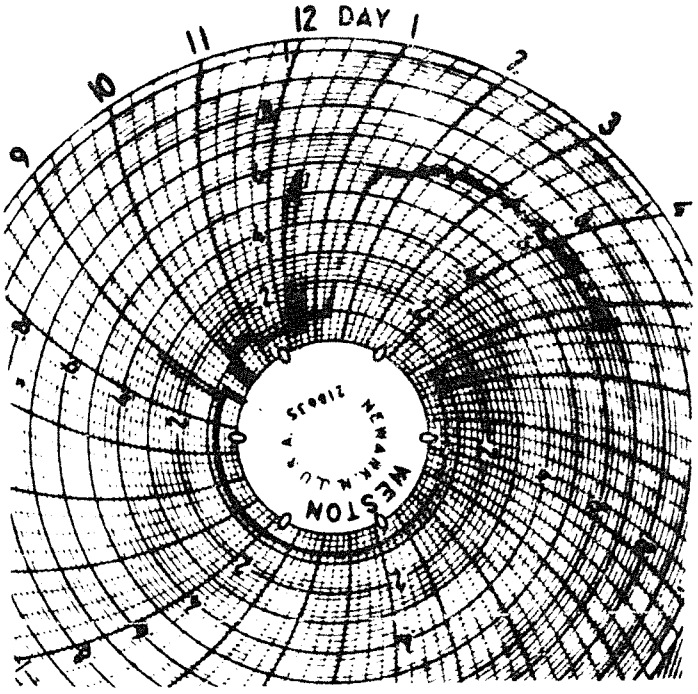
* Information not retained

Note: Middling samples filtered and filtrate weight plus wet cake weight added to get pulp weight.

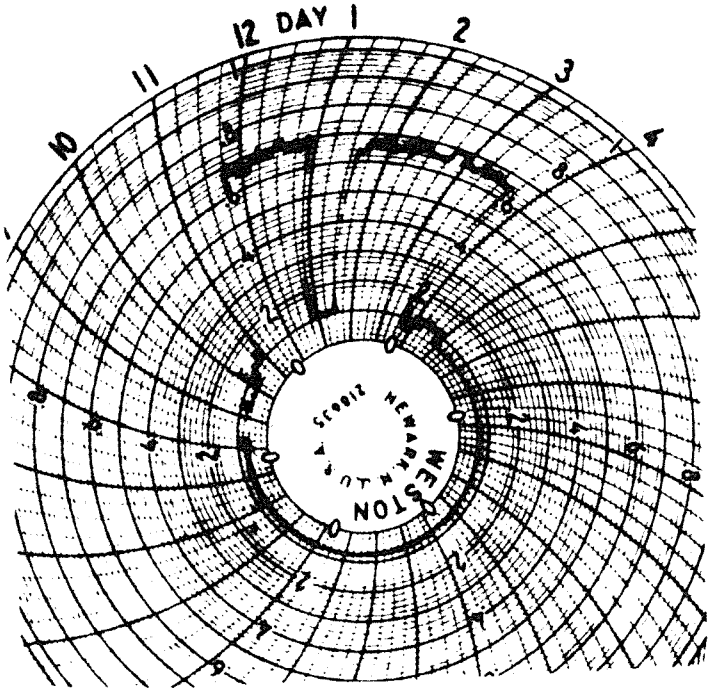
Run No. 6 - Dry weight of sample = 19.3 lbs (6 cuts taken)



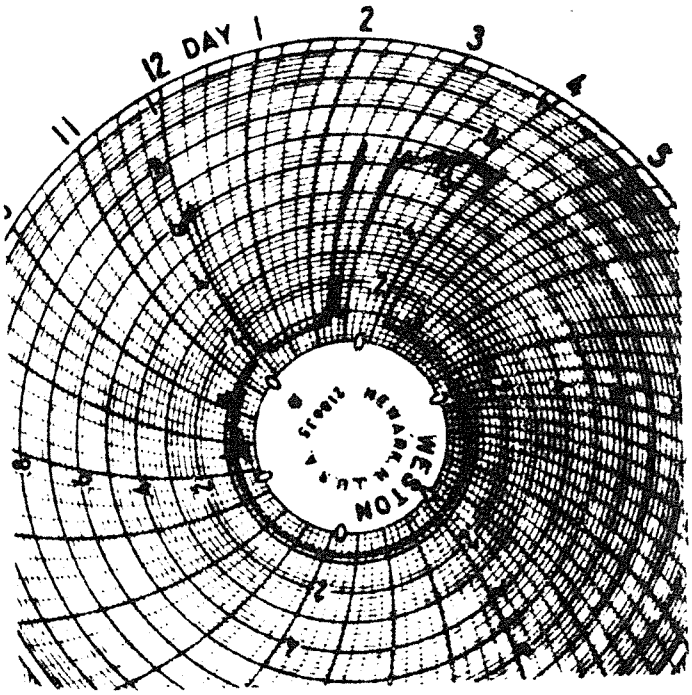
RUN NO. 1



RUN NO. 2 AND 3



RUN NO. 4 AND 5



RUN NO. 6

Figure 2 - Electric car charts