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NORANDA MINES LIMITED

NORANDA, QUEBEC

MAR 12 1975

VANGORDA PROJECT

Rapport No. 4

Tests préliminaires (locked test) sur les échantillons "low, medium, et high grade", provenant de Vangorda Creek

Noranda Ore Dressing Laboratory

February 26, 1975

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I N T R O D U C T I O N

Suite au rapport No. 2 du 19 décembre 1974, des tests préliminaires (locked test) ont été exécuté sur les échantillons "low grade", "medium grade", et "high grade". Ces tests ont été fait dans le but d'avoir une idée grossière de la métalurgie de ceux-ci. Les tests ont suivi la même procédure des tests de flottation "d'average grade".

Les montants de réactifs de ces tests, ont été ajusté selon les investigations optimuns trouvés sur "average grade".

T A B L E D E S M A T I E R E S

S O M M A I R E de résultats

Les résultats obtenu sont présentés dans le suivante tableau comparatif des résultats des tests de flottation sur les quatre échantillons.

LOW GRADE V-42 5 CYCLE 5

PRODUIT	%Wt.	(Assay (%) Or oz./ton Pb	Zn	Ag	DISTRIBUTION (%) Pb	Zn	Ag
2nd Pb Cl. Conc.	3.4	37.4	8.42	18.09	77.9	10.5	60.8
2nd Zn Cl. Conc.	4.3	1.1	49.2	1.69	2.9	77.4	7.2
Zn Tail	92.3	0.34	0.36	0.35	19.2	12.1	31.9
HEAD	100.0	1.63	2.73	1.01	100.0	100.0	100.0

AVERAGE GRADE V-39 CYCLE 5

PRODUIT	%Wt.	ASSAY (%) OR oz./ton Pb	Zn	Ag	DISTRIBUTION (%) Pb	Zn	Ag
2nd Pb Cl. Conc.	5.16	53.6	7.4	23.84	77.9	9.2	64.8
2nd Zn Cl. Conc.	6.17	3.5	51.8	3.36	6.1	77.3	10.9
Zn Tail	88.67	0.64	0.63	0.52	16.0	13.5	24.3
HEAD	100.0	3.55	4.14	1.90	100.0	100.0	100.0

MEDIUM GRADE V-46 CYCLE 5

PRODUIT	%Wt.	ASSAY(%) OR oz./ton Pb	Zn	Ag	DISTRIBUTION (%) Pb	Zn	Ag
2nd Pb Cl. Conc.	6.1	48.7	11.8	20.72	81.4	10.5	69.9
2nd Zn Cl. Conc.	10.1	2.48	54.4	2.16	6.9	80.4	12.1
Zn Tail	83.8	0.51	0.74	0.39	11.7	9.1	18.0
HEAD	100.0	3.65	6.83	1.81	100.0	100.0	100.0

HIGH GRADE V-47 CYCLE 5

PRODUIT	%Wt.	ASSAY(%) OR oz./ton Pb	Zn	Ag	DISTRIBUTION(%) Pb	Zn	Ag
2nd Pb Cl. Conc.	23.2	25.0	14.0	10.92	93.2	31.1	87.1
2nd Zn Cl. Conc.	13.9	1.48	48.6	1.52	3.3	64.6	7.3
Zn Tail	62.9	0.34	0.72	0.26	3.5	4.3	5.6
HEAD	100.0	6.22	10.46	2.91	100.0	100.0	100.0

Il est à noter que ces résultats ne sont point optimun, car aucune investigation des détails n'était fait sur les échantillons "low, medium et high grade".

La description et conditions de chaque test de flottation sont démontrés à l'appendice 3.

Les corrections des "head assay" suivent à l'appendice 1 et les analyses métalurgiques assays) sur les concentré (Pb-Zn) "d'average grade" se trouvent à l'appendice 2.

Les tests de flottation pour les investigations des détails sur les échantillons se poursuivent.

APPENDICE 1

Analyse chimique des différents échantillons reçus.

COMPOSITE	LOW GRADE	AVERAGE GRADE	MEDIUM GRADE	HIGH GRADE
Cu per cent	0.12	0.15	0.11	0.30
Pb per cent	2.12	3.32	4.04	5.00
Pb (as oxide) per cent	0.49	0.72	0.70	0.92
Zn per cent	3.26	4.14	6.86	9.54
Zn (as oxide) per cent	0.13	0.15	0.23	0.28
Au oz./ton	0.019	0.022	0.028	0.046
Ag oz./ton	1.06	1.58	1.98	2.60
Cd per cent	0.05	0.006	0.09	0.12
As per cent	0.31	0.29	0.26	0.18
Pyrrhotite per cent	4.93	4.10	3.86	3.94
Pyrite per cent	25.97	34.9	41.49	47.16
SiO_2 per cent	51.1	36.56	27.6	11.1
Al_2O_3 per cent	4.58	3.65	1.89	1.23
MgO per cent	0.65	0.67	0.99	0.48
CaO per cent	0.97	1.53	1.75	1.03
Fe per cent	14.7	19.2	21.3	24.0
S per cent	16.5	22.4	38.1	32.5
Insol per cent	57.8	N.A.	33.3	24.9
Hg (ppm)	15.60	21.20	50.0	76.0
SPECIFIC GRAVITY	3.2	3.3	4.0	4.0

APPENDICE 2

Les analyses métaluriques sur les concentrés du test V-39 CYCLE 5

PRODUIT	CYCLE 5 2nd Cl Pb Conc.	CYCLE 5 2nd Cl Zn Conc.	HEAD
Cu%	0.30	0.22	0.15
Pb%	53.6	3.52 (-) ?	3.32
Pb% (as oxide)	0.98	0.43	0.72
Zn%	7.40	51.8	4.12
Zn% (as oxide)	0.13	0.34	0.15
Au oz./ton	0.17	0.002	0.028
Ag oz./ton	23.84	3.36	1.58
Cd%	0.017	0.051	0.006
As%	0.60 ?	0.05	0.29
Pyrrhotite%	1.85	8.85	4.10
Pyrite%	13.92	3.44	34.9
SiO_2%	4.60	1.60	36.56
Al_2O_3%	0.51	0.23	3.65
MgO%	0.17	0.15	0.67
CaO%	0.40	0.42 Mattagami	1.53
Fe%	7.7	7.4	19.2
S%	19.4	30.8	22.4
Insoluble%	5.9	1.7	N.A.
Hg (ppm)	46.4	416.0 ?	21.20
Bi%	0.009	0.008	N.A.
Sb%	0.198	0.022	N.A.

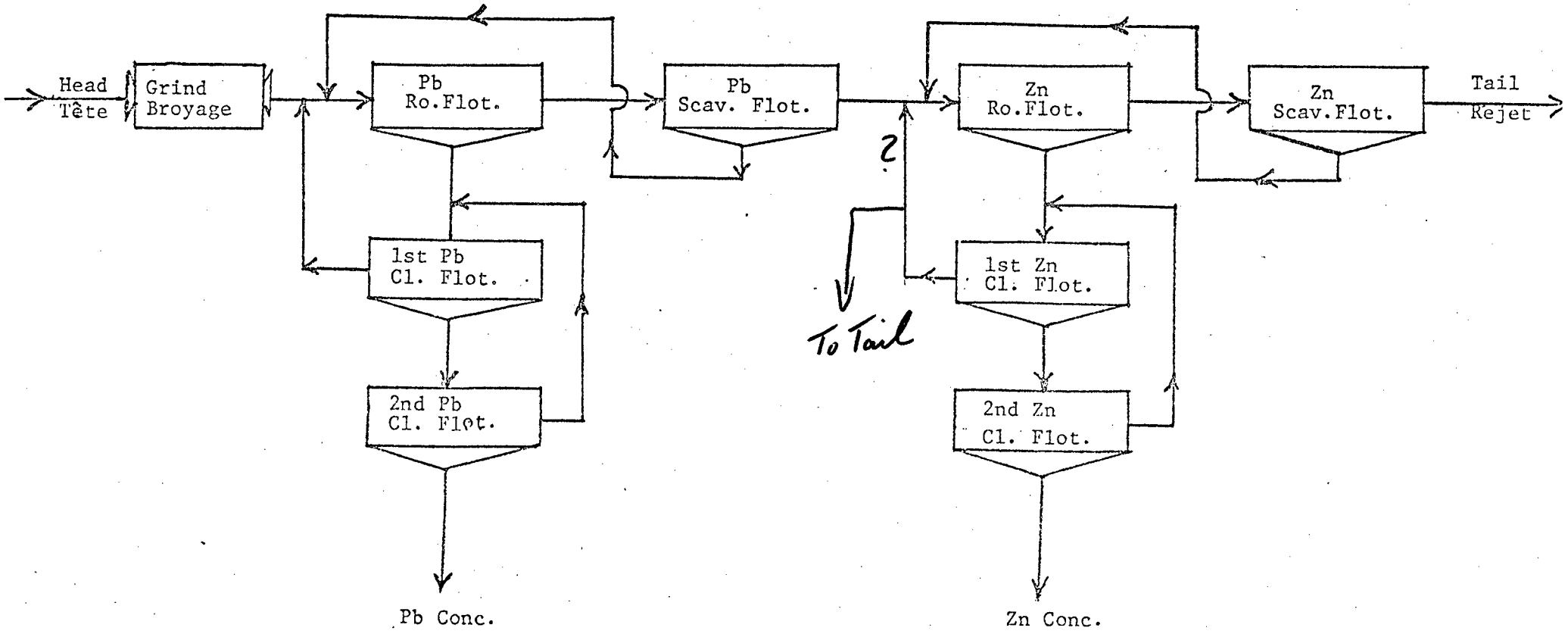
Mattabi 30-80 ppm
Mattagami 3 ppm

APPENDICE 3

Description et conditions de chaque test de flotation

Procédure (flowsheet) des tests de flotation (locked test)

V-39, V-42, V-43, V-44 V-46 V-47



NORANDA ORE DRESSING LABORATORY

PROJECT: VANGORDA DATE: NOVEMBER-DECEMBER

SAMPLE NO.: AVERAGE GRADE TEST NO.: V-39

CHARGE GMS: 2000

REMARKS: Quintuple (5) locked test

Analyse	GMS	Weight	Cum	
+65	-	-	-	
-65 + 100	-	-	-	
-100 + 150	2	1.0	-	99
-150 + 200	16	8.0	-	91
-200 + 325	56	28.0	-	63
- 325	126	63.0		
TOTAL	200	100.0		

	Time Mins.	% Solids	pH	REAGENTS lbs./ton NaCN	SO_2	Lime	AF-242	AF-404	R-317	$CuSO_4$	Mibc	CF-98
Grind	16	71	-	0.20	-	-	-	-	-	-		-
Pb Cond.	5	25	-	-	To pH 5.3	to pH 9.0 1.0	0.02	0.005	0.005	-		-
Pb Ro.+Scav.F.	10	25	9.2	-	-	-	-	-	0.01	-		-
1st Pb.Cl.C.	5	20	11.0	0.05	-	0.05	0.005	-	0.003	-		-
2nd Pb Cl.F.	4	12	11.0	0.025	-	0.04	0.0025	-	0.002	-		-
Zn Cond.	3	24	-	-	-	0.65	-	-	0.025	0.5	-	
Zn Ro.+Scav.F.	7	24	10.0	-	-	-	-	-	0.008	-	-	
1st Zn Cl.F.	3	10	10.0	-	-	0.01	-	-	0.002	-	-	
2nd Zn Cl.F.	3	8	10.0	-	-	0.01	-	-	0.001	-	-	

Metallurgical Balance 5 i.e Cycle

Product	GMS	%Wt.	Assay% or oz/ton Pb	Zn	As Ag	Units	%Distribution Pb	Zn	Ag
2nd Pb Cl.C.	103	5.16	53.6	7.4	23.84		77.9	9.2	64.8
2nd Zn Cl. C.	123	6.17	3.5	51.8	3.36		6.1	77.3	10.9
Zn Tails	1769	88.67	0.64	0.63	0.52		16.0	13.5	24.3
HEAD	1995	100.0	3.55	4.14	1.90		100.0	100.0	100.0

NORANDA ORE DRESSING LABORATORY

PROJECT: VANGORDA DATE: 15-01-75

SAMPLE NO.: Low Grade TEST NO.: V-42

CHARGE GMS: Quintuple (5) locked test

REMARKS:

Analyse	GMS	Weight	Cum	Pa
+65				
-65 + 100		0.5		99
-100 + 150		4.0		95
-150 + 200		15.0		80
-200 + 270		14.0		66
-270 + 325		11.0		55
- 325		55.0		
TOTAL				

	Time Mins.	% Solids	pH	REAGENTS lbs./ton NaCN	SO_2	Lime	AF242	AF404	R-317	$CuSO_4$	MIBC	CF-98
Grind	18	70	-	.20	-	-	-	-	-	-		-
Pb Cond.	3	25	-	-	pH 5.3	To pH 9.0 0.70	.02	.01	.005	-		-
Pb Ro+Scav.Fl.	9	25	9.0	-	-	-	-	-	.0125	-		-
1st Pb Cl.C.	5	20	10.1	-	-	.03	.005	-	.001	-		-
2nd Pb Cl.C.	3	12	10.3	-	-	.01	.005	-	.001	-		-
Zn Cond.	3	24	-	-	-	.60	-	-	.025	.50	-	
Zn Ro+Scav.F.	7	24	10.0	-	-	.03	-	-	.005	-	-	
1st Zn Cl.F.	4	10	10.3	-	-	.03	-	-	.002	-	-	
2nd Zn Cl.F.	2.5	8	-	-	-	.015	-	-	.001	-	-	

Metallurgical Balance du Cycle 5 Assay % or oz./ton Units %Distribution

Product	GMS	%Wt.	Pb	Zn	Ag	Pb	Zn	Ag
Pb Conc.	66	3.4	37.4	8.42	18.09	77.9	10.5	60.8
Zn Conc.	85	4.3	1.10	49.2	1.69	2.9	77.4	7.2
Zn Tail	1805	92.3	0.34	0.36	0.35	19.2	12.1	31.9
HEAD	1956	100.0	1.63	2.73	1.01	100.0	100.0	100.0

NORANDA ORE DRESSING LABORATORY

PROJECT: Vangorda DATE: 16-01-75

SAMPLE NO.: Medium Grade TEST NO.: V-43

CHARGE GMS: 2000g

REMARKS: quintuple (5) locked test

Analyse	GMS	Weight	Cum	Pa
+65				
-65 + 100				
-100 + 150		1.5		98
-150 + 200		9.5		89
-200 + 270		17.0		72
-270 + 325		14.0		58
- 325		58.0		
TOTAL				

	Time Mins.	% Solids	pH	REAGENTS lbs./ton NaCN	SO_2	Lime	AF242	AF404	R-317	$CuSO_4$	MIBC	CF98
Grind	16	70	-	0.20	-	-	-	-	-	-		-
Pb Cond.	3	25	-	-	pH5.3	To pH 9.0 .80	.025	.015	.005	-		-
Pb Ro+Scav.Fl.	9	25	9.0	-	-	-	-	-	.0125	-		-
1st Pb Cl.Fl.	4	20	10.0	-	-	.04	.005	-	.002	-		-
2nd Pb Cl.Fl.	3.5	12	10.1	-	-	.02	.005	-	.001	1.0-1.5		-
Zn Cond.	3	24	10.0	-	-	.75	-	-	.025	50	-	
Zn Ro+Scav.Fl.	8	24	10.0	-	-	-	-	-	.0075	-	-	
1st Zn Cl.Flt	4	10	10.2	-	-	.03	-	-	.002	-	-	
2nd Zn Cl.Flt.	2.5	8	10.4	-	-	.015	-	-	.001	-	-	

Metallurgical Balance du Cycle 5			Assay % or oz./ton			Units			%Distribution		
Product	GMS	%Wt.	Pb	Zn	Ag				Pb	Zn	Ag
Pb Conc.	136	6.7	40.2	10.76	19.51				73.2	9.73	62.7
Zn Conc.	105	5.1	4.0	52.6	3.15				5.5	36.2	7.7
Zn Tail	1804	88.2	0.89	4.54	0.70				21.3	54.0	29.6
HEAD	2045	100.0	3.68	7.41	2.09				100.0	100.0	100.0

NORANDA ORE DRESSING LABORATORY

PROJECT: Vangorda DATE: 17-01-75

SAMPLE NO.: High Grade TEST NO.: V-44

CHARGE GMS: 2000gr

REMARKS: quintuple (5) locked test

Analyse	GMS	Weight	Cum	Pa
+65				
-65 + 100		0.5		.99
-100 + 150		4.0		95
-150 + 200		12.0		83
-200 + 270		17.5		66
-270 + 325		66.0		-
- 325		100.0		
TOTAL				

	Time Mins.	% Solids	pH	REAGENTS lbs./ton NaCN	SO2	Lime	AF-242	AF404	R-317	$CuSO_4$	MIBC	CF-98
Grind	15.5	71	-	.20	-	-	-	-	-	-		-
Pb Cond.	3	25	-	-	pH 9.0 pH 5.3	.92	.025	.015	.005	-		-
Pb Ro+Scav.F.	9	25	9.1	-	-	-	-	-	.015	-		-
1st Pb Cl.F.	5	20	10.5	-	-	.13	.005	-	.002	-		-
2nd Pb Cl.F.	4	12	10.2	-	-	.01	.005	-	.001	-	1.0 - 1.5	-
Zn Cond.	3	24	10.0	-	-	.92	-	-	.025	.50	-	
Zn Ro+Scav.F.	8	24	10.0	-	-	-	-	-	.01	-	-	
1st Zn Cl.F.	4	10	10.4	-	-	.07	-	-	.002	-	-	
2nd Zn Cl.F.	3.5	8	10.2	-	-	.02	-	-	.001	-	-	

Metallurgical Balance du Cycle 4

Product	GMS	%Wt.	Assay % or oz./ton Pb	Zn	Ag	Units	%Distribution Pb	Zn	Ag
Pb Conc.	172	9.1	37.2	13.8	21.38		83.1	15.4	75.0
Zn Conc.	169	8.9	2.14	52.4	1.92		4.7	57.1	6.6
Zn Tail	1549	82.0	.61	2.74	0.58		12.2	27.5	18.4
HEAD	1890	100.0	4.08	8.17	2.59		100.0	100.0	100.0

NORANDA ORE DRESSING LABORATORY

PROJECT: VANGORDA DATE: 3-02-75

SAMPLE NO.: MEDIUM GRADE TEST NO.: V-46

CHARGE GMS: 2000

REMARKS: Quintuple (5) locked test

Repeat V-43 with adjustement collectors and pH.

Screen Analyse	Weight GMS	Weight	Cum	Passi
+65				
-65 + 100				
-100 + 150		1.0	99	
-150 + 200		7.0	92	
-200 + 325		15.5	76.5	
- 325 + 400		15.5	61.0	
- 400		61.0		
TOTAL		100.0		

	Time Mins.	% Solids	pH	REAGENTS lbs./ton NaCN	SO_2	Lime	AF242	AF404	R317	CuSO4	Mibc	CF-98
Grind	17	70	-	0.35	—	—	—	—	—	—		—
Pb Cond.	3	25	-	—	to pH 5.3	To pH 9.0 .90	.03	.015	.001	—		—
Pb Ro+Scav.Ro	10.5	25	9.1	—	—	—	—	—	.014	—		—
1st Pb Cl.Fl.	5.5	20	11.1	.06	—	.23	.007	—	.001	—		—
2nd Pb Cl.Fl.	5	12	11.2	.04	—	.06	.007	—	.001	—		—
Zn Cond.	3	24	-	—	—	1.68	—	—	.02	0.75	—	
Zn Ro+Scav.Fl.	9	24	11.0	—	—	.35	—	—	.035	0.10	—	
1st Zn Cl.Fl.	5	10	11.0	—	—	.10	—	—	.005	—	—	
2nd Zn Cl.Fl.	4	8	11.1	—	—	.05	—	—	.02	—	—	

Metallurgical Balance du CYCLE 5			Assay % or oz./ton			Units	%Distribution		
Product	GMS	%Wt.	Pb	Zn	Ag		Pb	Zn	Ag
2nd Pb Cl.C.	113	6.1	48.7	11.8	20.72		81.4	10.5	69.9
2nd Zn Cl.C.	187	10.1	2.48	54.4	2.16		6.9	80.4	12.1
Zn Tail	1550	83.8	0.51	0.74	0.39		11.7	9.1	18.0
HEAD	1850	100.0	3.65	6.83	1.81		100.0	100.0	100.0

NORANDA ORE DRESSING LABORATORY

PROJECT: VANGORDA DATE: 4-02-75

SAMPLE NO.: HIGH GRADE TEST NO.: V-47

CHARGE GMS: 2000

REMARKS: Quintuple (5) locked test

Repeat V-44 with adjustement collector and pH

Screen Analyse	Weight GMS	% Weight	% Cum	% Pass
+65				
-65 + 100				
-100 + 150		.5	99.5	
-150 + 200		4.0	95.5	
-200 + 325		10.5	85.0	
- 325 + 400		15.0	70.0	
- 400		70.0	-	
TOTAL		100.0		

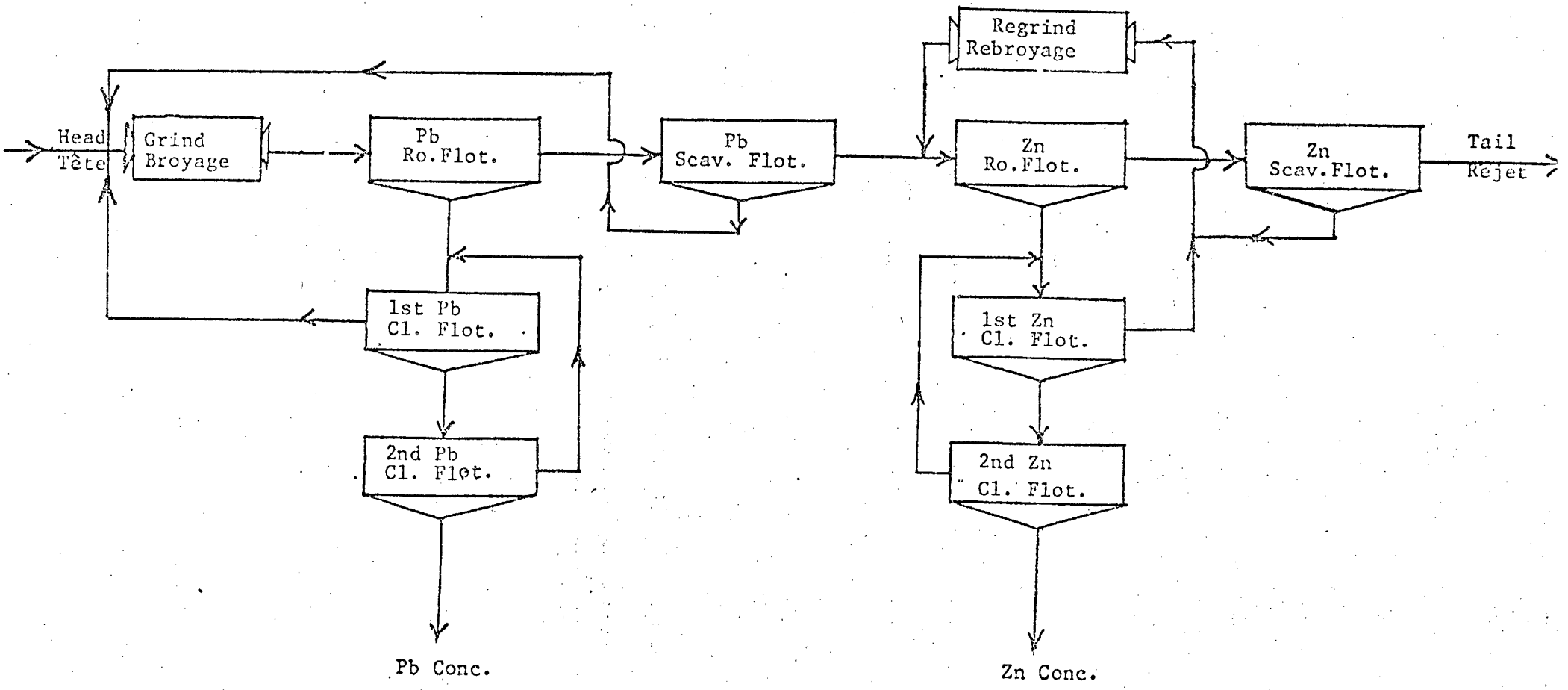
	Time Mins.	% Solids	pH	REAGENTS lbs./ton NaCN	SO_2	Lime	AF242	AF404	R317	$CuSO_4$	Mibc	CF98
Grind	15.5	70	-	.45	-	-	-	-	-	-		-
Pb Cond.	3	25	-	-	To pH 5.3 to	1.30	PH9.0 .035	.02	.001	-		-
Pb Ro+Scav.	11	25	9.1	-	-	-	-	.035	-	-		-
1st Pb Cl.Fl.	6	20	11.0	.10	-	.23	.025	-	-	-		-
2nd Pb Cl. Fl.	5.5	12	11.1	.06	-	.06	.009	-	-	-		-
Zn Cond.	3	24	-	-	-	1.66	-	-	.003	1.35	-	
Zn Ro+Scav.Fl.	11	24	10.7	-	-	-	-	-	.07	0.10	-	
1st Zn Cl.Fl.	5	10	10.9	-	-	.11	-	-	.006	-	-	
2nd Zn Cl.Fl.	4	8	11.0	-	-	.05	-	-	.003	-	-	

Metallurgical Balance du CYCLE 5 Assay % or oz./ton Units %Distribution

Product	GMS	%Wt.	Pb	Zn	Ag	Pb	Zn	Ag
2nd Pb Cl.C.	430	23.2	25.0	14.0	10.92	93.2	31.1	87.1
2nd Zn Cl.C.	256	13.9	1.48	48.6	1.52	3.3	64.6	7.3
Zn Tail	1161	62.9	0.34	0.72	0.26	3.5	4.3	5.6
HEAD	1847	100.0	6.22	10.46	2.91	100.0	100.0	100.0

Procédure (flowsheet) des tests de flotation (locked test)

V-45,



NORANDA ORE DRESSING LABORATORY

PROJECT: VANGORDA DATE: 24-01-75

SAMPLE NO.: AVERAGE GRADE TEST NO.: V-45

CHARGE GMS: 2000

REMARKS: Quintuple (5) locked test avec r/broyage

voir, flowsheet No. 2, meme montant de r/actif que V-39

Screen Analyse	GMS	Weight	Cum	Pass
+65				
-65 + 100				
-100 + 150		1.5	98.5	
-150 + 200		9.5	89.0	
-200 + 325		15.5	73.5	
- 325 + 400		14.5	59.0	
- 400		59.0		
TOTAL				

	Time Mins.	% Solids	pH	REAGENTS lbs./ton NaCN	SO_2	Lime	AF242	AF404	R-317	$CuSO_4$	Mibc	CF98
Grind	16	71	-	0.20	—	—	—	—	—	—		—
Pb Cond.	5	25	-	-	To pH 5.3	To pH 9.0 0.80	0.02	005	.001	—	—	—
Pb Ro+Scav.Fl.	11	25	9.0	—	—	—	—	—	.0125	—		—
1st Pb Cl.F.	5	20	11.1	—	—	.18	.005	—	.003	—		—
2nd Pb Cl.F.	5	12	11.1	—	—	.07	.002	—	002	—		—
Zn Cond.	3	24	-	—	—	.65	—	—	025	.50	—	
Zn Ro+Scav.F.	8	24	10.0	—	—	—	—	—	.005	—	—	
1st Zn Cl.F.	3	10	11.1	—	—	.18	—	—	.003	—	—	
2nd Zn Cl.F.	3	8	11.0	—	—	.05	—	—	.001	—	—	

Metallurgical Balance du CYCLE 5 Assay % or oz./ton Units %Distribution

Product	GMS	%Wt.	Pb	Zn	Ag	Pb	Zn	Ag
2nd Pb Cl.C.	86	4.30	67.80	4.74	28.46	75.1	4.8	64.6
2nd Zn Cl.C.	75	3.75	5.86	51.69	4.19	5.7	46.0	8.3
Zn Tail	1840	91.95	0.81	2.26	0.56	19.2	49.2	27.1
HEAD	20001	100.0	3.88	4.22	1.90	100.0	100.0	100.0

APPENDICE 4

Liste des équipements employés

Broyage: Broyeur à barres 8" dia. X 15"
rode de 1" X 13 7/8" en "stainless steel" (25 Kgr)
Speed: 84 R.P.M.

Flottation:

Celle de flottation D-1, de laboratoire
Flottation du "rougher": dans la celle de 7.5L
Speed: 1800 R.P.M.
"1st Cleaning": dans la cell 2.5L en stainless steel
Speed: 1500 R.P.M.
"2nd Cleaner": dans la cell 1.3L en stainless steel
Speed: 1000 R.P.M.