

FLOTATION, ROASTING & CONCENTRATION.
Florence Silver Mine.

September 1917.

An average portion of material received was crushed to pass 20 mesh and treated in a Callow Pneumatic Flotation.

Oil Used: G.E. #8
 $\frac{3}{4}$ lb. per ton of feed.

TABLE I:

	TONS.	Pb.	Zn.	Fe	Ins.	Pb.	Zn.	Fe.	Ins.	Pb.	Zn.
2. Flot. Conc'ts.	27.76	12.42	12.13	23.29	5.93	345.02	337.00	646.62	164.87	80.23	70.35
3. Tails.	72.24	1.18	1.96			85.74	142.16			19.77	29.65
1. Heads.	100.00	4.30	4.79			430.76	479.16			100.00	100.00

Flotation Concentrates, #2, were roasted to dim the iron and reflected using additional $\frac{1}{4}$ lb. G.E. Oil #8.

TABLE II:

Roasting Loss.	3.52										
4. Lead-zinc Conc'ts.	9.70	21.62	30.09	12.69	4.7	209.80	291.93	123.18	45.65	48.79	60.94
5. Iron Tails,	14.54	9.3	3.1	36.0	8.2	135.22	45.07	523.44	119.22	31.44	9.41
2. Feed.	27.76	12.42	12.13	23.29	5.93	345.02	337.00	646.62	164.87	80.23	70.35

Lead-Zinc Product, #4, was tabled to separate lead and zinc.

TABLE III:

6. Lead Conc'ts.	2.21	74.6	0.6	4.9	1.0	164.86	1.32	10.83	2.21	38.34	0.27
7. Zinc Conc'ts.	7.49	6.0	38.8	15.0	5.8	44.94	290.61	112.35	43.44	10.45	60.67
4. Feed.	9.70	21.62	30.9	12.69	4.7	209.80	291.93	123.18	45.65	48.79	60.94

Tails, #3, were tabled.

Table IV:

8. Lead-Iron,	5.30	8.6	0.3	39.6	2.4	45.58	1.59	209.88	12.72	10.60	0.31
9. Tails,	66.94	0.6	2.1			40.16	140.57			9.17	29.34
3. Feed.	72.24	1.18	1.96			85.74	142.16			19.77	29.65

TABLE V.

SUMMARY OF ALL PRODUCTS.

Roasting Loss.	3.52										
6. Lead Conc'ts.	2.21	74.6	0.6	4.9	1.0	164.86	1.32	10.83	2.21	38.34	0.27
5. Iron.	14.54	9.3	3.1	36.0	8.2	135.22	45.07	523.44	119.22	31.44	9.41
8. Pb-Fe.	5.30	8.6	0.3	39.6	2.4	45.58	1.59	209.88	12.72	10.60	0.31
7. Zinc.	7.49	6.0	38.8	15.0	5.8	44.94	290.61	112.35	43.44	10.45	60.67
9. Tails,	66.94	0.6	2.1			40.16	140.57			9.17	29.34
1. Heads,	100.00	4.3	4.79			430.76	479.16			100.00	100.00

TABLE VI.

FINAL SUMMARY.

x Roasting Loss,	3.82										
6 Lead Conc'ts.	2.21	74.6	0.6	4.9	1.0	164.86	1.32	10.83	2.21	38.34	0.27
5 / 8 Lead-Iron Conc'ts.	19.84	9.1	2.3	36.96	6.65	180.70	46.66	733.32	131.94	42.04	9.72
7. Zinc Conc'ts.	7.49	6.0	38.8	15.0	5.8	44.94	290.61	112.35	43.44	10.45	60.67
9 Tails,	66.94	0.6	2.1			40.16	140.57			9.17	29.34
1 Heads.	100.00	4.3	4.79			430.76	479.16			100.00	100.00

^x5,6,8 Lead-Iron Comb'd.

Combining Products 5,6,8 gives the following lead-iron concentrates;
22.05, 15.67, 2.17, 33.74, 6.08, 345.56, 47.98, 744.15, 134.15,
80.38, 9.99

Showing that out of every 100 tons of material treated, there would be produced;
2.21 tons of lead concentrates. Ratio of Concentration = 45.3 to 1. Sample #6.

Assaying.

Lead %	74.6
Zinc %	0.6
Iron %	4.9
Insoluble %	1.0

Containing.

38.34% of the total lead.
0.27% " " " zinc.

and 19.84 tons of Lead-Iron Concentrates. Ratio of Concentration = 5.05 to 1. Sample 5 / 8.

Assaying.

Lead %	9.1
Zinc %	2.3
Iron %	36.96
Insoluble,	6.65.

Containing.

42.04% of the Total Lead.
9.72% of the total zinc.

OR, combining 5, 6, and 8, there would be produced:
22.05 tons of Lead-Iron Concentrates. Ratio of concentration = 4.52 to 1.

THE GENERAL ENGINEERING COMPANY

ASSAYS ON ORE FROM FLORENCE.

September, 1917.

TEST	TREATMENT	TONS	Pb Conc'ts.	Zn Conc'ts.	Fe Assay	Ins	Pb. Recovery	Zn. Recovery	Pb. Final	Zn. Tails Assay.
1.	Crushed to 10 mesh & roughed. Tails re-crushed to 40 mesh & retabled. Mids sized & retabled. Tails reground to 80 mesh and floated. Flot. Conc'ts. and tails tables.									
	Conc'ts Lead-Iron.	23.65	20.67	5.61	31.05		83.22	25.95		
	Conc'ts Iron,	10.23	0.8	2.6	38.6		1.38	5.19		
	Conc'ts Zinc.	8.36	6.0	38.0	15.0		8.51	62.05		
	Tails,	57.76							0.7	0.6
2.	Crushed to 80 mesh & floated making a collective sulphide which was roasted & refloated, making a pb-zn Conc't & an Fe Conc't. Pb-Zn. tabled. Tails tabled.									
	Conc'ts Lead,	2.21	74.6	0.6	4.9	1.0	38.34	0.27		
	Conc'ts Iron,	19.84	9.1	2.3	36.96	6.65	42.04	9.72		
	Conc'ts Zinc.	7.49	6.0	38.8	15.0	5.8	10.45	60.67		
	Tails,								0.6	2.1
	Comb'd Pb. & Fe.	22.05	15.67	2.17	33.74	6.08	80.38	9.99		
3.	Crushed to 30 mesh. classified to 5 sizes and tabled. Tails reground to 100 mesh and floated. Flot. Conc'ts. tabled. Tails tabled.									
	Conc'ts. Lead.	17.99	22.97	3.22	29.84	2.91	79.65	11.55		
	Conc'ts Iron.	13.28	1.5	2.3	36.6	14.4	3.83	6.08		
	Conc'ts Zinc.	8.32	6.3	41.0	13.6	4.8	10.10	67.92		
	Tails,	60.41							0.55	1.2

ASSAY HEADS TO ALL TESTS

Gold oz.	Silver oz.	Lead %	Zinc %	Iron %	Insoluble %
Trace.	0.90	5.00	5.70	19.00	41.20

Sample furnished by the Florence Silver Mining Co.

SUMMARY OF TESTS ON FLORENCE ORE

GIVING NEGATIVE RESULTS.

- TEST I. Roughed at 10 mesh, recrushed 40, retabled, making Lead-Iron Conc'ts. Tails Ball Mill to 80 mesh, floated floated using G.N.S. #8, 4 drops to 1100 grams ore. Zinc floated fairly well (37% zinc in Conc'ts). Zn. tails good. NOTE: Oil added in Pachucha.
- TEST II. Roughed at 10 mesh, recrushed to 65 mesh, retabled. Tails mixed in Pachucha. 4 drops G.N.S. #8. Too much iron floats. Recrushed to 80 shows better zinc flotation. Recrushed to 100 mesh with oil in Ball Mill and iron floated. Test N.G.
- TEST III. Roughed at 20 mesh, recrushed to 80 mesh, tabled. Tails in Pachucha, 2 drops G.N.S. #8, iron floated. Iron floated in acid, neutral and alkaline circuits. Pine oil, no results. Tar Creosote, no results. Test N.G.
- TEST IV. Roughed at 30 mesh with close sizing. Ball Mill to 100 mesh, with 2 drops G.N.S. #8. No preferential action in acid, neutral or alkaline circuits. Test N.G.
- TEST V. Ball Mill to 100 mesh. Added 6 c.c. Swartz Carbohc Dope in Rougher. Shows some preferential action, lead-iron over zinc, but could not make iron tailing. Acid added and all minerals float. Test N.G.
- TEST VI. Ball Mill to 100 mesh, floated with $\frac{3}{4}$ pounds G.N.S. #17 in acid circuit. Iron Floats in acid or alkaline circuits.

The following chemicals were tried with negative results:

Sulphuric Acid	Olsic Acid.	Sodium Chloride
Acetic Acid.	Copper Sulphate	X-cake
Carbohc Acid.	Sodium Carbonate	Alum.

Oils Tried:

G.E. #8,	G.E. #136,	Pine Oil	Hardwood Creosote.
G.E. #11,	Creco.	Carbohc Acid	G.E. #138.
G.E. #2,	Torpineol	Olsic Acid.	

ANALYSIS OF CRUDE ORE:

Lead %	Zinc %	Iron %	Insoluble %
5.	5.7	19.0	41.2

ASSAYING

Lead % 15.67
 Zinc % 2.17
 Iron % 33.74
 Insoluble % 6.08

CONTAINING.

80.38% of the total lead.
 9.99% of the total zinc.

and.

7.49 tons of Zinc Concentrates. Ratio of concentration = 13.4 to 1 Sample #7.

ASSAYING.

Lead % 6.0
 Zinc % 38.8
 Iron % 15.0
 Insoluble 5.8

CONTAINING.

10.45% of the total lead.
 60.67% of the total zinc.

and.

66.94 tons of Tailings. Sample #9.

ASSAYING.

Lead % 0.6
 Zinc % 2.1

CONTAINING.

9.17% of the total lead.
 29.34% of the total zinc.

HEADS OF TEST.

	Gold oz.	Silver oz.	Lead%	Zinc%	Iron %	Insoluble %.
By Assay.	Trace.	0.9	5.0	5.7	19.0	41.2
By Products,			4.3	4.79		

Sample furnished by the Florence Silver Mining Company.

An average portion of material received was crushed to pass
 30 mesh and sized to the following sizes.

TABLE I.

1A. plus 35 mesh. 16.58
 1B. " 48 mesh. 16.58
 1C. " 65 mesh. 14.24
 1D. " 100 mesh. 14.56
 1E minus 100 mesh. 38.04

	pb.	Zn.	Fe	Ins.	Pb.	Zn.	Fe.	Ins.	Pb.	Zn.
1. Heads.	100.00	5.19	5.02		512.90	502.20			100.00	100.00

Sizes tabled separately, products from tables were combined.

TABLE II.

2. Lead Iron.
 3. Tails,

2. Lead Iron.	17.14	21.2	3.0	30.8	3.0	363.37	51.42	527.91	51.42	70.02	10.23
3. Tails,	82.86	1.87	5.44			155.53	450.78			29.98	89.77

1. Heads.

1. Heads.	100.00	5.19	5.02			518.90	502.20			100.00	100.00
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REAGENTS.

Tails, #3, were reground to pass 100 mesh and treated in a
 Callow Pneumatic Flotation Cell, using the following reagent
 s which were mixed in Pachuca.

G.E. #8 - $\frac{1}{8}$ lb.
 Soda Ash - $\frac{1}{2}$ lb.
 Copper Sulphate - .05 lb.

TABLE III.

4. Flot. Conc'ts.
 5 Tails,
 3. Feed.

4. Flot. Conc'ts.	9.17	11.16	37.92	13.33	4.46	102.39	347.75	122.24	40.95	19.73	69.24
5 Tails,	73.69	0.72	1.39			53.14	103.03			10.25	20.53
3. Feed.	82.86	1.87	5.44			155.53	450.78			29.98	89.77

Flotation Concentrates, #4, were tabled to separate lead and zinc.

TABLE IV.

6. Lead Conc'ts.
 7. Zinc Conc'ts.
 4. Feed.

6. Lead Conc'ts.	0.85	58.8	7.8	10.7	1.2	49.98	6.63	9.09	1.02	9.63	1.32
7. Zinc Conc'ts.	8.32	6.3	41.0	13.6	4.8	52.41	341.12	113.15	39.93	30.10	67.92
4. Feed.	9.17	11.16	37.92	13.33	4.46	102.39	347.75	122.24	40.95	19.73	69.24

Flotation Tails, #5, were tabled.

TABLE V.

8. Lead-Iron Conc'ts.
 9. Tails,
 5. Feed,

8. Lead-Iron Conc'ts.	13.28	1.5	2.3	36.6	14.4	19.92	30.54	486.04	191.23	3.83	6.08
9. Tails,	60.41	0.55	1.2			33.22	72.49			6.42	14.45
5. Feed,	73.69	0.72	1.29			53.14	103.03			10.25	20.53

TABLE VI.

SUMMARY OF ALL PRODUCTS.

2. Lead-Iron.	17.14	21.2	3.0	30.8	3.0	363.37	51.42	527.91	51.42	70.02	10.23
6. Lead Conc'ts.	0.85	58.8	7.8	10.7	1.2	49.98	6.63	9.09	1.02	9.63	1.32
8. Iron Conc'ts.	13.28	1.5	2.3	36.6	14.4	19.92	30.54	486.04	191.23	3.83	6.08
7. Zinc.	8.32	6.3	41.0	13.6	4.8	52.41	341.12	113.15	39.93	10.10	67.92
9. Tails,	60.41	0.55	1.2			33.22	72.49			6.42	14.45
1. Heads, (By Products)	100.00	5.19	5.02			518.90	502.20			100.00	100.00

TONS Pb Zn. Fe Pb Zn Fe Pb Zn Fe.

An average portion of sample tabled at 10 mesh crushing.

TABLE I.

2. Rougher Conc'ts.	9.74	28.0	6.0	26.4	272.72	58.44	257.13	46.33	11.41	14.03
3. Rougher Tails,	90.26	3.50	5.02	17.45	316.04	453.49	1575.22	53.68	88.59	85.97
1. Heads (by products).	100.00	5.88	5.12	18.32	588.76	511.93	1832.35	100.00	100.00	100.00

Tails, #3, recrushed to 40 mesh and retabled, making a Lead-Iron and a middling screened on 65 mesh. Sizes tabled separately. Products thrown with products from 40 mesh tabling.

TABLE II.

4. Table Conc'ts.	13.57	15.2	5.2	34.6	206.26	70.56	469.52	35.03	13.78	25.62
5. Table Tails,	76.69	1.43	4.99	14.41	109.78	382.83	1105.70	18.65	74.81	60.35
3. Feed (by products).	90.26	3.50	5.02	17.45	316.04	453.49	1575.22	53.68	88.59	85.97

Tails, #5, crushed in ball mill to pass 80 mesh and treated in a Callow Pneumatic Flotation Machine Using Oil Mixture. Oils Used.
C&E. #8, at rate of
.3 lb. per ton of feed.

TABLE III.

6. Flot. Conc'ts.	5.70	7.03	36.96	15.31	61.17	321.59	133.22	10.38	62.81	7.27
7. Flot. Tails,	67.99	0.71	0.90	14.30	46.61	61.24	972.48	8.27	12.00	53.08
5. Feed (by products).	76.69	1.43	4.99	14.41	109.78	382.83	1105.70	18.65	74.81	60.35

Flotation Concentrates, #6, tabled.

TABLE IV.

8. Pb-Fe. Conc'ts.	0.34	32.4	11.5	23.0	11.01	3.91	7.82	1.87	0.76	0.42
9. Zinc Conc'ts.	8.36	6.0	38.0	15.0	50.16	317.68	125.40	8.51	62.05	6.85
6. Feed (by Products).	8.70	7.08	36.96	15.31	61.17	321.59	133.22	10.38	62.81	7.27

Flotation Tails, #7, tabled.

TABLE V.

10. Iron Conc'ts.	10.23	0.8	2.6	38.6	8.18	26.59	394.88	1.38	5.19	21.55
11. Table Tails,	57.76	0.7	0.6	10.0	40.43	34.65	577.60	6.89	6.81	31.53
7. Feed (by Products).	67.99	0.71	0.90	14.30	46.61	61.24	972.48	8.27	12.00	53.08

SUMMARY OF ALL PRODUCTS.

TABLE VI.

2. Rougher Conc'ts.	9.74	28.0	6.0	26.4	272.72	58.44	257.13	46.33	11.41	14.03
4. Table Conc'ts.	13.57	15.2	5.2	34.6	206.26	70.56	469.52	35.03	13.78	25.62
8. Pb-Fe Conc'ts.	0.34	32.4	11.5	23.0	11.01	3.91	7.82	1.87	0.76	0.42
10. Iron Conc'ts.	10.23	0.8	2.6	38.6	8.18	26.59	394.88	1.38	5.19	21.55
9. Zinc Conc'ts.	8.36	6.0	38.0	15.0	50.16	317.68	125.40	8.51	62.05	6.85
11. Tails,	57.76	0.7	0.6	10.0	40.43	34.65	577.60	6.89	6.81	31.53
1. Heads (by Products).	100.00	5.88	5.12	18.32	588.76	511.93	1832.35	100.00	100.00	100.00

TABLE VII.

		FINAL		SUMMARY.						
2,4,8 Pb-Fe Conc'ts.	23.65	20.67	5.61	31.05	489.99	132.91	734.47	83.22	25.95	40.07
10. Iron Conc'ts.	10.23	0.8	2.6	38.6	8.18	26.59	394.88	1.38	5.19	21.55
9. Zinc Conc'ts.	8.36	6.0	38.0	15.0	50.16	317.68	125.40	8.51	62.05	6.85
11. Tails,	57.76	0.7	0.6	10.0	40.43	34.65	577.60	6.89	6.81	31.53
1 (Heads (by Products).	100.00	5.88	5.12	18.32	588.76	511.93	1832.35	100.00	100.00	100.00

Showing that out of every 100 tons of material treated there would ~~have~~ be produced: 23.65 tons of Lead-Iron Concentrates. Ratio of conc't. = 4.22 to 1. Sample #2, 4, 8.

Assaying.

Lead % 20.67
Zinc % 5.61
Iron % 31.05

Containing.

83.22% of the total lead.
25.95% " " " zinc.
40.07% " " " iron.

and 10.23 tons of Iron Concentrates. Ratio of concentration = 9.77 to 1. Sample #10.

Assaying.

Lead % 0.8
Zinc % 2.6
Iron % 38.6

Containing.

1.38% of the total lead.
5.19% of the total zinc.
21.55% " " " iron.

and 8.36 tons of Zinc Concentration. Ratio of concentration = 11.96 to 1. Sample #9.

Assaying.

Lead % 6.0
Zinc % 38.0
Iron % 15.0

Containing.

8.51% of the total lead.
62.05% of the total zinc.
6.85% of the total iron.

and 57.76 tons of tailings, Sample #11.

Assaying.

Lead % 0.7
Zinc % 0.6
Iron % 10.0%

Containing.

6.89% of the total lead.
6.81% of the total lead.
31.53% of the total iron.

HEADS OF TEST.		Lead	Iron	Inso
Gold oz.	Sliv. oz.	%	%	%
Trace.	0.9	5.0	19.0	41.2
		5.88	18.32	
		By Assay.		
		By Products.		
		(Zinc % By assay 5.7		
		" % By Products 5.12.		