006898

MICROSCOPIC ANALYSIS

PROJECT I

February 21, 1973

R. Fukuhara

INTRODUCTION:

Photomicrographs of the monthly composite concentrate samples for 1972 and various screened fractions of grab tailings samples have been compiled in this microscopic study. The evaluations given in the summary are generalizations only and are by no means expertise.

Each photomicrograph is labelled with the product name, date of sampling, the screened fraction size and its magnification. A micron ruler is provided with a scale for each of the magnifications (x44, x88, x224). The grades given below the lead and zinc concentrates are for the composite samples and not for the screened +400# fractions.

It should be noted that although it is possible to conject on the theoretical limits of concentrate grades and recoveries through microscopic analyses, since these studies do not account for the depression or levitation characteristics of different particle sizes, these studies are potentially useful only as a basis for laboratory testing.

SUMMARY:

1. The significance of grind to concentrate grade is clearly indicated in both the lead and zinc concentrates as the coarser sample will invariably have a greater fraction of middling particles.

2. Examination of the zinc concentrate photomicrographs apparently indicates two different ore types — one producing very clean particles with concentrates capable of being upgraded beyond 55% Zn, dependent on grind, and another gangue encrusted ore whose upper grade limit is considerably lower.

3. Regrinding the lead concentrate should enhance zinc recovery as well as the lead concentrate grade as a considerable portion of the +400# fraction of the lead concentrate is zinc.

4. The recovery of lead will not be increased by regrinding as its flotability is apparently not affected by particle size (see 22/11/72 Pb Ret. Tail).

5. The recovery of zinc is very dependent on particle size as the percent zinc in the zinc retreat tails decreases significantly towards the finer particle size.

6. The large particles on page 12 illustrate the degree of locking that occurs in the ore. Those particles are in the 200 to 300 micron size range.

7. The blue mineral on page 13, identified through microchemical analysis as covellite (CuS), is found in trace quantities throughout the lead circuit.

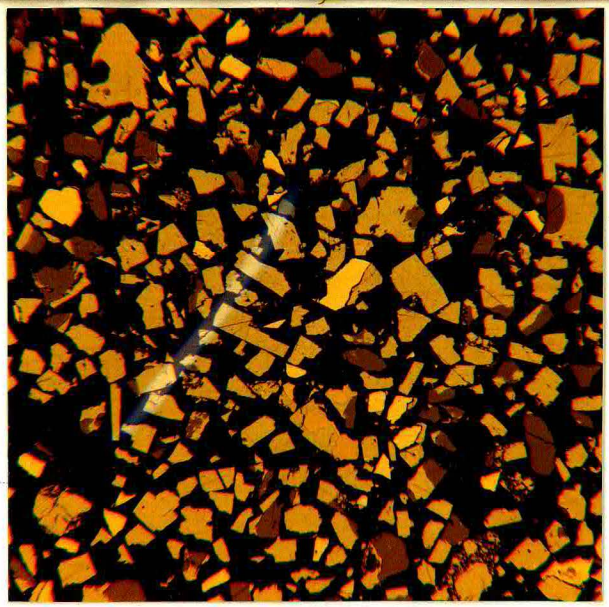
abbreviations used:

sp	-	sphalerite
ga	-	galena
py	-	pyrite
cp	-	chalcopyrite
po	-	pyrrhotite
gan	-	gangue
si	-	silica
cov	-	covellite

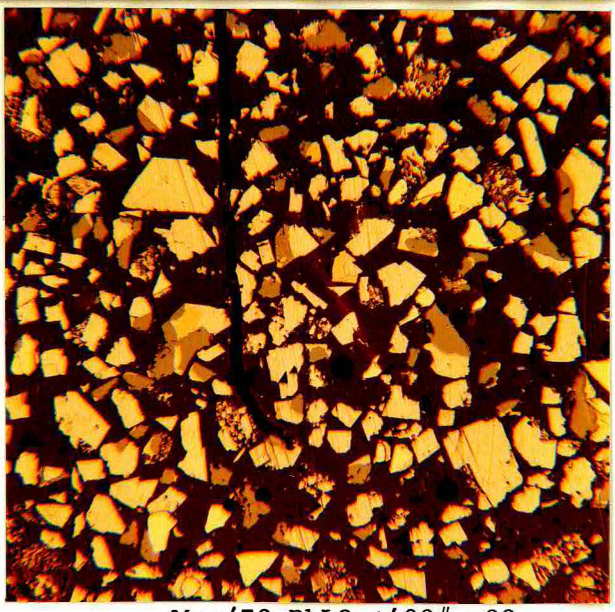
PART I

MONTHLY COMPOSITE SAMPLES

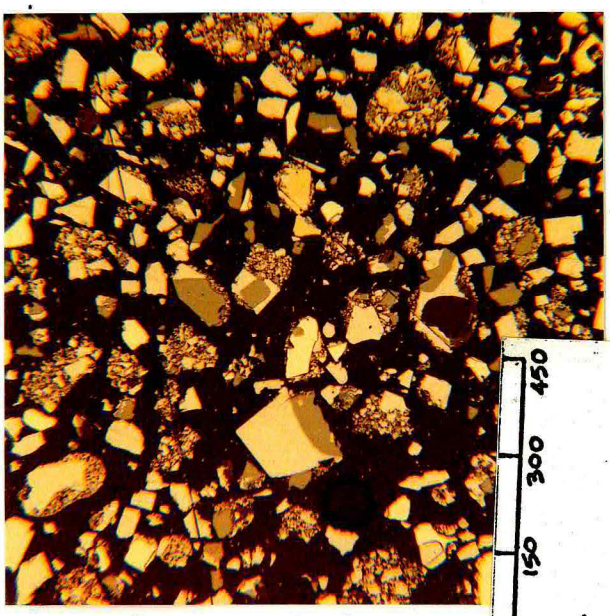
Pb Load-out, Zn Load-out, Bulk Load-out



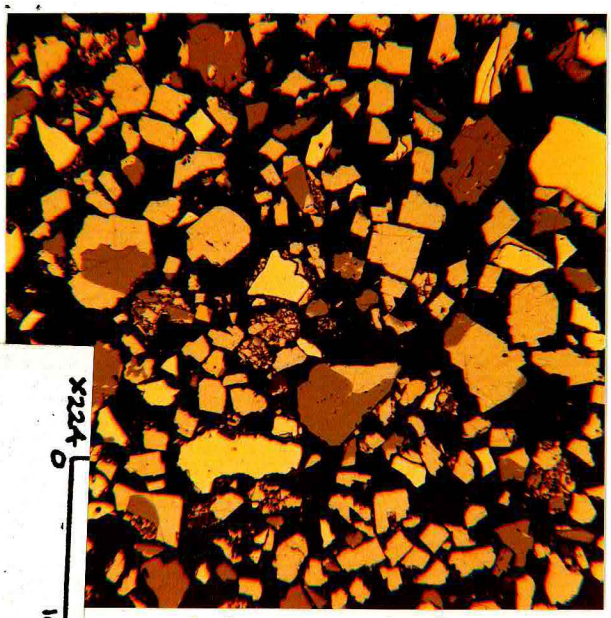
Jan/72 PbLO +400# x88
69.9% Pb



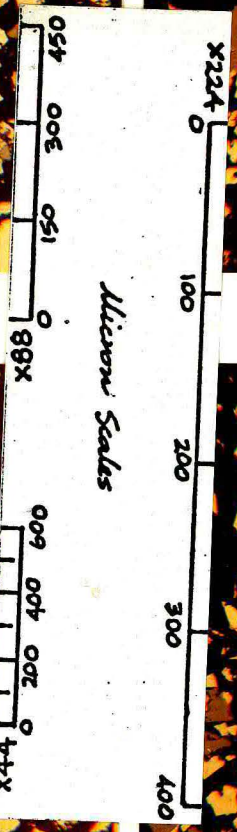
May/72 PbLO +400# x88
70.3% Pb

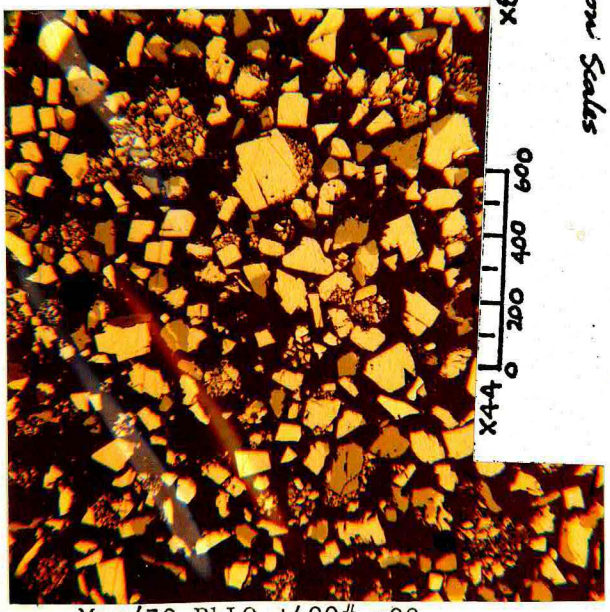


Feb/72 PbLO +400# x 88
69.2% Pb

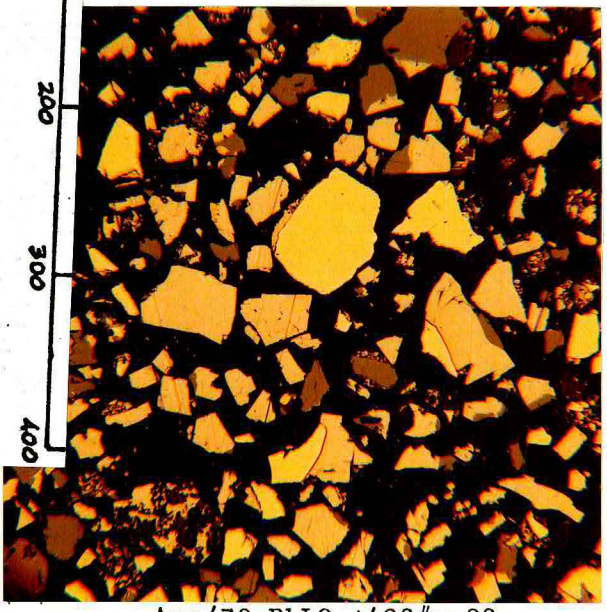


July/72 PbLO +400# x88
68.3% Pb



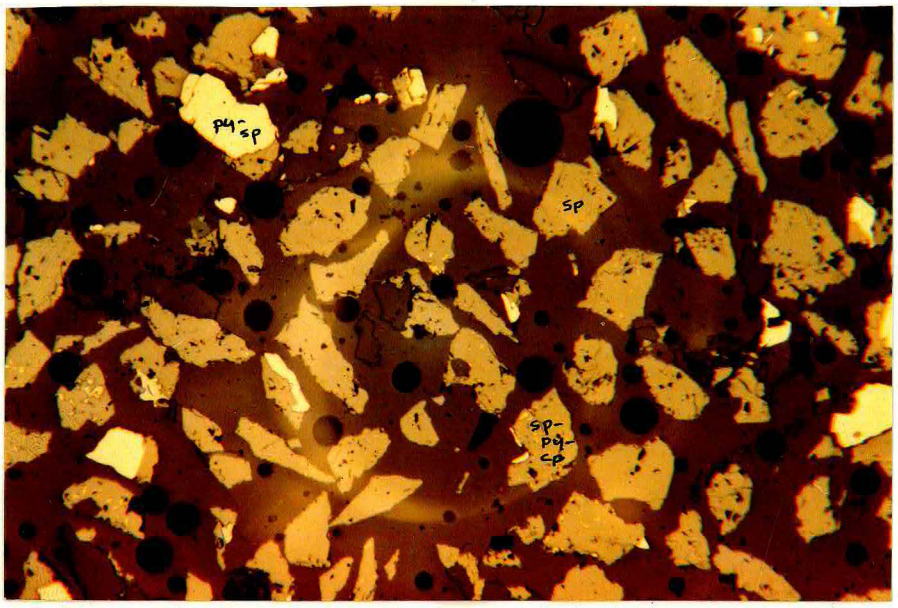


Mar/72 PbLO +400# x88
70.1% Pb

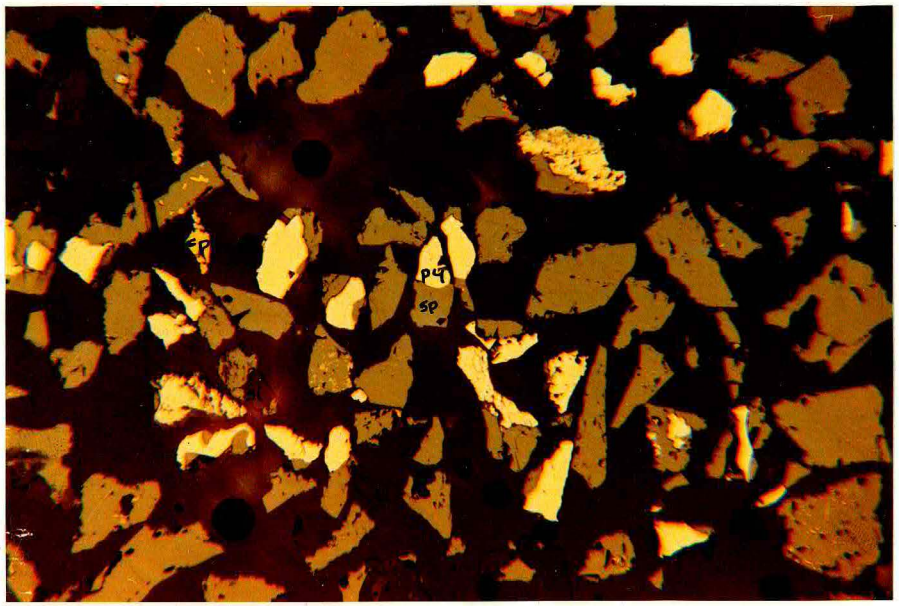


Aug/72 PbLO +400# x88
67.6% Pb

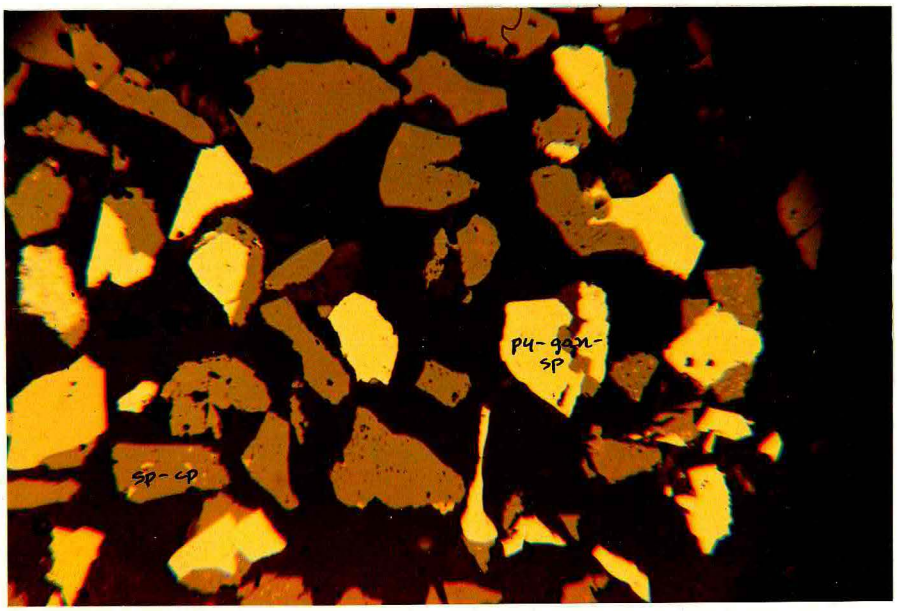
21 – 11 – 72 Zn 4th Cl. Tails



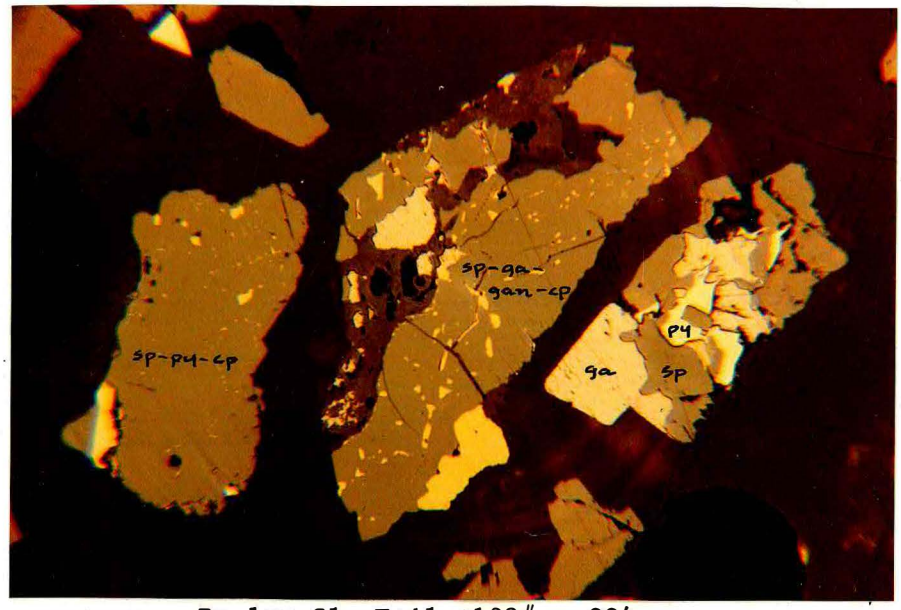
+100#
x44



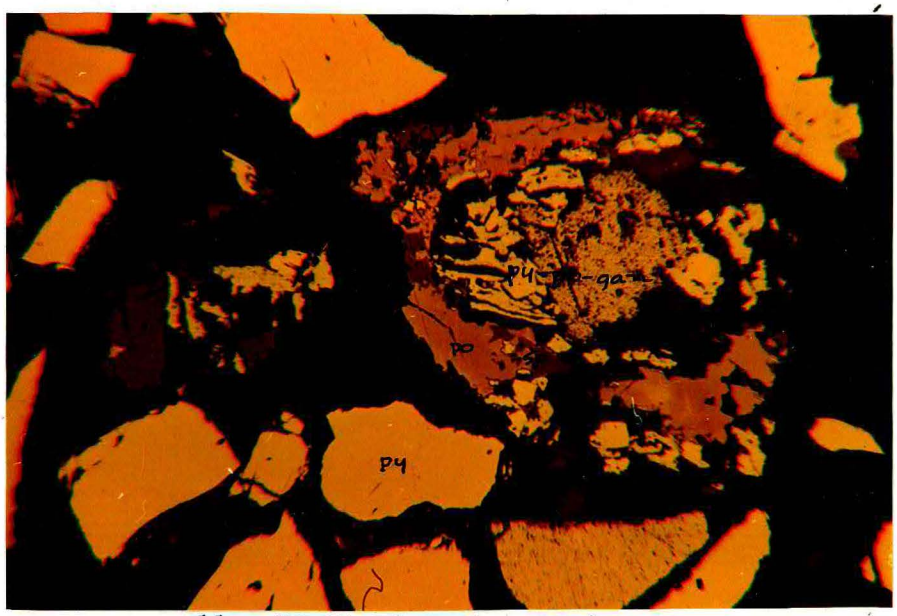
–100 +200#
x88



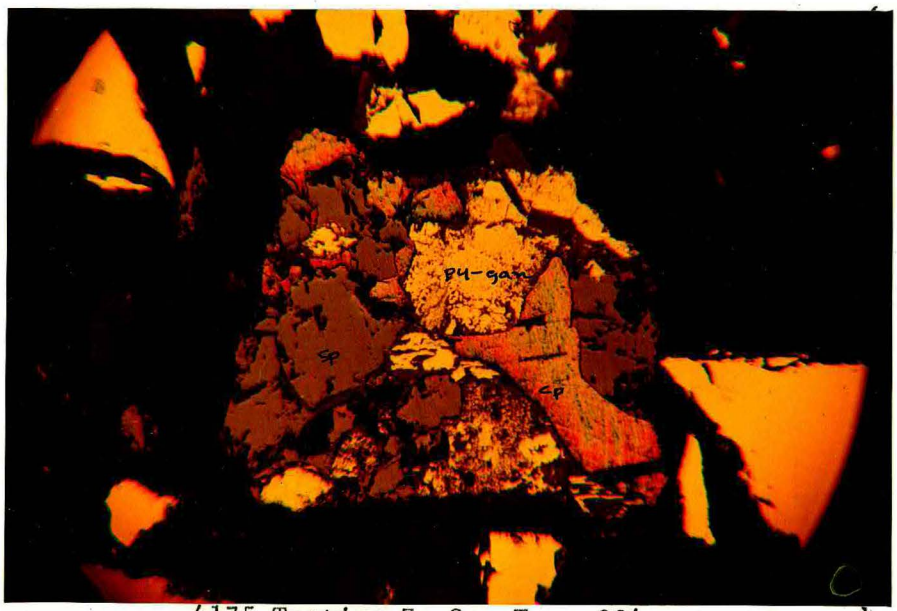
–200 +400#
x224



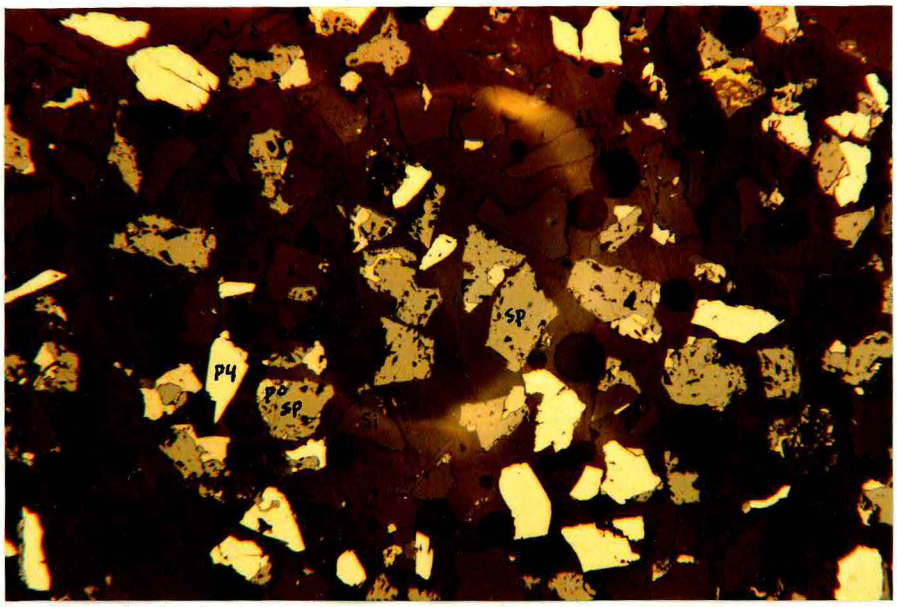
Zn 1st Cl. Tail +100# x224



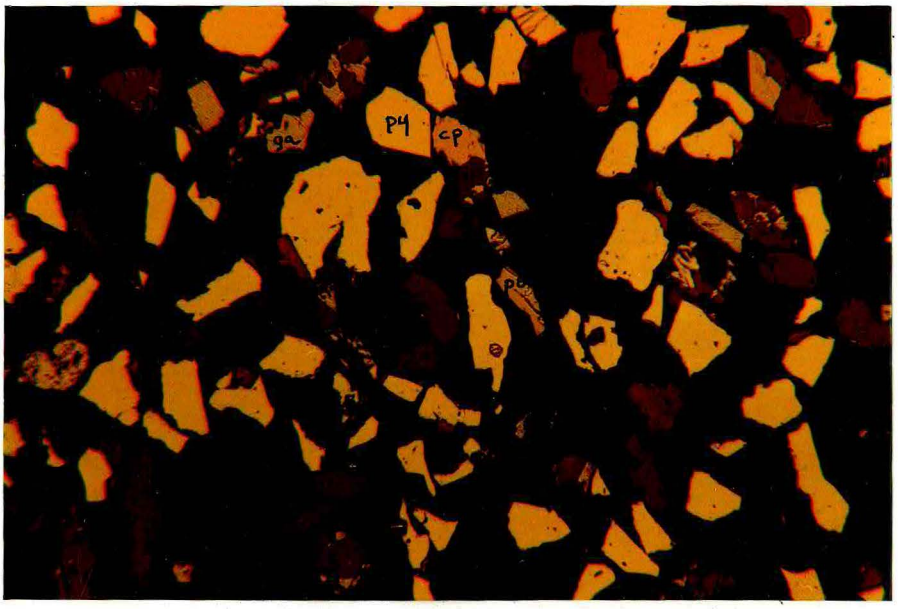
11 – 72 Final Tails +200# x224



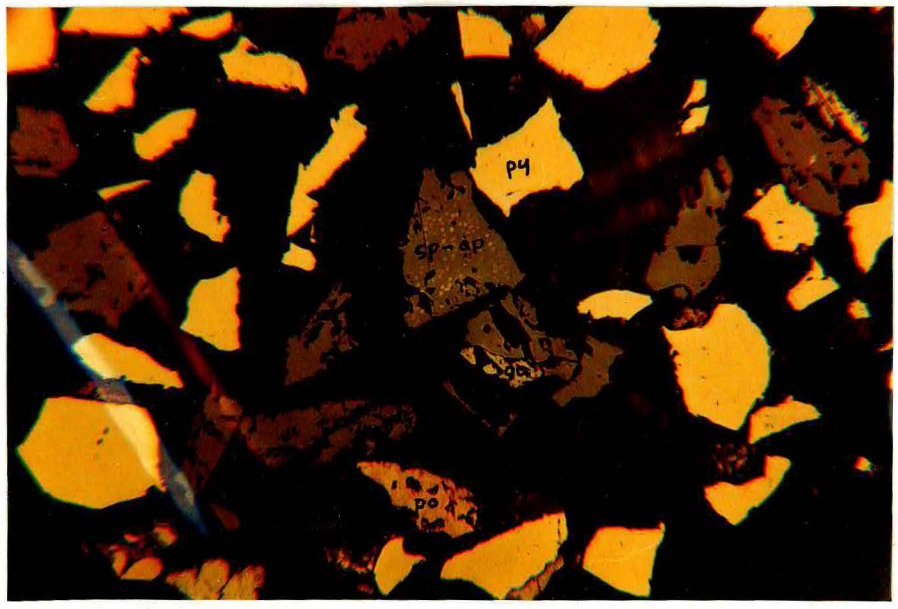
4175 Testing Zn Sc. T. x224



+100#
x44



–100 +200#
x88



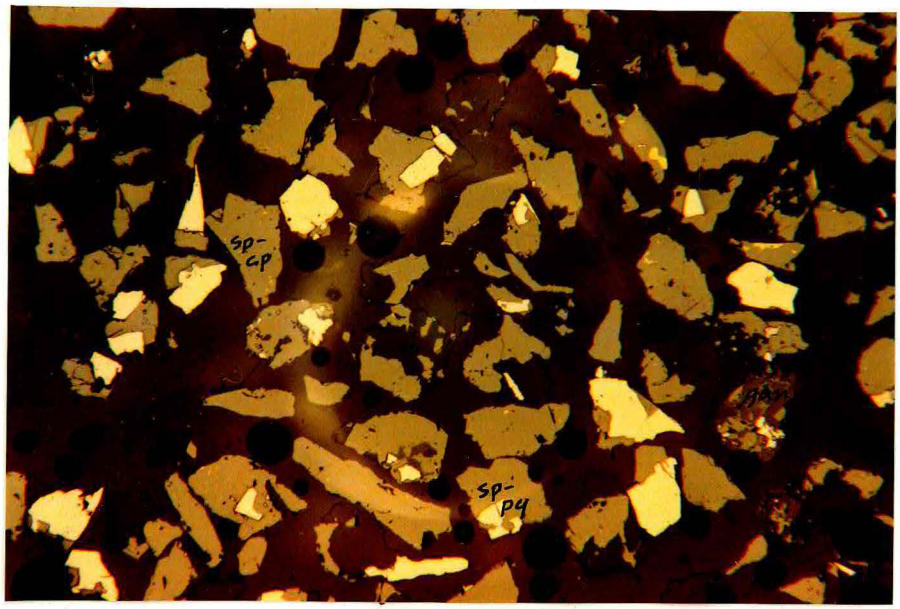
–200 +400#
x224

PART II

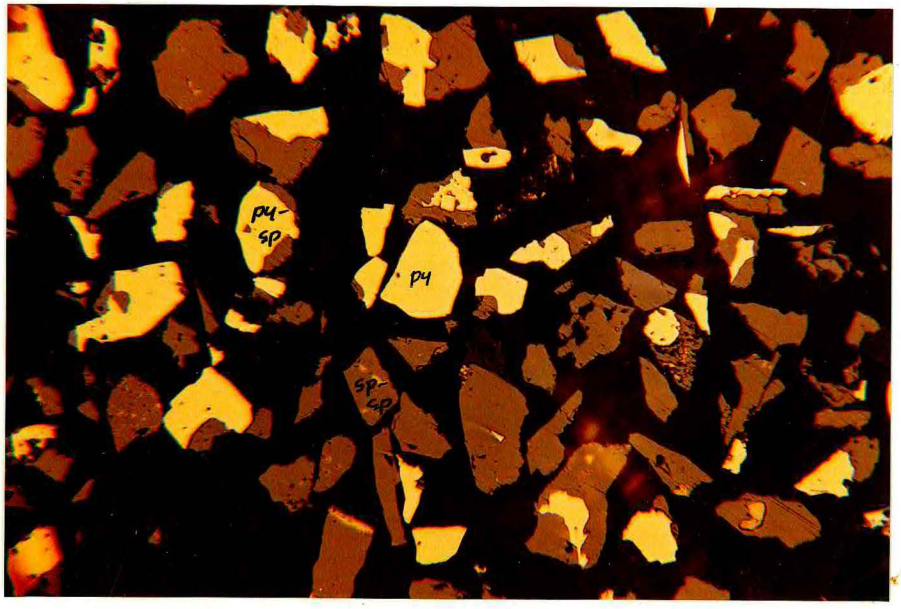
a) Screened fractions of tailings samples

b) Positive test for covellite (CuS)

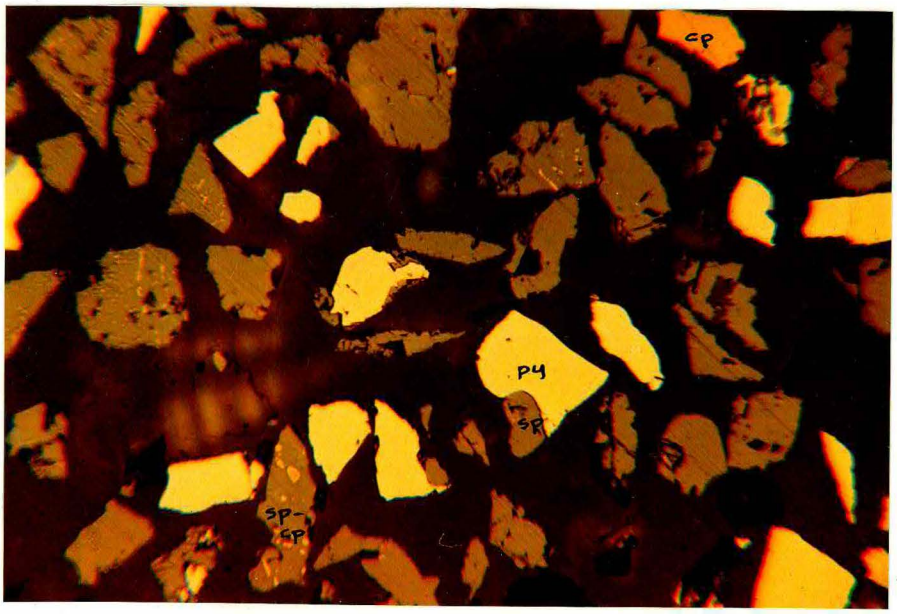
22 – 11 – 72 Zn lst. Cl. Tail



+100#
x44

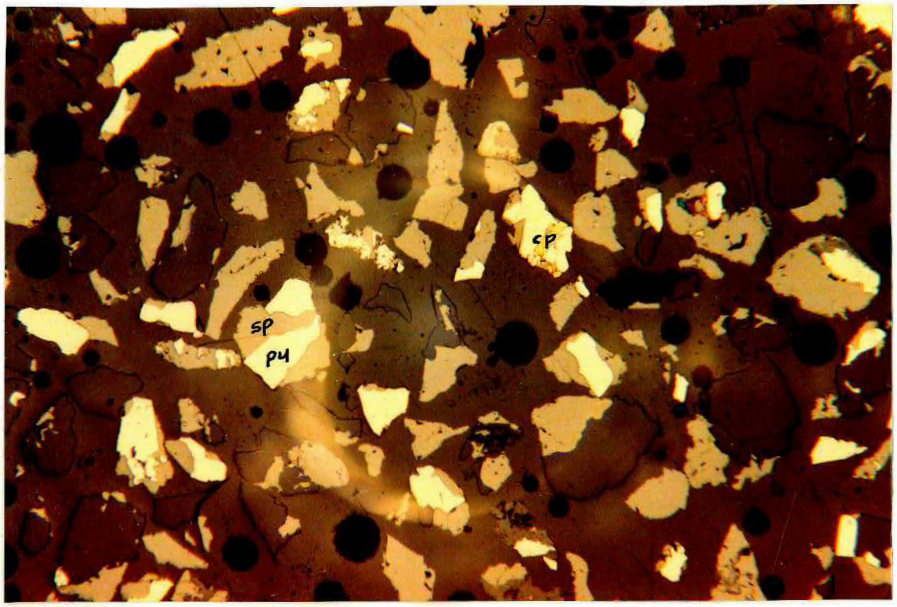


–100 +200#
x88

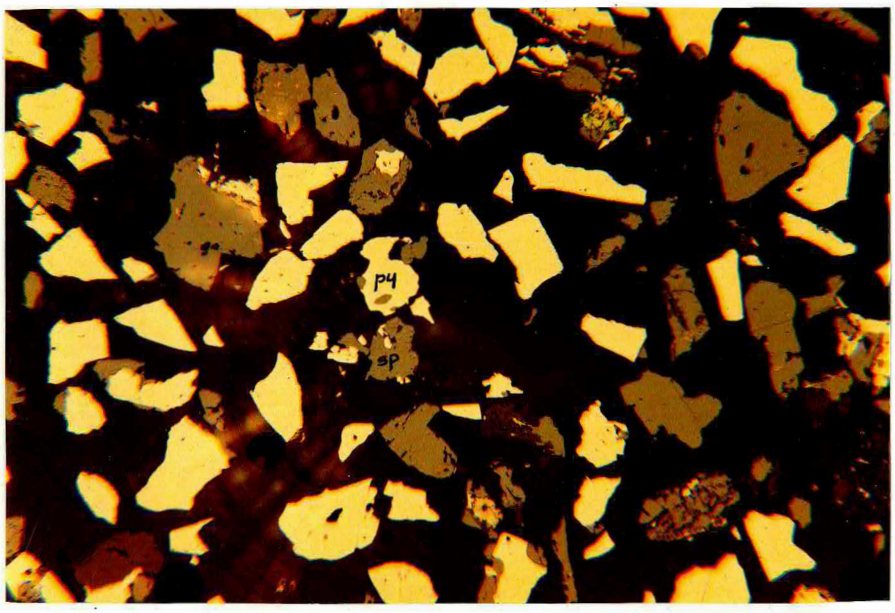


–200 +400#
x224

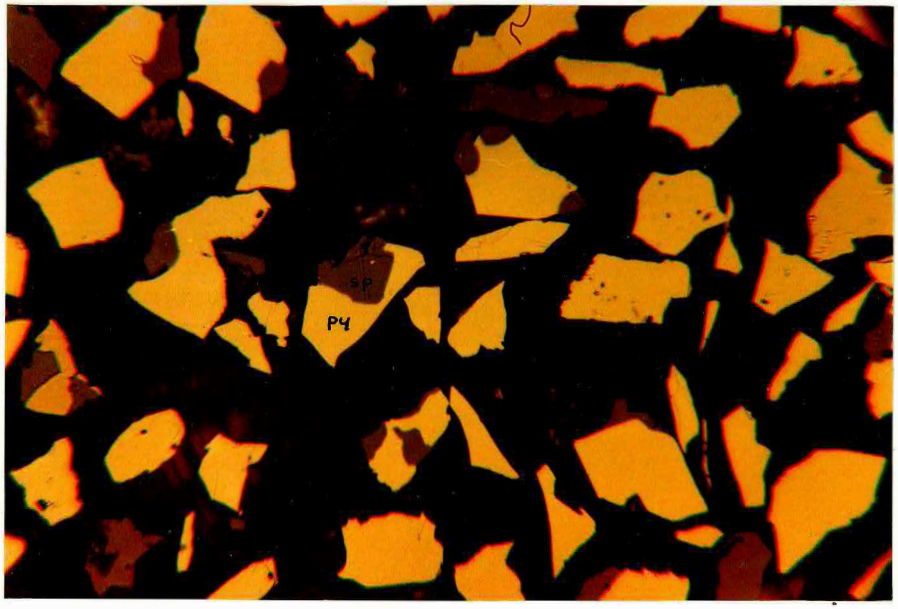
21 – 11 – 72 Zn Ret. Tail



+100#
x44



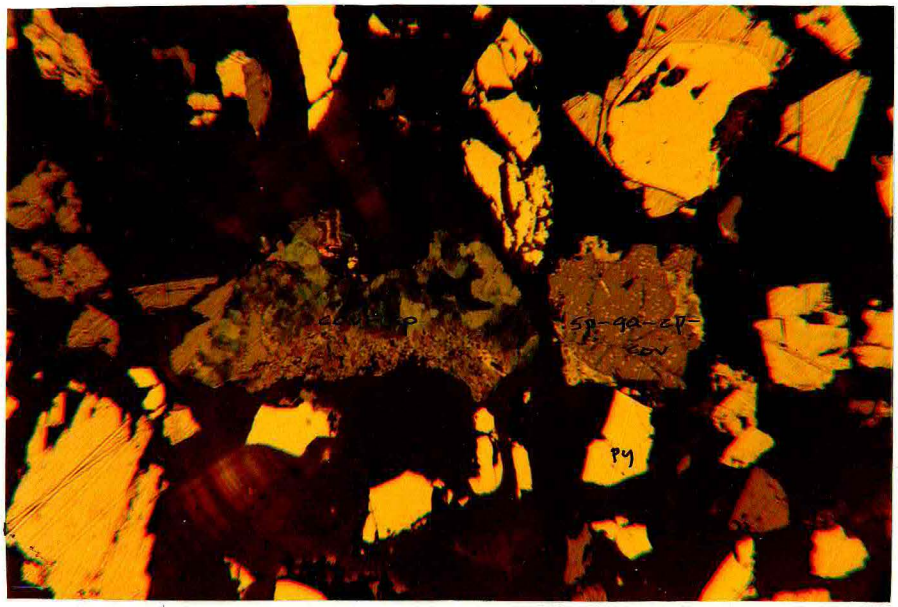
–100 +200#
x88



–200 +400#
x224

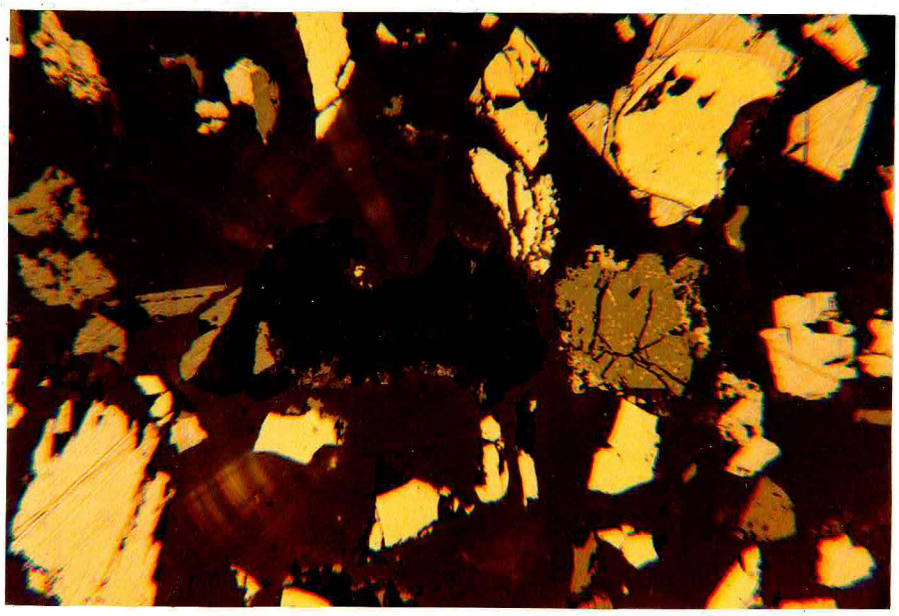
6 – 10 – 72 Pb Conc. +400# x224
Positive KCN test for Covellite

A



B

After KCN



ORE MICROSOPY SAMPLE LOG

SAMPLE ID.	DATE	REMARKS
80 Pb1	23-9	Pb ROUGHER CONC. - CELL NO. 1 A BANK.
80 Pb2	23-9	Pb ROUGHER CONC. - CELL NO. 9 A BANK.
80 Pb3	23-9	Pb SCAV. CONC - CELL NO. 12 A BANK - CLOSED CIRCUIT
80 Pb4	23-9	Pb SCAV. TAILINGS - A BANK
80 Pb5	23-9	1ST. CLEANER TAILS - THIS STREAM SENT TO Pb REGRIND MILL.
80 Pb6	3-10	Pb Rougher conc - cell NO. 1 B Bank TPH=360
80 Pb7	3-10	Pb Rougher conc - cell NO. 9 B Bank
80 Pb8	3-10	Pb Scav. conc. - cell No. 10 B Bank
80 Pb 9	3-10	Pb Scav. Tailings - B Bank
80 Pb 10	3-10	Pb Regrind Feed
80 Pb 11	3-10	Pb Regrind O/f
80 Pb 12	3-10	Pb Regrind U/f
80 Pb 13	3-10	Pb Retreat conc.

POLISHING TECHNIQUE FOR SAMPLES 80 Pb 6 - 80 Pb 12 :

ROUGH GRINDING STAGE INITIATED AT 320 GRIT.

ROUGH POLISHING - 5μm Al_2O_3 - 1 hr.

FINAL POLISHING - LINDE A .3μm - 1.5 hr.

LINDE B .05μm - 1.5 hr.

SAMPLE ID.	DATE	REMARKS
80Pb 14	16-10	3rd Pb cleaner - ore type 2BD
80Pb 15	16-10	4th Pb cleaner - ore type 2BD
80 Pb 16	16-10	Pb retreat concentrate - ore type 2BD
80 Pb 17	13-11	3rd Pb cleaner conc. wheel
80 Pb 18	13-11	1st Pb cleaner conc wheel / Vibrant
80 Pb 19	13-11	1st Pb cleaner tails wheel
80 Pb 20	13-11	Pb retreat conc. wheel / Vibrant
80 Pb 21	13-11	Pb retreat tails. wheel
80 Pb 22	13-11	Pb rougher conc. wheel / Vibrant
81 Pb 1	30-1	Pb rougher feed
81 Pb 2	30-1	Pb rougher conc.
81 Pb 3	30-1	Pb retreat tails.
81 Pb 4		Pb con from cyclone #1 (Lasta Filter test)
81 Pb 5		Pb " " " #2 "
81 Pb 6		Pb " " " #3 "
81 Pb 7		Pb " " " #4 "
81 Pb 8		Pb " " " #5 "

Sample I.D	Date	Remarks
81 Pb 1G	10-4	cyclone #4 2nd cleaner 5th cell 16-16 µm.
81 Pb 2E	10-4	cyclone #2 2nd cleaner 1st cell 20-28 µm
81 Pb 5E	10 4	cyclone #4 2nd cleaner diverted 14-21 µm
81 Pb 6B	13-4	cyclone #1 2nd cleaner 5th cell 20-28 µm
81 Pb 7B	13-4	" " 1st cell 20-28 µm
81 Pb 8B	13-4	" " diverted. 20-28 µm
81 Pb 9	22-4	3E - 2nd Pb Cl. Conc. #4 cyclone
81 Pb 10	22-4	4E - 3rd Pb Cl. Conc. #4 cyclone
81 Pb 11	22-4	5E - 2nd Pb Cl. Conc. (diverted) #4 cyclone
81 Pb 12	22-4	5B - " " " " " #1 cyclone.

SAMPLE ID.	DATE	REMARKS
80Zn1	16-10	4th Zn cleaner - ore type 2BD
80Zn2	16-10	3rd Zn cleaner - ore type 2BD
80Zn3	16-10	Zn retreat concentrate - ore type 2BD
80Zn4	6-11	Zn retreat tails - ore type 2BCDA + minor 2E + RP
80Zn5	6-11	Zn 1st cleaner tails "
80Zn6	6-11	Zn 1st cleaner concentrate "
80Zn7	6-11	Zn 3rd cleaner concentrate "
80Zn8	6-11	Zn scav. tails "
80Zn9	6-11	Zn regrind underflow "
80Zn10	13-11	3rd Zn cleaner final conc. whole / Vshort
80Zn11	13-11	1st Zn cleaner conc. whole
81Zn1		Zn Con from cyclone #1 (Lasta Filter test)
81Zn2		" " " " #2 "
81Zn3		" " " " #3 "
81Zn4		" " " " #4 "
81Zn5		" " " " #5 "
81Zn6	2-2	Zn Regrind surging overflow Cyclone #1
81Zn7	2-2	" " " " " #2
81Zn8	2-2	" " " " " #3

sample T.D.	Date	Remarks
81 Zn 9	2-2	Zn Regrind surging overflow Cyclone #4
81 Zn 10	2-2	" " " " " #5
81 Zn 11	2-2	Zn Regrind steady overflow Cyclone #1
81 Zn 12	2-2	" " " " " #2
81 Zn 13	2-2	" " " " " #3
81 Zn 14	2-2	" " " " " #4
81 Zn 15	2-2	" " " " " #5
81 Zn 16	1-2	Zn Scav Tails (LE bank) cyclone #1
81 Zn 17	1-2	" " " " " #2
81 Zn 18	1-2	" " " " " #3
81 Zn 19	1-2	" " " " " #4
81 Zn 20	1-2	" " " " " #5
81 Zn 21	1-24	Zn rougher conc.
81 Zn 22	1-24	Zn scav conc. 1st cell
81 Zn 23	1-24	Zn 1st Cl. Tails
81 Zn 24	1-24	Zn 1st cleaner conc.
81 Zn 25	22-4	1B - Zn Scav Tls cyclone #1 38.2-74um
81 Zn 26	22-4	1G - Zn Scav Tls cyclone tb. -9.3um.

Sample I.D.	Date	Remarks
81 Zn 27	22-5	Zn Rougher Conc 1C (+100 mesh) 150×106 μm
81 Zn 28	22-5	" " " 1D (+200 mesh) 106×74 μm sample of marcasite (FeS_2) comp with ZnS, PbS, FeS_2
81 Zn 29	22-5	" " " 1E (#cyclone) 74×33 μm
81 Zn 30	22-5	Pb Scav Tls 2B (+100 mesh) +150 μm
81 Zn 31	22-5	Zn Scav Tls 3B (+100 mesh) +150 μm
81 Zn 32	22-5	Zn Scav Conc 4C (+150 mesh) 150×106 μm
81 Zn 33	22-5	" " " 4T (cyclo Tls) -8 μm

SAMPLE ID.	DATE	REMARKS
8061	23-9	ROD MILL NO. 3 PRODUCT.
8062	23-9	SEC. BALL MILL O/F - OBTAINED AT COMMON COLLECTION POINT
8063	23-9	TERTIARY BALL MILL O/F - OBTAINED AT Pb A BANK FEED BOX.